

**MEGHALAYA STATE ELECTRICITY REGULATORY COMMISSION,  
SHILLONG**

**Meghalaya State Electricity Regulatory Commission – Guidelines  
on Cost-Effectiveness Assessment of Demand Side Management  
Programmes, 2021**

**PRE-PUBLICATION NOTIFICATION**

The 20<sup>th</sup> January, 2021

No.MSERC/DSM/COR/30/2020/41– In exercise of the powers conferred under Regulation 6.1 (c) of the Meghalaya State Electricity Regulatory Commission (Demand Side Management) Regulation 2016, after due consultation with Meghalaya Power Distribution Corporation Limited (MePDCL), the Meghalaya State Electricity Regulatory Commission proposed to issue the following Guidelines for Cost-Effectiveness Assessment of Demand Side Management programmes.

The Commission invites suggestion, if any, within 30 (thirty) days from the date of this notice before the publication of the notification.

**1. SHORT TITLE, APPLICATION AND COMMENCEMENT**

- 1.1** These Guidelines may be called the “Meghalaya State Electricity Regulatory Commission (Cost-Effectiveness Assessment of Demand Side Management Programmes) Guidelines, 2021”.
- 1.2** These Guidelines are to be followed by Distribution Licensees in the State of Meghalaya in its areas of supply –
- (a) while formulating the DSM programme pursuant to Regulation 11.2 of the Meghalaya State Electricity Regulatory Commission (Demand Side Management) Regulation, 2016;
  - (b) while selection and prioritization of various DSM programmes in the DSM plan pursuant to Regulation 9.4 of the Meghalaya State Electricity Regulatory Commission (Demand Side Management) Regulation, 2016;
  - (c) while preparing Programme Document, for each DSM programme included in the DSM Plan pursuant to Regulation 11.1 of the Meghalaya State Electricity Regulatory Commission (Demand Side Management) Regulation, 2016.
- 1.3.** These Guidelines shall come into force from the date of their publication and shall remain in force till such time they is modified by the Commission.

## 2. DEFINITIONS

2.1. In these Regulations unless the context otherwise requires:

- (a) “**Act**” means the Electricity Act, 2003 (36 of 2003) and amended from time to time;
- (b) “**Avoided Costs**” means the incremental costs that are avoided by the Distribution Licensee on power purchases and system upgradation in capacity (generation), distribution & transmission due to energy efficiency DSM measures/programmes. All cost savings resulting from efficiency measures are counted as “avoided cost” benefits;
- (c) “**Commission**” means the Meghalaya State Electricity Regulatory Commission;
- (d) “**Cost Effectiveness**” means an indicator of the relative performance or economic attractiveness of any investment in DSM programme or when compared to the costs of energy produced and delivered in the absence of such an investment;
- (e) “**Demand Side Management**” (**DSM**) means the action(s) of a Distribution Licensee to stimulate changes in the pattern of end-use (i.e., the demand side of electricity) and shall include any increase/ decrease in the demand, shifting the demand between high and low peak periods, managing the intermittent load demands, etc., with the objective of reducing the power purchase and/ or Distribution Licensee’s costs;
- (f) “**DSM Consultation Committee**” means a Committee set up to facilitate the DSM programme approval process for the Commission.
- (g) “**Demand-Side Resource**” means a saving in consumption (kWh) and/or demand (kW/KVA) available as a result of implementation of DSM programme and expressed in terms of Quantum {as to how much (kWh and/or kW) is available}; Time {as to when (time of day, days, season)}; and Cost ( as to what cost).
- (h) “**Energy Efficiency Measures**” or “**Energy Efficiency Programmes**” means the measures or programmes to bring about or to improve energy efficiency, to stimulate consumers to use energy more efficiently and switch over to energy efficiency devices/ appliances/ equipments/ technologies, etc., which reduces both energy demand and energy consumption;
- (i) “**Evaluation, Measurement and Verification (EM&V)**” means the activities to evaluate, monitor, measure and verify performance or other aspects of energy efficiency programmes or their market environment;

- (j) **“Life”** means an estimate of the median number of years that the DSM measures installed under the programme are still in place and operable; or warranted years of service or as defined by DSM Consultation Committee;
- (k) **“Load Research”** means an activity embracing the measurement and study of the characteristics of electric loads to provide a thorough and reliable knowledge of trends, and general behaviour of the load characteristics of the customers serviced by the electrical industry;
- (l) **“Regulations”** means the Meghalaya State Electricity Regulatory Commission (Demand Side Management), Regulations, 2016.

**2.2** All other expressions used herein but not specifically defined in these Guidelines, though defined in the Act and the Regulations shall have the meaning assigned to them in the Act and the Regulations.

### **3. BASIC PRINCIPLES**

- 3.1** Every Distribution Licensee shall adhere to the implementation framework specified in the Meghalaya State Electricity Regulatory Commission (Demand Side Management) Regulations, 2016 and submit the required DSM programmes and plans for the Commission’s approval in accordance with the said regulations.
- 3.2** Distribution Licensees shall be guided by these Guidelines –
  - (a) while submitting DSM programmes, portfolio and DSM plans for the approval of the Commission;
  - (b) while submitting to the Commission the impact on energy and demand, together with the cost-benefit analysis as included in Annual Revenue Requirement (ARR).
- 3.3** While submitting the DSM programme to the Commission, the programme document shall be supplemented with relevant technical studies and other studies, including, –
  - (a) indicative assessment of the DSM programmes with reference to CEI and CCE;
  - (b) assessment of the economic-effectiveness of a DSM programme made under simple assumptions regarding some of the decision variables such as, inter alia, DSM measure/programme costs and impacts (both, energy – kWh and demand – kVA or KW), discount rate, life, escalation rate and avoided cost.

#### **4. CATEGORIZATION OF DSM PROGRAMMES**

Every DSM programme shall be categorised on the basis of the source of funding of the programme cost. The programme cost may be funded/borne fully by the Distribution Licensee or by the consumers, or may be shared between them, or the DSM programmes may be developed and funded by the Central or State Government or other Funding Agency, with/without the contribution of consumers.

Following are the five categories of DSM programmes:-

- I. DSM Programme Costs borne fully by Distribution Licensee;
- II. DSM Programme Costs borne fully by Consumers;
- III. DSM Programme Costs borne partially by the Distribution Licensee and Consumers;
- IV. DSM Programme Costs borne by Government/Funding Agency, with or without the share of Distribution Licensee;
- V. DSM Programme Costs borne fully by Government/Funding Agency, with or without the share of Consumers.

#### **5. COST ASSOCIATED WITH DSM PROGRAMME**

##### **5.1 Programme Cost and General Cost**

- (a) Costs involved in DSM programmes are either categorized under “Programme Costs” or “General Costs”, depending upon their direct or indirect association with the DSM programme;
- (b) “Programme Costs” are those incurred to undertake programme related activities such as design, development and implementation of the DSM programme, monitoring & reporting and Evaluation, Measurement & Verification (E, M & V), etc;
- (c) “General Costs” are those associated with general DSM activities such as load and market research, technical potential assessment, energy audit, design and development of the DSM plans and administrative costs, which are not specific to any DSM programme. As such, general cost may have direct measurable benefit to more than one DSM programme. Thus, Distribution Licensee shall have to perform cost benefit analysis to apportion or assigning the cost to a specific DSM programme.

## 5.2 Category of programme costs associated with DSM activities

Category	Activity	Description
C1	Cost of design, development and implementation of DSM programme	Costs associated with design, development and implementation of DSM programme including cost of manpower involved, either partly or entirely, through the Distribution Licensee and/or of the third party (contractor/consultant).
C2	Capital Cost	Costs for replacement of old inefficient appliances or equipment, etc., which may be borne either by the Distribution Licensee or consumers, or may even be shared between them, depending upon the funding of the DSM programme.
C3	Cost of Installation of Efficient Appliances, etc	Costs associated with installation of new efficient appliances/equipment, etc., in respect of C2 above are to be borne by the respective funding party (ies) for the replacement of old ones.
C4	Annual Operation and Maintenance Costs	Costs pertaining to O&M of appliances/equipment in respect of C3 above are to be borne by the respective funding party (ies) for the new appliances/equipments.
C5	Monitoring and Reporting	Costs associated with monitoring and reporting of DSM programmes as per the MSERC (DSM), Regulations, 2016 shall be borne by the Distribution Licensee.
C6	Evaluation, Measurement and Verification Costs	Costs for providing necessary support to Regulatory Commission or third party assigned by the Commission in carrying out evaluation, measurement and verification work in connection with the DSM programme shall be borne by the Distribution Licensee.
C7	Communication and Outreach Expenses	Costs associated with marketing & awareness related activities for popularizing/ maximizing consumer's participation in DSM programme shall be borne by the Distribution Licensee or funding agency, etc., whichever is applicable.
C8	Third Party Contracting	Costs associated with contracting a third party for activities in C1, C2, C3, C4 and C7 categories above or C9 below shall be borne by the party which bears the cost for the activity in the respective category.

C9	Safe Disposal	Costs for safe disposal of old/inefficient appliances/equipment shall be borne by the party which bears the cost of its acquisition.
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## 6. COVERAGE AND SCOPE OF COST EFFECTIVE ASSESSMENT

The cost-effectiveness evaluation of DSM programme shall include the following approach –

- (a) The cost-effectiveness of DSM programme can be viewed from a variety of perspectives, each of which lead to a specific standard cost-effectiveness test. These Guidelines for the State of Meghalaya covers assessment of DSM programme only from the perspectives of Distribution Licensee and Consumers;
- (b) Assessment of DSM programme through standard Cost-effectiveness tests, namely, total resource cost test, ratepayer-impact measure, life-cycle revenue impact, participant cost test and societal cost test.

Details of cost-effectiveness assessment of DSM programme (a above) and cost-effectiveness tests (b above) are described in Para 7 and 8 below.

## 7. CRITERIA FOR ASSESSMENT OF DSM PROGRAMMES FROM DIFFERENT PERSPECTIVES

These Guidelines covers the cost-effectiveness assessment of DSM programme only from the perspective of Distribution Licensee perspective and consumers.

### (a) Criteria for Assessment of DSM Programme from the Perspective of Distribution Licensee:

#### (i) Cost Effectiveness Index (CEI):-

“Cost Effectiveness Index” (CEI) shall be used to assess the viability of DSM programme from the perspective of Distribution Licensee. CEI shall be based on ‘Benefit/Cost ratio’ (B/C ratio), which is sum of the present value of the benefits of DSM programme divided by the sum of the present value of the costs associated with the DSM programme. In equation form, it is expressed as under:-

$$\text{Cost Effectiveness Index} = \frac{PVB}{PVC}$$

where,

PVB = present value of benefits PVC = present value of costs.

Here, PVB and PVC are calculated using the following formulae:-

$$PVB = \sum_{k=1}^n \frac{B_k}{(1 + d_{DL})^k}$$

$$PVC = \sum_{k=0}^n \frac{C_k}{(1 + d_{DL})^k}$$

where,

Parameter	Definition
<b>B<sub>k</sub></b>	Total benefits in the 'k'th year
<b>C<sub>k</sub></b>	Total costs in 'k'th year
<b>N</b>	Life of the programme
<b>d<sub>DL</sub></b>	Discount rate for the Distribution Licensee

**NB: Benefits** to the Distribution Licensee is calculated by subtracting revenue loss due to lower sales from the benefits to the Distribution Licensee either due to lower power procurement at the marginal cost of procurement or sale of power to other consumer category for the power surplus and deficits scenarios respectively. Net Benefits to the Distribution Licensee in both the scenarios are calculated using the following formulae:-

➤ **Net Benefits to Distribution Licensee in Power Deficit Scenario:-**

$$B_k = ES_k \times (T_{avg} - T_{tc})$$

where,

Parameter	Definition	Example
<b>B<sub>k</sub></b>	Total benefits in the 'k'th year	In power deficit scenario, benefit should be quantified as sale of saved power to other consumer category minus loss of revenue due to lower sales to target consumer category.
<b>ES<sub>k</sub></b>	Energy saved in 'k'th year	Savings in quantum of energy due to implementation of DSM programme
<b>T<sub>avg</sub></b>	Average Tariff (considering all consumer categories) Rs./Unit	Calculated as total revenue realisation by total energy sales of the Distribution Licensee
<b>T<sub>tc</sub></b>	Tariff of Target Consumer Category, Rs./Unit	Revenue realized from the target consumer category in the year of the implementation of the DSM programme

➤ **Net Benefits to Distribution Licensee in Power Surplus Scenario:-**

$$B_k = ES_k \times \{PP_{MC} / (1 - TD_k) - T_{tc}\}$$

Where,

Parameter	Definition	Example
<b>B<sub>k</sub></b>	Benefits in the 'k'th year	In power surplus scenario, benefit should be quantified as reduction in power procurement at the marginal cost minus loss of revenue due to lower sales to target consumer category.
<b>ES<sub>k</sub></b>	Energy saved in 'k'th year	Savings in quantum of energy due to implementation of DSM programme
<b>PP<sub>MC</sub></b>	Marginal Cost of Power Purchase	Weighted average cost of top 10% of actual power procurement by the Distribution Licensee during the previous financial year
<b>TD<sub>k</sub></b>	T & D losses in 'k'th year	Latest value of Transmission and Distribution Losses defined as under: $TD_k = \{1 - (1 - \text{Transmission losses}) \times (1 - \text{Distribution losses})\}$
<b>T<sub>tc</sub></b>	Average Tariff of Target Consumer Category, Rs./ Unit	Revenue realized from the target consumer category in the year of the implementation of the DSM programme

The CEI greater than one means that the full cost of an investment will be recovered through the benefits.

**(ii) Demand versus Supply Side options or total cost of DSM programme per unit of energy save:-**

This criterion shall be used to assess that DSM programme is cost effective (cheaper alternative) as compared to the supply side options available to the Distribution Licensee. This is based on the principle that total cost incurred for the implementation of DSM programme per unit of energy saved should be lesser than marginal cost of the power purchase by the Distribution Licensee in the year of the implementation of the DSM programme.

The formula used for calculating cost of DSM programme per unit of energy saved shall be:-



$$\frac{\text{NPV (C) in RIM test}}{\text{Total energy saved during the life of DSM programme}} \quad \text{Rs./kWh}$$

Or

$$C_{ES} = \frac{PV(TC_{DSM})}{\sum_{k=0}^n ES_K}$$

$$PV(TC_{DSM}) = \sum_{k=0}^n \frac{(TC_{DSM})_k}{(1 + d_{DL})^k}$$

where,

Parameter	Definition	Example
$C_{ESk}$	Present value of total cost of DSM programme per unit of Energy saved during the life of programme – Rs. / Unit	Total cost incurred for the implementation of DSM programme in order to save per unit of energy
$TC_{DSM}$	Total cost of DSM programme	It includes all costs such as design and development of programme, purchase and installation of efficient appliance, monitoring and reporting, E M & V, etc., associated with a particular DSM programme
$N$	Life of the programme	Life of the programme
$ES_k$	Total Energy saved during the life of the DSM programme (Units)	Saving in quantum of energy due to implementation of DSM programme
$d_{DL}$	Discount rate for the Distribution Licensee	

**(b) Criteria for Assessment of DSM Programme from the Perspective of Consumers or Cost of Conserved Energy (CCE):-**

“Cost of Conserved Energy” (CCE) shall be used to assess the cost effectiveness of DSM programme from the point of view of the participating consumers investing in the programme. CCE shall be the annualised incremental cost of investment in efficient option divided by annual energy saved due to adoption of efficient option. The formula used for calculating cost of conserved energy is:-

$$CCE = \frac{(PVC_{EE} \times CRF_{EE}) - (PVC_{IE} \times CRF_{IE})}{\text{Annual Energy Saved in kWh}}$$

where,

PVC stands for Present Value of Cost,  
CRF stands for Capital Recovery Factor, and

$$PVC = \sum_{k=0}^n \frac{c_k}{(1 + d_c)^k}$$

$$CRF = \frac{[d_c(1 + d_c)^n]}{[(1 + d_c)^n - 1]}$$

PVC(EE) = PVC of Energy Efficient option

PVC(IE) = PVC of Energy Inefficient option

CRF(EE) = CRF of Energy Efficient option

CRF(IE) = CRF of Energy Inefficient option

C<sub>k</sub> = Cost of the option borne by consumer in k<sup>th</sup> year

N = Life of the DSM option

d<sub>c</sub> = Discount rate of the consumers

The capital recovery factor enables the determination of the annualized value equivalent to the initial investment. The CRF is dependent on the equipment life 'n' and the discount rate 'd'.

If Average Tariff of the target consumer category > CCE, DSM programme is considered viable from the point of the participating consumers. In case of multiple programmes satisfying the above criteria, DSM programme with a bigger difference between the CCE and Average Tariff for that category of consumers shall be given priority.

## 8. EVALUATION & CRITERIA OF COST-EFFECTIVENESS TESTS

Evaluating cost-effectiveness of DSM programme is essential to identifying both the impact of energy efficiency programme and the quantum of the State's potential for energy efficiency resources to be captured. In its simplest form, energy efficiency cost-effectiveness is measured by comparing the benefits of an investment with the costs and cost-effectiveness tests provide information about the impacts of energy efficiency programs from different perspectives.

The Five Principal Cost-Effectiveness Tests commonly used in assessing the impact of the DSM programme/ measures are Total Resource Cost (TRC) test, Ratepayer-Impact Measure (RIM), Life-cycle revenue impact (LRIRIM), Participant Cost test and Societal Cost test (SCT). The description of each test is given in detail in Para 8.3 below.

### **8.1 Cost-effectiveness tests criteria:**

The critical assessment of DSM programmes in Meghalaya will primarily be done through the following cost-effectiveness tests:

- (i) Total Resource Cost (TRC) test;
- (ii) Ratepayer-Impact Measure (RIM), and
- (iii) Life-cycle revenue impact (LRIRIM)

Besides, two other tests, namely Participant Cost Test and Societal Test, shall also be used to assess the DSM programme and their results, even though not considered as prime factors in the assessment, shall be also submitted along with the results of the three primary tests named above.

### **8.2 Sequential order of the three primary cost-effectiveness tests:**

- (a) TRC shall be the main hurdle test. This test evaluates the Net Present Value (NPV) of the Benefits over the NPV of Costs for the utility and participants.

DSM programmes that show positive number of NPV of benefits may be considered for further evaluation by RIM test.

- (b) RIM test: This test evaluates the NPV of the Benefits over the Costs for the Ratepayers, or, in other words, the impact through DSM measures on the tariffs.

DSM Programmes that show positive number of NPV of benefits may be considered for further evaluation by LRIRIM test.

- (c) LRIRIM test: This test evaluates the probable tariff impact due to implementation of the DSM programme(s). If the tariff impact of the Programme is less than Rs. 0.01/kWh or less than 0.1% of the existing tariff, whichever is higher, may be selected for implementation with the approval of the Commission.

### **8.3 Cost-Effectiveness Tests**

The following is the detailed description of the cost-effectiveness tests:

### 8.3.1 Total Resources Cost test (TRC)

- (a) This test measures the net benefits of a DSM programme from the point of view of the utility and its ratepayers as a whole.

The net benefits is determined by the difference of the Net Present Value (NPV) of Benefits (B) and Costs (C), i.e.,  $NPV = (B - C)$ ,

where , –

B = NPV of measure/programme benefits discounted over a specified time period; and

C = NPV of measure/programme costs discounted over a specified time period.

If the measure/programme benefit in year “t” is say “ $B_t$ ”, and discounting rate is say “r”, the time period for discounting is say “n” years, then B can be expressed as:

$$B = \sum_{t=1}^n [(B_t) / (1+r)^{t-1}] \quad (\text{equation 1})$$

Similarly, If the measure/ programme cost in year “t” is say “ $C_t$ ”, and discounting rate is say “r”, the time period for discounting is say “n” years, then C can be expressed as:

$$C = \sum_{t=1}^n [(C_t) / (1+r)^{t-1}] \quad (\text{equation 2})$$

- (b) Cost elements for the TRC test shall be determined considering the following:
- (i) Costs of design, development and implementation of DSM programme’
  - (ii) Capital costs (cost of efficient devices/equipments/ appliances/technology or practice, including the applicable taxes, duties and levies);
  - (iii) Installation, trial and commissioning costs associated with the efficient device/ equipment / appliance/practice/technology;
  - (iv) Annual operation and maintenance costs over the life of the measure/ programme;
  - (v) Costs for Monitoring and Reporting;
  - (vi) Evaluation, Measurement and Verification costs;
  - (vii) Communication and Outreach expenses;

(viii) Third Party Contracting;

(ix) Safe disposal costs; etc.

NB: (i) Tax credits, if any, shall be considered as reduction to the cost and the salvage value of old equipments/devices, etc., if any, shall be considered as a reduction in the cost.

(ii) Similarly, if there is old equipment/device/appliance/technology, etc., that is replaced, the salvage value of these shall be considered as a reduction in the cost.

(c) Benefits from DSM programme/measure through replacement of old equipment/appliances, etc with new efficient ones are ‘savings’ on energy consumption (kWh) and/or savings in the demand (kW). The savings on kWh shall be calculated on the basis of daily hours of usage of the equipment/appliances, etc., in a year.

On the other hand, to arrive at the ‘avoided cost benefits’ (or the benefit from the ‘avoided purchase of power’) in respect of the licensee, the participant’s savings at the point of use have to be suitably adjusted to account for the system transmission /distribution losses. The benefits have to be evaluated over the period for which the assessment is to be carried out.

(i) Thus, if savings at point of use in (year “t” are  $\Delta S_t$  expressed in kWh, and if transmission and distribution losses in the same year expressed as percentage are  $TL_t$  and  $DL_t$ , respectively, then, Avoided purchase of power in year “t” (APPt) by the licensee would be =  $\Delta S_t / [(1 - TL_t) \times (1 - DL_t)]$

(ii) If, rate of power purchase in year “t”, is  $R_t$ , then avoided power purchase cost (APPC<sub>t</sub>) in time “t” would be =  $APPt \times R_t$

NB: Any reduction in “intra-state transmission charges”, as a result of reduction in the average co-incident peak demand of the licensee, shall be considered as a “benefit” under this test;

(d) While calculating energy and demand savings as benefits, year-on-year escalation rate and discount rate shall be as prescribed under Para 8.4(c).

(e) Both benefits and costs shall be calculated over the “Life” of the technology being deployed. Distribution Licensee shall use the “warrantied” life of the retrofit by the technology provider as it is important to ensure that the savings considered are realized over the life-span of the equipment/appliances. Alternately, “life” as may be defined by the DSM Consultation Committee shall be used.

### 8.3.2 Ratepayer Impact Measure test

This test measures the impact of DSM programme on utility rates over the lifetime of the programme.

As energy efficiency measures could result in reduced energy sales, and therefore revenue loss, the likely impact on the utility is an upward pressure on retail rates to recover the revenue loss. If this upward pressure on rates exceeds the downward pressure from reduced utility system costs, the rates will increase, and vice versa.

(a) Cost elements mentioned below shall be used in “equation 2” in Para 8.3.1

(a) above:-

- (i) The cost of efficient devices/equipments/appliances/ technologies or practices, including the applicable taxes, duties, levies, etc. paid for by the licensee or to the extent paid for by the licensee;
- (ii) Installation, trial and commissioning costs associated with efficient devices/ equipments/ appliances/ technologies/ practices paid by the licensee or to the extent paid by the licensee;
- (iii) Yearly operation and maintenance costs over the life of the measure/programme paid for by the licensee or to the extent paid for by the licensee;
- (iv) Old inefficient equipment removal and safe disposal costs (if the DSM measure/programme involves replacement or retrofitting) paid for by the licensee or to the extent paid for by the licensee;
- (v) Programme administration, monitoring and evaluation costs paid for by the licensee or to the extent paid for by the licensee;
- (vi) Programme marketing costs, including incentives, if any, paid by the licensee or to the extent paid for by the licensee;
- (vii) Decrease in licensee revenues due to the DSM programme.

(b) Benefits of the DSM programme shall be calculated as “Avoided Cost of Power Purchase”.

- (i) If savings due to a DSM programme/measure at point of use in year “t” are  $\Delta S_t$ , and if transmission and distribution losses in the same year are  $TL_t$  and  $DL_t$ , expressed as a percentage, respectively, the Avoided purchase of power in year “t” (APP<sub>t</sub>) by the licensee would be =  $\Delta S_t / [(1-TL_t) \times (1-DL_t)]$
- (ii) If, rate of power purchase in year “t”, is  $R_t$ , then avoided power purchase cost (APPC<sub>t</sub>) in year “t” would be =  $APP_t \times R_t$

- (c) Any reduction in “intra-state transmission charges”, as a result of reduction in the average co-incident peak demand of the licensee, shall be considered as a “benefit” under this test.
- (d) While calculating energy and demand savings as benefits, year-on-year escalation rate shall be as ;
- (e) Benefits and costs shall be calculated over the “Life” of the technology being deployed.
- (f) Distribution Licensee shall use the “warrantied” life of the retrofit by the technology provider as it is important to ensure that the savings considered are realized over the life-span of the equipment/appliances. Alternately, “life” as may be defined by the DSM Consultation Committee shall be used.

### **8.3.3 Life-cycle Revenue Impact – LRIRIM test**

- (a) LRIRIM test shall be conducted using same data used for calculating the RIM test described in Para 8.3.2 above;
- (b) The difference between NPV of Cost and NPV of Benefits shall be divided by the total utility kWh sales to determine the rate impact on the non-participants;
- (c) If the tariff impact is likely to be less than Rs. 0.01/kWh or less than 0.1% of the existing tariff, whichever is higher, the DSM programme is considered to be a fit case for implementation.

### **8.3.4 Participant Cost Test (PCT)**

This test measures the costs and benefits from the perspective of participating consumers in a DSM measures/ programme. Costs and benefits taken into account for this test are given in detail here under:

- (a) Cost component of PC test:
  - The costs in this test are the programme costs paid by the participant. In addition, any increase in electricity bill of the participant as a result of the DSM programme is also to be considered as costs under this test. Thus the “Cost” elements usually associated with this test are:
    - (i) The cost of efficient device/equipment/appliance/ technology or practice, including the applicable taxes, duties, levies, etc. paid for or to the extent paid for by the participant;
    - (ii) Installation, trial and commissioning costs associated with efficient device/equipment / appliance/practice/technology paid or to the extent paid by the participant;

- (iii) Annual operation and maintenance costs over the life of the measure/programme paid for or to the extent paid for by the participant;
  - (iv) Old inefficient equipment removal costs (if the DSM measure/programme involves replacement or retrofitting) paid for or to the extent paid for by the participant;
  - (v) Programme administration, monitoring and evaluation costs paid for or to the extent paid for by the participant;
  - (vi) Programme marketing costs, including incentives, if any, paid or to the extent paid for by the participant;
  - (vii) Increase in participant electricity bill due to the DSM programme;
  - (viii) If there is old equipment/device / appliance / technology etc. that is being replaced; the salvage value of this old equipment or device is considered as a reduction in the cost;
  - (ix) Similarly, if there is tax credit or incentive offered to the consumer the same shall be treated as reduction in cost.
  - (x) Discount Rate and Escalation Rates shall be as prescribed under Para 8.4(b).
- (b) **Benefits:** Benefits under this test are the reduction in consumer's electricity bills, tax credit received by the consumer, and incentives received by the consumer.
- (c) **Test Results:** The NPV will be used as the primary evaluation criterion. An NPV value of zero or above will indicate that PCT test has been passed. It would also mean that the DSM programme is beneficial for an "average" participating consumer. On the other hand, an NPV value of less than zero will indicate that the DSM measure/programme being evaluated for PCT has failed the PCT, i.e. participation in a DSM programme is not beneficial for the consumer.

Tax credits and incentives appear on the benefit side of the NPV equation under this test. Thus the benefit side of the DSM programme can be boosted by offering incentives or tax credits or by offering larger tax credits or incentives. For DSM programmes that show negative NPV values, the PCT test can help identify the threshold level of tax credit/incentive that would need to be offered to make the DSM programme beneficial from participant perspective. Such threshold value will be the tax credit/incentive values for which NPV is zero.



Ideally, sensitivity analysis with respect to various assumptions should also be conducted in order to understand the level of influence of each assumption on the NPV value.

### **8.3.5 Societal Cost (SC) Test**

Societal Cost Test is structurally similar to the Total Resource Cost Test. However, it goes beyond the TRC test in that it also attempts to quantify the change in the total resource costs to society as a whole.

Societal Test differs from the TRC Test in the following ways:

- (i) The value of power purchase rate will be the “social cost of power” which could be considered as the price the consumers are willing to pay for power. In the Indian context, cost of diesel generation can be used as a proxy for consumers’ willingness to pay for power, and the social cost of power can be taken as cost of diesel generation. For the purposes of this test, diesel generation cost shall be considered as determined under Para 8.4(a);
- (ii) Since taxes, duties, levies, tax credits etc. are treated as a transfer payment in the Societal Test, they should be excluded from the calculations;
- (iii) The discount rate for SCT shall be as prescribed under Para 8.4(b);
- (iv) Certain indirect benefits such as reduction in greenhouse gases that takes place as an effect of implementing a DSM measure should be considered while calculating SCT.

### **8.3.6 Correction factors for power shortage situations**

- (i) Cost Effectiveness tests when applied in the power shortage situations will have to be substantiated by data on the hours of usage in pre and post-DSM programme implementation for the end-uses that are retrofitted or changed or installed newly.
- (ii) Measurement and verification process should take into account the power shortage situations besides the actual number of hours of usage post-implementation of DSM.

## **8.4 Preset values of key inputs to be used in the tests**

The prescribed default input values of Avoided costs of power purchase, Discount rates and escalation rates for each test are as under:-

- (a) Avoided costs of power purchase –  
for TRC, RIM and PCT – it shall be equivalent to the top 10% of the marginal cost of power purchase by the Distribution Licensee during the

previous financial year, arrived at on the basis of weighted Average of values arranged in descending order;

for SCT – it shall be equivalent to the cost of electricity generation by diesel or any other parameter as may be defined by the Commission;

(b) Discount rates –

for PCT for Consumers – it shall be equivalent to the lending rate of the State Bank of India;

for TRC and RIM tests for Distribution Licensee – it shall be equivalent to its “Weighted Average Cost of Capital”

for SCT – as this may differ from case to case, it shall be calculated on the methodology/ value declared by the Commission/Department of the State Government /Government of India.

(c) Escalation rates for power sales, avoided cost of purchase shall be at the rate as approved in the tariff order of the Commission.

(d) The Commission may revise the above preset values as and when deemed necessary.

## **9 CRITERIA FOR APPROVAL OF DSM PROGRAMME & GENERAL COSTS**

### **1) Criteria for Approval of DSM Programme Costs**

a) Where the DSM Programme costs are to be borne by Distribution Licensee:

- CEI should be greater than one, and
- Total cost of implementation of DSM programme per unit of energy saved should be less than marginal cost of power procurement by the Distribution Licensee in the year of implementation of the DSM programme.

In case of limited resources available with the Distribution Licensee, programmes with higher CEI should be given priority over those programmes with lower CEI.

b) Where DSM Programme Costs are to be borne by Consumers:

- CCE should be less than average tariff paid by that particular consumer category, and
- Total cost of implementation of DSM programme per unit of energy saved should be less than marginal cost of power procurement by the Distribution Licensee in the year of implementation of the DSM programme;

In case of multiple programmes satisfying above criteria and limited resources available with Distribution Licensee, those DSM programmes with bigger difference between CCE and Average Tariff should be given priority.

c) Where DSM Programme Costs are shared between Distribution Licensee and Consumers:

- CEI should be greater than one,
- CCE should be less than average tariff paid by that particular consumer category, and
- Total cost of DSM programme per unit of energy saved should be less than marginal cost of power procurement by the Distribution Licensee in the year of implementation of the DSM programme.

In case of multiple programmes satisfying all the three criteria above, priority should be given to DSM programmes with bigger difference between CCE and Average Tariff.

d) Where DSM Programme Costs are to be borne by Government/ Funding Agency and Distribution Licensee

- CEI should be greater than one, and
- Total cost of DSM programme per unit of energy saved should be less than marginal cost of power procurement by the Distribution Licensee in the year of implementation of the DSM programme.

Irrespective of the cost incurred by the Government or any other funding agency, regulatory approval shall be required only for the costs proposed to be incurred by the Distribution Licensee.

e) Where DSM Programme Costs are to be borne by Government/ Funding Agency and Consumers

- CCE should be less than average tariff paid by that particular consumer category; and
- Total cost of implementation of DSM programme per unit of energy saved should be less than marginal cost of power procurement by the Distribution Licensee in the year of implementation of the DSM programme;

Irrespective of the cost incurred by the Government of any other funding agency, regulatory approval shall be required only for the costs proposed to be incurred by the consumer.

## 2) Criteria for Approval of General Costs

- The General Cost for DSM programmes shall be limited to 10% of total DSM budget. However, the Commission on merits of the case may consider specific programme and relax the limit of General Cost for such specific programme.
- The Distribution Licensee shall submit the expenditure incurred for general activities through its ARR. The Commission would approve the general costs while approving ARR after application of standard prudence principles.

### 10 Relaxation

The Commission may, by general or special order, for reasons to be recorded in writing, relax any of the provisions of these Guidelines on its own motion or on an application made before it by the Distribution Licensee or consumers or any interested party (ies).

### 11 Amendment of the Guidelines

The Commission may, at any time, modify or amend any provision of these Guidelines as may be required.

By order, etc

(E. Slong)  
Secretary,  
Meghalaya State Electricity Regulatory Commission  
Shillong.

Memo No.MSERC/DSM/COR/30/2020/41-A

Dated Shillong, the 20<sup>th</sup> January, 2021

Copy to:

1. The Secretary to the Government of Meghalaya, Power Department.
2. The Director (Distribution), Meghalaya Power Distribution Corporation Limited.
3. The Chief Engineer (Distribution, Eastern Zone), Meghalaya Power Distribution Corporation Limited (MePDCL)

Secretary,  
Meghalaya State Electricity Regulatory Commission  
Shillong.