

Enabling Public-Private Partnerships in Renovation and Modernisation of Coal-fired Power Plants in India

This information note is prepared under an ESMAP¹ funded assignment to explore possibilities of leveraging third parties, primarily but not necessarily from the private sector, to deliver viable renovation and modernization (R&M) projects for coal-fired generation plants in India. The third party may bring private sector finance, enhanced efficiency across the life-cycle of R&M execution² and/or – depending on the utility concerned – may significantly augment institutional capacities for project implementation or provide increased capabilities where green field projects are taking up most institutional focus. This short information note provides an overview to investors and policy makers on the possible approach that could be followed to mainstream public-private partnerships (PPPs) in R&M in India. It addresses:

- *the rationale for PPP in R&M in India;*
- *the need for third-party involvement in R&M;*
- *the financial attractiveness of R&M projects;*
- *the enabling legal and policy provisions already in place;*
- *proposed transaction options;*
- *dealing with employee issues; and*
- *the way forward.*

Background

- 1.1 Wide consultations were held with various stakeholders during the course of this assignment, including initial discussions with state-owned generation utilities, feedback from investors during an Investor's Workshop held on 6 May 2009 and follow-on discussions with state utilities in five states³, presentation before the Forum of Indian Regulators and discussions with the Ministry of Power (MoP), Central Electricity Authority (CEA) and Central Electricity Regulatory Commission (CERC).
- 1.2 There exist several regulatory, institutional and financing constraints at the state level in executing R&M works⁴. This has resulted in significant under-achievement in meeting R&M execution targets set by the CEA under successive five year plans, with the consequence that an estimated one-third of the coal based capacity in the country is in need of R&M or likely to be in the near future.

¹ Energy Sector Management Assistance Program

² Life-cycle of R&M execution includes design stage, R&M vendor selection, R&M execution and operation & maintenance.

³ Interactions were held with 10 states in Stage-1 of the assignment with follow-on visits to 5 states, viz, Maharashtra, Madhya Pradesh, Chattisgarh, Jharkhand and Punjab.

⁴ For more details, refer to "Regulatory study to encourage energy efficiency through investment in rehabilitation of coal fired generation plant in India" study funded by ESMAP, October 2008. Available at: <http://www.forumofregulators.gov.in/Data/Reports/Regulatory%20Study%20to%20Encourage%20Energy%20Efficiency%20through%20Investment%20in%20Rehabilitation%20of%20Coal%20fired%20Generati on%20Plant%20in%20India.pdf>

- 1.3 The CEA and the MoP appear to be open to trying out alternative approaches towards implementing R&M / Life Extension works through increased participation of the private sector across multiple stages of the R&M life-cycle. PPP may be an effective means of overcoming the barriers commonly encountered in execution of R&M works by utilities. With proper structuring and demonstration of early success, a third-party/PPP approach to R&M could be scaled up rapidly and holds significant potential to meet the backlog of R&M projects in the country.
- 1.4 The changed business environment ushered in by the implementation of the Electricity Act, 2003, has revived private interest in the power sector in the country resulting in successful tendering out of over 25,000 MW of new build capacity on a competitive basis since December 2006. Besides these, there are independent generation capacity addition plans of several large players in the private sector. This improved investment climate in the sector also presents a unique opportunity to attract investments to R&M.

Rationale for PPP in R&M in India

Existing barriers to effective R&M in India

- 1.5 About 27,000 MW of coal-based generation capacity, representing about one-third of the total coal-based installed capacity in the country is estimated by the CEA to be in need of R&M now or likely to be in the near future. Against this requirement, the progress on R&M, especially at the state level, has been significantly behind target with several barriers affecting adequate investments.
- 1.6 Drawbacks exist today in the regulatory evaluation and tariff-setting framework for R&M employed by state regulators. In terms of the evaluation framework, not all the economic benefits of R&M, including alternative costs to the distribution company of not carrying out R&M, are considered at evaluation stage. There is also evidence that generating companies carry the majority of the risk and pass the majority of the benefits to the distribution companies thereby reducing the attraction of the R&M decision to the generating company. Wider involvement of the sector beneficiaries in the R&M decision and risks would lead to more efficient outcomes.
- 1.7 R&M competes for resources and institutional attention with new build generation projects (with their ability to add larger quantum of power at one go) and scores comparatively low on (political) priority/profile. In a (severe) deficit scenario, key stakeholders are likely to want to postpone R&M works rather than prolong black outs.
- 1.8 State utilities have also had institutional and financing constraints in managing large-scale R&M projects (sometimes due to the burden of simultaneously needing to manage green field investments). It is common for these constraints (rather than the R&M project itself) to lead to delays with periods ranging from 3-4 years between the design stage and the actual re-commissioning of the generating asset. This serves to reinforce the impression for decision makers at the state level that R&M is a difficult and complex process.

- 1.9 Achieving the full benefits of R&M often requires good operation and maintenance (O&M) practices. However, this is dependent on the utilities' O&M capabilities rather than the success of the R&M activity itself. This is often not considered when weighing up whether to carry out R&M.
- 1.10 Absence of an agreeable or efficient risk sharing arrangement between the generating company and R&M vendors also leads to high bids and limited interest from vendors in undertaking utility-led R&M activities in India. This issue is discussed further in Box 2.

Box1: Re-structuring R&M transactions creates opportunities to attract a wider type of third party investor/R&M deliverer than has been the case to date

R&M undertaken as PPP transactions has significant potential upside for participants in the Indian context and discussions with investors indicate extensive interest, if such options are well structured prior to being brought to the market.

To date, however, the predominant model has involved disproportionate risk-sharing mechanisms in the tender structures, often requiring guarantees (refer to Box 2) and an inflexible and pre-determined approach to R&M activities, based on technical studies (which the vendors often find do not reflect the true nature of the works required). The result has been that R&M projects in India have suffered from lukewarm interest (principally from R&M vendors), who are either Original Equipment Manufacturers (OEMs) or specialized engineering agencies interested in R&M. In most cases of R&M project tenders at the state level, not more than two or three R&M vendors have actually bid for a project.

The key point is that the third party need not be the supplier of R&M services as has been the case to date. It could be a developer or an investor that manages the process and allocates some of the activities/risks to other third parties (such as suppliers).

PPP transactions in R&M are more akin to business opportunities, as they require the bidders to take on defined output risks with the opportunity to retain gains from higher efficiencies.

R&M transaction structures being discussed here focus on output performance parameters such as the net electrical output of the plant, station heat rate, etc., instead of input actions required for attaining these desired outputs. It thus offers greater flexibility to the third party to structure innovative R&M interventions based on entrepreneurial approaches. This is apparent in the wider interest in R&M transactions, well beyond the limited set of OEMs and engineering firms that have tended to show interest.

It has raised interest amongst several Independent Power Producer (IPP) developers in India and internationally, who are ready to invest capital in such ventures, if properly structured. The Investor's Workshop held on 6 May 2009 elicited response from several such prospective investors and a few of them have followed up with comments and suggestions on the risk-sharing mechanisms and the transaction structure currently under discussion.

Involvement of a few such strategic investors would also allow participation from financial equity investors, such as equity funds focused on the power sector.

Need for third-party involvement

- 1.11 R&M execution continues to be a significant challenge on the part of the state government and utilities. Most R&M schemes, which have been undertaken at the state level over the past few years, have also fallen short of providing projected benefits.
- 1.12 Opening up the R&M value chain to third parties may release more of the inherent value embedded in the transaction. The objective would be to introduce third-party capabilities (institutional, financial, managerial, technical) that are better able to manage the combination of risks making up the R&M and subsequent O&M activities and deliver a more efficient overall R&M outcome.
- 1.13 PPP in R&M could also serve to free up the state's attention and resources to focus on new build projects, while ensuring greater accountability and an optimized approach to R&M.
- 1.14 A change in the manner in which R&M projects are structured, tendered and executed is necessary to bring in wider participation of third-parties. It is necessary to structure R&M investments as viable business opportunities, with the objective of obtaining the desired efficiency improvements in the process based on an optimal risk-sharing arrangement with/between the third party investors/suppliers.
- 1.15 In the above context, CEA and the MoP appear to be open to trying out alternative approaches towards implementation of R&M / Life Extension works through increased participation of the private sector across multiple stages of the R&M life-cycle to improve accountability and to realize and sustain intended benefits. With proper structuring and demonstration of early success, a third-party approach to R&M with formalised and replicable structures can be scaled up rapidly⁵ and therefore holds significant potential to meet R&M targets in an optimised, time-bound and efficient manner.

⁵ The experience of Case-1 and Case-2 based competitive bidding indicates that with a clear framework in place, state utilities find it easy to scale up and tender out PPP contracts. Over 25,000 MW of new build capacity (including four Ultra Mega Power Plants each of 4,000 MW capacity) have already been tendered out competitively since December 2006.

Box 2: R&M transactions can be structured to reduce the costs of supplier guarantees

Under regulatory pressure to demonstrate benefits from the R&M investment, tendering generation utilities have typically asked R&M vendors to offer a 12-24 month performance guarantee to cover parameters such as turbine heat rate, boiler efficiency, steam generation capacity, exit flue gas temperature, auxiliary consumption, emissions etc. Utilities feel that the capital investments required for R&M and poor track record to-date justify requests for binding performance guarantees from vendors.

However, the suppliers face a number of difficulties in offering the guarantees. The scope of work specified by the utility and considered by the vendor for bidding purposes is based on a set of technical studies provided by the utility. The nature of R&M dictates that these studies are often only indicative (with a likelihood of surprises during implementation). The scope of work requested of suppliers in several instances isn't comprehensive enough to allow them to provide extensive performance guarantees on overall plant performance (as they are requested to do). Furthermore, the need for guarantees to cover significant operating periods is also a matter of concern as suppliers consider there to be strong linkages between the machine performance and plant O&M practices, the latter being outside their control and in the hands of the utility.

The impact of all these uncertainties is to drive up the cost of providing the guarantee, and therefore of carrying out R&M.

Careful structuring of PPPs to better allocate risks to those best able to control them could reduce these costs. Firstly, shifting the focus of R&M requirements from inputs to outputs provides more control to the entity delivering R&M over the activities it can choose to undertake to deliver the required outputs. Shifting to a standard set of outputs such as unit heat rate, net electrical output and standard emission levels – offers the bidder the flexibility to decide on the intervention measures it wishes to undertake to achieve the output. Secondly, having the bidder involved over a period of time (say due to a role in O&M) gives the bidder the flexibility to carry out different investments at different times and as required (over the period of the concession) to maintain the required outputs. By giving the bidder control of post-R&M O&M (either directly or via a third party it appoints or is able to allocate responsibilities to), the risks to the bidder can be further managed. All of this should avoid unnecessary or ill timed work. Since the bidder is also expected to control and operate the plant over the concession period, concerns about standards of plant maintenance and operation can also be effectively addressed by the bidder.

This should all help to reduce the cost currently being imposed on R&M by the need for performance guarantees.

Attractiveness of R&M projects

- 1.16 Discussions with investors indicate significant interest in well structured R&M transactions in India. The attractive project qualities include the likely scale of this opportunity (close to 27,000 MWs of generation capacity due for R&M over the short-term) and the comparative benefits vis-à-vis new build capacities, viz, a significantly lower cost of obtaining a foothold over power sector assets that also have shorter commissioning periods and often have significant expansion potential, lesser issues with regards to consents and clearances and opportunities to trade merchant power in the rapidly evolving and demand-rich power markets across India.

- 1.17 Energy Efficiency focused R&M has been shown to be financially viable, in many cases even under utility-led programmes with proper regulatory incentives. Previous studies funded by ESMAP⁶ as well as under the IBRD/GEF supported intervention to support Government of India's program for R&M in the sector have indicated that there is significant benefit for investors in R&M projects, especially under a marginal cost based tariff for additional generation or under a market-based contracting approach.
- 1.18 An example of this nature is illustrated in the following table for two units of a pit-head power station in a state. The assumptions used in this example are representative of the contemporary experiences of R&M in state-owned generation utilities in India and are more fully elaborated in Annexure I. The R&M investments are assumed to be made in the 20th year of the plant, implying 5 years of residual term under the existing PPA.

The proposed R&M measures constitute investment of Rs. 6,500 million and would result in the following:

- (a) Enhancement of capacity to 440 MW from the current 420 MW.
- (b) Station heat rate would improve from 3300 Kcal/kWh to 2500 Kcal/kWh.
- (c) Plant Load Factor would improve from 70% to 85%.
- (d) Auxiliary Consumption would improve from 9.8% to 8.5%.

The R&M implementation would require a shutdown of 6 months for each unit, during which the utility is assumed to purchase substitute power on a short-term basis at Rs.4.00/kWh. Similarly additional generation both on account of enhanced PLF and enhanced capacity are assumed to result in an avoided procurement by the distribution utility at Rs.4.00/kWh.

⁶ "Regulatory study to encourage energy efficiency through investment in rehabilitation of coal fired generation plant in India"; IPA and KPMG study funded by ESMAP, October 2008.

Sl	Particulars	Unit	Base	post-R&M
1	Capacity	MW	420	440
2	R&M Investments	Rs Million	-	8400
3	Station Heat Rate	Kcal / kWh	3300	2500
4	Plant Load Factor	%	70%	85%
5	Auxiliary Consumption	%	9.8%	8.5%
6	Residual Life	Years	5	15
7	Generation	MU	2589	3280
8	Effective Tariff	Rs / kWh	1.51	1.71 (1 st Yr)
9	Shutdown Costs	Rs Million	-	5,180
10	Annual Benefits			
	Fuel Savings	Rs Million		1210
	Avoided Procurement	Rs Million		2770
11	Payback Period	Years		5.45
12	Equity IRR with <ul style="list-style-type: none"> • Additional Generation sold on merchant basis • Pre-R&M tariff retained for 5 yrs and adjusted for R&M thereafter 	%		25

The proposed R&M investment would result in a higher tariff but with the benefit of extended life of the plant, higher efficiency and annual generation. From the perspective of the overall sector, it is an investment with a payback period of about 5.45 years.

If regulated tariffs are allowed post-R&M without any additional benefits allowed to the generation company, it can only recover its regulated return on equity (RoE)⁷. On an allowed RoE of 14%, the equity IRR works back to about 12.5%.

However, if the transaction is structured so that the generation company is allowed to sell additional generation (both on account of higher PLF and enhanced rating) on merchant basis (assumed at Rs.3 / kWh), while keeping tariff unchanged for the residual 5 years of the PPA period, the equity IRR for the generation company would rise to 25%, indicating the remunerative nature of such investments, if structured appropriately.

- 1.19 The significant backlog of R&M activities at the state level suggest that formalised, replicable structures for PPP in R&M could contribute significantly to turning R&M into an attractive activity for a variety of third parties to embark on and derive good returns over a period of time whilst delivering optimised, time-bound and efficiently scoped projects. The improved investment climate created by the existing legal and policy provisions supports this goal.

⁷ All state electricity regulatory commissions continue to specify this at a post-tax level of 14% although the Central Electricity Regulatory Commission has in its last regulation on the subject has revised it to 15.5%.

Existing enabling legal and policy provisions under the Elec. Act, 2003

- 1.20 The concept of private participation in R&M is not new. The 1995 guidelines of the CEA proposed three alternative structures (Lease-Rehabilitate-Operate-Transfer, Joint Venture between public and private party and Sale of Plant) to undertake R&M activities. Not much progress was however achieved on this front, owing primarily to the lack of private sector investment climate in the sector in general. A lot has changed since the implementation of the Electricity Act, 2003, with introduction of competitive bidding under section 63 of the Act, provision of open access and creation of power exchanges. Several projects have been successfully tendered out to the private sector in India since December 2006, including four ultra mega projects, each of approximately 4,000 MW of capacity and several state sector mega projects in Chattisgarh, Punjab, Haryana and Maharashtra. Large-scale coal based projects have also been developed by a host of domestic investors with provisions of merchant capacity, signalling a significant improvement in investor confidence in the sector and its regulatory and policy framework post Electricity Act, 2003.
- 1.21 The enabling framework for a competitive procurement process, whether from new build or rehabilitated capacities, exists under section 63 of the Electricity Act, 2003 and has been demonstrated to operate successfully under the Case-1 and Case-2⁸ bidding scenarios.

Requirements going forward

- 1.22 Guidelines issued for procurement (applicable in effect for generation capacity development) by the Ministry of Power under section 63 of the Electricity Act, 2003 are more suited for green-field power projects. A separate set of guidelines are necessary to be issued by the Ministry of Power to undertake PPP in R&M through a set of alternative structures. The MoP is currently in the process of holding consultations with key stakeholders – CEA, CERC, state regulators and state generation utilities, in this regard and is expected to finalize a set of guidelines based on these consultations.
- 1.23 It is recommended that that the proposed guidelines cover the following aspects to bring in uniformity in approach.
- (a) *Basis for economic evaluation and selection of plants for PPP in R&M*, which could consider factors such as minimum unit size of 110 MW, age of unit exceeding (say) 20 years and minimum expectation of extended life exceeding 15 years, consideration of overall economic benefits⁹ to the sector for evaluating cost and benefits of R&M, etc.

⁸ Ministry of Power Guidelines provide for medium term (up to 7 years) or long-term (beyond years) procurement of power by distribution utilities on a tariff-based competitive bidding basis. It can either be Case 1, where site, fuel and technology is not specified or Case-2, where site, fuel and technology, etc. is specified and provided and a bidder selected to develop the plant to such specifications

⁹ Consideration of overall economic benefits is essential in an unbundled industry structure as most of the benefits of R&M over the extended life of the plant will accrue to the distribution utilities while the investments have to be made upfront by the generation utilities. Mere focus on engineering benchmarks or

- (b) *Guidelines should provide for utilities and State Governments to go ahead with PPP in R&M by simply notifying the concerned SERC, provided selection criteria, discussed above, are fulfilled. Specific deviations from these criteria should require prior approval of the concerned SERC.*
- (c) *Terms to be included: basis for upfront payment, minimum obligations of both parties, bid parameter for each transaction structure and standard timelines for the bid process, etc. (as discussed in more detail in the next section).*

narrow focus on financial benefits to the generation utility can lead to misleading economic conclusions. This was more fully addressed in the report on “Regulatory study to encourage energy efficiency through investment in rehabilitation of coal fired generation plant in India”; IPA and KPMG study funded by ESMAP, October 2008.

Proposed Transaction Options

- 1.24 Some State Governments and utilities have expressed their willingness to consider PPP in R&M, once guidelines are framed under section 63 of the Electricity Act, 2003, which would make the process more acceptable to internal stakeholders in the State.
- 1.25 A range of transaction options have been devised at this stage, providing flexibility to interested stakeholders in a given state to adopt any particular option which caters to the specific nature of the site proposed plant and stakeholder preferences. Based on stakeholders' discussions, facilitated by the MoP, these options would be suitably incorporated in the overall framework and guidelines for PPP in R&M.

Box 3: What constitutes a good PPP opportunity in R&M?

Following broad factors typically influence an investor's evaluation of what constitutes a good PPP transaction opportunity in R&M.

1. Technical / Project-specific Factors

There are certain basic *technical factors*, which can be considered to influence the amenability of projects for PPP considerations. Unit size as an important factor for determining feasibility for Energy Efficient R&M. We observe that the Industry trend in achieving EE R&M is usually to adopt an up-rating of the units from 210 to 215 MW by retrofit of the Baumann Stage in LP Turbine. Unit sizes of below 200-210 MW are less attractive due to technology impediments for smaller units and scalability issues.

From an *infrastructure set-up* standpoint, a combined coal handling plant (CHP) for all units in a station is considered a major deterrent to ring-fencing if only a fraction of the plant (a few units) is being considered for R&M. Units being considered for R&M should have a dedicated Coal Handling System (in terms of conveyor systems from Stock Pile / Rake unloading Point) for clear ring-fencing of control, operations and measurement of fuel and output.

Plant Sites with *expansion planned but not yet initiated* is considered highly positive, as it provides opportunity to bundle EE R&M with low-cost brown-field expansion, considered attractive to the private sector. Also sites with sizeable decommissioning plans are usually considered positive for PPP, from a brown-field expansion perspective.

R&M already under execution for a unit is expected to pose transition risks to a subsequent transaction, while those still at the design stage are considered positive.

2. State Level Factors

Amongst the factors which influence an investors decision to invest in PPP projects, the *support of the state government* and the *regulatory climate* in the state rate high in the investors' minds.

Of primary significance is also the performance of the power sector in the state and its long-term viability. Electricity utilities that are financially sound and with no history of default to power producers would rate highly in the minds of the investors.

- 1.26 The following broad transaction options are presented below along with a discussion on possible variations in ownership structures in these options.
- (a) **Rehabilitate-Operate-Maintain (ROM):** This represents a simple PPP structure where investment is made by the state generation utility.
 - (b) **Invest – Rehabilitate – Operate (IROT):** This is a more comprehensive transfer of responsibilities to a third-party.
 - (c) **Invest – Replace / Rehabilitate – Operate (IR/ROT):** This is a variant of the IROT model with flexibility for decommissioning and replacement of some units along with rehabilitation of others.

Rehabilitate – Operate – Maintain (R-O-M)

- 1.27 This option is most like the status quo, but with enhancements to the evaluation/bidding process and bundling with post-R&M operations and maintenance activity.
- 1.28 In ROM, the R&M capital investment is made by the generation utility and the R&M vendor has to make a bundled bid to undertake both R&M execution as well as O&M of the plant for a period of say 10 years or more, depending on the bid structure. The value in the ROM contract is intended to be in incentivising the private party over the O&M phase, where efficiencies are achieved in excess of defined thresholds relating to the output commitments.
- 1.29 This represents a simple transaction structure. Since the power purchase agreement (PPA) for the renovated plant would continue to be with the generation utility, it does not lend itself to competitive tariff-based bidding for selection of the preferred bidder.
- 1.30 In this option, capital investments and tariff related to R&M would need to be approved by the State Electricity Regulatory Commission (SERC) and under the PPA, performance obligations would eventually rest with the state generation utility. This option shall therefore specify the input parameters in the Request for Proposal (RFP) relating to specific R&M works to be undertaken along with commitments for outputs such as Net Capacity, Availability, Station Heat Rate, etc.
- 1.31 The proposed bid parameter and framework is as follows:
- (a) (1) Cost of R&M and (2) O&M for 1st contract year (to be escalated for term of the O&M period as per CERC defined indices for evaluation and payment)
 - (b) NPV of (R&M + O&M) to be used for selection of vendor
 - (c) O&M for 1st contract yr can be capped as a %age of cost of R&M to prevent transfer between R&M and O&M elements of the bid.

Invest - Rehabilitate – Operate – Transfer (IROT)

- 1.32 This transaction structure offers potential for harnessing the full range of benefits of PPP in R&M. The private investor is expected to take control of the power plant or units identified for R&M, invest and execute the R&M, operate the plant over the long-term and transfer the plant back to the generation utility at the end of the concession period.
- 1.33 At the kernel of the structure is the focus on output performance parameters instead of inputs. It is therefore essential in the bidding framework to define outputs clearly with the help of technical studies covering an assessment of the health of the candidate units or plant with options to the Bidder to conduct a Technical Due Diligence prior to bid with possibly a single shutdown requested. This will include *inter alia* the period of R&M or outter date for re-commissioning, expected net capacity of the plant (uprating benefits and net capacity from units added in excess of committed capacity should be left to the discretion of the developer, subject to first right of refusal by the state procurer), expected minimum efficiency of the plant (SHR to be a bid parameter for stations where coal is supplied by procurer), etc.
- 1.34 Within the envelope of these defined outputs, there should be flexibility for the developer to pursue his own solutions to make such outputs available, as it is his investments and returns at risk under this structure.

The proposed bidding framework under this structure will comprise of the following.

- **Bid Parameter:** Preferably the lowest levelised tariff quote of the renovated plant.
- **Upfront Payment:** Depreciated Book Value of assets as a transparent and unambiguous measure of upfront payment.
- **Term of Concession:** With respect to refurbished assets should last for a minimum of 15 years post-R&M. Concession for any new capacity added in the station (including replacement of existing units) should last for the useful life, which is 25 years.
- **Treatment of Land:** Would be preferred to be leased out by State Governments. Lease rentals should accordingly be nominal to reflect the restricted end-use and avoid excessive loading in tariffs.

Land lease charges for new capacities added at the plant site, could however be at market-determined rates.

- **Commitment on coal:** Minimum quality of coal should be specified and correction factors built in the PPA for coal quality falling below defined minimum quality coal.

- **End-of-period Transfer Value:** A zero end-of-concession transfer value is a clean and transparent concession structure for sufficiently long concession contracts. It will not however be efficient for contracts which are over shorter contract periods, as lack of transfer value gets loaded back into tariffs.

For shorter concession terms, say less than 20 years, the end-of-concession transfer value can simply be equal to the Upfront Payment made by the successful bidder.

1.35 The form of transfer is largely irrelevant so long as the concession structure provides adequate legal rights for economic exploitation of the assets. Legal ownership of assets due to public sensitivities in many states may need to continue partly or fully with state-owned utilities. This provides for an opportunity to either

- (a) Transfer control and operation through long-term contracts (e.g. franchised operation); or
- (b) Make the State Govt a Joint Venture partner with or without (in lieu of land & other infrastructure) equity contribution.

1.36 **Obligations and risk-sharing of each party to the Concession Contract:**

- The private party is expected to take on the following obligations under the R&M execution contract and the Power Purchase Agreement
 - (a) Meet minimum committed output requirements in the form of
 - Net capacity
 - Plant efficiency
 - Normative Availability
 - Outer date for re-commissioning of R&M plant
 - (b) Financing and R&M procurement within designated time-lines
 - (c) Mobilisation of O&M personnel within a short (defined) time-period from award of project

Adequate performance guarantee in the form of a Bank Guarantee would be required to be furnished by the private party, which can be drawn upon failure to meet obligations under the contract relating specifically to delay in commissioning and failure to meet net capacity output commitments. Such damages would need to be capped and liquidated at acceptable limits in the contracts to make the projects bankable under project financing structures.

- The generation and distribution utilities at the state level are expected to take on the following obligations.
 - (a) Provide energy audit and RLA study outputs as part of RFP documents
 - (b) Meet commitments on *in situ* spares
 - (c) The PPA should have specifications of minimum quality coal and build in correction factors for quality falling below such specified benchmark.
 - (d) Meeting facility obligations, re-commissioning tests, etc.; providing support for pre-shut down operation of the plants under existing PPA
 - (e) Providing timely shutdown of units

Invest - Rehabilitate / Replace – Operate – Transfer (IR/ROT)

- 1.37 The primary difference between IR/ROT and the IROT structure is the flexibility to consider replacement new capacity as a part of this structure. Accordingly the main areas of difference in the framework are also with respect to the obligations of both parties with respect to this new capacity.
- 1.38 The output in the RFP with respect to net capacity will therefore have two parts to it as follows.
- Net capacity of stages under R&M to be re-commissioned within a specific time-frame.
 - Replacement capacity to be commissioned (say) maximum of 48 months from Letter of Award
- 1.39 Addition of new capacity is similar to Case-2 bidding under the competitive bidding guidelines of the Ministry of Power and therefore the obligations of the utility with regards to preparatory activities are expected to be similar to that under Case-2. These will cover aspects such as land acquisition (where applicable), environmental clearance, water and fuel arrangements and necessary data for detailed project report.
- 1.40 It has been observed in recent Case-2 bids that allowing part of new capacity to be un-contracted for sale on merchant basis improves the attractiveness of the project for investors with likely benefits passed on the distribution utility in the form of lower quoted tariffs. Such a possibility should be considered for new capacities considered as part of the structure.
- 1.41 The entire project can be bid out on the basis of lowest levelised tariff quote, although with different capacity commitments and commissioning time-lines for the R&M and new capacity addition portions.

Employee Issues in the Transaction Options

- 1.42 Employee issues in a generation transaction are important as all plants have on-site, plant-specific deployment of executives and non-executives (workmen and supervisory staff). While executives are usually transferable across locations, non-executive employees in most state generation utilities are seldom transferred and become the mainstay of the plant operations with knowledge and skills gained on working at specific plant locations. There is also a likelihood of over-staffing at the non-executive level in many plant locations.
- 1.43 Third party transaction option of any nature tends to affect non-executives significantly, as any attempt to redeploy them to other locations or transferring them under the control of third-parties, may be perceived as a violation of their terms and conditions of service. Third-parties are also likely to have optimised employee staffing norms for O&M, which would require fewer employees than existing at the plant at the point of transaction.
- 1.44 These issues are less complex in a power plant, where the utility already has generation expansion opportunities planned or under construction, as it offers an option for redeployment of non-executives at the same location. Where such an option does not exist, the following path can be adopted through a consultative approach.
- (a) Third-parties are usually keen on inducting their own managerial cadre for plant operation and maintenance¹⁰. Executive employees should therefore be re-deployed appropriately by the state generation utility.
 - (b) Internal redeployment opportunities should be assessed and communicated to the non-executive employees posted at the plant being considered for transaction. An option exercise should be conducted to provide an opportunity to willing non-executives to shift to other locations.
 - (c) For the non-executives keen on continuing in the power plant under third-party control, one or a mix of the following alternatives can be provided in consultation with the employees and the third party.
 - (i) At the choice of the third-party, certain employees could continue under deputation from the state generation utility but shall administratively report to executives appointed by the third party. The terms and conditions of service with the state generation undertaking shall continue to hold for such employees but they may have further entitlement to any additional benefits enjoyed by other O&M employees appointed directly by the third party. This is currently the practice for private distribution franchisees in India and has become more or less acceptable to employees in state-owned utilities. In such a scenario, the third party will have to reimburse the cost of the employees to the generation utility.

¹⁰ NTPC preferred not to take over executive employees in Talcher or Tanda, the two stations it acquired from Orissa and Uttar Pradesh State Electricity Boards respectively and rehabilitated successfully.

- (ii) Employees may opt to get themselves formally transferred to the third party, in which case the third party may be required to provide an undertaking to the state owned generation utility to offer terms and conditions of service to such employees, which are not inferior to that existing on the date of transfer. A better performing station also serves to improve employee morale, as it opens avenues for employee incentives and improved townships and amenities¹¹. Upfront commitments in these regard by the third party and outlining a participative management framework in the plant R&M and O&M with employee involvement, will make such a transfer smoother. It is recommended that such improvements in employee townships be made a part of the output requirements of the R&M transaction.
- 1.45 It is also essential to point out to the employees concerned that the involvement of the third party would effectively extend plant life (preventing their relocation over the short-term) and improve plant performance, which would contribute to improvement in incentive opportunities and development and upkeep of employee townships.

Way Forward

- 1.46 A meeting of key stakeholders (CEA, CERC, state regulators and state generation utilities) is proposed to be convened by the Ministry of Power in mid-late 2009 to seek inputs from the stakeholders in preparing the necessary framework for PPP in R&M.
- 1.47 A few states have been willing to consider PPP in R&M and have voiced the need for a clear framework and guidelines from the Central Government to make the process more acceptable to all stakeholders.
- 1.48 An existing enabling framework needs to be supplemented by a set of guidelines under section 63 of the Electricity Act, 2003 to provide the necessary impetus and a uniform basis for willing state governments and utilities to adopt PPP in R&M.
- 1.49 Based on this framework, State Utilities have to commission preparatory studies relating to health assessment of candidate plants and initiate preparation of acceptable bid documents for undertaking a transaction in conformity with the framework finalised by the Central Government. It is expected that certain standard bidding documents will evolve over time. These activities would take between 4-6 months depending on internal approvals and lead-times for appointment of technical and transaction advisors.
- 1.50 On the above basis, it is envisaged that willing states would succeed in bringing R&M transaction(s) to the market by first quarter of 2010.

¹¹ For example, before the transfer, the township at Talcher was in poor condition, with poor maintenance and inadequate amenities. NTPC carried out extensive developmental work in the township, as well as in the office buildings. Drains and roads have been laid and schooling and medical facilities have been improved. Further upgradation of facilities -- including construction of new quarters, new roads, a sewage treatment plant, etc. were planned and executed under phase II of the R&M plan.

Appendix 1: Assumptions for the R&M Investment Model

- Existing Plant Capacity – 2 x 210 MW
- Capital Expenditure – Rs. 8400 Million at a Capex intensity of Rs. 200 Million / MW
- Plant Performance Improvement Post R&M
 - Capacity up-rating by 20 MW in individual 210 MW sets resulting in total capacity of 440 MW from earlier capacity levels of 420 MW
 - Improvement of Net Plant Load Factor by 15% from 70% (Pre R&M) to 85% (Post R&M) via
 - Gross PLF improvement from 78% to 93%
 - Auxiliary Power Reduction from 9.8% to 8.5%
 - Residual Life Improvement by 10 Years from 5 Years (Pre R&M) to 15 Years (Post R&M)
- Financing Plan for R&M is as per the following basis
 - Debt: Equity ratio for total investment of Rs. 8400 Million – 70:30
 - Lending Terms & Condition are
 - Average Interest Rate – 11.5% per annum
 - Moratorium on repayment – 1 Years post Re-commissioning of assets.
 - Repayment Period (Excluding Moratorium) – 8 Years
- Incremental Expenses (Fixed Charges) are projected considering
 - Interest Expenses
 - Depreciation Charges on additional Capitalization of R&M Investment
 - Additional O&M Charges- Additional Charges are considered on Capacity recovered and Average 5 Year levels of O&M expenses in Lakhs/MW as per CERC Regulations 2009-14
 - RoE on additional Equity Investment of Rs.2520 Million per annum
- Shutdown Costs assessed considering
 - Shutdown period of 6 Months for each 210 MW unit
 - Procurement of shortfall quantity is measured at Average Power Purchase Rate and Marginal Power Purchase rate
- Fuel Parameters considered are following
 - Coal – GCV of 4100 Kcal / Kg with a landed Price of Rs 1650 / MT
 - Oil – GCV of 9200 Kcal / Liter with a landed Price of Rs 9200 / KL
- Tariff Rates for Economic Benefit Assessment Case for computing both Shutdown & Avoided Procurement Costs are
 - Average Power Purchase Rate of 1.85 Rs / Kwh considering a mix of assets servicing the existing demand of State
 - Marginal Power Purchase Rate of Rs 4.30 / Kwh has been considered
 - Merchant Tariffs for sale of Non-contracted power from the rehabilitated units have been conservatively considered at Rs 3 / kwh considering that short term weighted average trading prices shall reduce on account of D-S gap closure.