HARYANA ELECTRICITY REGULATORY COMMISSION
BAYS NO. 33-36, SECTOR – 4, PANCHKULA – 134113, HARYANA

Haryana Electricity Regulatory Commission – Guidelines on Evaluation, Measurement and Verification of Demand Side Management Programmes, 2016

Notification

The 28th July, 2016

No. HERC/35/ 2016: - In exercise of the powers conferred on it by Haryana Electricity Regulatory Commission (Demand Side Management), Regulations, 2014, under Regulations 6.1 (iv), the Haryana Electricity Regulatory Commission hereby issues the following Guidelines, for providing framework for Evaluation, Measurement and Verification of Demand Side Management Programmes to be followed by the Distribution Licensees and for matters in connection therewith and incidental and ancillary thereto.

1.1 SHORT TITLE, COMMENCEMENT, EXTENT OF APPLICATION AND INTERPRETATIION

(1) These Guidelines may be called the "**Haryana Electricity Regulatory Commission (Evaluation, Measurement and Verification of DSM Programmes) Guidelines, 2016".**

(2) These Guidelines shall be followed by Distribution Licensees and Commission or Third Party Evaluator empanelled by the Commission in the State of Haryana while:

a) Formulating E,M&V Plan for each DSM programme;

b) Engaging Third Party Evaluator for undertaking E,M&V of DSM programme;

c) Undertaking E,M&V of DSM programme by the Third Party Evaluator;

d) Reporting the findings of the E,M&V of DSM programme by the Third Party Evaluator.

(3) These Guidelines shall come into force on the date of publication of the same and shall remain in force till such time it is modified by the Commission. Any modifications in the assessment methodology, as and when required, can be incorporated in the subsequent version of the Guidelines.

1.2 DEFINITIONS

(1) In these Guidelines, unless the context otherwise requires:-

(a) **"Adjustments"** means the factors that modify baseline energy or demand values to account for independent variables that influence energy use. These

adjustments account for conditions in the reporting period that are different from the conditions during the baseline period but are not a result of the programme activity;

(b) "Baseline data" or "Baseline Energy Use" means the initial base level consumption and/or demand for electricity before a DSM programme begins to provide a reference point for comparison for assessments;

(c) **"DSM Measure"** means individual energy efficiency and / or energy conservation equipment or technology installed in the residence or facility of the consumer;

(d) **"Gross Savings"** means the change in energy consumption, resulting from consumers participation in the DSM project;

(e) **"Evaluation, Measurement and Verification"** means activities undertaken to evaluate, measure and verify the progress, performance or other aspects of DSM/energy efficient programmes or their market environment;

(f) **"Evaluation, Measurement and Verification Plan"** means a plan to be prepared by the Distribution Licensee to evaluate, measure and verify the performance or other aspects of DSM programme;

(g) **"Reporting Period Energy Use"** means energy and/or demand use post implementation of DSM programme;

(h) **"Third Party Evaluator"** means the Commission empanelled agency (s) having credentials defined under these Regulations to be appointed by the Distribution Licensee for conducting E,M&V of DSM programme.

(2) All other expressions used herein but not specifically defined in these Regulations but defined in the Act shall have the meaning assigned to them in the Act. The other expressions used herein but not specifically defined in these Regulations or in the Act but defined in the Haryana Electricity Reform Act, 1997 (Act 10 of 1998) shall have the meanings assigned to them in the Haryana Electricity Reform Act, 1997 (Act 10 of 1998) or any law passed by the Parliament/Assembly/any other Regulations including CERC, provided that such definitions are not inconsistent with the provisions of the Electricity Act, 2003.

1.3 RELEVANT PROVISIONS OF HERC (DEMAND SIDE MANAGEMENT), REGULATIONS, 2014

(1) The Demand Side Management Regulations notified by the Haryana Electricity Regulatory Commission require all Distribution Licensees to prepare a plan for E,M&V for each DSM programme using E,M&V Guidelines to be issued by HERC.

The relevant provisions of the HERC (Demand Side Management) Regulations, 2014 are reproduced below:-

a) **Regulation 17: Evaluation, Measurement and Verification of DSM Programme:** *"17.1 Distribution Licensee shall prepare plan for evaluation, measurement and verification of savings from DSM programmes as per Guidelines on Evaluation, Measurement and Verification issued by the Commission from time to time.*

17.*2 Third party Evaluation Measurement and Verification of DSM programmes may be undertaken by the Commission or through third party assigned by Commission. While engaging the agency, the Commission shall ensure that the Agency is not undertaking any other engagement which could conflict with the interests of the consumers in the State.*

17.*3 Distribution Licensee shall make available necessary information/data to the Commission or third party assigned by the Commission to measure and verify the savings from DSM programmes."*

1.4 EVALUATION, MEASUREMENT AND VERIFICATION GUIDING PRINCIPLES

(1) The entire E,M&V process for each DSM programme implemented by the Distribution Licensee in the State of Haryana shall be managed in the following manner:-

a) The Distribution Licensee shall prepare a plan for E,M&V of savings from a DSM programme as per the Guidelines on E,M&V issued by the Commission and submit the same to the Commission along with the DSM programme document for approval.

b) The Commission shall empanel Third Party Evaluators for undertaking E,M&V of DSM programmes. Third Party Evaluator shall be empanelled as per the criteria defined under the Regulation 1.8 of these Guidelines.

c) The Distribution Licensee shall engage Commission's empanelled Third Party Evaluator through competitive bidding for undertaking E,M&V of DSM programme. The Distribution Licensee shall bear the cost of engaging Third Party Evaluator.

d) The Third Party Evaluator shall conduct E,M&V of each DSM programme implemented by the Distribution Licensee.

e) The Distribution Licensee shall make available necessary information / data to the Third Party Evaluator to evaluate, measure and verify the savings from the DSM programme.

f) The Third Party Evaluator shall document the findings of the E,M&V in the form of report and submit the same to the Commission. The E,M&V report shall include all the contents specified under the Regulation 1.9 of these Guidelines.

g) The DSM Advisory Committee shall review the E,M&V report submitted by the Distribution Licensee and submit the same to the Commission with its observations and comments.

h) The Commission may seek clarifications from DSM Advisory Committee and/or the Distribution Licensee and issue directives/Guidelines to the Distribution Licensee for improvement of current and future DSM programmes.

1.5 DEVELOPMENT OF E,M&V PLAN BY THE DISTRIBUTION LICENSEE

(1) The Distribution Licensee shall prepare the E,M&V Plan for each DSM programme and submit the same to the Commission along with the DSM programme document. The plan shall contain the following details:-

a) DSM Programme Overview.

(i) Goal and Objectives;

(ii) Target market;

(iii) Eligibility criteria for participants;

(iv) Key programme elements;

(v) Programme timings; and

(vi) Estimated participations;

(vii) Estimated savings (in terms of energy and demand);

(viii) Programme implementation mechanism;

b) Brief description of previous similar programme evaluation including pilot programme.

c) Evaluation Overview.

(i) List of evaluation objectives and how they support programme goal;

(ii) Evaluation approach selected;

(iii) Evaluation Cycle (i.e. interval/frequency)

(iv) List of indicators to be reported;

d) Detailed Evaluation Approach, Scope, Budget, Schedule and Staffing.

(i) Details of evaluation approach selected;

(ii) Data collection details – assessment mechanism – interview, surveys, secondary market research, sampling approach and criteria for sample selection, methods for measurement collection and data analysis;

(iii) Ways of dealing with uncertainty – discussions & presentations with the Commission, method of quality control etc;

(iv) Activity timelines with programme deliverables dates;

(v) Detailed budget for evaluation;

(vi) Reporting format of evaluation results;

(2) The Commission shall approve E,M&V Plan before implementation of DSM programme by the Distribution Licensee.

1.6 EVALUATION TYPES AND APPROACHES

(1) These Guidelines shall be used for evaluation of all the DSM programmes implemented by the Distribution Licensees.

(2) Evaluation shall determine direct benefits (i.e. energy and demand savings) and co-benefits (i.e. avoided emissions) that directly result from a DSM programme. The E,M&V report shall specifically corroborate with the DSM programme's cost effectiveness assessment.

(3) Evaluation shall be expressed in terms of Gross Energy and Demand Savings. Gross savings shall be determined by comparing energy use and demand after implementation of DSM programme (i.e. the reporting period) with the energy use and demand before implementation of DSM programme (i.e. the baseline period). The following formula shall be used to determine the energy and demand savings from DSM programme:-

Demand Savings = Energy Savings / Time Period (Operating Hours) of Energy Savings

Energy Savings = (Baseline Energy Use) – (Reporting Period Energy Use) ±Adjustments

Wherein:

Baseline Energy Use:- Business as usual energy use or pre DSM programme implementation energy use;

Reporting Period Energy Use:- Post implementation energy use;

Adjustments: Suitable adjustments shall be made to the baseline when post-implementation conditions in energy use have changed in relation to the pre installation conditions;

(4) Evaluation shall primarily be carried out using any of the following three approaches such as Deemed Savings Approach, Measurement & Verification Approach and Large Scale Data Analysis Approach.

a) **Deemed Savings Approach:-** This approach shall be used when value of savings for a DSM measure is available based on historical savings data of previous DSM programmes. The sources of stipulated value to be used shall be documented in the E,M&V plan. This approach shall be used for the DSM programmes having simple DSM measures with well understood savings mechanism (i.e. energy consumption usage pattern), similar operating conditions (i.e. operating hours) and are also not subject to significant variation in savings due to changes in independent variables. This approach does not require onsite measurement or metering but requires field inspection for all or a sample of projects in order to ensure its proper installation and operations.

b) **Measurement & Verification Approach:-** Any one or a combination of the four International Performance Measurement & Verification Protocol (IPMVP)[1] Options shall be used to estimate the gross savings through implementation of DSM programme. A particular option shall be chosen based on the specific features such as type and complexity, uncertainty of the project savings, potential for changes in key factors between baseline and reporting period and value of project savings of particular DSM programme.

Options	Description	Typical Application
Option A – Retrofit Isolation: Key Parameter Measurement	• This Option is based on combination of measured and estimated factors when variation in factors are not expected; • Measurements are spot and short-term and are taken at the component or system level, both in the baseline and post-installation cases. • Measurement should include the key performance parameter(s) which define the energy use of the DSM measure. Parameters not selected for field measurements are estimated. Estimates can be based on historical data, manufacturer's specifications or engineering judgement. • Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values.	• Typical application includes lighting or fan retrofit programme where (a) power draw by the lighting or fan retrofit is the key performance parameter that is measured periodically and (b) lighting or fan operating hours are estimated based on facility operating schedules and occupant behaviour.

[1]International Performance Measurement and Verification Protocol prepared by EVO, June 2014

Option B – Retrofit Isolation: All Parameter Measurement	• This option is based on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. • Energy or proxies of energy use are measured continuously. Periodic spot or short term measurements may suffice when variations in factors are not expected. • Savings are determined from analysis of baseline and reporting period energy use or proxies of energy use.	• Typical application includes installation of variable speed drive on motor to adjust/control the flow of pump. Measure electric power with a kW meter installed on the electrical supply to the motor, which reads the power every minute. In the baseline period, this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to track variation in power use.
Option C – Whole Facility	• This option is based on long-term, continuous, whole-building utility meter, facility level, or sub-meter energy data. • Savings are determined from analysis of baseline and reporting period energy data. Typically, regression analysis is conducted to correlated with and adjust energy use to independent variables such as weather, but simple comparisons may also be used.	• This option is most commonly used for M&V of building energy efficiency retrofits. • Typical application involves multifaceted energy management programme affecting many systems in a facility. Measure energy use with electric utility meter for a twelve month baseline period and throughout the reporting period.
Option D – Calibrated Simulation	• Simulation software is used to model energy performance of a whole facility or sub-facility. Models must be calibrated with actual hourly or monthly billing data from the facility. • Inputs to the models include facility characteristics, performance specifications of new and existing equipment or system, engineering estimates, spot, short-term, or long-term measurements of system components, and long-term whole-building utility meter data. • After the model has been calibrated, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data.	• Typical application involves multifaceted energy management programme affecting many systems in a facility but where no meter existed in the baseline period. Energy use measurement after installation of electric meters, is used to calibrate the simulation. Baseline energy use, determined using the calibrated simulation, is compared to a simulation of reporting period energy use.

c) Large Scale Data Analysis Approach:- This approach shall use a variety of statistical methods to measure facility energy consumption meter data (almost

always whole facility utility meter billing data) and independent variable data to estimate gross energy and demand savings. This approach shall be most suitable for programmes that involve large scale retrofit programmes with many participants. This approach shall be most suitable for DSM programmes that meet following criteria**:-**

- Participation is well defined;
- The programme has a relatively large number of participants;
- At least one year's worth energy consumption data are available after programme measures are installed. If a comparison group is not used, at least one year's worth of baseline energy consumption data should also be available;
- There is some similarity between or relatively homogenous sub-groups of participants can be formed with similar facility and DSM measures characteristics;
- Expected changes in energy consumption due to DSM measures installed through the programme account for at least 10 percent of facility energy consumption.

1.7 SELECTION OF APPROACHES FOR ESTIMATING SAVINGS

(1) The Distribution Licensee shall select any one or combination of more approaches as specified under Regulation 1.6 (4) of these Guidelines for estimating savings through proposed DSM programme.

(2) The Distribution Licensee shall include the selected approach in to the E,M&V plan and submit the same to the Commission along with the DSM programme document for approval.

(3) The DSM Advisory Committee shall review the approach proposed by the Distribution Licensee for evaluation of each DSM programme. The DSM Advisory Committee may call for clarification, additional information and data as necessary considering type and complexity, uncertainty of the programme savings, value of savings and objectives of the proposed DSM programme.

(4) The DSM Advisory Committee shall evaluate revised documents submitted by the Distribution Licensee and present the same to the Commission with its observations and comments.

(5) The Commission shall evaluate revised documents submitted by the DSM Advisory Committee/Distribution Licensee and freeze the approach to be used for conducting evaluation of DSM programme.

1.8 CRITERIA FOR EMPANELMENT & SELECTION OF THIRD PARTY EVALUATOR

(1) The Commission shall empanel Third Party Evaluator to undertake E,M&V of the DSM programmes.

(2) The Commission shall empanel Third Party Evaluator based on the following criteria:-

a) Third Party Evaluator should be consultancy organization and/or consortia thereof;

b) Third Party Evaluator shall have at least one Certified Measurement & Verification Professional (CMVP) or Certified Energy Auditor from Bureau of Energy Efficiency (BEE) on its team;

c) Third Party Evaluator shall possess prior experience in conducting E,M&V of DSM programmes;

(3) The Distribution Licensee shall engage Commission's empanelled Third Party Evaluator through competitive bidding for undertaking E,M&V of the each DSM programme.

(4) The Distribution Licensee shall ensure that selected Third Party Evaluator shall not be involved in design, development, implementation and review of that particular DSM programme in last two years or have any present ongoing engagement with the utility.

(5) The Third Party Evaluator shall carry out E,M&V of DSM programme as per the E,M&V plan approved by the Commission.

(6) The Third Party Evaluator shall provide E,M&V report for individual DSM measure as per the timeline defined in the approved E,M&V plan.

1.9 E,M&V REPORT

(1) The Third Party Evaluator shall document the findings of the E,M&V in the form of report and submit the same to the Commission.

(2) The E,M&V report shall include the following details:-

a) DSM programme overview;

b) Evaluation objectives;

c) Methodology for evaluation;

d) Market segments;

e) Programme components;

f) Measurement instruments used and accuracy;

g) Performance of DSM measures;

h) Estimation of gross savings;

i) Assessment of DSM programme cost-effectiveness;

j) Accuracy and reliability of E,M&V results;

k) Lessons learnt from E,M&V;

l) Key recommendations for improvement of current and future DSM programmes;

(3) The DSM Advisory Committee shall review the E,M&V report. The DSM Advisory Committee may either ask for clarification, additional information and data as necessary with respect to the E,M&V report from the Third Party Evaluator or submit the same to the Commission with its observations and comments.

(4) The Commission may seek clarifications from DSM Advisory Committee and/or Third Party Evaluator and issue directives/Guidelines to the Distribution Licensee for improvement of current and future DSM programmes.

(5) The Commission shall also take in to consideration results of E,M&V while approving the large scale DSM programme or future DSM programmes.

1.10 MISCELLANEOUS

(1) The Commission may, at any time add, vary, alter, modify or amend any provisions of these Guidelines.

a) **Powers to remove difficulty:-** If any difficulty arises in giving effect to the provisions of these Guidelines, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty.

b) **Powers to give directions**:- The Commission may, from time to time, issue amendments and practice directions as considered appropriate to ensure implementation of the Guidelines and procedures to be followed.

c) **Powers to relax**:- The Commission may by general or special order, for reasons to be recorded in writing, may relax any of the provisions of these Guidelines on its own motion or on an application made before it by an interested person.

d) All disputes arising under these Guidelines shall be decided by the Commission based on an application made by the person aggrieved in accordance with the HERC (Conduct of Business) Regulations,2004 read with amendment thereof.

By orders of the Commission
-Sd-
Director/Tariff
Haryana Electricity Regulatory Commission

Annexure-I

ACRONYMS

Acronym	Definition
Act	Electricity Act, 2003
BEE	Bureau of Energy Efficiency
CMVP	Certified Measurement and Verification Professional
DSM	Demand Side Management
EE	Energy Efficiency
E,M&V	Evaluation, Measurement and Verification
HERC	Haryana Electricity Regulatory Commission
IPMVP	International Performance Measurement and Verification Protocol