

**Before the**  
**MAHARASHTRA ELECTRICITY REGULATORY COMMISSION**  
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**CASE No. 5 of 2005**

**In the matter of**  
**Principles and Protocol to be adopted for Load Shedding by MSEB**

**Dr Pramod Deo, Chairman,**  
**Shri A. Velayutham, Member**

**ORDER**

**Dated: 16<sup>th</sup> June, 2005.**

In its Order dated 4<sup>th</sup> March, 2005 on an Application for compliance of Tariff Order provisions in respect of load shedding undertaken by the Maharashtra State Electricity Board (MSEB) and related issues, the Commission had, inter alia, observed that there were significant variations in the implementation of load shedding. The Order cited Chairman, MSEB's statement that such variations are based on commercial decisions. On this, the Commission had stated (at para 17.1.7 of the Order) that :

*“This raises the basic issue of whether a distribution licensee is free to decide the manner in which a shortage of power is to be allocated as between different areas and/or consumers, and the principles on which such rationing is to be based... Such rationing has to be fair and equitable, and the principles on which load shedding is undertaken have to be known... Within such a framework, technical exigencies requiring variations would be within the domain of the State Load Dispatch Centre to decide independently.*

*Considering the above, and in the context of Sections 42(1), 43, 61, 86 and other provisions of the Electricity Act (EA), 2003 and of the Supply Code and Standards of Performance Regulations notified recently, MSEB should submit to the Commission, within the next one month, the principles and protocol proposed to be adopted for load shedding, the other alternatives that might also meet the tests of equity, fairness and reasonableness, and the likely impacts. Thereafter, this matter would be separately considered and addressed by the Commission.”*

2. In its initial response dated April 1, 2005, MSEB set out the various considerations underlying the load shedding undertaken by it and the distinctions made between different areas and consumer categories. Subsequently, under a separate Application dated April 9, 2005, MSEB sought directions under Section 23 of the Electricity Act (EA), 2003 to all Distribution Licensees in the State to take certain measures for a limited period of time to curb electricity demand, particularly during the evening peak hours, considering the serious demand-supply gap necessitating load shedding on an extensive scale. By its Orders dated April 26, 2005 and May 4, 2005 on that Application, issued after hearing the Licensees and consumer representatives, the Commission directed all the Licensees to take certain emergent measures. The Commission also touched on the separate matter of load shedding principles and protocol, and the Order dated May 4, 2005 stated that:



*“15. At its hearing on April 26, 2005, the Commission also considered the principles that should be adopted for undertaking load shedding by MSEB, as a part of separate proceedings flowing from directions given in its Order dated March 4, 2005. In addition to the various points suggested by MSEB, the Commission directed that the T & D losses and collection efficiency in different areas need to be taken into account while deciding the load shedding protocol. MSEB should revert to the Commission with its further submissions in this regard. The Commission will pass Orders on the principles and protocol for load shedding separately later. In the meantime, MSEB should publish their load shedding programme on their website also.”*

It may be mentioned that, in addition to other relevant provisions, S. 23 of EA, 2003 has a direct nexus with the present Order.

3. Separately, on various Writ Petitions concerning load shedding and related issues, the Honorable Bombay High Court (Nagpur Bench) passed an interim Order on May 4, 2005 addressing, inter alia, the discriminatory application of load shedding, and clarified some aspects further on May 6, 2005. On a Special Leave Petition filed by MSEB, the Honorable Supreme Court of India stated on May 12, 2005:

*“In terms of Order dated 6<sup>th</sup> May, 2005 the High Court, considering the difficulties of the petitioner in rescheduling the power supply as per interim order dated 4<sup>th</sup> May, 2005, has directed that it would do so in consultation with the Maharashtra Electricity Regulatory Commission. The further direction that there should be no discrimination amongst consumers irrespective of geographical allocation is modified for the time being and the matter is left to be determined by the petitioner in consultation with the Regulatory Commission.”*

The High Court has extended the time for the Commission to decide the load shedding principles upto June 30, 2005.

4. MSEB submitted its revised proposal on the principles and protocol of load shedding on May 16, 2005. The Commission issued a Public Notice the same day making the proposal available, inviting written comments and suggestions from the public, and intimating dates of Public Hearings for those who wished to be heard in person. Accordingly, Public Hearings were conducted at Thane, Nashik, Aurangabad, Pune, Nagpur and Amravati from May 26 to June 3, 2005. Around 150 individuals/organizations participated in this public process through written or oral submissions, or both. The Commission also held several discussions with MSEB for better understanding of operational constraints, refinement of data, etc.

5. MSEB's proposal essentially sets out different categories of consumers and areas for application of load shedding depending on the quantum of shortage, the inter se Aggregate Technical and Commercial Loss (ATC) levels, and certain exclusions and exemptions which are detailed in the proposal. Some of the proposed area exemptions cite State Government instructions. The Commission notes, however, that no submissions in this regard have been made by the Govt. of Maharashtra (GoM) during these proceedings. MSEB's proposal also states that, at present, MSEB's system demand during evening peak hours ranges between 11,000 MW to 13,000 MW, as compared to the online capacity during those hours of 8500 MW to 9400 MW, thus necessitating load shedding of the order of 2500 MW to 3600 MW. The load shedding necessary during non-peak hours is around 2200 MW.

6. The Commission notes its mandate and powers under Sections 23, 42(1), 43, 61, 86 and other provisions of the Electricity Act (EA), 2003, which are directly or indirectly relevant to the issues involved in these proceedings. The Commission has carefully considered the various submissions made and inputs received by it in this matter. The Commission also notes that the supply-demand gap is not a short-term phenomenon, and will persist to a greater or lesser extent for a considerable further period of time.



7. The detailed Order in these proceedings will be issued shortly. In the meantime, the Commission has decided to issue this summary, operative Order. The Commission's substantive directions with regard to the principles and protocol to be adopted for load shedding are briefly set out as follows:

- (a) The EA, 2003 casts certain obligations on Distribution Licensees with regard to supply of electricity to their consumers, except in certain circumstances outside their control. However, it is inevitable that, when there is a shortage of available power vis-à-vis the requirement of consumers, load shedding would have to be undertaken in order to maintain the system frequency and to ensure its security. The present Order deals with the basis on which such shortage should be apportioned among different consumers and areas through load shedding rather than the actual extent of shortage that may prevail at any point of time. Thus, it should not be construed as the Commission having validated or accepted the figures presented by MSEB with regard to the shortfall or its reasons. Moreover, the load shedding requirement is dynamic, and would vary from time to time depending on the system demand-supply gap, system frequency, season, time of day, etc.
- (b) The thrust of the EA, 2003 is on efficiency and economy of operations. Moreover, the immediate issue of concern in these proceedings is the equitable management and regulation of the load in a situation of shortage. In order to do so in a fair and equitable manner, the Commission believes that it is necessary to distinguish between areas with better performance, and undertake lesser load shedding in areas with lower Distribution losses and higher collection efficiency, all else being equal. This would be in keeping with the principle that, at a time of scarcity, areas where energy is not being efficiently utilized or paid for should rank lower in the rationing order.
- (c) In its proposal, MSEB has considered Circles (comprising several Divisions) as the area unit to which such principles should be applied. However, MSEB also stated that

*“Division-wise categorization based on loss levels would ideally be most suitable. Although Division-wise loss statistics are available, Division-wise load data is not yet available and hence it would be difficult at the moment to work out the load shedding programme on that basis. This refinement can be incorporated subsequently.”*

Many participants in the public process stressed that, for obvious reasons, the application of such principles would be more meaningful the greater the level of disaggregation and the smaller the unit. This would also help to focus awareness and accountability better. The Commission's interactions with MSEB indicate that it is now possible to consider the Division as the unit, and it has accordingly decided to adopt it for the present. An exception has been made in the metropolitan and other major cities, where it is more appropriate to consider the city as a compact unit, clubbing the Divisions comprising it in case there are more than one.

- (d) MSEB had proposed the ranking of Circles or other units on the basis of their Aggregate Technical & Commercial (AT&C) losses. However, the Commission believes that it is necessary to separate the two components, being essentially different in nature, and also to give greater weightage to Distribution losses (after excluding transmission losses as described below). It is worth recalling that, in an earlier Tariff Order dated January 10, 2002, the Commission had decided that the burden of Transmission & Distribution losses above a benchmark level of 26.87% should be shared equally by consumers and MSEB, and the resultant charge to consumers shown separately in their bills. This dispensation was challenged in various Writ Petitions, but the Bombay High Court upheld it. In its judgment dated February 11, 2004, the High Court observed, inter alia, that



*“the Commission has adopted an unorthodox and innovative method in dealing with T & D losses...The Board and the consumers are pari delecto in preventing T&D losses on account of theft...The Commission has also noted that it will be improper to require the consumers in areas which show better compliance to pay for the thefts by consumers in other areas which show less compliances and higher thefts... We are inclined to ignore the criticism that the Commission has proposed to do something which has not been done before.”*

(Subsequent to that Tariff Order, the Commission exempted Circles with T&D losses below the benchmark level from the charge. Separate T&D loss charges were discontinued altogether from December 1, 2003.) Although there may be correlation between some of the factors responsible for losses as well as low recovery (such as organizational inefficiency and malpractices, local social ethos and paying culture, etc.), the emphasis for the present purpose has to be on the losses criterion considering the primary objective of managing the load, and this is reflected in weightage in the ratio of 70:30 for the Distribution loss and collection inefficiency, respectively, adopted now by the Commission.

- (e) Only Distribution losses have been taken, considering that Transmission losses are at the higher levels of voltages and outside the control of the Divisions. For the time being for want of a better alternative, the loss figures considered for this purpose are as assessed by MSEB. Validation of the data has not been undertaken by the Commission, and is not in a form comparable to the data submitted earlier on energy accounting and merit order despatch in compliance of various Tariff Order directions. Further exercises required of MSEB will be outlined in the detailed Order.
- (f) Distribution loss has been computed from EHV Sub-station output levels, after excluding the segregatable industrial load in order to give a more representative picture, since it tends to skew the loss levels. Moreover, since HT industry is largely excluded from the load shedding mechanism based on the criteria and rankings adopted (but not altogether from load shedding per se), it is appropriate to exclude the HT industrial load from the Distribution loss computations. The broadly representative MIDC feeder loss levels assessed by the Commission in its Tariff Order for FY 2003-04 have been considered to estimate the corresponding HT input from the HT sales, so as to derive the balance LT input (including unavoidably, some HT input on mixed feeders) from the total energy input to the Division. Collection efficiency has also been computed excluding HT recovery for the application of the 70:30 criterion, since the Commission finds that such recovery is generally very high, requires little effort to maintain, and is likely to give a misleading picture of such effort even in Divisions where there may be a few large consumers of this type, and skew the overall collection efficiency figures. For the time being, both Distribution loss and collection efficiency have been considered taking into account the period from April, 2004 to March, 2005, so that seasonal and other variations are captured.
- (g) Weightage has also been given to the fact that the technical Distribution losses in rural areas will generally be higher than in urban areas, given the wider spread of the LT network in the former and other factors. The Commission has for the moment considered a difference of 3% for the purpose of this Order, based on discussions with MSEB. However, this difference will be reassessed after further data and analysis is submitted by MSEB.
- (h) The Divisions have been ranked on the basis of the weighted average loss levels, computed as described earlier. The contribution of the Divisions in each of three types of areas, viz. major urban areas, other urban areas, and rural areas (as categorized by MSEB) to the daily total load has been segregated. Analysis of the sheddable load (after excluding the HT industrial load and public water works connected to separate/express feeders) shows that the contribution of the major urban, other urban and rural Divisions to the sheddable load is 1063 MW, 2227 MW, and 5100 MW, i.e. approximately in the ratio of 1:2:5. In effect, 1 hour of load shedding in rural areas will give load relief equal to that achieved by 5 hours of load



shedding in major cities and 2 hours of load shedding in other urban areas. Hence, the desired load relief can be achieved by shedding load in proportion to the contribution to the total load of these different types of areas.

- (i) Applying the above principles, the Divisions have been ranked in four Groups as follows, such that all Divisions within a Group would be subject to the same level of load shedding (except for Divisions comprising a major city, which would be clubbed):

	Group	Weighted average loss and collection efficiency level	
		Urban	Rural
1	Group A	0% to 25%	0% to 28%
2	Group B	> 25% to 35%	> 28% to 38%
3	Group C	> 35% to 50%	> 38% to 53%
4	Group D	Above 50%	Above 53%

(The first bracket is upto 25%/28%, for which a parallel can be drawn with the benchmark T&D Loss level of 28.67% considered in the Commission's first Tariff Order, although the components of these percentages are of course somewhat different.)

- (j) All Divisions in the MSEB area of supply will be subject to load shedding as and when it is required, but the number of hours of load shedding in one Division as compared to another would differ on the basis of the above principles and the total load required to be shed.
- (k) The maximum hours of planned load shedding during any day in any Division should not be more than 8 hours. In circumstances in which the application of the principles in this Order would result in this ceiling being exceeded in any Division category (e.g. rural), the load shedding in the same category in the next higher Group will be increased upto the ceiling of 8 hours. For example, if rural Divisions in Group D require 10 hours of load shedding as per these principles, they would be subject only to 8 hours. The load equivalent to the excess 2 hours will be shed by adding to the load shedding in rural Divisions of Group C to the extent necessary (subject also to the ceiling of 8 hours), and so on till the load can be met. This will ensure that, in such circumstances, the load ratio between categories is still followed, but not Group-wise.
- (l) When it is found that the quantum of load relief actually required is less than planned, it should be distributed by pro-rata reduction in the hours of load shedding in Group A Divisions.
- (m) MSEB should not shed load for more than 4 hours at a stretch in any Division. If the total load shedding to be carried out is more than 4 hours, it should be undertaken in two or more blocks.
- (n) MSEB will have to ensure that, taking its supply area as a whole, the load shedding programme is drawn up in such a way that the load withdrawal or addition related to load shedding should not result in frequency jerk endangering grid security.
- (o) The above principles will not apply to Railway traction loads, and those public water works (including MIDC, CIDCO, and Maharashtra Jivan Pradhikaran, etc. as may be relevant) and continuous process industries which are on separate feeders, nor will these be subject to load shedding. They will also not apply to those industries and industrial areas which are supplied through dedicated/express feeders. However, such industries and industrial areas (excluding continuous process industries) will be subject to load shedding for 16 hours on the day of the area-wise staggered weekly-off set out in GoM's Maharashtra Electrical Energy (Regulation



of Distribution, Supply, Consumption or Use) Order, 1995 dated 1st December, 1995. In this context, it will be recalled that, in its Order dated May 4, 2005, the Commission had stated that

*“In order to remove any doubt or uncertainty, the Commission directs that the contents of that Order, as amended to date, will remain protected and shall continue to be in force until further orders”.*

With the Commission’s present Order, the rest of the GoM dispensation will not survive.

- (p) Based on the above Grouping and principles, and in consultation with MSEB, the Commission has simulated the different levels of load shedding across these Groups, with further differentiation between major urban, other urban, and rural areas according to the rationale discussed earlier, to achieve the load relief desired. An illustrative simulation using a shortfall level of around 2500 MW during the evening peak, given purely as an example for providing greater clarity on the application of the principles adopted by the Commission, is at Annexure 1. Annexure 2 lists the MSEB Divisions Group-wise considering the criteria set out above. The Annexures also set out the meanings of the relevant terms used, as defined by MSEB. As noted elsewhere in this Order, the figures are as presented by MSEB and have not been validated by the Commission, for which further data and analysis may be necessary subsequently.
- (q) The Commission would like to make it clear that this dispensation is intended for planned load shedding. Even in this case, some rounding off (particularly to the advantage of Divisions in Group A) may have to be resorted to in micro-planning while adhering broadly to the load ratio differentiation in the number of hours of load shedding in different Divisions and types of areas. There may also be exigent situations such as forced outages, etc., in which the State Load Despatch Centre would require deviations from these principles in actual operation. However, while the detailed load shedding programme itself may change from time to time depending on changes in estimates of expected load or the shape of the daily load curve due to seasonal or other factors, planned load shedding should be undertaken in accordance with these principles. The concerned Division officials must be held accountable for deviations, and action taken against them. At the same time, it is necessary to recognize consistent and sustained improvements in loss and collection efficiency parameters beyond a benchmark level through an incentive scheme for the concerned Division personnel. Similarly, consistently poor performance should be penalised through the instrument of the Annual Confidential Reports and other means. MSEB should report the mechanism adopted for the purpose by it within 2 months.
- (r) MSEB should publicize (including hosting it on its website) and implement its load shedding programme on the basis of this Order within a week.
8. The Commission reiterates that it has not accepted MSEB’s submissions regarding the extent of load shedding required and other figures except for the time being, and that further data and analysis is required. The Commission’s requirements in this regard, as well as the manner in which load shedding according to the principles is to be monitored will be set out in the detailed Order.
9. During the public process, the Confederation of Indian Industry (CII), Western Region pointed out that large captive generation capacity is available with industries around Pune. Considering the significantly higher running costs of such plants, some dispensation is required to compensate such industries for operating them throughout the day and thereby reducing the load on MSEB and enable it to better supply other consumers. Alternatively, a link can be established with industrial and other consumers who are willing to pay more for reliable, uninterrupted power. This would also relieve MSEB to that extent. The Commission’s Order dated September, 8, 2004 on fossil-fuel based Captive Power Plants does not fully address such variants. In this context, it will be



recalled that, in an earlier Tariff Order, the Commission had mooted the concept of a 'Reliability Charge' to be proposed by MSEB, and reiterated it in its last Tariff Order. Considering the cluster of surplus captive power capacity at Pune, MSEB should revert within 3 weeks to the Commission with detailed, workable alternatives for harnessing it on a pilot basis, which might provide a model for other such clusters. For this purpose, MSEB should consult CII, as well as others such as the Maharashtra Chamber of Commerce, Industries & Agriculture, etc.

10. It is evident that significant levels of shortages will continue to prevail in the MSEB area for a considerable period. The Commission has been stressing the urgent need for MSEB to undertake Demand-Side Management measures and to intervene pro-actively through energy conservation and efficiency promotion schemes so as to build a critical mass of consumer awareness and adoption. The Commission has taken up these issues separately. Another aspect of such measures is joint load management with the participation of consumers rather than load regulation. In its Order dated March 4, 2005 the Commission had emphasized the need for separation of feeders, which would also give greater flexibility in agricultural and other load management. Thereafter, MSEB has submitted a very limited 1<sup>st</sup>-phase programme for capital expenditure approval, which is being examined separately. In the meantime, MSEB should identify clusters of consumers in each Division with whom to work out an arrangement for a ceiling on load at different times of the day. MIDC areas may be suitable to begin with, but there would be several other such types of consumers or clusters which can be approached on priority. MSEB's Akshay Prakash scheme of joint, voluntary self-regulation by villages is one variant of this approach, but it is difficult to take up villages in isolation considering the nature of feeders at present.

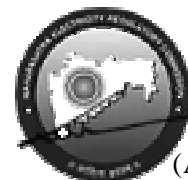
11. Although load shedding is being resorted to in most States in one form or the other, this Order constitutes perhaps the first exercise of its kind to settle certain transparent and equitable principles through a public regulatory process after the coming into force of the EA, 2003. Considering the persistence of power shortages, by its very nature this dispensation will have to be seen as 'work in progress', to be reviewed and refined periodically by the Commission considering actual working and the ground realities obtaining from time to time, further data and analysis, other measures that are undertaken, the performance of different Divisions, and other factors.

12. Recently, MSEB has given way to three functional successor entities and a holding company (the distribution function having been vested in the Maharashtra State Distribution Company). However, the term 'MSEB' has been used throughout this Order for convenience.

The detailed Order will follow shortly.

Sd/-  
(A. Velayutham)  
Member

Sd/-  
(Dr Pramod Deo)  
Chairman, MERC



(A.M. Khan)  
Secretary, MERC