

Latest updates on JCOAL activities in the power sector in India

CEA-JCOAL Workshop
In FY2019
November 8, 2019

Japan Coal Energy Center (JCOAL)

1. Japan Coal Energy Center (JCOAL)

2. CEA - JCOAL Cooperation

Organization of the cooperation

Short history

Studies conducted in India

3. Recent Studies

4. Information and knowledge sharing/exchange

CEA-JCOAL Workshop and CCT Training program

5. Summary

1. Japan Coal Energy Center (JCOAL)

- Established in 1990, with its origin back to 1948
- Covers all coal related issues from upstream to downstream of the coal value chain
- Members: 175 incl. major public-listed companies and main players in energy and relevant sectors
- Supervision by METI (Ministry of Economy, Trade and Industry of Japan)

Facilitation and promotion of cleaner utilization of coal



Coal Center



Power plant



Cement plant

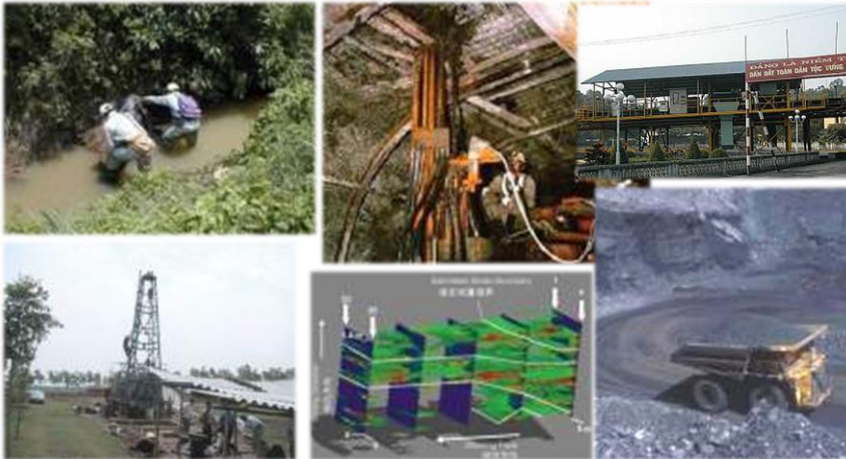


Iron works



Chemical plant

Exploration



Coal utilization technology development



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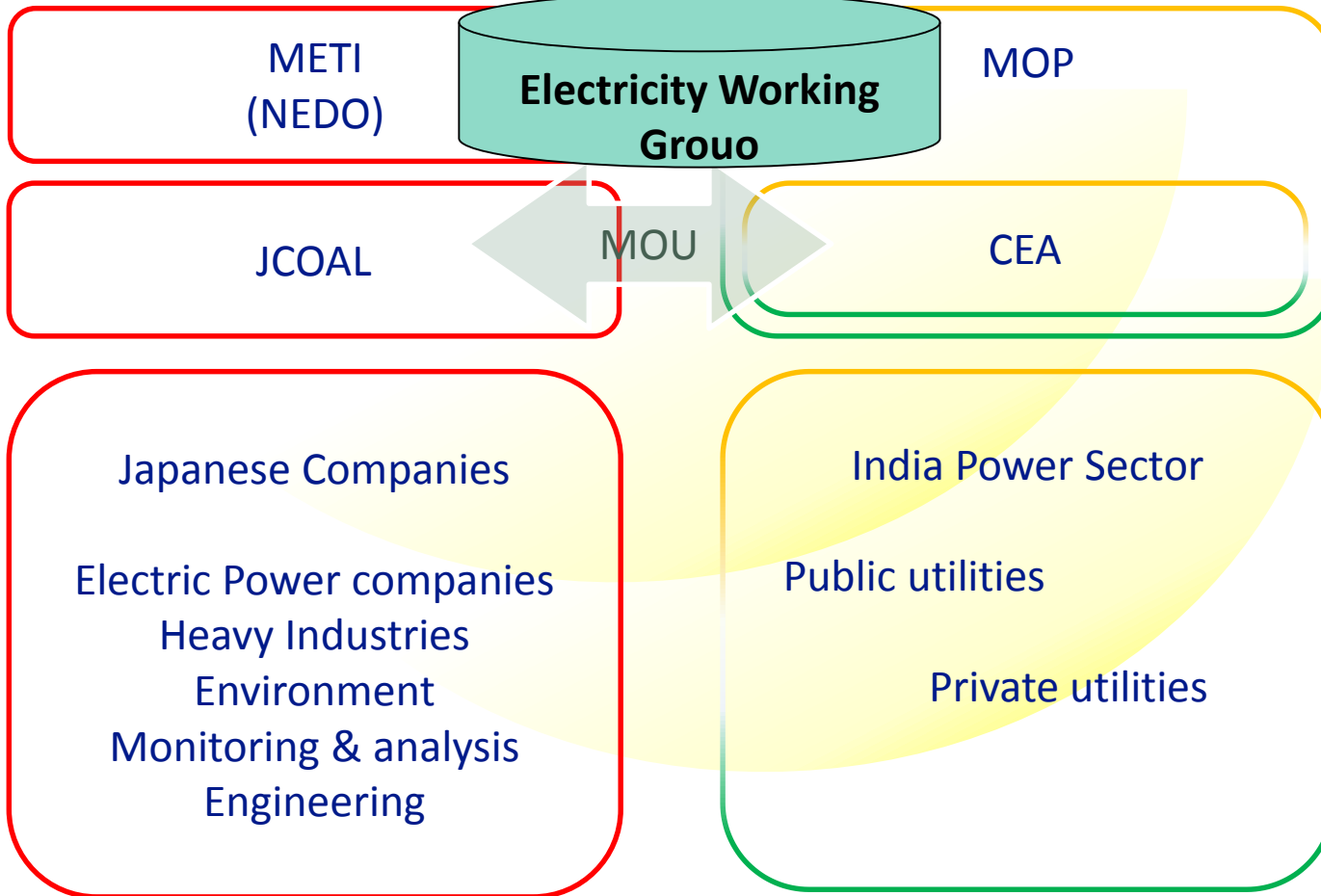
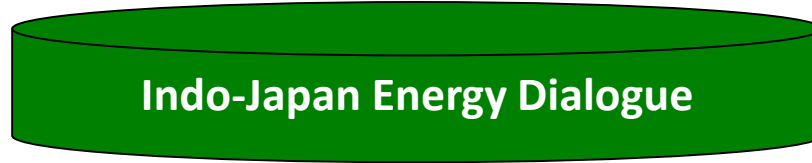
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2.-1 CEA-JCOAL Cooperation: Organizational Framework



2.-2 CEA - JCOAL Cooperation

- A MOU of Pre-primary Study of Efficiency and Environmental Improvement of Coal-fired Power Stations was signed on April 30, 2010, in the presence of Deputy Chairman, Planning Commission of India, and Minister of Economy, Trade and Industry of Japan.
- 2nd MOU signed on June 11, 2012 and 3rd MOU signed on January 22, 2016 was respectively executed for the Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity.
- Diagnostic activities, residual life assessment, replacement FS and combustion test study were conducted for addressing the issues and barriers in India Power Sector.
- Programmes for information and knowledge/experience exchange; such as an annual workshop in Delhi, CCT Training Program in Japan is regularly conducted.



2.-3 Study conducted in India (1)

Year	Study	Budget
2010,11	Diagnosis at GSECL Wanakbori TPS	METI
2010-12	Diagnosis and cost benefit analysis at APGENCO Dr. Narla Tata Rao TPS	METI
2010	Diagnosis at NTPC Ramagundam STPS	METI
2011	Diagnosis at NTPC Kahalgaon STPS	METI
2012	Diagnosis and Cost Benefit Analysis at DVC Durgapur TPS	METI
2012	Diagnosis at NTPC Feroze Gandhi, Unchahar STPS	METI
2012	Diagnosis at NTPC Badarpur TPS	METI
2014-15	Replacement feasibility study at NTPC Badarpur TPS	NEDO
2014	Residual life assessment at NTPC Dadri STPS	METI

2.-4 Study conducted in India (2)

Year	Study	Budget
2015	Combustion test of Indian domestic coal for environmental impact	METI
2016	Viability of R&M or Replacement of existing 210 MW at NTPC Singrauli STPS	METI
2016	Diagnosis at COASTAL ENERGEN PVT. LTD., Mutiara TPS, Tuticorin	Sojitz
2017	Environmental Study, NTPC Dadri TPS	NEDO
2017	The O&M Enhancement Study at Durgapur Steel TPS, DVC	NEDO
2017	De-NOx Demonstration test at NTPC Sipat STPS (support to MHPS)	NEDO
2017	Dry type de-SOx/de-NOx feasibility Study at TATA Power by JGC	METI

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1. 2018 METI IoT/AI Applicability Study

METI-JCOAL proposed Japan's IOT/AI applicability study for Existing Coal-fired Thermal Power Plant to investigate the effects on the flexibility and Optimum operation in economy and reliability.

SITE IMPLIMENTATION

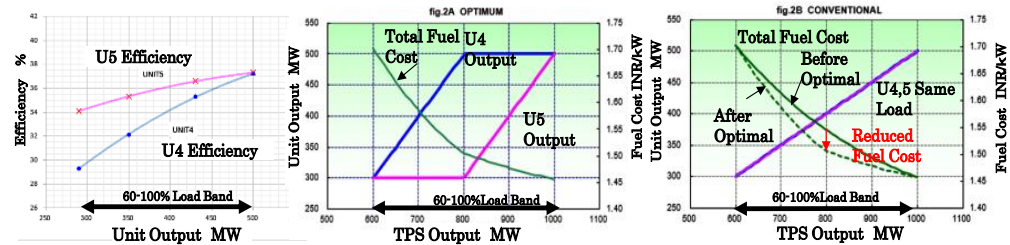
- ✓ CEA and UPRVUNL agreed to select Anpara B TPS for the study.
- ✓ JCOAL-Toshiba obtained the digital data of Unit-4 and 5 and survey the site operation conditions.

Site survey : Nov. & Dec.2018 , Feed Back: Jan.2019

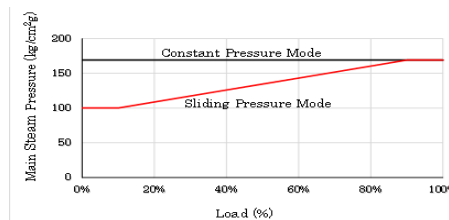


2. Outcomes

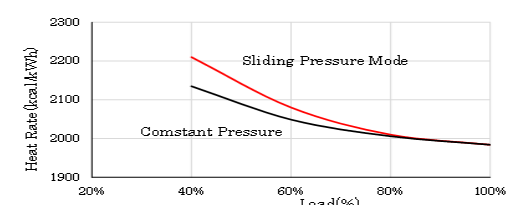
- ✓ Optimized Operation Load distribution between Unit-4 & 5 were defined. ⇒ Apprx.2.6% Fuel Cost Reduction at 80% Load.
- ✓ Measures of Plant performance improvement were identified.
- ✓ Sliding Pressure Mode was identified to reduce the life consumption and improve the efficiency in flexible operation.
- ✓ Boiler and Mill operation had enormous potential to minimize the start-stop time and to stabilize the plant by adjusting the facilities.



Equipment	Difference from Design Value	
	Unit 4	Unit 5
HP Turbine	-8.7~-8.8%	-10.2%
IP Turbine	-6.2~-8.0%	-6.6%
Condenser	-20.7~-21.7%	-20.4%
Boiler	Approx.-5.5%	Approx.-5.5%
Feed Water Heaters	TTD -1.47~-2.10°C DCA 0.76~2.70°C	TTD -1.02°C DCA 1.46°C



Main steam pressure in sliding mode



Heat Rate Improvement by Sliding Pressure Mode

1. 2018-2019 NEDO flexibilisation Study

- ✓ 4 technical study to improve operation flexibility for unit XI (500MW) and optimal operation study for 13 units was completed for Vindhyachal STPS/NTPC in 2018.12 - 2019.6

2. Results & Effects

- ✓ Major issue which obstruct flexible operation of No.11 unit are malfunction of MW control logic and Drum level control logic. So, JERA recommends control logic modification and tuning of control logic by test operation.
- ✓ Possibility of Coal Consumption Reduction due to Merit Order by analyzing Unit 1-6 Operating Data in 2018 In Addition, more Possibility of Coal Consumption Reduction by DSS in case of Huge Amount Introduction of Renewable Energy.

<Technical Approach>

Target Unit

Items

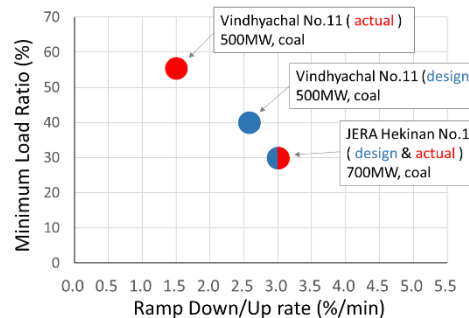
Select One 500MW unit out of 7 units

- ☐ Reduction of Minimum Load
- ☐ Shortening of Startup time
- ☐ Improvement of Load Fluctuation Rate
- ☐ Effective partial Load Operation

The entire VSTPS

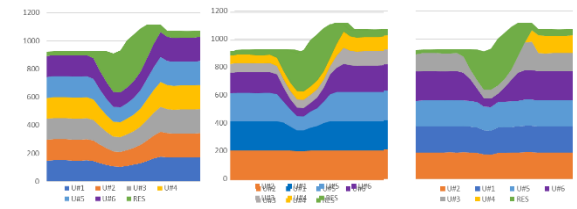
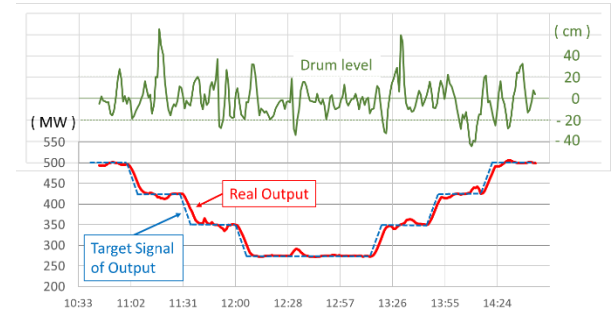
- ☐ To formulate the optimum operation plan for the entire 13 units. (Reflects improvement result of single plant)

Operational Flexibility of No.11 unit



Optimum Operation focused on Stage-I of VSTPS

Ramp down/up test 7 March 2019



Fuel Consumption Reduction

30,000t/y + 70,000 t/y

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4. CEA-JCOAL Workshop, CCT Training programme

CEA –JCOAL annual Workshop: Held in Delhi so that all relevant organization can participate to hear latest topics and discuss the pressing issues.

Topics to be presented and discussed

2010, 2011 : Debriefing of diagnosis, R&M

2012 : Coal utilization, blending and R&M

2013 : USC and its O&M technologies

2014 : USC, O&M, emission control, coal quality and finance,

2015, 2016 : USC, environmental measures and finance

2017 : environmental compliance, O&M enhancement

CCT Training Program: Conducted in Japan

Clean Coal Technology (CCT) Training Program was first implemented in October, 2013 as a new activity item in CEA-JCOAL cooperation.

Delegates visit relevant equipments or facilities actually working and effective and see the high technology of O&M in subcritical coal fired thermal power station, the latest USC technology, etc. and exchange views with Japanese experts.



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Coming at the venue

JCOAL is looking forward to working with you



Website:

<http://www.jcoal.or.jp/index-en.html>

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