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Singareni Bhavan, Red Hills, Lakdi ka Pool  
Hyderabad

31 July 2014

**Sub: Study report for Determination of Fixed Cost norms for Non-Conventional Energy Sources (Wind Projects)**

**Ref: Lr. No. APERC/E – 801(H)/Dir-Engg/JD(PPP)/D.No. 74/2014-01 Dated 17-01-2014**

Dear Sir,

We have been retained by APERC to provide consultancy services vide the LOI cited under reference above.

Accordingly, we have analysed the performance of the Wind players based on information furnished to us. Based on our findings, analysis and discussions held with the Commission, we have prepared the Study Report on “**Determination of Fixed Cost norms for Non-Conventional Energy Sources (Wind Projects)**”.

Please find enclosed Final Study Report for your reference.

Yours Sincerely

Best Regards,

Srinivasa Rao Patnana

Associate Director, KPMG Advisory Services Private Limited

**STUDY REPORT FOR DETERMINATION OF FIXED COST NORMS FOR NON  
CONVENTIONAL ENERGY SOURCES (WIND PROJECTS)**

**31JULY 2014**

## Table of Content

Introductory Note .....	3
1 Background .....	4
2 Performance analysis of existing Wind power projects .....	6
3 Tariff proposal filed by APCPDCL on wind tariff .....	8
4 Wind tariff fixed by other SERCs .....	9
5 Conclusion .....	10

## **Introductory Note**

This study report has been done by KPMG for Andhra Pradesh Electricity Regulatory Commission for determination of Fixed cost norms for Wind Energy Generation projects in the erstwhile Andhra Pradesh state for the future. This exercise was done over the period January, 2014 to July, 2014 and the recommendations on the adoption of fixed cost norms for Wind Energy Generation projects have been documented in the study report.

## 1 Background

Government of India (GoI) formulated a policy framework in FY 1993-94 for promotion of generating capacity from Non-Conventional Energy (NCE) sources with the objective of conserving fossil fuels and to reduce environmental pollution arising out of the emissions following the combustion of fossil fuels. The NCE sources consisted of the following

- Biomass based Power Projects
- Bagasse based cogeneration Power Projects
- Industrial Waste to Energy Projects
- Municipal Waste to Energy Projects
- Mini Hydel Projects
- Wind Electricity Generation Projects

The policy framework provided incentives and facilities for promoting capacity addition through NCE sources. Among other parameters under the policy framework, the tariff payable for power from the NCE sources was predetermined in 1993-94 to take effect from 01-04-1994 with escalation year-on-year.

This policy framework had set a tariff of **Rs. 2.25/Unit** for wind power for FY 1994-95. An annual escalation of 5% was allowed on this tariff. The wind developers were paid at this tariff till March 2004.

APERC directed APTRANSCO and NEDCAP to file tariff proposals for tariffs and incentives for various categories of NCE projects to be applicable from 01 April 2004. APERC while determining the tariff for NCE sources was guided by the following principles of The Electricity Act, 2003

- Section 86 (1) (e) of the Electricity Act, 2003 provides that State Regulatory Commission would promote renewable and NCE sources.
- Section 86 (1) (a) of the Electricity Act, 2003 empowers the State Commission to fix the tariff for generating stations in the State.

APERC analysed the proposals submitted by APTRANSCO and NEDCAP, considered the environmental benefits from NCE sources and determined the tariff for NCE sources in its March 2004 order.

APERC in its March 2004 order stated that *“The Commission likes to retain the base unit price of Rs. 2.25 as on 1.4.1994 and the escalation index of 5% p.a. But, the escalation would be simple and not compounded every year. In other words, the base price as on 01-04-2004 will be Rs. 3.37/kWh. As these projects have no variable expenses and negligible increase in maintenance cost, the tariff will be frozen for a period of five years, to be reviewed however, thereafter”*. The order also stated that a further review of the individual projects will be undertaken on completion of 10 years of the project.

Subsequently, APERC in its March 2009 order after considering the views of all stakeholders decided to continue with the tariff of **Rs. 3.37/Unit** for Wind based power projects for the five year period 01 April 2009 to 31 March 2013.

Most of the wind projects in the state have already crossed their 10<sup>th</sup> year of operation and there is a need to determine the tariff for these wind projects for remaining life of the project. Hence, APERC has undertaken this exercise for determination of tariff for wind projects for the remaining life of the project life.

This study report looks at performance of wind projects and suggests suitable tariff options.

## 2 Performance analysis of existing Wind power projects

Andhra Pradesh is blessed with good wind potential. The total wind potential in the state is nearly 6000 MW. Ministry of Non-Conventional Energy Sources in order to encourage wind power projects had decided on a tariff of **Rs. 2.25/Unit** for FY 1994-95 with an annual escalation of 5%. The following mentioned points encouraged wind developers to install wind power projects in Andhra Pradesh

- Accelerated depreciation up to 80% of the project cost was allowed in its first year of operation
- Andhra Pradesh Government granted capital subsidy to wind developers to the extent of 20% of project cost subject to a ceiling of Rs. 25 lakhs.
- Government land was given on lease for a period of 20 years out of which first 5 years were rent free

The above mentioned steps encouraged a lot of wind players to set up wind projects in Andhra Pradesh. Currently, the total installed capacity of wind power in Andhra Pradesh is around 700 MW.

As most of the wind projects were set up before FY 2008-09 and hence for such wind players, tariff was not determined as per any norms. The wind players were being paid a tariff of **Rs. 3.37/Unit** from 01 April 2004. It has been argued by wind developers that tariff has not been computed based on particular norms and tariff fixed is too low. Low PLF of wind plants (Average ~14%) has along with high costs of operation has further worsened the situation for wind power developers.

A sample of wind power players - Nile, Weizmann and ILFS were selected for the performance analysis. Some of the wind players had consolidated balance sheet for varied businesses apart from wind power generation and hence performance analysis of such wind players was not done.

The following table summarises a comparative analysis of the wind players

**Table 1 : Comparative analysis of Wind players for the period FY 04-05 to FY 12-13<sup>1</sup>**

Parameter	Nile	Weizmann	ILFS
Capacity (MW)	2	8	6.5
Capital Cost (Rs. Lakh/MW)	370	450	483
CUF (%)	12-16%	9-12%	10-14%
Debt (Rs. Lakh/ MW)	No Loan taken	337	No Loan taken
Outstanding Debt at the end of 10 years (Rs. Cr.)	0	0	0
O&M Expenses (Rs. Lakh/MW)*	8-17	8-19	13-28

It can be seen that capital cost of the project varied from Rs. 370-480 Lakh/MW. Government of Andhra Pradesh had given a capital subsidy of Rs. 25 Lakh to wind players effectively reducing their capital cost infusion by 6.25%. Most of the projects have been funded completely by equity indicating the strong financial health of the wind players.

The average interest rate of the term loans taken by the wind players is around 12% which was the prevailing market rate. The CUF of wind players was in the range of 12-16% which was on the lower side.

It can be observed that some parameters like Capital Cost, Interest on term loans have already been incurred by wind players while a lot of wind players have funded the capital cost requirement from equity. It can be ascertained that performance of wind players on all operational parameters is good except the CUF.

<sup>1</sup>Annual accounts



### 3 Tariff proposal filed by APCPDCL on wind tariff

Central Power Distribution Company of Andhra Pradesh Limited (APCPDCL) had filed for tariff proposals for determination of tariff of wind plants on completion of 10<sup>th</sup> year of operation till the life of the project.

APCPDCL had assumed the following norms for computation of tariff for wind projects

Table 2 : Norms proposed by APCPDCL for wind tariff		
	Units	APERC June 2013 Order (Based on APTEL norms)
Project Life	Years	20
Capital Cost	Rs. Cr/MW	4.0
CUF	%	20%
O&M expenses (1 <sup>st</sup> year of operation)	% of Capital Cost	1% of Capital cost
O&M Annual escalation	%	4%
Debt: Equity Ratio	Ratio	70:30
Depreciation	%	7.84% (Till accumulated Dep >70% ) Remaining depreciated equally over remaining project life
Interest on Debt	%	14%
ROE	%	14%
Interest on Working Capital	%	12% (1 month O&M, 1 month receivable)

The initial tariff as per MNES guidelines of Rs. 2.25/Unit and revised tariff as per APERC 2004 and 2009 order of Rs. 3.37/Unit were not computed based on any norms.

APCPDCL has considered that entire loan is repaid by the end of 10<sup>th</sup> year and also allowed for 70% of depreciation in the first 9 years of operation. Hence, no interest cost and very low depreciation cost has been considered by APCPDCL for computation of tariff. APCPDCL as per the following norms had computed a tariff of Rs. 1.43/Unit for wind projects on completion of their 10<sup>th</sup> year of operation till

the life of the project. This approach of computing tariff based on norms midwaylife of project is not fair either to wind players or the Distribution licensee and is always open to debate from both sides.

#### 4 Wind tariff fixed by other SERCs

The other State Electricity Regulatory Commissions (SERCs) have also set the tariff for wind players from 11<sup>th</sup> year onwards. Most of the SERCs have followed the approach of not computing a norm based tariff midway life of the project. The following table lists down the tariff fixed by other SERCs.

<b>Table 3: Wind tariff determined by SERCs</b>		
<b>SERC</b>	<b>Tariff Structure followed after completion of 10 years</b>	<b>Basis for arriving at Tariff</b>
MERC (Maharashtra)	Followed the MNES guidelines- Tariff at the end of 10 <sup>th</sup> year to be continued for next 3 years, and 5% increase every year for the next 7 years.	
TNERC (Tamil Nadu)	Followed the MNES guidelines for first 5 years to arrive at a tariff of Rs. 2.70/unit. Thereafter flat tariff of Rs. 2.70/unit for next 5 yrs. Later, tariff fixed at Rs. 2.75/unit for wind plants established prior to the date of tariff order (15/05/2006)	Tariff after 10 years determined on basis of parameters fixed by Commission.
KERC (Karnataka)	Order dated 11 <sup>th</sup> December 2009 stated that tenth year tariff would be applicable for the next ten years without escalation for all projects which have completed ten years of operation.	After completion of 10 years of servicing will have been fully met and only increase (marginal) would be respect of O & M expenses, but at same time the opportunity cost of power would have gone up.

It can be observed that the above mentioned SERCs have allowed for an escalation on the MNES tariff for only a specific period of time and allowed for a flat tariff thereafter. This approach was followed by SERCs as there were no norms which were followed while setting the MNES tariff of Rs. 2.25/Unit.

## 5 Conclusion

This study report analyses the tariff setting history for wind projects in Andhra Pradesh. The base tariff set by MNES in FY 1994-95 to promote energy generation from NCE sources. Apart from this, incentives like Accelerated Depreciation, Capital Subsidy etc. resulted in wind players adding significant capacity in Andhra Pradesh in mid and late 1990s. Wind developers who are due for tariff revision post the completion of 10<sup>th</sup> year of operation have argued that their plants have been operating at a low CUF and the tariff is not remunerative. Hence, tariff from 11<sup>th</sup> year onwards should be determined in a way that these wind projects do not suffer losses.

A performance analysis of sample wind players was covered. Most of the wind players have funded their projects through equity which means they had no debt and interest repayment costs. Wind players faced the issue of low CUF (Average 14%).

The proposal for wind tariff filed by APCPDCL was analysed in detail. APCPDCL had filed wind tariff proposal considering some norms and assuming the repayment of debt and interest costs by the end of 10<sup>th</sup> year. Though the MNES tariff was not determined based on any norms, APCPDCL had proposed a tariff of **Rs. 1.43/Unit** from 11<sup>th</sup> year onwards.

Other SERCs had fixed tariff for wind projects without following the normative approach.

It can be concluded that determining a norm based tariff midway through the life of project is not a correct way as the first 10 year tariff has already been paid to wind developers based on some benchmark price. A norm based tariff would not be fair to either developer or the Distribution licensee. Hence, the benchmark tariff approach should be followed to fix the tariff for existing wind plants from 11<sup>th</sup> year till completion of project life.