

**KERALA STATE ELECTRICITY REGULATORY COMMISSION
THIRUVANANTHAPURAM**

**Present: Shri. T.M. Manoharan, Chairman
Shri. Mathew George, Member
OP No 23/2014**

PETITION IN THE MATTER OF

Determination of tariff for providing shore power supply to vessels at berth by Cochin Port Trust

Petitioner : Cochin Port Trust, Willington Island, Cochin

Respondents : (1) President Cochin Steamer Agents' Association
(2) Dy Director (Supply and Aviation), Lakshadweep Administration,

Order Dated 15-12-2014

1. Cochin Port Trust has filed a petition dated 24-04-2014 to assign separate tariff for providing shore power supply to vessels at berth and also permit use of data approved by the Hon Commission from 01-04-2014 vide Regulation 33 of Kerala Electricity Supply Code, 2014 for providing shore supply to vessels at berth.
2. Petitioner intended to develop a power distribution network for providing shore supply to the ships calling at berths at different voltages depending on load requirement. Design voltage and frequency differ from vessel to vessel and there is no standardization across vessels. The voltage and frequency provided by the port has to match with the design voltage and frequency of the vessel to receive shore power. This requires investment in transformer to adjust the voltage and a frequency convertor to adjust the frequency or both.
3. It is stated by the petitioner that an emerging global best practice is the increasing use of Alternate Maritime Power (AMP) for vessels in port . The AMP is a system which allows ships to turn off their engines when in port and plug into shore side electricity supply , reducing air pollution in the port and surrounding communities. All emissions from the vessel including NOx, Sox, CO2 are eliminated from the port area when the engines are secured and ship receives power from shore side. Cochin Port Trust has requested to assign separate tariff for providing shore power supply to vessels at berth and also permit use of data approved by the Hon Commission from 01-04-2014 vide Reg 33 of Kerala Electricity Supply Code, 2014 for providing shore supply to vessels. The Respondents in the above petition are President Cochin Steamer Agents' Association and Dy Director (Supply and Aviation), Lakshadweep Administration.

Prayers

4. The prayers of the petitioner are

(i) Assign separate tariff for the shore power supply to vessels at berth as per following schedule during 2014-15:

Supply System	Fixed charge Rs/ kW/ month demand charge in Rs/ kVA/Month	Energy charge in Rs/Unit
LT	120	13.00
HT	400	12.50

(ii) To permit use of the cost data approved by the Hon Commission from 01-04-2014 vide Regulation 33 of Kerala Electricity Supply Code, 2014 for providing shore supply to vessels.

5. The petition was admitted and notices were issued fixing the public hearing on 30-07-2014 at Conference Hall Cochin Port Trust , Cochin. Sri Abdul Rahim, Executive Engineer, Cochin Port Trust presented the petition on behalf of Cochin Port Trust in the public hearing held on 30-07-2014. Respondents were absent in the public hearing.

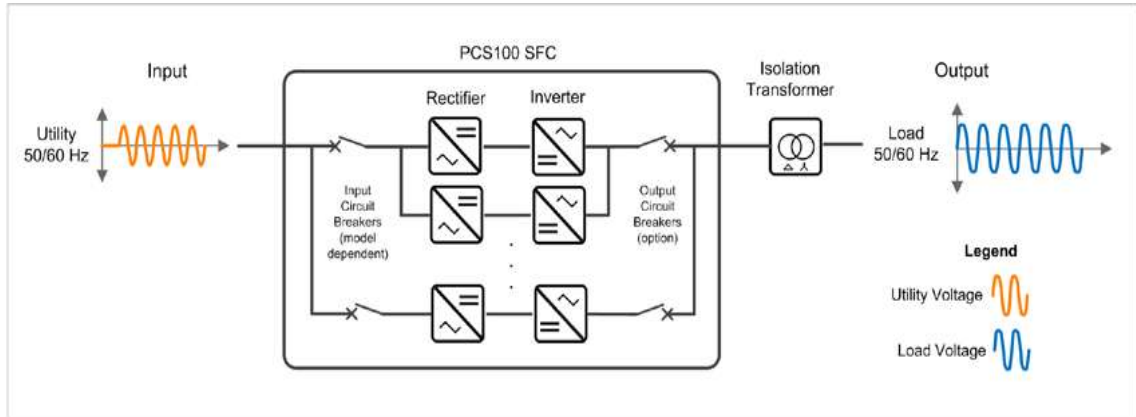
Hearing of Petition

6. The main points submitted by the petitioner Cochin Port Trust, Willington Island, Cochin during the hearing and subsequent submission are quoted hereunder:

“ An emerging global best-practice is the increasing use of Alternate Maritime Power (AMP) for vessels in port. AMP is a cold ironing system which allows ships to turn off their engines when in port and plug into shore side electricity supply, thus reducing air pollution in the port and surrounding communities. Virtually all emissions from the vessel, including NO_x, SO_x, CO₂, are eliminated from the port area when the engines are secured and the ship receives power from shore side. New regulations are being put in place in some ports like Los Angeles requiring ships to increasingly switch over from generators while in port, and use grid based power in its place; their regulations require vessel operators to rely on DG power for not more than 50% by 2014 and to 30% by 2017. The advantages of AMP is (a) to Eliminate emission of toxic fumes from DG, (b) to reduce atmospheric pollution, (c) to reduce noise level, and (d) to allow maintenance of DGs when the vessel is in harbor.

It is pertinent to note that the design voltage and frequency differ from vessel to vessel, and there is no standardization across vessels. The voltage and

frequency provided by the port has to match the vessel's design voltage and frequency for the vessel to receive shore power. This can be accomplished by inserting a Static Frequency Converter (SFC) in the supply system and rectifier units along with Isolating transformer, the SLD of which is shown below.



The

2. The electrical infrastructure required for providing AMP

It is proposed that 3 berths are to be modified suitably for extending AMP to the vessels as below, for easy connection/disconnection of the shore power.

Location	HT /LT Cables	HT Switch gears	SFC	Isolating Transformer	Control room	LT Switch gears
	Mtrs.	Nos.	Nos.	Nos.	Sqmtr	
BTP Berth	1500	1	1	1	1000	1
UTL berth	1600	1	1	1	1000	1
Q9/Q8 berth	1700	1	1	1	800	1
Total	4800	3	3	3	2800	3

2. Estimate of power infrastructure to be provided for AMP in CoPT

Sl. No	Description	Qty	unit	Rate in Rs Lakhs	Amount in Rs Lakhs	Remarks
1	HT Circuit breakers (VCB)	3	Nos	15	45	

2	1000 KVA dry type transformer with ratio of 11KV /485V/415V/230V, with all types of protection system	3	Nos	50.12	150.36	BP= 40 Lakhs+10.3 E.D+VAT@14.5 %+0.5% for storage
3	HT and LT Cables including termination kits	4.8	Km	25	120	
4	Frequency converters, Isolating trfrs, associated CBs etc	3	Nos	230	690	BP= 172 Lakhs+10.3% E.D+14.5% VAT+ Contractor's profit
5	Control rooms at berths	3	Nos	18	54	
6	Labour charge				101.592	
7	Earthing system	LS			25	
8	Other statutory expenditure	LS			25	
9	Service tax @ 12.36% on Labour				12.56	
	Total				1223.51	

Note: The estimate is prepared based on the budgetary offer furnished by M/s ABB, Bangalore, for SFC and Isolating transformer. For other equipments the figures are taken from the SoR approved by CPWD, Delhi rate with escalation of 36% and KPWD approved rates.

3. Method of computation of operating cost

Sl. No	Description	For additional facility	For existing facility
1	Repair and Maintenance cost	2.42% of GFA as recommended by the consultant (GFA= Rs 1210 Lakhs)	As per consultant's recommendation @ 2.42% of GFA and 10% increase there from. (GFA= Rs 3897 Lakhs during 2013-14 and 15%

			increase there from) GFA during 2014-15= Rs 3897.29 as approved by the Commission and 15% increase there from.
2	Employee cost	@ Rs 21200/- per consumer as recommended by the consultant. Assuming 70 consumers using new facility	@ Rs 332.90 as approved by the Commission.
3	A&G expense	@ Rs 6960 per consumer taking	Rs 6960 per consumer (1230 consumer) with 10% increase annually
4	Depreciation	@ 5.28% as recommended by the consultant	@ 5.8% on NFA as recommended by the consultant.
5	Interest and Finance charge	@ 14.5% as per interest rate followed by SBI,W/Island.	Nil as the Commission not allowed the I&F charge
6	Other debits		
7	Return on Investment	3% on NFA as recommended by consultant.	3% on NFA as recommended by the Consultant

4. Operating cost for existing & additional facilities

Year	2014-15			2015-16	2016-17	2017-18	2018-19	2019-20
Description	Existing business	New facility	Total					
Interest and Finance charges	0.00	175.45	175.45	193.00	212.29	233.52	256.88	282.56
Depreciation	226.05	70.18	296.23	259.95	298.94	343.78	395.35	454.65

Employee cost	332.90	14.84	347.74	382.84	421.12	463.23	509.55	560.51
Repairs & Maintenance cost	93.53	29.04	122.57	147.09	176.51	211.81	254.17	305.01
Admn & General expenses	85.61	4.87	90.48	99.53	109.48	120.43	132.47	145.72
R.O.I (3% of NFA)	110.14	36.30	146.44	161.08	177.19	194.91	214.40	235.84
Grand total	848.23	330.68	1178.92	1243.48	1395.53	1567.68	1762.82	1984.29

6. Additional Energy Requirements

The frequency of vessels call, its time duration and energy consumption of different vessels are furnished below.

Name of vessel	Calling frequency in days/ year	Connect: Requirement in Kw	Energy Cons: in lakhs units
UTL vessel	84	450	6.3
Coast guard vessel	60	300	3.0
Other vessel	84	1800	25.4
Amet Majesty (Actual)	275	600	12.6
Total		2750	47.3

Even though total quantum of power estimated is 2750 Kw, it is possible to provide the required energy for the vessels with 1800 KVA of contract demand. Since the operating voltage of different vessels are with 3 wire, 415V, 385V and 230V etc a step down transformer with multi core secondary is required for the system. More over majority of the vessels are equipped with electrical gadgets at a frequency of 60 Hz and hence a frequency convertor from 50 Hz to 60Hz is necessary for the assets to be created for providing shore power. Hence an additional T&D loss to the tune 0.5% may be accounted for Static frequency convertor specially designed for AMP.

Thus total input power requirement at receiving side at 110 KV side for meeting the shore power requirement is furnished hereunder.

Year	Approved T&D Loss	Additional T&D loss for SFC	Total Loss	Addl energy requirement for providing shore power in Lakhs units	Addl Input power for meeting Shore power in Lakhs units
2014-15	2.10%	0.50%	2.60%	47.3	48.56
2015-16	2.10%	0.50%	2.60%	48.72	50.02
2016-17	2.10%	0.50%	2.60%	50.18	51.52
2017-18	2.10%	0.50%	2.60%	51.69	53.07
2018-19	2.10%	0.50%	2.60%	53.24	54.66
2019-20	2.10%	0.50%	2.60%	54.83	56.30
2020-21	2.10%	0.50%	2.60%	56.48	57.99

Note: Increase in annual energy consumption is assumed to be 3%, with same T&D loss of 2.6

7. Bulk Supply Tariff

The bulk supply tariff (BST) proposed is as follows

Year	Demand Charge in Rs/KVA/month	Energy charge in Rs/Kwh
2014-15	300	5.2
2015-16	300	5.72
2016-17	300	6.29
2017-18	300	6.92
2018-19	300	7.61
2019-20	300	8.37

5. Power purchase cost for existing business and for additional facility

Year	Power input in Lakhs units			Demand			Tariff		Total Power Purchase Cost in Lakhs Rs
	Existing	New facility	Total	Existing	New	Total	D.C (Rs/KVA/month)	E.C (Rs/Kwh)	
2014-15	331.07	48.56	379.63	97333	21600	118933	300	5.2	2330.88
2015-16	341.00	50.02	391.02	100253	21600	121853	300	5.72	2602.19
2016-17	351.23	51.52	402.75	103261	21600	124861	300	6.29	2908.68
2017-18	361.77	53.06	414.83	106358	21600	127958	300	6.92	3255.01
2018-19	372.62	54.65	427.28	109549	21600	131149	300	7.61	3646.44
2019-20	383.80	56.29	440.10	112836	21600	134435	300	8.37	4088.95

6. Total Revenue Requirement for Combined business

Total Revenue Requirement for the existing and additional facility is furnished hereunder.

Year	Total Power Purchase Cost in Rs Lakhs (Vide item 9)	Total Operating cost in Rs Lakhs (vide item 6)	Total Revenue Requirement (Rs Lakhs)	Remarks
2014-15	2330.88	1178.92	3509.80	
2015-16	2602.19	1243.48	3845.67	
2016-17	2908.68	1395.53	4304.21	
2017-18	3255.01	1567.68	4822.69	
2018-19	3646.44	1762.82	5409.26	
2019-20	4088.95	1984.29	6073.24	

7. Computation of Retail tariff for shore power

For computing the RST for shore power, following points were considered.

- (i) Revenue projection for the existing facility for the year 2014-15 (Approved by the Commission).
- (ii) The Revenue requirement for FY 2014-15 for existing business and for additional facility as detailed in item (5), (6) and (9) above.
- (iii) Energy requirement for the additional facility as per item no (7) above.
- (iv) The BST applicable to CoPT as proposed under item no (8) above.

Based on the above the per unit cost of energy is calculated as below.

Year	Power consumption in Lakhs unit by				Revenue from sales as approved by KSERC for FY 2014-15	Balance amount	Proposed tariff at 11 KV	Proposed tariff at LT
	Existing	New facility	Total	Total RR				
2014-15	324.12	47.3	371.42	3509.80	2644.69	865.11	18.29	20.00
2015-16	333.84	48.72	382.56	3845.67	2909.16	936.51	19.22	22.00

2016-17	343.86	50.18	394.04	4304.21	3200.07	1104.14	22.00	24.00
2017-18	354.17	51.69	405.86	4822.69	3520.08	1302.61	25.20	27.00
2018-19	364.80	53.24	418.04	5409.26	3872.09	1537.17	28.87	30.00
2019-20	375.74	54.83	430.58	6073.24	4259.30	1813.94	33.08	35.00

9. Additional Charges to be collected from the users of shore power over and above the normal tariff.

No tariff is assigned for shore power supply to the vessels so far. However tariff for similar activity such as for House boats is already assigned under LTVII (A). Hence additional tariff that may be assigned over and above the normal tariff under LTVII (A) is proposed as below.

Year	BST applicable to CoPT in Rs/Kwh	Existing tariff under LT VII (A) in Rs/Kwh	Proposed RST for shore power	Additional charges over and above the normal tariff under LTVII(A).	Additional tariff over and above BST
2014-15	5.2	9.30	20.00	10.70	14.80
2015-16	5.72	NA	22.00	NA	16.28
2016-17	6.29	NA	24.00	NA	17.71
2017-18	6.92	NA	27.00	NA	20.08
2018-19	7.61	NA	30.00	NA	22.39
2019-20	8.37	NA	35.00	NA	26.63

Analysis by the Commission

7. The total estimated cost for the Alternate Maritime Power System is Rs 12.23 Crores. The capacity of the system is 3 MVA. Since transformers, HT and LT cables and frequency convertors constitute 78% of the project cost, the useful life of the AMP plant is taken as 25 years (that of transformers). The levelised tariff for 25 years is worked out as per norms given below.

SI No	Description	Norms
(1)	Capital investment (Rs Crore/MW)	4.5
(2)	Life of Plant (Years)and salvage value(%)	25, 10
(3)	Depreciation rate(%)	3.6
(4)	O&M expenses(%)	1.3
(5)	Debt Equity Ratio	70:30

(6)	Loan repayment (Years)	10
(7)	Interest on debt (125)	12
(8)	ROE (%)	14
(9)	Capacity Utilization Factor (%)	30
(10)	Inflation (%)	5.5
(11)	Interest Working Capital (%)	13
(12)	Discounting rate(%)	12

The levelled additional tariff is Rs 2.38/Unit for 25 years. Hence an additional cost of Rs 2.38/Unit has to be collected provisionally from consumers who use supply from the Alternate Maritime Power System in Cochin Port Trust

The charges proposed by Cochin Port Trust are

Fixed Charge (Rs/kW/Month) Three Phase	120
Energy Charge (Paise/Unit) Of and below 100 Units/Month	1300

Since the tariff applicable for such services is LT VII A Commercial the rates for those who avail services from Alternate Maritime Power System (AMP) have to be charged Rs 2.38 (Rs 2.40 rounded) additional in their energy charges.

The provisional tariff that shall be applicable to the consumers who use power from AMP are as follows

LOW TENSION-VII- COMMERCIAL(D) [LT VII(D)]

For consumers availing power from Alternate Maritime Power System

	Existing LT VII A	Additional charges	LT VIID Tariff Approved by the Commission
Fixed Charge (Rs/kW/Month) Three Phase	120		120
Energy Charge (Paise/Unit) Of and below 100 Units/Month	600	240	840
Of and below 200 Units/Month	670	240	910
Of and below 300 Units/Month	740	240	980
Of and below 500 Units/Month	800	240	1040
Above 500 Units/Month	930	240	1170

Order of the Commission

The provisional rates that shall be applicable to the consumers of Cochin Port Trust who use power from AMP are as follows

LOW TENSION-VII- COMMERCIAL(D) [LT-VII(D)]

For consumers availing power from Alternate Maritime Power System

	Approved by the Commission
Fixed Charge (Rs/kW/Month) Three Phase	120
Energy Charge (Paise/Unit) Of and below 100 Units/Month	840
Of and below 200 Units/Month	910
Of and below 300 Units/Month	980
Of and below 500 Units/Month	1040
Above 500 Units/Month	1170

The provisional tariff rates shown above shall be substituted by final tariff one year after the commercial operation of the project and after determination of the actual project cost duly verifying the actual cost of all equipments of the AMP system installed.

Dated this the 15 th day of December, 2014

Sd.
Mathew George
Member (Finance)

Sd.
T.M.Manoharan
Chairman

Approved for issue

Secretary.