

Dhariwal Infrastructure Limited

CIN : U70109WB2006PLC111457 E-mail : dhariwalinfrastructure@rp-sg.in

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Ref: DIL/REG/CERC/FY 23-24/04

Τo,

The Secretary, Central Electricity Regulatory Commission, 3rd & 4th Floor, Chanderlok Building, 36, Janpath, New Delhi- 110001

Sub: Comments/suggestions on Approach Paper on Terms & Conditions of Tariff Regulations for the period from 01.04.2024 to 31.03.2029

Dear Sir,

At the outset, we thank the Hon'ble Commission for providing us an opportunity to give our comments/suggestions on the Approach Paper on Terms & Conditions of Tariff Regulations for the period from 01.04.2024 to 31.03.2029 vide its notification No. L- 1/268/2022/CERC dated 26.05.2023 read with the Addendum dated 03.07.2023.

Accordingly, please find attached comments on the same on behalf of Dhariwal Infrastructure Limited, a Generating Company having its Registered Office at Kolkata and a 2 x 300 MW Coal-fired Power Generating Station at Tadali, near Chandrapur, Maharashtra.

The 3 hard copies along with soft copy as per the notification has been submitted for your kind consideration.

Thanking you

Yours faithfully, For Dhariwal Infrastructure Limited

Authorized Signatory

Encl: As above

COMMENTS ON CERC APPROACH PAPER ON TERMS & CONDITIONS OF TARIFF REGULATIONS FOR THE TARIFF PERIOD FY 2024-29

The Hon'ble Central Electricity Regulatory Commission ("*Hon'ble Commission*") has brought out the Approach Paper on Terms & Conditions of Tariff Regulations for the period from 01.04.2024 to 31.03.2029 and has sought comments from all the stakeholders. The comments and suggestions on the proposed tariff structure and its terms, on behalf of Dhariwal Infrastructure Limited ("*DIL*"), are provided in the following matrix for the kind perusal of the Hon'ble Commission.

PARAGRAPH	Particulars	COMMENTS AND SUGGESTIONS
3.2	APPROACH 1: NORMATIVE TARIFF 1) Whether clustering the components of AFC based on their nature to increase/ decrease will allow better projections? Any other possible method to cluster the AFC components? 2) What other methodology can be adopted to determine the increasing/ decreasing factors? 3) Whether the impact of additional capitalisation can also be allowed through the same indexation mechanism or through a separate revenue stream?	 in the existing framework. <u>Justification:</u> 1. With the Capital Cost being approved upto a fixed date, the Annual Fixed Charges ("AFC") involves various components which remain constant over a period (<i>viz.</i>
		2. Further, the Capital Cost shall not remain constant throughout the useful life of the Project. Additional Capitalization is necessary based on the nature of

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		requirement of the Project which would call for change in Capital Cost. The corresponding change in the AFC by way of indexation may not reflect the actual impact of the addition/deletion in the Capital Cost.
		3. It is not clear as to how the mid-term correction in the AFC indexation would be factored due to variation in the Additional Capitalization, Interest on Loan and Interest on Working Capital. Further, if the indexation is indeed corrected midway of the Control Period due to variation in the above factors, the indexation due to O&M Expenses should also be corrected to take care of the actual variation in the inflation rates and other factors like change in law events. This will lead to multiplicity in tariff determination process and correction during the Control Period and may lead to more complexity rather than simplification.
FINANCIAL ASP	PECTS IMPACTING TARIFF: CAPITAL COST	
4.2.1	BACKGROUND The provision for interim-tariff can, therefore, be continued in the next tariff period as well. However, comments and suggestions are sought from stakeholders on the continuation of the said provision.	The existing practice of determination of provisional tariff based on approval of anticipated project cost may be continued as it helps to minimize the impact of retrospective revision of tariff, by reducing the burden of carrying cost, after the determination of final tariff based on approved project cost.
		1. The capital cost claimed by the utilities during the determination of provisional tariff is based on projected capital expenditure which is generally made in line with the original investment approval unless there is cost overrun/time overrun on account of unexpected delay in the commissioning of the project. Hence, the tariff claimed based on projected capital expenditure is close to actual capital expenditure which is determined at the time of final approval of Capital Cost and it minimizes the burden of carrying cost on the utilities/beneficiaries.

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		2. It is submitted that few packages although included in the original investment approval/benchmark cost may need to be shifted for capitalization beyond the Cut-off Date due to many reasons not under control of the project developer. The Hon'ble Commission may kindly allow such expenditure beyond the Cut-off Date as long as the utilities are able to manage the capitalization within the projected cost.
4.2.3	REFERENCE COST FOR APPROVAL OF CAPITAL COST – BENCHMARK	Development of ratios with specific range of variation can be a possible approach
	Cost V/s Investment Approval Cost	to benchmark Capital Cost of thermal power projects of various unit size,
		geographical location and other project variables.
	Comments and suggestions of stakeholders are invited	
	on other efficient reference costs other than Investment	Justification:
	Approval costs that can be considered for prudence	
	checks.	1. The variation in the capital cost of thermal power plants depends on various factors and therefore it is difficult to predict the capital cost of a thermal power project until the project reaches an advance stage. The process of benchmarking can reflect the true picture if the comparison is done within the ambit of similar factors and constraints. Further, there are certain intangible factors which also affect the cost competitiveness of a project, viz., quality of workmanship, labour productivity etc.
		2. Given the difference in various technologies and geographical differences leading to different designs and equipment including varying land and construction costs coupled with variation in micro and macro-economic factors, there can be no single Benchmark Capital Cost which can be compared with thermal power plants across the country. A possible approach to benchmarking could be made by development of ratios with specific range of variation, for e.g., Lang Factor method. The Lang Factor is the ratio of the total project cost to total equipment

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		cost. Similar benchmarking ratios can be developed for other project parameters like IDC to Total Loan Amount (excluding that accrued on account of any delay), Insurance Cost to Total Equipment Cost, etc. Further, the Hon'ble Commission may allow suitable adjustments for escalation and location and size based on statistical analysis, and then compare with the specified ratios in order to benchmark performance.
4.4.1	Сомритатіом ог IDC – Post Scheduled COD Comments and suggestions are sought from stakeholders on the following options for allowing IDC:	In our humble opinion, the Hon'ble Commission may allow the IDC computed under Option 2 of the instant Paper or the IDC computed by deducting the actual IDC incurred during the period of delay from the total IDC, whichever is higher.
	 Existing mechanism wherein the pro-rata deduction (based on delay not condoned) is done on IDC beyond SCOD. Pro-rata IDC may be allowed considering the total implementation period wherein the actual IDC till implementation of the project is pro-rated considering the period upto SCOD and period of delay condoned over total implementation period. IDC approved in the original Investment Approval to be considered while allowing actual IDC in case of delay. 	 Justification: In our humble submission, if the IDC, accrued by the developers, is pro-rated only for the period beyond the SCOD, the impact becomes much higher because of higher accrual during such period. Hence, as proposed by the Hon'ble Commission in the instant Paper, Option 2 would provide a fair treatment to the developers as the IDC would be pro-rated based on the SCOD and delay condoned vis-à-vis the actual implementation period. Pertinently, IDC is computed on the loan provided by the Lenders of the Project from the date of first installment of disbursal of such loan. In case of delay at the beginning of the project due to difficulties faced by the developers in land acquisition, settlement of R&R, securing Right of Way, obtaining environment, forest and other applicable clearances, the disbursal of the project loan is generally deferred by the developers to reduce the burden of IDC. In such cases, there could be no IDC incurred during the initial period of the project which would cause the delay in achieving the SCOD. In such cases, if the delay is not condoned by the Hon'ble Commission, the IDC is deducted on a pro-rated basis. In our

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		humble opinion, the actual IDC incurred during such period of delay must be deducted from the total IDC payout to compute the IDC incurred had there been no delay. Such IDC should be compared with the IDC computed under Option 2 and higher of the two may be allowed. This is further explained with the following example:
		Let us suppose that the delay of 12 months, as considered in the example in the Approach Paper, had occurred during a period when the actual IDC payout was Rs. Z. After detailed scrutiny, the Hon'ble Commission allows only 4 months delay for condonation. Therefore, the actual IDC disallowance should have been (Z x 8/12). In our humble opinion, the Hon'ble Commission may allow IDC as (X+Y) x 40/48, as computed under Option 2, or [(X+Y) – Z x (8/12)], whichever is higher.
		3. Further, any disallowance in the actual IDC based on the IDC approved IDC as in the Investment Approval would not be prudent since the latter is based on estimated cash flows and projected interest rates. The actual cash flows vary based on the project activities and the interest rates also change from time to time. While the variations in the cash flows are managed by the developer and its lenders so as to optimize the IDC payout, the variations in the interest rates are completely beyond the control of the developers. In either case, such variations cannot be attributed to the developers and therefore, the approval of actual IDC based on that in Investment Approval would not be fair.
4.6	RENOVATION & MODERNISATION (R&M) Comments and suggestions are sought from stakeholders on continuation of the existing provisions and on the above suggestion of continuing with Special	Renovation & Modernization (" <i>R&M</i> ") should be allowed to be undertaken after specified years of service. Further, depreciation and debt servicing cost of the Additional Capitalization should be allowed to be recovered within the balance useful life of the plant after considering the life extension, if any. As an alternative,

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	Allowance, if opted at the beginning of the tariff period for the rest of the tariff period.	the Hon'ble Commission may allow special allowance on cumulative basis for the eligible plants and allow the balance capital cost for addition to the GFA.
		Justification:
		1. Approval of R&M expenditure for generating companies or transmission licensee should be provided through a separate exercise by the Hon'ble Commission after specified years of operation (to be fixed by Commission). Plants completing specified number of years of operation (say 15-20 years) may opt to take up R&M evaluation based on OEM recommendation & certification before submitting the proposal before the Hon'ble Commission.
		2. Taking up R&M on completion of 25 years could deteriorate the unit to such a condition that the R&M will not bring intended results. Taking up projects for R&M before completing 25 years of operation will give sufficient time for recovery of R&M expenses without significant increase in tariff. The utilities taking up R&M Projects, with expected life extension, should be allowed to recover the depreciation and debt servicing costs within the extended useful life of the project. In our humble opinion, the Hon'ble Commission may consider it essential to specify in Tariff Regulations the time period after which the generating companies/transmission licensees may opt for such R&M activities, based on industry trends and recommendations of key OEMs in the power sector.
		3. Special Allowance as allowed by the Hon'ble Commission, in various Projects, could not meet the entire investment required for R&M purpose. Further, R&M projects cannot be undertaken on piecemeal basis. Therefore, if special allowances are envisaged for meeting the R&M requirements, the Hon'ble Commission should allow the utilities to utilize the accumulated special

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		allowances, starting after say 15 years, at the time of undertaking the R&M Project. The balance, if any, required for meeting the cost requirement of R&M Project may be additionally approved by the Hon'ble Commission as capital expenditure. However, the utility may be allowed to recover the additional fixed charges only on the balance approved by the Hon'ble Commission. This is further explained through the following hypothetical example:
		Let us assume the Special Allowance for a Generation Project of 500 MW = Rs 9.5 Lakhs/MW. The Generating Station shall be eligible for such Special Allowance after 15 years of operation.
		The Generating Station at the end of 22 years of operation proposes to undertake R&M Project with an investment of about Rs 350 Crores.
		Total Accumulation of Special Allowance = 500*9.5/100*7 = Rs 332.5 Crores
		Let the life extension proposed be of 5 years beyond 25 years.
		Balance fund required for meeting the R&M Project = (350 – 332.5) = Rs 17.5 Crores, in the form of capital expenditure.
		Therefore, Rs 332.5 Crores of the proposed R&M Project shall be met through accumulated Special Allowance and the balance \gtrless 17.5 Crores as capital expenditure may be allowed to be added in the Gross Fixed Asset. Depreciation, Interest on Loan and Return on Equity shall be available only on such \gtrless 17.5 Crores. Further, the developer may be allowed to recover 90% of \gtrless 17.5 Crores within (25-22 +5) = 8 years.

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4.8	CONTROLLABLE AND UN-CONTROLLABLE FACTORS	Forest Clearance is indeed an uncontrollable factor for the developers. We welcome the proposal of the Hon'ble Commission to include the same in the list of
	In view of the same, delays on account of forest clearances can also be considered for inclusion as uncontrollable factor provided that such delays are not attributable to the generating company or the transmission licensee.	uncontrollable factors. Further, we also request the Hon'ble Commission to continue the inclusion of delay on account of land acquisition and right off way as uncontrollable factors in the forthcoming Tariff Regulations 2024.
	Comments and suggestions are sought from stakeholders on continued inclusion of delay on account of land acquisition as an uncontrollable factor and on the further inclusion of delay on account of forest clearances as an uncontrollable factor.	
4.9	Differential Norms - Servicing Impact of Delay	In a cost-plus regime, the shareholder's minimum expected return on the invested
		amount is the Return on Equity as specified in the Tariff Regulations. The delay in
	In view of the above, comments and suggestions are	commissioning includes an inherent disincentive in terms of drop in Equity IRR. The
	sought on the following:	proposal for further reduction of rate of RoE on account of time overrun/cost
	1. To encourage rigorous pursuit of such approvals from	overrun or mandating the generators to bear some part of the cost impact, even
	statutory authorities, even if delay beyond SCOD on account of clearances and approvals that are	after condoning the delay, would provide double impact on the developers.
	condoned, some part of the cost impact (Say 20%)	Justification:
	corresponding to the delay condoned may be	
	disallowed.	1. In case where the equity is deployed to fund the cost overrun/increase in project
	2. Alternatively, RoE corresponding to cost and time	cost on account of uncontrollable factors, it would be unfair to restrict the
	overruns allowed over and above project cost as per	recovery of expected rate of return on equity. The shareholders' return anyway
	investment approval may be allowed at the weighted	suffers from the effect of prolonged gestation period on account of delay in
	average rate of interest on loans instead of a fixed RoE.	commissioning of the Project.

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	3. The current mechanism of treating time overrun may be continued, considering that utilities are automatically disincentivised if the project gets delayed.	2. In any case, the delay is condoned by the Hon'ble Commission only after due prudence check of the delay and after satisfactory demonstration of no fault from developer's side. In case the same is found attributable to the developer, it is disallowed by the Hon'ble Commission. Condoning a delay therefore clarifies that the developers are not at fault. Hence, further reduction in reasonable return to shareholders for the cost overrun allowed by the Hon'ble Commission would imply imposition of penalty for no fault of the developer and is therefore not desirable. This would in turn reduce the cash flow to reserves for funding future growth.
4.10	ADDITIONAL CAPITALISATION Therefore, in order to have an enabling provision under which such additional capitalisation can be allowed with prior approval, a provision may be introduced to existing Regulation 26 to allow such expenses if they are found to be beneficial/essential for continued operations. Comments and suggestions are sought from stakeholders on the above and any other ways to address the issue flagged above.	 We request the Hon'ble Commission to include an enabling provision which shall allow a generating station not only to seek approval of costs pertaining to Railway Infrastructure and its augmentation for transportation of coal, but also on account of replacement of critical assets which may outlive their life due to continuous operation or the replacement becomes mandatory on account of any Change in Law/statutory directions/technological obsolescence. Further, the Hon'ble Commission may allow depreciation on assets capitalized at midway or fag end of the useful life of the project to be recovered in full during the remaining useful life of the project. 1. We appreciate the concern of the Hon'ble Commission for inclusion of an enabling provision by virtue of which a generating station can seek approval of costs pertaining to Railway Infrastructure and its augmentation for transportation of coal up to the receiving end of the generating station under additional capitalization. However, the Hon'ble Commission may appreciate that the

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		Generating Units which are older than 10 years may require additional capitalization towards replacement of certain assets which have outlived their life due to continuous operation. Therefore, any additional expenditure on items such as boiler tubes, control and instrumentation system, critical fault detection equipment, batteries, replacement due to obsolescence of technology, replacement of switchyard equipment due to increase of fault level, emergency restoration system, replacement of damaged equipment not covered by insurance and any other expenditure which has become necessary for successful and efficient operation of the Generating Station should also be allowed.
		2. For the Capex schemes which would be required to be capitalized, in order to comply with the new provisions/amendments under the Environment Law/Rules and any other statutes or due to technological obsolescence or efficient plant operation, at the midway or at the fag end of the useful life of the Project, the depreciation of such capitalized assets is required to be recovered within the useful life of the project. The Tariff Regulations 2024 should clearly bring out that the recovery of depreciation under a separate category of Capex Schemes which are to be incurred under Environment law/Rules/any other statute or due to technological obsolescence and these depreciation rates should be clearly demarcated from the existing Depreciation Rates specified in the Tariff Regulations.
4.10.1	NORMATIVE ADD-CAP - GENERATING STATION	Since the Normative Additional Capitalization based on past trends may not reflect
		the actual requirement year on year, the Hon'ble Commission may continue the
	For generating stations that have already crossed the	present practice of scrutinizing the proposal of Additional Capitalization on case to
	cut-off date as on 31.03.2024, the additional	case basis on merits and as per the provisions of Regulations.
	capitalisation for such generating stations can be	
	considered as per the following:	Justification:

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	1. Thermal Generating Stations – Based on the analysis of actual additional capitalisation incurred by such generating stations in the past (15-20 years) and co- relating such expenses to different unit sizes such as 200/210 MW series, 500/660 MW Series and different vintages (5-10, 10-15, 15-20, 20-25 years post COD), a special compensation in the form of yearly allowance may be allowed based on unit sizes and vintage, which shall not be subject to any true up and shall not be required to be capitalised.	 In our humble opinion, the purpose of implementing Additional Capitalization is based out of the requirement from technical or statutory aspects. Hence, the requirement in any year cannot be generalized. As such, considering a derived value of Additional Capitalization based on past trends will not be a correct picture of the actual requirement year-on-year. In some year, the requirement may be higher than the normative and in some other the same may be lower than the normative or even nil. Further, such requirement of Additional Capital Expenditure is also dependent on several factors like geographical location, quality of maintenance activities, technology etc. Hence, a generalization based on Unit size and vintage may not fully reflect the actual requirement for Additional Capitalization. It is further submitted that Additional Capitalization is an integral part of the tariff as it impacts 4 out of 5 components of the fixed charges. Hence, Additional Capitalization cannot be considered separate to the fixed charge stream on normative basis and should be considered at actual. Adoption of normative basis for determination of Additional Capitalization may disrupt the process of prudence check by the Hon'ble Commission. We, therefore, request the Hon'ble Commission to continue the present practice of scrutinizing the proposal of Additional Capitalization on case to case basis on merits and as per the provisions
4.11	GFA/NFA/MODIFIED GFA APPROACH	of Regulations. In view of the anticipated growth in electricity demand and the existing challenges
		in the power sector, a balanced hybrid approach is required to be adopted for tariff
	Increasing the Investors confidence by ensuring assured	determination in the larger interest of the sector. The Hon'ble Commission may,
	returns is important, and further considering the recent spikes in power tariffs in power exchanges indicating	therefore, continue with the Gross Fixed Asset (GFA) approach in the interest of desired growth of the power sector.
	shortage of power availability, investment in Power	active Brown of the power sector.

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	sector needs a boost, and therefore the existing GFA approach, being a balanced approach, may be	Justification:
	continued. However, comments/ suggestions are invited on alternate approaches, i.e. GFA/ NFA/ Modified GFA approach.	1. It is to be noted that under Net Fixed Asset (NFA) approach, the equity base of the project will effectively reduce which in turn will reduce the return on equity significantly. Adoption of NFA approach may severally affect the internal resource generation of power generating companies and further investment in the power sector will be impacted adversely alongwith debt service obligation. The investors have made investments based on GFA approach and changing the methodology at this stage will have detrimental effect on the returns on the investments. In our humble opinion, therefore, NFA approach will be unfair on the developers as this will deny reasonable returns to the developer as well as it will not be able to provide adequate cash to developer to meet its debt service obligation.
		2. It is further submitted that as deliberated by the Hon'ble Commission in the instant Paper, the addition in thermal power capacity has reduced due to various policies adopted by the government. However, in order to meet the projected demand of FY 2029-30 of 777 GW, the thermal capacity need to increase to 275 GW which translates to addition of 38 GW in the next control period. Hence, framework of the proposed Regulations should not include any provision which can deter investment in the thermal power generation sector.
		3. We are of the considered opinion that the departing from the GFA approach is against the spirit of National Tariff Policy 2016 as returns will become unattractive post debts are repaid. If the NFA approach is considered, the returns will reduce after debt repayment is done. To see that the developers will have sufficient incentive to run the project efficiently and keep it in good operational condition till end of its useful life, NFA approach may not be the suitable option because presently the power sector is facing various challenges such as non-availability of

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		fuel, cancellation of coal blocks, setting up of projects without linkages, lack of adequate long-term PPAs by states, promoters' inability to infuse equity and working capital, contract/tariff-related disputes, issues related to banks/financial institutions, filing of bankruptcy and delay in project implementation leading to cost overruns etc.
4.12.1	SEGREGATION OF NORMATIVE O&M EXPENSES	As proposed by the Hon'ble Commission, the Other O&M Expenses should be
		further segregated to Repair & Maintenance, Admin & General Expenses and other
	O&M norms may be specified under the following two categories.	broad categories and allow normative escalation rates on each and every category based on the prevailing market scenario.
	1. Employee Expenses	
	2. Other O&M Expenses comprise Repair and Maintenance and Administrative and General	Justification:
	Expenses. Alternatively, to give effect to the impact of pay/wage revision, 50% of the actual wage revision can be allowed on a normative basis.	1. The expenses under O&M Expenses like Employee Expenses, Repair & Maintenance Expenses and Administrative & General Expenses are directly related to the inflation rate and are also specific to the State where the Generating Station is located since it decides the availability of labour, spares and other administrative expenses. Segregation of the normative O&M Expenses into Employee Expenses and Other O&M Expenses would bring in clarity in the
	Comments and suggestions are sought from stakeholders on above suggestions and alternatives, if any.	expenses allowed under the different heads. We request by the Hon'ble Commission, the other O&M Expenses may be bifurcated further into Repair & Maintenance, A&G Expenses and other broad categories and allow normative escalation rates on each and every category based on the prevailing market scenario. This would allow the Normative O&M Expenses to be closer to the actual. Exceptions, if any, is required for any year, can be allowed only to such heads which has undergone variation more than the normative escalation.

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		2. Regarding allowance of 50% of the actual wage revision on normative basis, clarification is required whether such allowance would also be provided to private developers and whether such wage revision would also cater the wage revision of the employees under service contract. Further clarification is required as to why only 50% of the actual wage revision is allowed on normative basis. In our opinion, the same should be allowed at actuals.
		3. Further, there are some other expenditures like Ash Disposal Expenses, additional expenses due to vintage, unexpected expenses on account of any event under 'Change in Law' which should be allowed separately.
4.12.4	INCLUSION OF CAPITAL SPARES	In line with our above suggestion regarding segregation of the Other O&M Expenses
		into broad categories, we request the Hon'ble Commission for allowing Capital
	Therefore, if the same can be projected with some	Spares on normative basis, subject to truing up after prudence check as per the
	degree of predictability, the same may be allowed on a	existing provisions.
	normative basis along with O&M expenses.	
	Alternatively, instead of including all such capital	Justification:
	spares as part of normative O&M expenses, recurring	
	and low value spares below Rs. 20 lakh may be made	It is humbly submitted that nature of O&M activities for a generating station varies
	part of normative O&M expenses, while for capital	with the vintage of the assets. For newer assets, requirement of spares is much less.
	spares with a value in excess of Rs. 20 lakh, utilities may	However, with the vintage of such assets both spares and service costs increase in
	submit the same on a case to case basis for	order to restore the capability of the assets to maintain optimum performance of the
	reimbursement with appropriate justification for the	units. Further, with the fast advancement of technology, the old units/systems face
	Commission's consideration.	the challenge of availability of spares on account of obsolescence. Therefore, it
		becomes onerous on part of old generating stations to perform at par with the new
	Comments and suggestion are sought from	units/systems by incurring additional costs towards services and repair of old assets.
	stakeholders on the above suggested approach and	Accordingly, the Capital Spares may be allowed on normative basis, subject to truing
		up based on prudence check by the Hon'ble Commission.

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	alternatives, if any, to streamline the approval process for spares.	
4.13	DEPRECIATION In view of the above, a depreciation rate may be specified considering a loan tenure of 15 years instead of the current practice of 12 years. Further, additional provisions may also be specified that allow lower rate of depreciation to be charged by the generator in the initial years if mutually agreed upon with the beneficiary(ies).	 We request the Hon'ble Commission that the existing policy for charging Depreciation based on loan tenure of 12 years may be continued. Justification: 1. The Weighted Average Rate of Depreciation for a full year (without any Additional Capitalization) for a generating station lies between 5.20% to 5.50%. Based on the existing rate of Depreciation of 5.28% on Plant & Machinery, the total depreciation reserve for 12 years even falls short to fully meet the debt service obligation. In our humble opinion, the cost of debt/interest rates and the repayment period depends on the credit ratings and the past performance of the utilities. Therefore, there is no standardized rate and repayment period available at which the utilities can borrow from banks and financial institutions. Reducing the rates of depreciation would therefore impact the new players in the sector and create an entry barrier for fresh investments.
		 Further, reducing the rates of depreciation by linking the same with loan tenure of 15 years will not fulfil the purpose of meeting the debt service obligation of the utilities and there would always be mismatch between the cash flow available through recovery of depreciation and the actual service obligation. Depreciation allowed under the regulatory mechanism is a major component of tariff and assures the cash flow for the project which is utilized for meeting the

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		in uncertain cash flows and this will create problem in arranging finances for the project.
		4. Further, the Weighted Average Rate of Depreciation, computed on the basis of individual depreciation rates of different class of assets capitalized with the capitalized amount in each class of asset as the weights, is different for different utilities since the actual mix of capitalized assets for each utility varies from the other on various factors like technology, availability of resources, phasing of capitalization etc. It is therefore submitted that a uniform rate of depreciation for Plant & Machinery, linked to repayment of debt, may be adopted which may allow the developer to meet its cash requirement for repayment of loan adequately. Accordingly, such rate of depreciation may be kept at 5.83% = (70% of debt/12 years of normative loan repayment period) for the initial period of 12 years. The balance value of the asset could be allowed to be depreciated over the residual life, duly considering the salvage value as per the existing practice.
		5. However, as mentioned earlier, the deprecation of assets under Additional Capitalization which are capitalized during mid or fag end of the useful life of the Project, must be allowed to be recovered in entirety within such useful life of the Project irrespective of the above deprecation rates of various asset classes. For such assets, separate depreciation rates may be prescribed by the Hon'ble Commission.
4.14.1	WEIGHTED AVERAGE RATE OF INTEREST AND FERV	In our humble opinion, the existing method of working out cost of debt by
		considering weighted average rate of interest, calculated on the basis of actual loan
	To simplify the approval of interest on loans, the	portfolio of the Project, actual interest rate and scheduled loan repayment is the
	weighted average actual rate of interest of the	right approach for computation of tariff. Further, approval on hedging cost at actual
	generating company or transmission licensee may be	would encourage the developers to secure foreign loans without any risk.

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	considered instead of project specific interest on loans. Further, the cost of hedging related to foreign loans be allowed on an actual basis, without allowing any actual FERV.	The rate of interest on the outstanding loan of the entire generating company or transmission licensee will not be fair for the beneficiaries & consumers as the same may be higher & lower than the project specific rate of interest on loan.
	Comments and suggestions are sought from stakeholders on the above suggestions and alternatives, including in respect of treatment of FERV/cost of hedging.	
4.15	RETURN ON EQUITY (ROE) V/S RETURN ON CAPITAL EMPLOYED (ROCE) As in the past, much has been deliberated and discussed on the two approaches, and in view of the long-standing position of this Commission, the present system, or ROE approach, may be continued. Comments and suggestions are, however, sought from stakeholders on the continuation of the ROE approach.	 It is humbly submitted that the Hon'ble Commission may continue with the Return on Equity ("RoE") approach for the Tariff Regulations for FY 2024-29. <u>Justification:</u> Benchmarking of cost of debt for implementation of Return on Capital Employed ("RoCE") approach is difficult in current unstable Indian debt market. With the falling Rupee, the foreign loans and bonds would become expensive and the interest rates are expected to fluctuate. Any variation in cost of debt would add to the risk profile of the developer. In addition, the borrowing capability of
		 different companies varies and depends on the rating in terms of its financial status. The existing players shall be benefitted as loans shall be available to them at lower rates and this may limit the influx of new players in the power sector and reduce the competition. With RoCE approach, the developers may have to bear the upside fluctuations in the cost of debt, if any, and the Equity IRR of the project would drop. In our humble submission, the shareholders of the existing projects would be denied of

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		the assured return promised to them based on earlier RoE based approach. This would reduce the confidence of the investors on the regulatory framework and would not provide the required thrust on investment for addition of 38 GW by FY 2029-30.
		3. Further, for existing generating stations, the original investment decision was originally made based on RoE approach. Hence, it won't be fair to switch to RoCE approach at this stage.
		In view of above, it is proposed that RoE based approach may be continued for the next Tariff period.
4.16	RATE OF RETURN ON EQUITY	In our humble opinion, there is no further requirement to increase the financial
		stress factors on the developers by reducing the existing reasonable rate of return
	Comments and suggestions are sought from	on equity already invested in the existing and under construction projects.
	stakeholders on the following issues:	
	1. Review of Rate of RoE to be allowed, including that	Justification:
	to be allowed on additional capitalisation that is	
	carried out on account of Change in Law and Force	1. It is apparent from the present power sector scenario that the future growth in
	Majeure.	demand for the next 5-7 years can be met through improvement in PLF of the
	2. Whether the revised rate of RoE to be made	existing capacity and the gradual commissioning of the pipeline capacity. It is
	applicable to only new projects or to both existing and	submitted that reducing the gap between demand and supply itself would be
	new projects?	natural entry barrier for the new players unless they have a cost leadership over
	3. Whether timely completion of hydro generating	the existing players. With the gradual saturation of the long-term market, the
	stations can be incentivised to attract investments?	effect of market dynamics over price of electricity would be visible in the medium
	4. Merit behind approving different Rate of RoE to	and short-term markets. Further, the existing plants are also striving with various difficulties to recover their reasonable return on account of several factors like
	thermal, hydro generation and transmission projects	
		change in law events, non-regulated Coal invoicing and inefficient quality

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	with further incentives for dam/reservoir based projects including PSP. 5. Merit in allowing RoE by linking the rate of return with market interest rates such as G-SEC rates/MCLR/RBI Base Rate.	monitoring, differential treatment of Coal companies, delay in payment by DISCOMs and various other uncontrollable factors. Hence, when the sector is expecting fresh investments from the developers as well investment towards R&M for old plants or for compliance to 'Change in Law' events or to mitigate any Forced Majeure conditions, the rate of RoE needs to be set at 15.5% for both original Capital Cost as well as for Additional Capitalization towards the above reasons.
		2. The proposal for different RoE for new and old generating stations would also be detrimental, particularly at the time when the sector is expecting investments and capacity installation of around 38 GW by the next 5-7 years.
		3. If we examine the trend of 10-year G-Sec bonds in domestic market, the yield trend has definitely come down from 8.08% in September 2018 to 5.77% in July 2020, but has again picked up the increasing trend and is currently pegged at 7.11% (as on 05.07.2023). In our humble opinion, such cyclic movement for G-Sec bonds is completely market driven and depends on various factors like liquidity in primary market, inflation expectations, risk perceptions etc. Such factors are not expected to continuously rise or continuously fall in a stable/growing economy like India. Therefore, the movement of interest rates in the primary and secondary markets for the past five years would not be a suitable basis for concluding on a reduction in the rate of return on equity. Further, linking expected rate of return to market (through CAPM method) is also not advisable as the volatility in the capital market for the power sector may not represent the true pricing of private equities.
4.18	INTEREST ON WORKING CAPITAL	The present methodology clearly sets out the item-wise capital allotment for sustaining daily operations. In our humble opinion, the existing methodology of

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		determination of normative working capital is best suited for the generating station as it provides a clear projection of working capital to be provided for the tariff period. Further, the rate of interest on working capital being linked to the MCLR of one year plus 350 basis points reflects the optimum short-term interest rate as per the prevailing market conditions. Hence, the present methodology may be continued.
4.19	LIFE OF GENERATING STATIONS AND TRANSMISSION SYSTEM	Useful Life of the thermal assets should not be increased without OEM consultation and recommendations based on RLA study.
	the useful life of coal based thermal generating stations and transmission sub-stations may be increased to 35 years from the current specified useful life of 25 years.	Justification:
	 As the need for higher repairs will still be required, the current dispensation of allowing a special allowance or provision of R&M may be continued after 25 years.	 In our humble opinion, the useful life of the assets depends on various factors like equipment design, materials, O&M practices, etc. The equipment specification, design and materials used cannot be altered for existing utilities. It is therefore reiterated that extension of useful life of the project should be linked to mandatory Residual Life Assessment ("RLA") study and the corresponding R&M
	Comments and suggestions are sought from stakeholders on the above proposal and the necessity of further changes, if required.	project wherein the Hon'ble Commission in consultation with the OEM may determine the extended useful life of the project at the midway or fag end of the useful life of the project. The depreciation of such capitalized assets should be allowed under a separate category which is to be recovered within the extended useful life of the project irrespective of the Depreciation Rates specified in the Tariff Regulations.
		2. It is pertinent to note here that it would be very difficult to assess the capability of assets of generating stations to run beyond their current useful life without assessing various aspects which affects the performance of the assets, <i>viz.</i> , maintenance quality, residual life assessment, etc. Further, it is required to gather

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		data/information on equipment failures, routine activities, process improvements etc. over a substantial period of time in order to assess the maintenance quality of the entire plant. In order to assess the quality of maintenance, the Hon'ble Commission is required to define relevant metrics, e.g., Forced Outage Rate, MTBF, MTTR and link actual Repair & Maintenance expenses with various major maintenance works executed over the years.
		3. Further, in a particular plant, the quality and residual life of different asset categories would be different. It would not be appropriate to assess the quality and residual life of the entire station on the basis of limited critical assets like BTG package. Also, the impact of extending the useful life of the assets would be different on different generating stations based on their elapsed life. Hence, it would be meaningless to incorporate the changes in the useful life of the assets and adjust the financial parameters only which might impact the developers differently.
		4. Further, the PPAs and FSAs of the existing generating stations have been entered upon based on the useful life of 25 years. Mere extension of the useful life of the generating stations would leave the assets with no firm PPA/FSA for such extended life tenure. In our humble opinion, if at all the life of the generating units are extended, the tenure of the existing PPAs and FSAs should also be extended for sustenance of the existing generating units till the end of the extended life.
4.23	TREATMENT OF INTEREST ON DIFFERENTIAL TARIFF AFTER TRUING	In our humble opinion, the interest may be allowed till the date of actual payment
	UP	by way of equated monthly instalments ("EMI") instead of simple interest in six
	 In order to streamline the rate of interest on the	equal monthly instalments.
	differential amount, the current practice of allowing a	

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	simple interest rate as per Regulation 10(7) in the 2024- 29 tariff block may be continued. Further, interest may be allowed to be charged on the differential amount by the utility only until the issuance of the order, and no interest may be allowed during the recovery in six equal monthly instalments. Comments and suggestions are sought from stakeholders on the above approach and alternative ways, if any.	 Justification: It is submitted that the revenue gap/(surplus) reflects the deferred recovery of legitimate amount payable to the generators and therefore the interest on such amounts should be paid till the date the entire amount gets paid. Since the amount of the revenue gap/(surplus) is determined till the date of the Order, the interest amount can be calculated till the date of actual payment by way of equated monthly instalments ("EMI"). Hence, we request the Hon'ble Commission to allow the generators to recover the interest on approved revenue gap/(surplus) based on six EMI with the interest calculated till the due date of payment. Further, by virtue of the above method, the interest amount and the instalments can be revised by the generators in case of default in making payment by the beneficiaries. However, the same is not possible in case the interest is calculated based on simple interest only until the date of issuance of the Order. Also, in case of payment default by the beneficiaries, the generators have to levy Late payment Surcharge which would make the recovery process more complex. Hence, we request the Hon'ble Commission to allow the recovery of interest on revenue gap/(surplus) till the date of actual payment by way of payment by the date of actual payment by the payment by the beneficiaries. Hence, we request the Hon'ble Commission to allow the recovery process more complex. Hence, we request the Hon'ble Commission to allow the recovery of interest on revenue gap/(surplus) till the date of actual payment by way of payment by the labore for the payment by way of payment by the date of actual payment by way of payment by the payment by the beneficiaries to payment by the payment by the beneficiaries, the generators have to levy Late payment surcharge which would make the recovery process more complex. Hence, we request the Hon'ble Commission to allow the recovery of interest on revenue gap/(surplus) till the date of actual payment by way of EMI.
O PERATIONAL	PARAMETERS IMPACTING TARIFF	
5.1.1	NORMATIVE ANNUAL PLANT AVAILABILITY FACTOR (NAPAF) In view of the above, the existing norms of NAPAF may need review by considering past years' PAF, the procurement of coal from alternate sources, other than	The Hon'ble Commission may consider to continue with the present norm of 85% as NAPAF in the next Control Period as well so as to give sufficient time to the thermal generation sector to stabilize under the new conditions of responding to flexible operation.

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	designated fuel supply agreements, changes in hydrology, etc.	Justification:
		1. With the increase in the norm of NAPAF, the risk of the generators also increases since the Annual Fixed Charges will not be recovered in case the actual availability falls short of the NAPAF. It is submitted that with the improvement in the PAF of the generation sector does not always reflect the capability or performance of the majority players and many generating stations might have met the existing norms after overcoming various difficulties like coal shortage, intermittent equipment failures, forced shut down etc. The Hon'ble Commission may appreciate the fact that an Annual Shutdown of 20 days translates to a loss of Annual Availability in the tune of 5-6%.
		2. With further stringent conditions of thermal power plant operation related to fast ramping up and ramping down so as to respond to the demand signals, reduction in technical minimum load to about 40%, it is quite likely that the forced outages in the generating units are likely to increase in the coming years. It may take a few years of time for the generation sector to cope up with the new norms of flexible generation response. Till such time, the availability of the units may get hampered due to technical and operational faults. Hence, we request the Hon'ble Commission to continue with the present norm of 85% in the next Control Period as well so as to give sufficient time to the thermal generation sector to stabilize under the forthcoming conditions of flexibility being brought by the government.
5.2	PEAK AND OFF-PEAK TARIFF	We request the Hon'ble Commission to continue with the present mechanism of
		fixed charges recovery based on daily peak and off-peak periods.
	As recovery of reasonable costs is of prime importance	
	for any infrastructure sectoral growth,	
	comments/suggestions are sought on the possible	

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	interventions/modifications required to address the issues highlighted above. Specific suggestions are also sought on the following. 1. Whether it would be advisable to limit the recovery based on daily peak and off-peak periods. 2. Suggestions on National versus Regional Peak as a reference point for recovery of fixed charges.	 Justification: It is submitted that the thermal generating stations are essentially base load stations designed to meet the base load requirement of the DISCOMs. However, the DISCOMs operating in a particular state do not have similar peak and of-peak periods due to different demographics, consumer categories as well as tariff structure. Generally, the RLDCs and the SLDCs determine the peak and off-peak period based on the peak and off-peak period of the entire region and the State respectively. For e.g., the State DISCOMs catering to a larger demand and consumer base may have a peak at evening while a private DISCOM operating with a lesser consumer base may have the peak at night. But while determination of the peak and off-peak hours of the State DISCOM may play the major role and the peak period of the entire state is defined as the evening hours. This leads to differential impact on the generators supplying to State and private DISCOMs considering the outage in the same hours. However, this being an inherent problem, would remain under the existing system. If the Hon'ble Commission wishes to define a National or Regional peak as a reference point for recovery of Fixed Charges, it may lead to further anomaly as the difference (in terms of peak hours) would then crop up between the States in the same region and the among all the States in the country. We therefore
		request the Hon'ble Commission to continue with the present mechanism of recovery of fixed charges based on daily peak and off-peak periods.
5.3	OPERATIONAL NORMS	It is submitted that the operating norms should be based on past performance of
		the units in the country including State Utilities/IPPs of relevant vintage of the units and should factor in operating constraints, like, partial loading due to erratic load

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	Further, as the generating stations are separately allowed degradation impact due to low load operations, it is felt that the norms may be fixed considering the ideal loading of generating units.	pattern of the beneficiaries and lower operating load factor due to shortfall of quantity and quality of fuel which is expected to continue in future. Further, the margin in Design Heat Rate should be different for the generating stations with respect to the Control Period in which it was commissioned.
	Comments and suggestions are sought from stakeholders on the above proposal and other key determinants to be considered while approving the	<u>Justification</u> : Station Heat Rate -
	norms.	1. It is submitted that with operation of a generating unit under varying load conditions and with variations in the quality of fuel, the efficiency of the boiler and turbine tends to degrade over time. Hence, we request the Hon'ble Commission to specify the margin in the Design Heat Rate to be different for a generating station completing every block of 5-years. The margin provided to the generating stations commissioned in the Control Period FY 2014-19 should be higher than a generating station commissioned in FY 2019-24.
		2. It is further submitted that the capability of a generating station to perform at a specified level is determined based on the date of commissioning of the units and accordingly the normative operating parameters are set. In case the EPC order is placed by the generating company based on the operating norms prevailing on that date and the unit is commissioned in the next tariff period under different Tariff Regulations with revised norms of operation, the generating company shall be constrained with operating the unit with revised norms. Hence, we request the Hon'ble Commission to determine the margin in Design Heat Rate based on date of placement of order for the BTG package in the relevant Control Period.

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		3. Further, we request the Hon'ble Commission may consider the following important criteria while specifying norms for Station Heat Rate:
		 a. Quality of Fuel b. Operating pattern of machines (part load/full load etc.) c. Vintage of machines d. Unit size e. Climatic condition. f. Loss of Ignition
5.10	INCENTIVES However, incentives linked to generation in excess of target PLF/NAPAF especially during peak periods, in the case of hydro stations and old pit-head generating	We propose the Hon'ble Commission may link the Incentive back to Plant Availability and Annual Fixed Charges over the Useful life of the Plant which would provide the opportunity to the generating stations to recover the lost Depreciation and interest costs in other years and restore the Project IRR.
	stations, may need a review in order to encourage higher generation from such plants. This will result in increased generation from such plants and will also benefit beneficiaries.	 Justification: Since ensuring Availability of units is linked to Fixed Charges, it will be judicious to restore the methodology of linking the incentive also with the Fixed Charges.
	Comments and suggestions are sought from beneficiaries on the above proposal and any other alternative options, if any.	Further, the incentive is being provided to a generating station and the same should depend on the performance parameters on which the generating station has its control. The PLF is controlled by the beneficiaries and therefore, the generating stations having a huge gap between Plant Availability and PLF, stand to lose despite maintaining a higher Declared Capacity. Further, the existing provision of Dis-Incentive below Normative Plant Availability impacts the recovery of Depreciation and Interest payment of the generating stations for. As per the National Tariff Policy 2016, the mechanism of Incentive and Dis-Incentive needs

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		 generators is already linked to Normative Annual Plant Availability factor (NAPAF), an equitable approach is required to be adopted for Incentive. 2. PLF-based Incentive mechanism would allow the beneficiaries to maintain adequate spinning reserves for meeting the peaking load. This would not address the lack of efficiency in demand forecasting and effective utilization of resources by the DISCOMs.
		3. It would be prudent to link the incentive for generators to parameters which are under the control of the generators like availability. The PLF is not a parameter which can be controlled by a generator. The beneficiaries maintaining a high spinning reserve, generally opt for lower scheduling during off-peak hours to avoid the incentive. Further, if the peak period of any beneficiary falls at a time when the renewable power is available, then the thermal generators would be backed down and they would miss the opportunity to earn peak-period incentives. Hence, it would be equitable to provide incentive to generating companies on the basis of the availability of their generating units during the year.

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OTHER KEY ISS	OTHER KEY ISSUES				
6.3 6.6	DECOMMISSIONING OF GENERATING STATION AND TRANSMISSION ASSETS In view of the above, comments and suggestions are sought from stakeholders on the possible approaches to recover or refund the impact of decommissioning costs in case the generating stations/transmission systems are decommissioned before the completion of their useful lives, if such decommissioning is done in compliance of a statutory order or due to technological obsolescence duly approved by RPC. UP-GRADATION OF ASSET/REPLACEMENT In view of the above, comments and suggestions are	 The Hon'ble Commission may consider reimbursement of the book value of the asset (GFA – Accumulated Depreciation) as a one-time settlement in case of decommissioning of assets on account of reasons beyond the control of the developers Justification: 1. Decommissioning of an asset prior to completion of useful life of the same leads to loss on account of the developer due to unrecovered depreciation, amount towards debt service obligations and drop in equity IRR. There are various grounds of decommissioning which are beyond the control of the developers like compliance of a statutory order, due to technological obsolescence, due to equipment failure on account of abrasive wear and tear (particularly in case of coastal thermal plants). In such cases, the assets are decapitalized and the 			
	invited from stakeholders regarding the treatment of unrecovered depreciation.	 corresponding book value of the asset is written off from the books. In turn, the entire adverse financial impact is taken by the developer. In such cases, the developers can meet the debt service obligations only upto the accumulated depreciation. Unless the balance cash is provided by means of tariff, the developers would face difficulty in servicing the debt obligations. Further, the amount invested in the form of equity can never be recovered and are considered as a loss. 			

COMMENTS ON CERC APPROACH PAPER ON TERMS & CONDITIONS OF TARIFF REGULATIONS FOR THE TARIFF PERIOD FY 2024-29

Comments on the Addendum to the Approach Paper on Terms and Conditions of tariff regulations for the Tariff Period 1.4.2024 to 31.3.2029:

- 1. **COMPENSATION FOR OPERATING AT 55% LOADING:** It is submitted that the existing methodology for part-load compensation is provided to the generating stations for degradation in the key operating parameters, viz. Station Heat Rate, Auxiliary Power Consumption and Oil Consumption gradually with loads falling below 85% up to 55%. While the Annexure to the Addendum to the Approach Paper has suggested the compensation mechanism for operating at loading bands of 55%-50%, 50%-45% and 45%-40%, the compensation for operating up to 55% loading from 85% loading, as provided under the existing compensation methodology, should continue. This aspect is required to be clarified in the Tariff Regulations 2024. Further, similar compensation mechanism may also be specified by the Hon'ble Commission, through a separate Order, for generating stations or capacities which are supplying power under Section 63 of the Act.
- 2. **COMPENSATION ON ACCOUNT OF HIGHER AUXILIARY POWER CONSUMPTION AT LOADS BELOW 55%**: The proposed compensation mechanism for below 55% loading caters to Capital Expenditure, O&M Expenses, Net Heat Rate and Oil Consumption. However, it may be noted that the impact on Auxiliary Power Consumption due to such loading below 55% has not been considered in the proposed Approach Paper. In our humble opinion, at lower loads, the degradation of Auxiliary Power Consumption increases on account of operating the unit with essential equipment at minimum loading. Further, frequent start/stop of various equipment at lower loads also contribute to the degradation of Auxiliary Power Consumption. Further, the variation is acute for the generators having units below 500 MW where there is no option of turbine driven BFP. In case of electrically driven BFP, the variation is higher due to fluctuation in the loading.

In view of the above, we humbly request the Hon'ble Commission to consider suitable compensation for Auxiliary Power Consumption at loading bands of 55%-50%, 50%-45% and 45%-40%.

3. **FREQUENCY OF CYCLES**: It is submitted that the existing compensation mechanism provides for compensation worked out for the month on cumulative basis considering Average Unit Loading ("**AUL**"), subject to reconciliation at the end of the year. It is noteworthy here that the computation of the impact of partial loading based on AUL defeats the main purpose of providing the compensation. The cycles of partial loading are event specific and the assessment of the impact of the frequency of such cycles of partial loading on the generating units needs to be incorporated in the compensation mechanism. The computation methodology of such compensation mechanism on AUL and further annual reconciliation would not reflect the actual impact as the same is not linearly proportional to the loading levels. For example, consider two identical generating units of 500 MW. Both the units record an AUL of 50% but one of the machines has undergone frequent load changeover ranging from 40% to 60% whereas the other machine has undergone a relatively stable operation at around 50%. The

COMMENTS ON CERC APPROACH PAPER ON TERMS & CONDITIONS OF TARIFF REGULATIONS FOR THE TARIFF PERIOD FY 2024-29

compensation would be identical for both the generating units although the impact of the cyclical load on the first machine is much deeper than the latter.

In view of the above, we request the Hon'ble Commission to kindly consider the impact of cycles undergone by the generating units while operating at partial loading conditions.

4. **CONSIDERATION OF IMPACT ON CAPITAL COST ON CASE-TO-CASE BASIS**: The present paper has proposed for one-time capital expenditure towards retrofitting of existing generating units with improved control systems for attaining capability to perform under flexible conditions of ramping up and ramping down at partial loading. However, the present paper has not stipulated the nature of capex schemes required for such retrofitting of existing generating units in order to ensure smooth operation at partial loading of the units. Instead, such capital expenditure has been considered instead of any actual data. Such estimation may cater the requirement fully or fall short of the actual requirement. There may be various factors like compatibility of latest technology with the existing systems, technological obsolescence etc. which drive the cost of such retrofitting upwards.

In our humble opinion, since this is a new approach to be implemented in the thermal generation sector, the determination of the requirement of capital expenditure may be based on the actual bids discovered by the generators from the bidders/vendors. This may provide the necessary impetus to the generators for adopting and implementing the retrofits. Else there can be representations, litigations, etc. for securing the additional capital expenditure required for such retrofitting of the control systems.