

## **BACKGROUND**

1. Orient Power Company Ltd. (OPCL) is a locally incorporated specific purpose company intending to set up a 225 MW combined cycle power generation unit. The project will be located at Balluki, Tehsil Pattuki, District Kasur. The primary fuel for the project is proposed to be natural gas and back up fuel is proposed to be HSD. The electricity generated will be sold to NTDC. OPCL's principal sponsors include Mr. Nadeem Babar and Globeleq Inc. UK.
  
2. Having already applied for a generation license, OPCL submitted a tariff application on Feb 01, 2005 for sale of power to NTDC. This tariff petition was admitted for consideration by the Authority on Feb 16, 2005 and was assigned case number NEPRA/LAG/72/Tariff. Salient features of the petition were advertised in the newspapers to inform all the interested persons/stakeholders and to invite participation in the tariff-setting proceedings through their comments and/or becoming a party to the proceedings as intervenors. Invitations were also sent to the concerned Federal Government ministries, provincial governments, Chambers of Commerce and Industries, Representatives of Professional bodies and Experts, soliciting their views on the petition.
  
3. A public hearing on the petition was held on March 11, 2005 in Islamabad. This hearing was participated by the applicant, stakeholders, commentators as well as members of general public.

## **SUBMISSIONS OF OPCL**

4. OPCL submitted that the proposed generation plant would consist of a combined cycle power plant with an installed capacity of 225 MW gross at ISO conditions. The combined cycle power plant will comprise of two Gas Turbines, a Heat Recovery Steam Generator

(HRSG), and a Steam Turbine. OPCL and NTDC have already agreed on a reference tariff. The estimated total Capital Cost of the project is proposed to be US\$ 170 million.

5. OPCL has requested a two-part tariff consisting of Capacity Purchase Price (CPP) and Energy Purchase Price (EPP) for 25 years. The tariff has been worked out on the basis of Return on Equity along with compensation of all costs incurred including debt repayment. The average capacity payments for the first ten year period are proposed to be Rs. 683/kW/month followed by capacity payments of Rs. 271 /kW/month during the remaining period of year 11 to 25. The energy component is uniform for the period at Rs. 1.48/kWh. Key cost recovery components include:
  - Fuel Cost
  - O&M Costs
  - Debt Servicing Liability
  - Return on Equity

#### Structure of Reference Tariff

6. The structure of Reference Tariff has been proposed to comprise of the following components:
  - (i) Capacity Purchase Price (CPP) consisting of two parts:
    - Escalable Component
    - Non-Escalable Component
  - i) Energy Purchase Price (EPP) consisting of two parts:
    - Fuel Cost;
    - Variable O&M
  - ii) Pass-Through Items

#### Components of Tariff

7. OPCL indicated that the proposed tariff components comprise of various cost items as noted below: -

- Components of CPP
  - A. Escalable Component
    - Foreign Currency Component Rs. 222 per kW per Month
    - Local Currency Component Rs. 49 per kW per month.
  - B. Non Escalable Component
    - Repayment of long term loans  
*Average annual debt principal repayments estimated to be Rs. 765 million*
    - Interest payments on long term loans  
*Average annual interest charges of Rs. 269 million*
- Components of EPP
  - Fuel Cost  
*Fuel cost at Rs. 1.27/kWh*
  - Variable O&M Cost  
*Variable O&M cost*  
*Local Rs. 0.055/kWh*  
*Foreign 0.156/KWh*

OPCL has stated that they have agreed on a reference tariff with NTDC as indicated in the following table.

Description	Energy Price Rs./kWh			Capacity Price Rs./kWh			Total
	Fuel	Var O&M	Total	Escalable	Non-escalable	Total	
Average Years 1-10	1.270	0.211	1.481	0.619	0.941	1.560	3.041
Average Years 11-25	1.270	0.211	1.481	0.619	0	0.619	2.100
Levelized Rs.Years 1-25	1.270	0.211	1.481	0.619	0.687	1.305	2.786
Levelized US cents.Years 1-25	2.116	0.352	2.468	1.031	1.145	2.176	4.644

Further details are as follows:

- i) Capacity purchase price starting from Rs. 856/kW/month and gradually reducing each year till year ten after which it will remain constant at Rs. 271/kWh for the next 15 years.

- ii) Total Capital cost of the project is proposed to be Rs. 10.2 billion (at reference exchange rate of Rs. 60 to one USD); the project will be financed 75% by debt (Rs. 7,663 million) and 25% by equity (Rs. 2,554 million);
- iii) The entire debt is proposed to be raised in Pak Rupees at a rate of 3% over KIBOR; the tenor of the debt is 10 years after COD with 2 years grace period for construction.
- iv) A 15% return on equity has been proposed after withholding tax of 7.5% (Gross 16.13% )

#### Pass-through Items

8. Following items have been identified as pass-through in the petition:
- Variation in Fuel Price
  - Variation in KIBOR
  - Taxes, levies, government charges etc.

#### Escalation

9. OPCL has requested that the Local part of Variable O & M be indexed to Local CPI and Foreign component of Variable O&M to be indexed to US CPI, compounded bi-annually. Similar treatment is requested for local and foreign components of escalable capacity payments.
10. Foreign components of Variable O & M and escalable capacity payment are requested to be subjected to USD- Rupee indexation.

#### **Determination Sought**

11. Based on its submissions, OPCL has sought determination of the Authority in respect of the following:
- (a) Reference Tariff to remain effective for the next 25 years.
  - (b) Approval of Pass-through items; and
  - (c) Approval of proposed escalation in tariff

## **SUBMISSIONS OF COMMENTATORS**

12. The following participated in the hearing in person or through their representatives and submitted their views and comments through communications or email during the proceedings:

Karachi Electric Supply Corporation  
National Transmission and Dispatch Company Ltd.  
Lahore Electric Supply Corporation.  
Site Association of Industry.

13. The views expressed are as follows:

### **Karachi Electric Supply Corporation>**

14. The comments of KESC are as under:
- 14.1 The fuel components of energy purchase price with a thermal efficiency of 51.2%, the plant is the most efficient in the country, using latest available technology.
- 14.2 The overall/proposed tariff requires some clarification and disclosures in determination process.
- 14.3 The variable O & M at 21.1 Paisa is too high. The effect of this component is related to each (kWh) energy dispatched. The basis of determination of this component may be thoroughly checked by the Authority, so that this component is determined according to well-verified process, specially related to Energy Plan only and not the salaries, lubricants etc.
- 14.4 The escalable component is proposed, part of it in local currency and part in foreign currency, e.g. the equity portion is all in US\$. Considering the fact that the local Escalable components would be indexed to local CPI & the foreign component to US CPI, the calculation of Escalable component during each period, for indexation of tariff would make the administration of PPA difficult. It is proposed that the equity financing like the cost of the project be in local currency, so that one yardstick of indexation, may be followed.
- 14.5 The tariff proposal does not contain the Capacity Factor at which the Escalable & Non-escalable component of the Capacity Purchase Price is calculated. The Capacity Factor be disclosed.

- 14.6 The tariff proposal mentions that the debt is to be raised at 7.4% as of reference date. The petition does not mention the date with effect from which this interest rate is to be applied.

### **National Transmission & Dispatch Company Ltd.**

The submissions of NTDC are as under:

15. under Power Policy 2002 LOI was issued by PPIB to M/s Orient Power Company (Pvt.) to Develop, Build, Own & Operate (BOO) 400 MW Combined Cycle Power Project at Balluki near Lahore. The project is scheduled to be implemented in two phases comprising of two identical CCPP blocks.
  - 15.1 NTDC supports the proposed project as the same is going to be installed to cater for the future demand of the area. The project is included in the least cost generation expansion plan. The project is near the load center (Lahore) and will improve the system voltage, and system stability.
  - 15.2 The Company submitted the feasibility report prepared by the consultant which was approved by the Panel of Experts
  - 15.3 Tariff negotiations between the company and NTDC/WPPO representatives were conducted. The tariff has been agreed by the parties as per Tariff table.
  - 15.4 It is, pointed out that pursuant to Clause -6.3.5 of the Power Policy 2002 USCPI indexation is not allowed. Therefore, NTDC cannot agree for USCPI indexation for the proposed project. However, the Company may include components in the EPP and CPP, which are Escalable for Pakistan Rupee Inflation by the Pakistan Wholesale Price index (WPI) for 'manufacturing' as notified by the GOP's Federal Bureau of Statistics (FBS).
  - 15.5 The standardized PPA is still under deliberation with PPIB. Draft Power Purchase Agreement (PPA) attached with the application has not been negotiated between the parties. The same will be negotiated when standard PPA is finalized.
  - 15.6 Clause 6.3.4 of the Power Policy 2002 allows only variations in the exchange rate between Pakistan Rupee and US Dollar. Therefore, reference exchange rate in Euro is not applicable.
  - 15.7 For dispersal of Power from the proposed plant, 132kV double circuit line on fail conductor with a length of 50km will be constructed and maintained by the NTDC. The

company will arrange the funds for this line and NTDC will pay it back as per agreed schedule between the parties.

15.8 The following recommendations are made by NTDC:

- i) Agreed tariff as per attached tariff table may please be approved.
- ii) USCPI indexation may not be allowed pursuant to clause 6.3.5 of the Power Policy 2002.
- iii) Approval of Draft Power Purchase Agreement may please be deferred, until the standard PPA is finalized by PPIB and PPA is negotiated by the parties.
- iv) Pursuant to Power Policy 2002 ref. Exchange Rate variations may be allowed only in the exchange rate between Pakistan Rupee and US Dollar.
- v) NEPRA may include NTDC in all conferences/hearings relating to grant of license and tariff determination proceedings.

### **Lahore Electric Supply Company Ltd.**

LESCO's submissions are as under:

16. Notwithstanding the fact that OPCL will supply to NTDC, Location of Power House should be near to the load centers of LESCO, Present location of the Power house is more than 65km away from Load centers of LESCO, it would be more beneficial for LESCO as well as OPCL to install Generators near the load centers of LESCO, so that voltage drop and Technical losses be minimized in case of direct purchase of electricity from OPCL.

16.1. To meet load growth of LESCO, which is more then 10% per annum, the completion/commissioning time of powerhouse project may be reduced.

16.2. The proposed Generation power tariff Rs. 3.041/KWH for 1<sup>st</sup> ten years and Rs. 2.100/KWH for next 15 years is on higher side, which requires rationalization.

### **OPCL's RESPONSE TO THE COMMENTS**

#### **Responses to Comments by KESC**

17. Regarding high O&M cost OPCL stated that the variable O&M for the project is based on calculations which have been provided to NEPRA. In this context we would like to point out two main items

for consideration. First, these machines are the latest model high efficiency F Class gas turbines and as such the cost of their spare parts is higher than older versions of similar machines. Second, we have endeavored to align the interests of the parties and have calculated the variable charge to include a cost of parts on a “fired hour” basis instead of putting all spare parts costs in the fixed O&M category. Further that on a total basis, the annual O&M cost proposed (including annualized major maintenance overhauls) is very close to other Combined Cycle Gas Turbine Plants in Pakistan like Habibullah Coastal and Uch Power despite these machines being more expensive to maintain.

18. With respect to having local currency for equity as well debt, OPCL stated that the equity is all funded in US Dollars while the debt is all funded in Pakistan Rupees. The 2002 Policy clearly provides that all capital funded in USD is entitled to be recovered as such. The company does not agree that having two currencies makes administration of the PPA difficult. In fact, most projects under the 1994 Policy had components of both currencies.

#### **Responses to Comments by NTDC**

19. In respect of USCPI indexation OPCL has acknowledged the comment and accepted NTDC’s proposal to replace the US CPI index with local WPI index.
20. Regarding foreign exchange indexation for Euro OPCL stated that while many of the components for the power plant will be coming out of Europe and will initially be priced in Euros, we acknowledge that the tariff was agreed between the parties in relation to indexation only with USD. As such any inadvertent reference to Euro can be deleted. However, having reviewed DHA Cogen’s Tariff Determination, we understand that Euro indexation was provided in such case and we would like to understand the legal position of the same.

21. Other points were agreed to by OPCL

### **ISSUES ARISING OUT OF THE PROCEEDINGS**

22. The following main issues have emerged from the contents of the tariff petition, submissions of the Commentators and proceedings in the case:

- Procurement of power by NTDC from private GENCO's.
- Availability of gas and Choice of Alternate fuel
- Length of tariff control period
- Interconnecting transmission line
- Capital Cost of the project
- Cost of Capital
- Fuel Cost
- O&M Expenses

### **PROCUREMENT OF POWER BY NTDC FROM PRIVATE GENERATING COMPANIES**

23. The prudence of procurement of power is the primary consideration to ensure that public interest is guarded and a wholesome balance is maintained between the interest of the consumers as well as the service providers and other stakeholders. In this realm the guiding policy before the Authority is the Prime Ministers' Directive U.O No. 11(22)E&F-I/98 dated October 24, 1998, requiring the implementation of the decisions of the Council of Common Interests taken towards restructuring and reformation of the Power Sector. The policies of the GoP as issued from time to time particularly the Power Policy 2002 are also kept in view and followed to the extent consistent with the NEPRA Act. In this context NEPRA has issued the Interim Power Procurement (Procedures and Standards) Regulations, 2005 (Power Procurement Regulations) which required NTDC to establish prudence of power procurement on behalf of DISCOs. However, NTDC has negotiated

Power Purchase Agreement with OPCL prior to the issuance of the said regulations, therefore the prudence has to be examined and confirmed with respect to the proposed power purchase agreement being the optimum, least cost solution. The technology, quantum/size of plant location and timing of induction of power has, therefore, to be examined in the instant case.

a) Technology

24. OPCL has proposed to install a combined cycle plant based on gas usage with Diesel as alternate fuel. Orient has further explained that their proposed plant is GE 206 FA+, which is not suitable for running on RFO. If RFO is to be used as an alternate fuel, the suitable plant is Siemens V94.2 which has been discussed in the feasibility report but not recommended in comparison to the single fuel gas turbine arrangement. The combined cycle technology is acceptable, however, the main choice between a gas operated turbine vs dual fired flexible arrangement is discussed later under "Availability of gas and choice of alternative fuel". Orient has proposed a smaller steam turbine while as per GTW Handbook 2004 Edition, the two turbines together can support a bigger steam turbine. The real economic gain from a Combined Cycle Gas Power Plant comes from the Steam turbine which captures the heat generated by the gas turbines. If standard configuration as mentioned in GTW Handbook is used, the net output of the plant would increase by 17MW. The Authority is therefore, allowing the standard configuration of GE206FA+ giving an output of 237.9 MW on ISO conditions and expectation of 226 MW net on site as compared to net on site output of 209 MW proposed by Orient.

(b) Quantum

25. The proposed plant will have a capacity of 220 MW (ISO rating) in the first phase. Later on a second phase of about 200 MW is to be added to achieve capacity of about 400MW at one place. A 400 MW plant on account of economy of scale in plant equipment cost, associated infrastructure cost and transmission line (plus inter connection) cost could have reduced the capacity cost per kW per month to the purchaser by about 30%. PPIB has informed that the project had been agreed on the basis of current availability of gas. Later on additional capacity of 200 MW is supposed to be added depending on gas availability in the future. This brings to light the important consideration of evaluation of an offer as the least cost option in the context of the overall requirement of power. The question of gas availability remains uncertain irrespective of what size of plant is installed initially. The sponsors could have been asked to install the ultimate size of the plant or offers could have been solicited for the same from other intending investors in an open and competitive mode. The requirement of meeting the peak demand at the location of the proposed plant is more than 400 MW. The installation of the plant was required to be evaluated on an overall power requirement basis accordingly instead of splitting up and phasing of the project into two equal parts. This could have saved the power purchaser and in turn the ultimate consumers of power by about 15% of the overall power procurement cost in the long run
26. In view of the Power Procurement Regulations effective since March 16, 2005, and to arrive at the most optimum solution with respect to size of a plant in future, NTDC is directed to strictly follow the said regulations and adopt only the lowest cost option.

(c) Location

27. The location of the plant is proposed to be within the load demand area of LESCO, FESCO and GEPCO where capacity additions are required to be as near to the load centers as possible. Therefore the location is appropriate and agreed to in view of the demand projections of these Discos provided by NTDC.

(d) Timing of Induction.

28. We have been informed by NTDC that approximately 1663 MW of power generating capacity needs to be augmented if peak demand in 2007 is to be met without recourse to load shedding. However the areas of peak demand requirement and the transmission system configuration have to be examined to ensure that power from OPCL is made available to meet area wise peak demand as close to the time of occurrence of demand as possible
29. We have been informed by NTDC that the load demand in winter peak of January 2007 requires additional power mainly in the area FESCO, LESCO and GEPCO to the tune of about 1700 MW. Power generated from Orient Power even to the extent of 400 MW can therefore be effectively utilized to meet the demand in 2007 in the aforesaid area.

**Availability of Gas and Choice of Alternate fuel.**

30. OPCL has proposed to install a combined cycle steam and gas (STAG) plant. During the proceedings the question of assured availability of gas through out the life of the project on annual basis was examined. It was revealed that there is no formal fuel supply agreement between the fuel supplier and OPCL. This was a matter of concern for the Authority because the proposal and tariff application of the investor was based on gas usage with diesel as back up fuel.

31. In this context, PPIB vide their letter dated 26.02.2005 addressed to OPCL informed that gas availability is confirmed on 9 months in a year basis only up to 2009-10 and that gas availability beyond 2009-10 will be subject to anticipated supply through new discovery in the country or through import. The matter was referred to the Secretary, Ministry of Water & Power by the Authority vide its communication of 25<sup>th</sup> March 2005 in which the Ministry of Water & Power was apprised of the significance of the adverse impact on consumer end tariff in case of non availability of gas and use of diesel as an alternate fuel. In response the Ministry of Water & Power vide PPIB No. 1(102)PPIB-1003/05/PRJ dated 27.4.2005 informed that the approval for new power projects until 2011 is based on existing gas supply contracts, most of which are expiring between 2011-2014; however, in all likelihood new supply contracts will be made on the basis of imported gas or new discoveries. PPIB further informed that the GoP guaranteeing the supply of gas only until 2011 does not mean that supplies will be suddenly cut off after 2011 and it is expected that gas will continue to be supplied to new power projects beyond 2010 may be for a period of less than 9 months in a year. Once gas imports start, as projected in 2011 supply for full 12 months is expected for the long term.
32. The correspondence received from the Ministry of Water & Power in no manner, assures continuous supply of gas for the life of the project even for 9 months in a year. We have received no other assurance from any quarters and pleadings from the applicant only mention expectations of import or new discoveries. In such a situation the Authority can not ignore (a) the possibility of a shortage of gas at some stage in the 25 years period, (b) a price of imported gas which makes LSFO a favorable alternative or a policy of preference of gas usage for other industries and fertilizers

instead of usage in power generation for future projects. Therefore we are constrained to consider the comparison of alternate (a) combined cycle power plant operating only on gas with the risk of high fuel cost in case of non-availability of gas and usage of diesel as alternate fuel (b) a dual fired RFO + Gas based combined cycle power plant with the risk of lower efficiency in fuel usage if gas is made available through out the life of plant through imports or new discoveries at comparable prices.

33. Various scenarios were examined and sensitivity analysis carried out by comparing the two options for different gas availability scenarios ranging from 3 to 9 months in a year and lowering of availability at various stages during the life of the project. The results indicate that gas based combined cycle plant can only be preferable to the dual fired technology if diesel usage is restricted to two months in a year during the peak period and around 9 months gas availability is assured during the remaining part of the year.
34. The Authority is aware that the non-availability of gas is mainly expected to occur in or around the winter months of December and January. Therefore if alternate fuel usage is not allowed the capacity addition would become redundant as a means of catering for peak demand in winter. As such to avail the optimum benefit of additional investments either diesel usage is to be restricted as a back up fuel during the peak winter months or dual fired LSFO CC technology has to be adopted.
35. In view of the optimism shown by both the Ministry of Water & Power as well as the sponsor regarding the prospects of the availability of gas the matter of using a less efficient plant for the life of the project and imposing an undue burden of higher variable cost (avoidable in case of availability of gas) has also to be taken

into consideration. Our prime concern is maintaining the interest of the investors as well as consumers. The matter involves an extreme level of uncertainty as to which alternative would ultimately prove better in the long run. Looking at the problem from the overall power acquisition mix, we consider that the present case of power acquisition constitutes about 5% of the generation capacity addition expected to be inducted through the private sector between now and the year 2012. PPIB intends to solicit offers in the competitive mode on a dual fired technology basis and future capacity additions can be considered on dual fired technology under the NEPRA Power Procurement Regulations. In this manner the possible effect of any adverse impact on the consumer rates in case of adopting a less than ideal arrangement can be mitigated to a large extent. As far as the sponsor is concerned, the choice of the two options should not be a matter of concern as in both cases revenues commensurate with costs and a reasonable return would be provided to him through the rates allowed, however, the dual fired technology is not being pressed in view of the insistence of the sponsor that single fuel STAG arrangement is preferable even if gas is available for 6 months in a year. However the Authority has to keep in view the interest of the consumer as well as the public interest in general regarding the scenario in which the gas availability falls down to below 6 months in a year and diesel usage during this period results in an unaffordable purchase and sale rate to the consumer or capacity acquired at the margin is made redundant due to minimal dispatch.

36. In view of the above the Authority is restricting the usage of diesel as alternate fuel to the peak winter months i.e. December and January. During the remaining months the variable rate allowed as well dispatch criteria would be based on gas usage and payment

to the operator would be made on the variable charge on gas irrespective of actual type of fuel usage.

### **Length of tariff control period**

37. OPCL has requested a tariff for 25 years. The tariff is front loaded with average tariff of Rs.3.041/kwh for the first 10 years and Rs.2.10/kWh for the next 15 years. OPCL has not signed any contract with a gas distribution company. 75% of the project cost is proposed to be financed by rupee based commercial debt. The tenure of this debt would be 10 years with initial two years grace period. The normal life of a generation plant is 30 years. The terms and conditions of PPA have to be treated separately from the tariff. An advanced tariff for each of the 25 years separately cannot be given upfront save to the extent of a limited control period with adjustment specified in a formula for variation of fuel price adjustment and other adjustment factors which can be linked to a price or rate indicator as allowed by the Authority. However, the investor would require some form of pre determined tariff for the future on which a revenue stream can be assured such that a loan can be secured from a lender in the market and a reasonable share of equity in the capital structure is attracted.

A tariff control period of longer than 7 years can not be considered an incentive based multi year tariff because the basic cost drivers, applied indexation parameters and efficiency gain avenues are expected to change and would therefore require regulatory intervention for correction. On the other hand the private investor would need at least a ten-year period of assured revenues to be able to match revenues to the loan repayment requirement. As per confirmation made by our experts, the banking institutions are not prepared to lend money to the intending generating companies for

a period beyond 10 years. This arrangement requires an agreement of at least 10 years assured revenues through tariff and a total repayment of loan within this period. This would result in a higher capacity cost or fixed charges per month to the consumer in the first 10 years as compared to the later 15 years. It would therefore be fair to allow the purchaser to avail the benefit of reduced fixed capacity charges in the later 10 to 15 years to compensate for the higher fixed capacity charges in the first 10 years.

38. Within the given constraints, therefore, a 25-year period of power purchase arrangement can be allowed. The tariff allowed during this period would specify a rate for the first 10 years and the remaining 15 years in accordance with Rule 6 of the Generation Licensing Rules 2000. The specified tariff would include allowed indexations for inflation, fuel etc., as determined later in this determination. The specified tariff along with the allowed indexation would set the maximum limits of rates at which SPGL can sell power to NTDC on behalf of DISCO(s). During the currency of power purchase agreement, after the competitive market operation date (CMOD), SPGL may of its own volition, charge a reduced variable charge in accordance with the terms and conditions of its licence.

### **Inter Connecting Transmission Line**

39. The plant is proposed to be connected to 132kV Lahore Sub transmission system Ring by 55km long Transmission Line to be constructed by NTDC. The assets of the existing 132kV system belong to LESCO and as such the proposed new line is expected to become part of LESCO's asset base. In this context, Information direction was issued to NTDC for explaining the sources of financing the line, any agreement with LESCO for construction of the line on its behalf and the impact on tariff. NTDC has confirmed

that Orient will provide financing for the line which will be paid by NTDC out of its own sources (revenues) and increase in tariff won't be requested on account of the cost of the line. NTDC has requested that it may be allowed to construct the line as provided in NEPRA rules and the License granted. Accordingly the arrangement is allowed. The proposed interconnection transmission line will be considered as the assets of NTDC till such time as otherwise directed by NEPRA. The responsibility of the availability of interconnection line for dispersal of power lies with OPCL and the availability will be considered a pre-condition for the inception of the power purchase and obligation of payment of generation capacity.

#### **Capital Cost of the project**

40. Orient has proposed a non standard configuration of steam and gas (STAG) power plant with a smaller steam turbine falling in between the versions of GE 206FA and GE 206FA+. As the economy of Combined Cycle Power Plant is enhanced by means of the steam turbine, the Authority is of the view that the standard configuration as given in GTW Hand book 2004 Edition with steam turbine of 92 MW is the optimum consideration within the range instead of the combination with reduced size of steam turbine as proposed by Orient. PPIB vide letter No. 1(102)PPIB-1003/05/PRJ dated 26<sup>th</sup> February, 2005 has indicated the availability of natural gas from SNGPL for power plants starting from 247 MMCFD and concluding with 94MMCFD in 2010-11. Further, Orient has been allocated 38MMCFD for 200 MW gas and can be allocated additional gas if required for the additional requirement of the standard steam turbine. The Plant and Equipment cost (PEC) of the project has been estimated at \$110.4 million for standard configuration S-206FA+ as per GTW Handbook as compared to Orient's Basic Equipment cost of \$108.5 million estimated vide Letter No OPCL-2005/5/NB9 dated May 16, 2005 for the proposed reduced version.

Orient had originally proposed \$118.5 million as Basic Equipment cost vide their letter No. OPCL2005/2/NB11 dated February 28, 2005 out of the total project cost of \$170 million. After adjusting the basic equipment cost to \$108.5 million in the light of Orient letter dated May 16, 2004, the original proposed Project Cost works out to \$160 million out of which non-equipment cost works out to \$51.5 million. By allowing the standard configuration of GE S-206FA+ for US\$ 110.4 million and non equipment cost of US\$ 51.5 million, the project cost is adopted at US \$ 162 million. Orient's non-equipment cost works out to 32% of the project cost for 237.9 MW of net capacity, which is acceptable.

## **COST OF CAPITAL**

### **Cost of Debt**

41. The applicant has proposed a cost of debt of KIBOR (Karachi Inter-bank Offer Rate) plus 300 basis points. Any variation in KIBOR is proposed to be passed-through with the spread remaining the same. In its previous determinations for ex-Wapda companies, the Authority has allowed a fixed rate for cost of debt as part of tariff. This practice was appropriate as it reflected the actual debt profile of these companies. In the present case, a private commercial enterprise is planning to borrow from the banking sector. Lending at floating rates has largely replaced fixed rate lending in the local banking sector. KIBOR is presently the most commonly used benchmark for floating rate in Pakistan, which is usually adjusted after every three or six months.
  
42. Allowing a fixed interest rate as cost of debt in the tariff would result in a comparatively less volatile tariff structure. However it would entail additional risk for the investor who is facing a floating rate environment, having little relationship with the cost of debt recovered from a fixed interest rate. In such a lending environment if the banks agree on lending at a fixed rate, such a fixed rate

would be kept quite high in order to give a safety margin to the banks to cater for expectation of future rise in interest rates. If the tariff is based on a fixed interest rate and the applicant borrows at a floating rate, the applicant may be able cover the risk of variation between a floating rate and fixed rate by getting into a swap arrangement. However, given the lack of depth in the local derivatives market, such an arrangement is expected to increase the risk of the investor. Such incremental risk would have to be considered while determining the fixed rate and may increase the tariff burden on the consumer, which can be avoided by allowing the floating rate.

43. Financial Markets are going through a phase of rising interest rates and this trend is expected to continue for the foreseeable future. Therefore, in order to avoid the risk of a vast variation between allowed and actual interest rates in future years, a floating interest rate arrangement is considered appropriate both for the consumers as well as investors. As local borrowing is largely pegged to KIBOR, therefore allowing only a fixed interest rate will be a disincentive for local borrowing. As such, another consideration in allowing a floating interest rate is to encourage local borrowing.
44. The applicant has requested for a cost of debt based on 6-month KIBOR adjustments twice a year which is considered reasonable and 6 monthly adjustment is allowed. The quantum of financing needed has a major impact on the interest rate. Higher the amount borrowed, lower is the interest rate. Considering that the amount of borrowing needed for the project is more than Rs. 7 billion, therefore the loan is expected to be obtained at a comparatively favorable rate. Additionally, as opposed to a higher liquidity risk, longer-term loans generally also entail a lower reinvestment risk for the banks. Furthermore, it would be unfair to compare this power generation project with other normal commercial projects. Normal

commercial projects have no assured revenue stream and are highly vulnerable to downside risk. Theoretically a commercial project can earn unlimited profits and it can also incur unlimited losses. This is not the case in the present situation. Orient will have a contractual arrangement of an assured revenue stream in the form of capacity purchase price which covers all or most of its fixed costs irrespective of whether or not there is any actual operation. Such assured revenues mitigate any downside risk and therefore do not justify the claim for a higher cost of debt than for commercial projects exposed to downside risk.

45. In view of the aforementioned, a 1.5% premium over 6-month KIBOR is considered as reasonable and allowed. The KIBOR used will be 6-month KIBOR, ask side, and any adjustments in KIBOR will be made bi-annually. The KIBOR will be adjusted every six months on January 01 and July 01 each year based on the prevailing KIBOR on the previous business day as posted on the State Bank of Pakistan website. An adjustment mechanism is being prescribed in the indexations allowed to the sale/purchase rate.

### **Cost of Equity**

46. The applicant has requested a return of equity of 15% net of a 7.5% withholding tax on dividends.

Cost of equity is determined utilizing the basic CAPM formula:

$$k_e = R_f + (R_m - R_f) \times \beta$$

where,

$R_f$  = Risk-free rate of return

$R_m$  = Market rate of return, also  $(R_m - R_f)$  is called market risk premium

$\beta$  = Beta, the measure of systematic risk

The values of these variables that we used are:

Risk-free rate	=	<b>10.2%</b> , based on current yield for 10-year PIB
Market Risk Premium	=	<b>4.1%</b> , based on current KSE-100 index return differential with risk free rate
Beta	=	<b>1.15</b> , using a proxy asset beta and re-leveraging the proxy asset beta according to applicant's capital structure of 75:25

Using the CAPM formula, we get a **Cost of Equity of 14.92%**

- a. Given the proposed capital structure and the present market trends, a 15% post-corporate tax return on equity is considered reasonable and allowed. Any corporate taxes paid by Orient will be treated as pass through. However, as per common business practice, the withholding tax on dividends is a liability of the investor and cannot be passed on to consumers. Therefore withholding tax on dividends is not allowed to be passed on to consumer.

### **Fuel Cost**

- 47 The fuel cost has been calculated on the basis of efficiencies at site conditions on the following reference values:

#### **Natural Gas**

Efficiency of Combined Cycle Plant (Full Load)	51.2%	
Reference Price	197.110	Rs./MMBTU
Heat Rate	6,666	BTU/kWh
Fuel component on Gas	1.3139	Rs./kWh

#### **Diesel**

Efficiency of Combined Cycle Plant (Full Load)	48.5%	
Reference Price	29.13	Rs./Litre
Heating Value	40,140	MMBTU/Litre
Heat Rate	7,037	BTU./kWh
Fuel component on Diesel	5.1069	Rs./kWh

### **O&M Costs**

48. The applicant has proposed to recover the O&M Costs for 209MW of net output as under:

Variable -Local	Rs.0.0550/kWh
Foreign	Rs.0.1560/kWh

Escalable Capacity Charges-

Foreign - Rs.221.76/kW/month as under:

ROE	Rs.164.88
Insurance	33.49
Foreign O&M	23.39

Local -Rs.49.15/kW/Month as under:

Interest on working capital	Rs. 9.92
Local O&M	39.23

Non-escalable Capacity Charges

Debt Servicing Year1-10 on average -

Rs.412.24/kW/Month

49. The variable charge per kWh was objected to by KESC in the hearing as being too high and such a high variable cost would burden the consumers. Orient explained that they had proposed to recover most of the major overhaul costs on annualized basis through variable charge on firing hours basis rather than the recovering these costs through capacity charges. The Authority has allowed Rs.0.0895/kWh to Star Power having capacity of 130 MW and consuming low BTU gas. Orient during the hearing indicated that their machines being of high efficiency later technology of F Type are more expensive to maintain as compared to other machines. The Authority is of the view that the variable cost on a per kWh basis should be comparatively lower than that of Star Power as the maintenance cost of power plant consuming low BTU gas on a lesser scale and size of plant is expected to be higher. Accordingly a charge of Rs.0.0895 per kWh is allowed.
50. The fixed O&M costs requested by Orient have been segregated into ROE, Debt Servicing, Insurance and fixed maintenance costs. The ROE and Debt Servicing costs are being allowed on the basis of

project cost and insurance is being allowed on the basis of EPC costs. The fixed O&M costs allowed to Star Power are Rs.101.64/kW/Month for 126 MW of capacity. The Authority is of the view, per kW/month cost of Orient should be lower for 226 MW of capacity, and considers Rs.95.53/kW/Month to be reasonable escalable fixed O&M for Orient Power. The insurance cost is not subject to any variation due to inflation, therefore, it is not included in the escalable fixed component of capacity charge. Also the return on equity is in nominal term and the inflationary effect is included in the rate, therefore return on equity part is not included in the escalable component of the fixed capacity charge. The interest part of debt servicing is based on KIBOR and adjustment for variation in KIBOR is being allowed on 6 monthly basis.

51. The project is proposed to be set up on BOO basis and after the expiry of the 25 years term of the PPA, will be owned by Orient. 75% of the project cost is being allowed to be recovered in the first 10 years through debt servicing charge. Thus accelerated depreciation of the 75% of the project cost is being allowed in the first 10 years. The normal useful life of a thermal power plant is expected to be 30 years while 75% of the depreciation is allowed in the first 10 years in a 25 years term. Thus the consumer would pay for the 5 years left over useful life for which a fair adjustment is required. The depreciation of the 75% of the project cost @3% P.A for 5 years has been credited equally to fixed O&M, which has been determined as a fair adjustment for the left over useful life of the plant.
52. Incorporating the above elements of cost the fixed and variable charges are allowed as per Annexure - I.

### **Indexation/Escalation**

53. The following items on which costs have been based and which are expected to be varied during the tenure of the PPA are not in the control of the operator and therefore are considered pass through items such that the sale purchase rate is varied to incorporate the variation in the relevant cost elements.

i) INFLATION

a) Local Inflation (CPI) applicable to fixed O&M.

The Fixed O&M part of Capacity Charge will be adjusted in future, on account of Inflation (CPI) only. Indexation due to inflation will be made twice a year on January 1 and July 1, on the basis of CPI as notified by the Federal Bureau of Statistics (FBS) for the month of November & May respectively. Adjustment in case of inflation indexation will be approved and announced by the Authority within seven days of the applicable date. OPCL may submit a request prior to the applicable date indicating the level of indexation estimated for the period.

(b) Foreign exchange rate variation applicable to variable O&M

The variable O&M part of Variable Charge will be adjusted in future on account of variation in \$/Rupee exchange rate. Indexation on this account will be made twice a year on January 1 and July 1 on the basis of revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan in Rupees Per US \$.

ii) Adjustment for KIBOR variation

54. The interest part of non-escalable fixed charge component will be adjusted on account of variations in interest rate as a result of variation in 6 months KIBOR.

(iii) Fuel Price Variation

55. The Variable Charge part of the tariff relating to fuel cost shall be adjusted on account of the fuel price variations as and when notified by the relevant authority, which in the instant case is OGRA.

## **ORDER**

56. Pursuant to Rule 6 of the NEPRA Licensing Generation Rules 2000, Orient Power Company (Pvt) Ltd is allowed to charge the following specified tariff for sale of electricity to Central Power Purchase Agency of NTDC on behalf of Ex-WAPDA Distribution Companies:

### **Specified Tariff**

<b>Description</b>	<b>First 10 years</b>	<b>Next 15 years</b>	<b>Indexation</b>
<b>CAPACITY CHARGE *</b>			
	<b>Rs./kW/Month</b>	<b>Rs./kW/Month</b>	
Fixed O&M	79.40	79.40	Local CPI
Insurance	30.09	30.09	Nil
Return on Equity	134.40	134.40	Nil
Debt Service	431.39		KIBOR
<b>Total Fixed Charges</b>	<b>675.29</b>	<b>243.89</b>	
<b>VARIABLE CHARGE</b>			
<b>(a) Variable Charge (A):</b>	<b>Rs./kWh</b>	<b>Rs./kWh</b>	
During the year excluding the two months of January and December.			
Fuel Cost	1.3139	1.3139	Fuel Price
Variable O&M	0.0895	0.0895	\$ to Rupee
<b>Total Variable Charge (A)</b>	<b>1.4034</b>	<b>1.4034</b>	
Dispatch criterion will be variable charge during this period (i.e. ten months in a year other than the months of January and December.			
<b>(b) Variable Charge (B):</b>	<b>Rs./kWh</b>	<b>Rs./kWh</b>	
During the months of January and December.			
Fuel Cost	5.3827	5.3827	Fuel Price
Variable O&M	0.0895	0.0895	\$ to Rupee
<b>Total Variable Charge (B)</b>	<b>5.4722</b>	<b>5.4722</b>	
Dispatch criterion will be variable charge (B) during this period (two months of January and December.			
<b>(c)</b> If gas is available during the two months of January and December in a year, variable charge as well as dispatch criterion will be based on variable charge (a) for the energy generated on gas as fuel during the two months of January and December.			

\*Capacity Charge, Rs./kW/Month applicable to dependable capacity.

Note: The above tariff is applicable for a period of 25 years commencing from the date of Commercial Operation

The Specified tariff will be subject to the following adjustment:

i) INFLATION

a) Local Inflation (CPI) applicable to Fixed O&M.

The fixed O&M part of the capacity charge will be adjusted in future, on account of Inflation (CPI) only. Indexation due to inflation will be made twice a year on January 1 and July 1, on the basis of CPI as notified by the Federal Bureau of Statistics (FBS) for the month of November & May respectively. The mode of indexation for escalable component will be as under:

$$(i) \quad F O\&M_{(REV)} = Rs.79.40 \text{ per kW per month} * CPI_{(REV)} / 126.53$$

Where:

$$F O\&M_{(REV)} = \text{The revised applicable Fixed O\&M component of the Capacity Charge}$$

$$CPI_{(REV)} = \text{The Revised Consumer Price Index}$$

$$\text{Reference CPI} = 126.53 \text{ consumer price index for the month of April 2005 notified by Federal Bureau of Statistics for the month of March 2005.}$$

(b) Foreign exchange rate variation applicable to variable and Fixed O&M

The Variable O&M part of variable charge will be adjusted in future on account of variation in \$/Rupee exchange rate. Indexation on this account will be made twice a year on January 1 and July 1 on the basis of revised TT & OD selling rate of US Dollar as notified by the National Bank of Pakistan in Rupees per US \$.

The variable O & M component of the variable charge will be revised as under:

$$V O\&M_{(REV)} = Rs.0.0895 \text{ per kWh} * ER_{(REV)}/60.$$

Where:

$$V O\&M_{(REV)} = \text{The revised applicable Variable O\&M component of the variable charge.}$$

$$ER_{(REV)} = \text{The Revised TT \& OD selling rate of US dollar as notified by the National Bank of Pakistan in Rs per US\$}.$$

ii) Adjustment for KIBOR variation

The interest part of non-escalable fixed charge component will remain unchanged throughout the term except for the adjustment due to variations in interest rate as a result of variation in six monthly KIBOR according to the following formula;

$$\Delta I = I_{(REF)} * (KIBOR_{(REV)} - 8.5\%) / 2$$

Where:

$\Delta I$  = The variation in interest charges applicable corresponding to variation in KIBOR.  $\Delta I$  can be positive or negative depending upon whether  $KIBOR_{REV} >$  or  $< 8.5\%$ . The interest payment obligation will be enhanced or reduced to the extent of  $\Delta I$  for the half yearly period under adjustment applicable on six-monthly basis to the Interest Charge payment.

$KIBOR_{(REV)}$  = The revised KIBOR for the half yearly period under review.

$I_{(REF)}$  = The amount of interest payable for the respective half yearly period to which adjustment is applicable. Half yearly payments indicated as per the following table.

Half yearly Period	Interest payment $I_{(REF)}$ mln Rs.
1	364.50
2	353.48
3	341.90
4	329.75
5	316.99
6	303.59
7	289.52
8	274.75
9	259.24
10	242.95
11	225.85
12	207.89
13	189.04
14	169.24
15	148.46
16	126.63
17	103.71
18	79.65
19	54.38
20	27.86

**Note:** Period 1 shall commence on the date on which the first half yearly installment is due after availing the grace period.

(iv) Fuel Price Variation

The Variable Charge part of the tariff relating to fuel cost shall be adjusted on account of the fuel price variations as and when notified by the relevant authority, which in the instant case is the Oil & Gas Regulatory Authority. In this regard, the variation in OPCL's allowed rate relating to fuel cost shall be revised according to the following formula:

$$(a) \quad FC_{(RevG)} = Rs.1.3139 \text{ per kWh} * FP_{(RevG)} / Rs.197.11 \text{ per MMBTUs.}$$

Where:

$$FC_{(RevG)} = \text{Revised fuel cost component of Variable Charge on Gas.}$$

$$FP_{(RevG)} = \text{The new LHV fuel price of Gas as notified by the relevant authority per MMBTUs of gas}$$

$$(b) \quad FC_{(RevD)} = Rs.5.3827 \text{ per kWh} * FP_{(RevD)} / Rs.0.000765 \text{ per BTU.}$$

Where:

$$FC_{(RevD)} = \text{Revised fuel cost component of Variable Charge on Diesel.}$$

$$FP_{(RevD)} = \text{The new LHV fuel price of Diesel as notified by the relevant authority per BTU of fuel.}$$

Adjustment on account of inflation, foreign exchange variation, KIBOR variation and fuel price variation will be approved and announced by the Authority within seven days of the applicable date. OPCL may submit a request prior to the applicable date indicating the level of indexation estimated for the period. The adjustment so determined shall be intimated to OPCL and NTDC within 7 working days of the notification of fuel price variation.

Terms and conditions of tariff.

- i) Gas usage will be considered the primary fuel subject to (iii)
- ii) All equipment installed will be new and the plant will be of standard configuration as given in the GTW Handbook 2004.
- iii) Dispatch will be based on the variable charge applicable at the time as under:

**a) Variable Charge A:**

Variable charge during the year excluding the two months of January and December. Dispatch criterion will be variable charge during this period (i.e. ten months in a year other than the months of January and December.

**b) Variable Charge B:**

During the months of January and December. Dispatch criterion will be variable charge B during this period (two months of January and December).

c) If gas is available during the two months of January and December in a year, variable charge as well as dispatch criterion will be based on variable charge (a) for the energy generated on gas as fuel during the two months of January and December.

iii) Diesel oil will be used only for startups and other contingent requirements save to the extent of usage allowed for variable charge application and dispatch criterion as per clause (ii) above. Use of Diesel oil as main fuel during the ten months in a year other than the months of January and December in case on non-availability of gas (except in Force Majeure conditions as declared by the Authority) dispatched on variable charge A during the period shall not entitle OPCL to claim a charge higher than variable charge A.

The above tariff and terms and conditions be incorporated as the specified tariff approved by the Authority pursuant to Rule 6 of the Generation Licensing Rules, in a Power Purchase Agreement between OPCL and NTDC.

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Nasiruddin Ahmed  
(Member)

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Abdul Rahim Khan  
(Member)

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Fazlullah Qureshi  
(Member)

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Lt Gen (Retd.) Saeed uz Zafar  
(Chairman)

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