savings) that directly result from a programme. Impact evaluations support cost-effectiveness analysis aimed at identifying relative programme costs and benefits.

b) **Process evaluation** that assesses programme delivery, from design to implementation, in order to identify bottlenecks, efficiencies, constraints, and potential improvements. Timelines in identifying opportunities for improvement is essential.

c) **Market effects evaluation** that estimates a programme's influence on encouraging future DF/DSM projects because of changes in the energy market place.

Entire **Evaluation, Measurement & Verification** (**EMV**) process for all the demand flexibility and demand side management projects and programmes shall be managed in a transparent manner using online and real-time assessment tools wherever feasible. The Distribution Licensees shall empanel Independent Verification Agencies (IVAs), who are either individuals or organizations with expertise defined under these Regulations. The Commission may choose to have an IVA to evaluate the programmes directly as well on a case-to-case basis if it chooses to do so.

11. Impact Evaluation:

The impact evaluation expressed as gross energy/demand savings and the demand flexibility created shall be determined by comparing energy use and demand after a DF / DSM programme is implemented (i.e. the reporting period) with the energy use and demand if the programme has not been implemented (i.e. the baseline). The estimated savings shall be determined by the following equation:

Estimated savings = (baseline use) – (reporting period use) ± (appropriate adjustments)

The impact evaluation shall primarily be carried out using either of the three approaches:

a) Measurement & verification approach;

b) Deemed savings approach; and

c) Large-scale data analysis.

11.1 Measurement & verification approach

Four generic measurement & verification methodologies A, B, C and D described in the **International Performance Measurement & Verification Protocol (IPMVP)** may be used to estimate the savings comparing baseline use and reporting period use with appropriate adjustments thereto. **The distribution licensee should propose the evaluation process that complies with the IPMVP guidelines at the approval stage of the new demand side management programmes.** If the distribution licensees wish to propose any other suitable methodologies, the portfolio and programmes should include those explicitly with justifications thereto. **Annexure - 3** shows the general description of the four measurement & verification methodologies as per IPMVP.

11.2 Deemed savings approach:

Deemed savings (also referred to as "stipulated" savings) shall be reported on the basis of historical savings values of typical DSM projects. Sources of deemed savings values must be documented in the evaluation plan.

The deemed savings determined for a sample of projects shall be applied to all the projects in the DSM programme to estimate the programme-level savings. The deemed savings approach shall be recommended by the distribution licensee for DSM programmes that are repeated and have fixed operating conditions (e.g. operating hours) and well-substantiated savings values (e.g. energy consumption patterns). Distribution licensees shall propose this approach when well documented and systematically validated sources, such as historical evaluations, are available for certain types of technologies.

11.3 Large-scale data analysis:

In case of established homogeneous energy use patterns and implementation of programmes in such categories, the savings evaluation can be carried out using time-series comparisons of energy use before and after the implementation of demand side management programmes. The other approach shall include comparison of energy use of participants and non-participants.

12. Process evaluation:

Distribution licensees shall also include robust process evaluations to improve the programme design and cost-effectiveness of the proposed measures. Process evaluations shall be structured in order to examine the efficiency and effectiveness of DF/DSM programme implementation procedures and system.

13. Market Effect Evaluation:

The EMV shall also assess Market effects as a result of the specific DF / DSM programmes. This evaluation shall include:

a) Assessment of additional DF / DSM programmes implemented by the participants without the support from distribution licensee.

b) Additional entities implementing the technical interventions promoted through the distribution licensee's DSM programmes.

c) Assessment of pricing, changes in pre-dominant efficiencies and availability of efficient products in the market.

14. Empanelment of Independent Verification Agencies:

Distribution Licensees shall empanel Independent Verification Agencies (IVAs). The IVAs shall be selected based on the following criteria:

a) IVAs should be individual consultants, consultancy organizations, academic/research institutions, civil society organisations and/or consortia thereof;

b) IVAs should have at least one BEE Certified Energy Auditor or Certified Energy Manager; or a Certified Measurement & Verification Professional (CMVP) certified by any national or international certification agency on their team in case of consultancy organizations/consortia thereof; and

c) Shall possess experience in design, implementation, review, measurement, verification and statistical analysis related to large datasets. The IVAs appointed for specific projects should not have been involved in DF / DSM programme design, implementation, review, and any related activity.

15. EMV report formats:

The EMV reports submitted by the IVAs shall include at a minimum the following – DF/ DSM portfolio / programme description, description of the proposed impact, process and market evaluation methodologies, description of measurement instruments, sampling process, reporting period, baseline period, metering/measurement accuracies, statistical analyses carried, list of assumptions, survey instruments used and annexes including the key raw data, list of respondents with their contact details, and credentials of IVAs.

CHAPTER IV: MISCELLANEOUS

16. Powers to remove difficulties:

If any difficulty arises in giving effect to any of the provisions of these Regulations, the Commission may by order, take suitable action, not being inconsistent with the Act, which appears to the Commission to be necessary or expedient for the purpose of removing difficulties.

17. Orders and Practice Directions:

Subject to the provisions of the Act, the Commission may from time-to-time issue orders and practice directions in regard to the implementation of these Regulations.

18. Repeal and Savings:

1. Save as otherwise provided in these regulations, the Karnataka Electricity Regulatory Commission (Demand Side Management) Regulations, 2015 shall stand repealed from the date of commencement of these Regulations.

2. Notwithstanding such repeal, anything done or any action taken or purported to have been done or taken, including any procedure, minutes, reports, confirmation or declaration of any instrument executed under the repealed regulations, shall be deemed to have been done or taken under the relevant provisions of these regulations.

19. Power to Amend

The Commission may, at any time, vary, alter, modify or amend any provisions of these Regulations.

20. Interpretation:

If any question arises relating to the interpretation of any provision of these Regulations, the decision of the Commission shall be final.

21. Power of Relaxation:

The Commission may in public interest and for reasons to be recorded in writing, relax any of the provisions of these Regulations.

By the approval of the Commission,

Secretary
Karnataka Electricity Regulatory Commission.

Annexure 1: Format of DF / DSM programme portfolio and implementation action plan

DF / DSM Detailed Project Report (DPR) to be submitted by the Distribution Licensees for the approval of the Commission shall be required to include the following **(for ARR proposal**):

PROJECT DATA FORMAT:

Name of the Licensee: …….
Zone/ Circle /Division /Location :……/……/……/…….

Name/Description of the DF/DSM Work:……
Estimated Cost: ……
Proposed Date of Commencement:……..
Targeted Date of Completion:……

BRIEF DESCRIPTION OF THE WORK

i. **New Proposals** shall include**:**
   a. overview of the Plan,
   b. the DF / DSM target for the Plan period;

c. total funding envisaged for the MYT period with a break up of funds for programmes and funds for administration and management of DF / DSM effort by the licensee, listing and brief description of the DF / DSM programmes proposed to be implemented for meeting the DF / DSM targets set by the Commission;
d. Plan level and individual DF / DSM programme level cost effectiveness, including impact on consumer tariffs;
e. qualitative and/or quantitative contribution of the Plan;
f. year wise break up of achievement of targets and funds requirement;

ii. Briefly record the reasons (circumstances necessitating) for taking up the Work in comparison with following (if applicable):

a. achievements of the past multi-year plan as against the targets;
b. the reasons and explanations if the targets set have not been achieved;
c. fund usage;
d. justification on the major constraints faced in the implementation of various programmes;
e. suggestions /facts to be considered for future implementation

iii. **Characteristics to be considered for proposal:**

a. Present time series (past 5 years) information about power situation in general, including demand met, load shedding, if any;
b. the consumer base of the licensee – total number of consumers, consumers by rate category;
c. Total consumption and break-up of the same by consumer and rate category;
d. Source wise energy purchase and the average rate of purchase of power; Load duration curve, peak load by season, typical average daily, seasonal and weekly load curves;
e. Forecast of demand, energy requirement, sales and revenue requirement over the next five years (Plan period), including elaboration of methodology used, data used, statement of underlying assumptions used and basis for the assumptions, sensitivity analysis carried out and

changes in assumptions and other conditions assumed for carrying out sensitivity analysis.

f. **Primary/Major objective or the purpose intended to be achieved in terms of quantifying the results intended (Ex: reducing the peak load of ---- MVA/kVA (in comparison with targets approved by the Commission if applicable)**

.....

.....

g. **Action Plan for achievement of primary objective:**
   a. To be achieved in full on commissioning
   b. To be achieved in phases of
   1st Year……%,
   2nd Year:….%,
   3rd Year: ……%.

h. **DF / DSM Plan targets and the resource availability estimates:** Details on the proposed DSM targets and the resource requirements for meeting the targets.

i. **List other intended objectives, if any to be achieved and the time planned for achievement of targets such as identification of sectors, segments and end-uses:** Details on the sectors such as domestic, commercial, industrial, agriculture, segments such as consumer category, such as – offices, hospitals, hotels, malls, banks, industrial cluster - industrial estate, geographical area, street lighting, gram panchayat water supply systems, specific feeders, etc. and end-uses (lighting, pumping, heating, space cooling, air-conditioning, etc.) target for be the achievement and justification for choosing these sectors, segments and end-uses.

	Name of the Objectives	Targeted time of achievement
1.	.....	.....
2.	.....	.....
3.	.....	.....
4.	.....	.....
5.	.....	.....

j. **Identification of DF / DSM measures/technology options / portfolio plans to achieve DSM targets:**

Detailed process (including justification) to be used for identification of DSM measures and technologies (within the identified sectors, segments and end-uses) that are intended to achieve the targets.

k. **Details of financing plan for the project to be undertaken, if any. Else provide the sources from which the funds were diverted**

.....

l. **Planning of Expenditure:**

Year 1:Rs. .....
Year 2:Rs. .....
Year 3:Rs. .....

a. Provide the list of alternatives considered. If the alternatives are provided, mention the basis on which the proposed scheme is finalised.

.....
.....

b. Details of Cost Benefit Analysis as specified in these Regulations.

.....
.....

iv. **Individual Programme Description:** For each of the DSM programme included in the final identified portfolio of DSM programmes, provide information highlighted at the end of this Annexure.

v. **Annual and cumulative achievements:** Details of annual contribution that will come forth from various DSM programmes in the final identified portfolio (to ensure that the Plan cumulative targets are met).

vi. **DF/DSM Plan EMV:** Details on the EMV Plan for the DSM Plan as per the **Chapter III** of these regulations.

vii. **DF/DSM Plan monitoring and reporting:** Details on the monitoring and reporting Plan (frequency, minimum content, format, indicators and means of verification chosen).

viii. **Implementation Plan:** Details on the schedule of implementation of different elements of the programmes, portfolio and plan; also qualifying the same with submission of activity charts.

Note:

The cost effectiveness shall be calculated as per tests indicated in chapter II of these Regulations

To Be submitted in APR:

Elements of Detailed Project Report (DPR) Document:

This shall be a reference document for the licensee and all stakeholders. This shall have information on the consumer segments along with identified DSM measures to be implemented and have information on incentives achieved and features of consumer/vendor interface, delivery options, institutional relationships, detailed programme implementation plan with time lines and implementation responsibilities. The APR shall include the following elements.

1. **Programme description:**
    a. Description of DSM measures and technologies, the programme is intending to implement, relevant pricing, quality assurance and replacement/guarantee policy as per prevailing Regulations.
    b. Consumer segments the programme is targeting, including eligibility criteria to be used for identification of potential consumers within the identified target segment.
    c. Other stakeholders (financiers, energy services companies, equipment vendors, consultants, energy auditors, trade associations, groups of persons, NGOs, academic institutions, government organisations) involved in the implementation process, description of their roles and responsibilities and manner of participation.
    d. Barriers the programme is addressing.
    e. Strategy the programme proposes to use, including proposed incentives, if any, strategies to motivate consumers and other stakeholders to participate in the programme, description of payment and collection mechanism and equipment/appliance/service delivery mechanism.
    f. Description of programme management and implementation arrangements, including description of institutional relationships and internal programme tracking systems followed by the licensees.

2. **EMV, Monitoring & Reporting:**
    This shall include EMV and monitoring and reporting plans:
    a. Description of baseline calculation and description of monitoring and verification methodology.
    b. Description of DSM programme monitoring, review and impact (in terms of programme participation, in terms of increases in penetration level of efficient devices and technologies, and in terms of load reduction/energy savings) analysis system/mechanism.

3. **Details of Implementation schedule as per actuals v/s target:**

4. **Annual and cumulative savings** due to the programme with all the assumptions used in savings estimation process, including base line considered.

5. **Annual programme funding requirements**: This shall include description of financing arrangement and share of distribution licensee, vendors, consumers, retailers, State government, Central government, etc.

6. **Cost effectiveness calculation details**, including programme costs and benefits, impact on consumer tariffs, with explicit description of all the input values considered and cost effectiveness calculations.

7. **Dispute Resolution Mechanism:** Appropriate mechanism to be followed for resolution of disputes arising during programme implementation stage.

Annexure 2: Methods to carry out the PCT and SCT

1. **Participants Cost Test (PCT)**

This test provides a measure of the quantifiable benefits and costs to an "average" consumer for participating in a DSM programme. Since many consumers do not base their decision to participate in a DSM programme entirely on quantifiable variables (many times consumers decision to buy an appliance/device/equipment are based on factors such as discount offered, features, brand value, initial cost, etc.), this test may not fully represent the benefits and costs of a programme to a consumer.

1.1 Costs

In its simplest form, 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:

a) 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;

b) Installation, trial and commissioning costs associated with efficient device/equipment / appliance/practice/technology paid or to the extent paid by the participant;

c) Annual operation and maintenance costs over the life of the measure/programme paid for or to the extent paid for by the participant;

d) 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;

e) Programme administration, monitoring and evaluation costs paid for or to the extent paid for by the participant;

f) Programme marketing costs, including incentives, if any, paid or to the extent paid for by the participant;

g) Increase in participant electricity bill due to the DSM programme.

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. Similarly, if there is tax credit or incentive offered to the consumer the same can be treated as reduction in cost. Conventionally, the same will be treated as benefits accruing to the participant as a result of DSM programme under PCT.

1.2 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.

1.3 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, a 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. 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.

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.

2. Societal Cost Test (SCT)

The Societal Cost Test is structurally similar to the Total Resource Cost Test. However, since the SCT goes beyond the TRC test in that it attempts to quantify the change in the total resource costs to society as a whole rather than to only the service territory (the licensee and its consumers), it would be necessary to consider different values for some of the input variables such as power purchase rate, discount rate, etc. More specifically, the Societal Test differs from the TRC Test in the following ways:

2.1 The value of power purchase rate will need to be the "**social cost of power"** which could be considered as the consumers' willingness to pay for power or the price the consumers are willing to pay for power. In the Indian context, ceiling rate for Day Ahead market set by the CERC can be used as a proxy for consumers' willingness to pay for power, and thus the social cost of power can be taken as per **Regulation 9** of these Regulations.

2.2 Since taxes, duties, levies, tax credits etc. are treated as a transfer payment in the Societal Test, they should be excluded from the calculations.

2.3 The value of the discounting rate under SCT should be the societal discount rate. In the context of DSM programmes, the licensees could use the societal discounting rate as per **Regulation 9** of these Regulations.

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.

Annexure 3: IPMVP Measurement & Verification methodologies and recommended selection process.

The four IPMVP Options provide a flexible set of methods (Options A, B, C, and D) for evaluating energy savings in facilities with varying levels of savings certainty and cost. A brief description of each Option is provided here:

Option A involves using a combination of both stipulations and measurements of the key factors needed to calculate savings in engineering models.

Options B and C involve using spot, short-term, or continuous measurements in engineering models (Option B) or regression analyses (Option C).

Option D may include spot, short-term, or continuous measurements to calibrate computer simulation models.

A particular option is chosen based on various features of each project. One criterion that works across all of the approaches is IVA's experience and expertise.

Secretary

Karnataka Electricity Regulatory Commission

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