

**Memorandum of Understanding (MoU)
on Indo-Japan Cooperation for
Efficiency and Environmental Improvement for
Sustainable, Stable and Low-carbon Supply of Electricity
between Central Electricity Authority (CEA) and Japan Coal Energy Center (JCOAL)**

This Memorandum of Understanding (hereinafter referred to as MoU), made and entered into the 16th day of Dec. 2019 by and between:

- (i) Central Electricity Authority (CEA), a statutory body under the Electricity Act 2003, which has the responsibility of formulating the National Electricity Plan in accordance with the National Electricity Policy and remains the main technical as well as policy advisor of the Central Govt/States Govt/Commissions/Utilities existing under the laws of India, and having its principal office at Sewa Bhawan, R.K. Puram, New Delhi - 110066, and
- (ii) Japan Coal Energy Center (JCOAL), is the only institution in Japan which plays a major role through upstream to downstream of the coal chain under the existing laws of Japan and under the jurisdiction of Ministry of Economy, Trade and Industry, Japan, and having its principal office at 3-2-1 Nishi-Shimbashi, Minato-ku, Tokyo 105-0003 Japan

Whereas, CEA and JCOAL (hereinafter referred to as “the Parties”) acknowledge that the outcomes of the preceding three-phased cooperation have contributed to the endeavors by the Government of India for the sake of better efficiency and environment, and intend to further enhance the effect of the Cooperation in concerted efforts through continuously implementing the Indo-Japan Cooperation for Efficiency and Environmental Improvement for Sustainable, Stable and Low Carbon Supply of Power (hereinafter referred to as “the Cooperation”).

Now, therefore, in consideration of the mutual agreements contained herein, the Parties have reached the following understanding:

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Article -1 (Background)

The Parties embarked on their cooperation as of April 30, 2010, when they signed the first Memorandum of Understanding (MoU) on Indo-Japan Cooperation for Pre-primary Study of Efficiency and Environmental Improvement of Coal Fired Power Stations through diagnostic studies for energy efficiency-oriented Renovation and Modernization (R&M) activities in existing thermal power units, for the sake of expediting efficiency and environmental improvement of coal fired power stations in India. The cooperation for the Pre-Primary Study, which was the first program of its kind in India under the umbrella global initiative "Clean Coal for the Earth" that has been taken up by Ministry of Economy, Trade and Industry (hereinafter referred to as "METI") of Japan and supported by Ministry of Power (hereinafter referred to as "MoP") of India, aimed at sharing of technical expertise as well as actual implementation of mutually agreed techno-economical R&M solutions, based on the common understanding that R&M as well as Life Extension (LE) of existing power plants are quite significant to the power supply security in India.

The 2nd MoU (2012-2015) constituted the continued framework of the foregoing cooperation.

In light of the changing dynamics of the power sector in India, the Parties decided to proceed to the next phase of the Cooperation under the 3rd MoU (2016-19) with a wider scope involving new power development/replacement and with focus on environmental measures and technologies for coal fired power stations.

Article -2 (Purpose)

The purpose of this MoU is to address issues and barriers in expediting sustainable, stable and low carbon thermal power development by means of studies, training program and knowledge-sharing activities, outcomes of which are to be conducive to overall power development in India as well as to expedite relevant policy implementation by the Government of India.

Article -3 (Activities envisaged under the MoU)

- a. Update on the current and future policy trend in the Indian power sector and consideration of the identified issues/barriers to find out those which could be addressed through mutual collaboration by the Parties.

- b. Identification of issues to be addressed regarding both existing and upcoming facilities, and also operation & maintenance at either of them.
- c. Implementation of studies with priorities on, but not limited to environmental technologies for coal fired power generation Flexibilization measures and biomass utilization are also of high priority in this context.
- d. Biomass study shall inter alia include:
 - ① Co firing of biomass pellets
 - ② Waste to Energy Technologies

Theme/ target site of each study will be decided through mutual consultation by the Parties in close coordination with relevant utility/utilities. Techno-economical assessment may constitute part of a study under the Cooperation, as it is deemed to be essential to make the study outcome viable.

Coal Gross Calorific Value (GCV) loss in power plant and its remedy: There are various unaccounted losses in coal, both in terms of quality (GCV) and quantity, in between the coal is received in power plants and fired in the boiler after certain processing. Further, all the coal received by power plants is not used immediately and stored in stockyard. There is some loss of GCV in the coal stock during storage. Also, there are minor unavoidable loss of GCV in the coal during handling inside the power plant. All such losses in GCV occurring inside a power plant before firing the coal in the boiler need to be assessed so as to calculate the actual heat being used in boiler to generate power.

- e. Implementation of an annual workshop in India and Clean Coal Technology (CCT) Training Programme in Japan for bilateral knowledge and technology exchanges on environmental technologies for coal fired power station such as Integrated Gasification Combined Cycle (IGCC), flexibilization measures, biomass utilization and any other relevant themes (that may be required in future) that have been agreed to be incorporated between the Parties.
- f. Holding a joint meeting, as required, to be attended by representatives of the Parties to discuss issues that have arisen or may arise in the course of

implementation of the Cooperation, in order to enhance the effect of the Cooperation. Any relevant party/stakeholder may also attend the meeting as special invitees as agreed on by the Parties.

The work sharing of the Parties is as listed in Table-1 of Appendix-I.

Article -4 (Cost of Implementation)

Japanese side and Indian side will bear respective expert cost for travelling, boarding, lodging, etc. in this MoU. In the meantime, any cost for CCT Training Program in Japan including the travelling expenses between Delhi and Narita, if incurred, will be borne by JCOAL.

Article -5 (Duration)

This MoU shall come into effect on the date of its signing and shall remain effective for a period of one (1) year and shall be automatically extended for successive period of one (1) year each up to a total period of three (3) years maximum, unless either Party shall have otherwise notified to the other Party in writing at least three (3) months prior to the expiry of this MoU or any extension thereof.


Article -6 (Amendments)

This MoU may be modified only in writing signed by authorized representatives of the Parties.

Article -7 (Dispute settlement)

Any dispute between the Parties as to matters arising pursuant to this MoU will be settled amicably through negotiations and consultations between the Parties.

In witness of this MoU, the Parties have signed this MoU at on this 16th day of Dec 2019 in two originals in the Hindi and English language.


Mr. Osamu Tsukamoto
President
Japan Coal Energy Center



Mr. P. D. Siwal
Member (Thermal)
Central Electricity Authority

Table-1 The Work Sharing between CEA and JCOAL

Items	CEA	JCOAL
<p>a. Update on the current and future policy trend in the Indian power sector and consideration of the identified issues/barriers to find out those which could be addressed through mutual collaboration by the Parties.</p> <p>i. Provide updates on the current and future policy trend of the India power sector with an emphasis on coal fired power generation</p> <p>ii. Jointly identify issues/barriers and measures to address the same</p>	<p>√</p> <p>√</p>	<p></p> <p>√</p>
<p>b. Identification of issues to be addressed regarding both existing and upcoming facilities, and also operation and maintenance at either of them.</p>	<p>√</p>	<p>√</p>
<p>c. Implementation of studies with priorities on, but not limited to environmental technologies for coal fired power generation. Flexibilization measures and biomass utilization are also of high priority in this context. Theme/target site of each study will be decided through mutual consultation by the Parties in close coordination with relevant utility/utilities. Techno-economical assessment may constitute part of a study under the Cooperation, as it is deemed to be essential to make the study outcome viable.</p> <p>i. Conductance of studies on /grid and coal fired power plant flexibilization</p> <p>ii. Study on utilization of Biomass shall inter alia include</p> <p style="padding-left: 40px;">① Co firing of biomass pellets</p> <p style="padding-left: 40px;">② Waste to Energy Technologies</p> <p>iii. Coal GCV loss in power plant and its remedy</p> <p>iv. Any other subject that has been agreed on between the Parties</p> <p>v. Review and finalization of report</p>	<p>√</p> <p>√</p> <p>√</p> <p>√</p> <p>√</p> <p>√</p>	<p>√</p> <p>√</p> <p>√</p> <p>√</p> <p>√</p>
<p>d. Implementation of an annual workshop in India and CCT Training Programme in Japan for bilateral knowledge and technology exchanges on environmental and efficiency enhancement technologies for coal fired power station such as flexibilization measures, biomass utilization and any other relevant themes that have been agreed to be incorporated between the Parties.</p> <p>i. Jointly organize and conduct an annual workshop in India</p> <p>ii. Jointly organize and conduct CCT Training Programme in Japan</p>	<p>√</p> <p>√</p>	<p>√</p> <p>√</p>
<p>e. Holding a joint meeting, as required, to be attended by representatives of the Parties to discuss issues that have arisen or may arise in the course of implementation of the Cooperation, in order to enhance the effect of the Cooperation. Any relevant party/stakeholder may also attend the meeting as special invitees as agreed on by the Parties.</p> <p>i. Holding a joint meeting, as required, in close coordination with MoP and METI.</p> <p>ii. Report to the Electricity Working Group of the India-Japan Energy Dialogue or any other appropriate occasion of a bilateral meeting about the outcome of the annual joint meeting.</p>	<p>√</p> <p>√</p>	<p>√</p> <p>√</p>

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