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DRAFT NOTIFICATION OF

Tamil Nadu Electricity Regulatory Commission (Battery Energy Storage Systems) Regulations, 2026

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[Draft Notification No. TNERC/BESS/2026/……. dated xx-05-2026]

(Comments/suggestions are invited on or before 30-05-2026)

In exercise of the powers conferred under Section 181 read with Sections 32, 33, 61, 62, 63, 66, 86(1) and clause (zp) of sub-section (2) of Section 181 of the Electricity Act, 2003 (Central Act 36 of 2003), and having regard to the provisions of the Electricity (Amendment) Rules, 2025, the Guidelines and Policy Directions issued by the Ministry of Power, Government of India, including the Guidelines for Procurement and Utilisation of Battery Energy Storage Systems and the National Framework for Promoting Energy Storage Systems, the applicable Regulations, Orders and Guidelines issued by the Central Electricity Regulatory Commission, including the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024, as amended from time to time, and all other powers enabling it in this behalf, the Tamil Nadu Electricity Regulatory Commission hereby makes the following Regulations, namely, the Tamil Nadu Electricity Regulatory Commission (Battery Energy Storage Systems) Regulations, 2026, for the State of Tamil Nadu for the information of all persons likely to be affected thereby.

2. Notice is hereby given that the draft Regulations will be taken into consideration after the expiry of fifteen days from the date of publication of this notification in the TNERC website and that any objection or suggestion, which may be received from any person before the expiry of the aforesaid period, will be considered by the Commission.

3. Objection or suggestion, if any, should be addressed in duplicate to the Secretary, Tamil Nadu Electricity Regulatory Commission, 4th floor, SIDCO Corporate Office Building, Thiru-Vi-Ka Industrial Estate, Guindy, Chennai – 600 032.

PART I: PRELIMINARY

1.0 Short Title, Extent and Commencement

1.1 Short Title: These Regulations may be called the Tamil Nadu Electricity Regulatory Commission (Battery Energy Storage Systems) Regulations, 2026.

1.2 Commencement: These Regulations shall come into force from the date of their publication in the Tamil Nadu Government Gazette.

Provided that actions taken, approvals granted and agreements executed in relation to Battery Energy Storage Systems prior to such commencement shall continue to remain valid, subject to the provisions of the Act and these Regulations and any specific Orders of the Commission:

Provided further that, upon renewal, extension or material amendment of any such agreement or approval after the commencement of these Regulations, the provisions of these Regulations shall apply to such renewed, extended or amended agreement or approval, to the extent specified by the Commission.

1.3 Extent: These Regulations shall apply throughout the State of Tamil Nadu and to all entities engaged in the planning, installation, ownership, operation or utilization of BESS connected to the intra-State transmission and distribution systems in the State, and to such other entities as may be subject to the jurisdiction of the Commission under the Act.

1.4 Supersession: In case of any inconsistency between the provisions of these Regulations and any other Regulations, Orders or directions of the Commission,

the provisions of these Regulations shall prevail to the extent of such inconsistency in relation to Battery Energy Storage Systems.

Provided that nothing in these Regulations shall be construed as derogating from the jurisdiction of the Central Electricity Regulatory Commission in respect of inter-State transmission, inter-State trading or centralised power markets, and BESS participating in such inter-State activities shall be governed by the applicable Regulations of the Central Electricity Regulatory Commission, to the extent of such participation.

2. Objectives

2.1 The objectives of these Regulations are to:

(a) promote procurement and deployment of Battery Energy Storage Systems (BESS) to support grid stability, Peak load management, congestion management, frequency management, voltage control, black start capability, reactive power services and reliable integration and firming of Renewable Energy (RE) into the Grid;

(b) enable cost-effective deployment and utilization of BESS in various configurations, including:

(i) Independent energy storage systems (merchant/standalone),

(ii) BESS co-located with generation facilities (renewable or conventional), including hybrid projects;

(iii) BESS embedded in transmission or distribution networks; and

(iv) Behind-the-meter systems for consumers and prosumers;

(c) facilitate the participation of BESS in ancillary services and other electricity markets in accordance with the CERC (Ancillary Service) Regulations, 2022 and any amendments or re-enactments thereof, until the notification of the Commission's Ancillary Services Regulations and other relevant market rules;

(d) facilitate the grid operation and dispatch of BESS procured by the Distribution Licensee and Transmission Licensee, or procured on their behalf, under real time operational control of the Tamil Nadu State Load Dispatch Centre (System Operator), while being maintained and managed by the BESS or asset owner in accordance with the applicable contractual agreements;

(e) establish a transparent and competitive framework for captive, third-party and standalone BESS developers to participate in the electricity market while ensuring non-discriminatory and fair access to grid infrastructure in accordance with applicable Intra-State Open Access and Grid Code Regulations;

(f) specify minimum performance standards, quality and safety norms, and environmental requirements for BESS installations, so as to ensure grid security, system reliability, and protection of consumer interests;

(g) enable effective leveraging of Central Government schemes, incentives and concessions and to enhance the commercial viability of BESS projects in Tamil Nadu;

(h) support compliance with the Resource Adequacy obligations and planning framework notified by the Commission, by recognizing the contribution of BESS to peak demand management, reserve margin and system reliability; and

(i) minimize the overall cost to consumers by enabling optimal utilization of BESS, including through appropriate use of Central Government schemes, incentives and viability gap funding, and by promoting efficient, competitive procurement and operation of BESS.

3.0 Definitions

3.1 In these Regulations, unless the context otherwise requires, the following terms shall have the meanings hereby assigned to them:

(a) **"Act"** means the Electricity Act, 2003 (Central Act 36 of 2003), as amended from time to time;

(b) **"Ancillary Service"** in relation to power system operation means services necessary to support grid operation in maintaining power quality, reliability, and security, and includes, but not limited to:

(i) Primary Reserve Ancillary Service (PRAS),

(ii) Secondary Reserve Ancillary Service (SRAS),

(iii) Tertiary Reserve Ancillary Service (TRAS),

(iv) Active and reactive power support,

(v) Black start capability,

(vi) Voltage support services, and

(vii) Such other services as may be defined in Indian Electricity Grid Code (IEGC), Tamil Nadu Electricity Grid Code, or by orders of the Commission.

(c) **"Automatic Generation Control"(AGC)** means a mechanism through which the active power output or drawal of a SRAS provider in a control area is automatically adjusted in response to a Secondary Control Signal issued by the System Operator;

(d) **"Auxiliary Energy Consumption"(AEC)** means the electrical energy consumed by auxiliary systems of a Battery Energy Storage System, including but not limited to thermal management systems (HVAC and cooling), battery management systems (BMS), power conditioning and control systems, fire protection systems, lighting, and communication systems required for the operation, monitoring, safety, and maintenance of the BESS, excluding losses in the Power Converter System (PCS) and Grid side transformers, unless otherwise specified by the Commission.

(e) **"Battery Energy Storage System"(BESS)** means a stationery energy

storage system utilizing electrochemical batteries (Lead acid, Li-ion, solid state batteries, flow batteries, etc.,) or other approved battery technologies, and comprising battery cells or modules, power conversion systems, battery management systems, cooling and safety systems, and all associated auxiliary equipment necessary for safe and reliable operation, which is capable of storing electrical energy and delivering stored energy to a load and/or to the grid on demand;

(f) **"Battery Management System" (BMS)** means an electronic system associated with a battery energy storage system that monitors, controls, and protects the battery by managing parameters such as voltage, current, temperature, state of charge (SoC), and state of health (SoH), and that ensures safe, reliable, and optimal operation of the battery through functions including cell balancing, fault detection, and communication with external control systems.

(g) "**Battery Energy Storage Service Agreement" (BESSA)** means the agreement entered into between the System Operator and / or a Distribution Licensee or Transmission Licensee, as the case may be and a BESS Developer or Operator, for the provision of energy storage services including, but not limited to, charging and discharging services, capacity availability, grid support services and ancillary services, on agreed technical, commercial, scheduling, and performance terms for a specified contract period.

(h) **"Battery Energy Storage Connectivity Agreement" (BESCA)** means the agreement entered into between a BESS Developer/Owner and the Transmission Licensee or Distribution Licensee, as the case may be, governing the terms and conditions for grid connectivity of the Battery Energy Storage System, including interconnection facilities, technical standards, metering, protection systems, and operational coordination requirements.

(i) **"Battery Energy Storage Purchase Agreement" (BESPA)** means the agreement entered into between a Procurer and a BESS Developer or Owner for

the supply and delivery of electrical energy and/or storage capacity from a Battery Energy Storage System, including obligations relating to charging, discharging, availability, scheduling, and performance, on agreed technical and commercial terms for a specified period.

(j) **"Black Start"** means the technical capability of a BESS to restore power by injecting electrical energy into the grid, or into an islanded section thereof, following a system collapse, without drawing starting power from the grid;

(k) **"Build-Own-Operate" (BOO)** model means a project development model under which the developer designs, finances, constructs, owns and operates the BESS for the duration of the contract period, typically under a long-term service or purchase agreement;

(l)**"Build-Own-Operate-Transfer"(BOOT)** model means a project development model under which the developer designs, finances, constructs, owns and operates the BESS for a specified period, after which the ownership of the BESS is transferred to the state, Transmission Licensee or the Distribution Licensee, as applicable, at an agreed terms and conditions;

(m) **"CEA"** means the Central Electricity Authority;

(n) **"CERC"** means the Central Electricity Regulatory Commission;

(o) **"Commission"** or **"TNERC"** means the Tamil Nadu Electricity Regulatory Commission;

(p) **"Co-located BESS"** means a BESS facility physically located at, and electrically connected with, a generating station (renewable or conventional), and planned and operated as an integrated system with such generating station, subject to applicable Grid Code and connectivity requirements;

(q) **"C-rate"** means the rate at which a Battery Energy Storage System (BESS) is charged or discharged relative to its rated energy capacity, expressed as a

multiple or fraction of such capacity (for example, 1C denotes charging or discharging the full rated energy in one hour);

(r) **"Contracted Capacity"** means:

(i) Contracted Power Capacity (MW) – the maximum alternating current (AC) power output (discharge) and/or input (charge) at the interconnection point, as specified in the relevant agreement; and

(ii) Contracted Energy Capacity (MWh) – the usable energy that can be discharged from the Battery Energy Storage System at the interconnection point under specified operating conditions, including Depth of Discharge and degradation assumptions, as agreed in the relevant Agreement.

(s) "**Connectivity Agreement"** means an agreement entered into between a Generator and/or Battery Energy Storage System developer and the concerned Transmission Licensee or Distribution Licensee, as the case may be, in accordance with the Electricity Act, 2003, the Central Electricity Authority (Technical Standards for Connectivity), the Indian Electricity Grid Code, the applicable State Grid Code and Open Access Regulations, for the purpose of establishing and maintaining electrical interconnection of the generating station / and/or BESS facility with the grid at the designated interconnection Point, including provisions relating to technical standards, operational coordination, metering, protection, safety, and communication requirements, as amended from time to time.

(t)**"Cycle Life"** means the number of complete charge-discharge cycles a battery can perform while maintaining at least eighty percent of its rated capacity under specified operating conditions;

(u) **"Demand Response"** means the modulation of electricity consumption by consumers in response to grid conditions, price signals or other signals issued by

the System Operator or Distribution Licensee, in order to help balance electricity supply and demand;

(v) **"Deviation Settlement"** means the financial settlement mechanism for deviations between scheduled and actual power injection or drawal, as specified in the Commission's Deviation Settlement Mechanism Regulations, as amended from time to time;

(w) **"Distribution Licensee" (DISCOM)** means a person or entity licensed under the Act to distribute electricity within a specified area of supply in the State of Tamil Nadu;

(x) **"Down Regulation"** means a reduction in active power injection into the grid or an increase in active power consumption by a BESS in response to control signals issued by the System Operator;

(y) **"Embedded BESS"** means a BESS facility connected within the transmission or distribution network (other than behind-the-meter) but not co-located with a generator;

(z) **"Energy Audit"** means periodic technical and financial review of BESS performance against contractual specifications;

(aa) **"Environmental Clearance"** means the approval or consent obtained from the competent environmental authorities in respect of a BESS project, including approvals relating to land use, Environmental impact assessment, waste management, emissions and community health and safety, as applicable;

(bb) "**Energy Management System (EMS)"** means a supervisory control system for electrical installations and Battery Energy Storage Systems (BESS) that performs real-time monitoring, control, and optimization of energy resources and power flows by acquiring system data and issuing commands to subordinate systems such as Power Conversion Systems (PCS) for regulation of active and

reactive power, voltage, and operational modes, such as grid-following or grid-forming, and for scheduling battery charging and discharging based on demand, tariffs and grid conditions, so as to ensure safe, reliable, efficient, and compliant operation of the integrated power system.

(cc) **"Forecasted Capacity"** means the BESS operator's forecast, submitted in the day-ahead or other specified time frame, of the capacity expected to be available from the BESS for charging, discharging and ancillary services, taking into account maintenance schedules, weather impacts, and state-of-charge projections and other relevant constraints;

(dd) **"Generator"** means an entity licensed to generate electricity and includes thermal, hydro, renewable energy, or merchant generators;

(ee) **"Grid Code"** means Indian Electricity Grid Code (IEGC) and Tamil Nadu Electricity Grid Code, as notified by the Commission and as amended from time to time;

(ff) **"Grid Connected"** means electrically connected to the transmission or distribution system with appropriate metering, protection and control systems in accordance with applicable technical standards and Grid Code provisions;

(gg) **"Grid following(GFL) PCS"** means a power electronic based power conditioning system that synchronizes with existing grid voltage and frequency using a phase-locked loop (PLL) or equivalent control mechanism, injects active and reactive power based on reference signals, and depends on a stable grid source without independently establishing grid voltage or frequency;

(hh) **"Grid forming (GFM) PCS"** means a power electronic based power conditioning system capable of establishing and regulating grid voltage and frequency independently, without relying on an existing grid source, and capable of operating in islanded mode, while providing virtual inertia, voltage support, and system strength to the grid, in coordination with the EMS where applicable;

(ii) **"Independent Energy Storage Service Provider"** means an entity authorized to design, install, own, and operate BESS facilities and to provide energy storage and related services to the grid and/or to consumers without, itself being a generator of electricity;

(jj) **"Installed Capacity"** means the rated power capacity (MW) and/or energy capacity (MWh) of the BESS as installed, tested and commissioned by the developer or owner, which may exceed the Contracted Capacity, as declared in accordance with the applicable agreement and procedures;

(kk) **"Interconnection Point"** means the point at which the BESS is electrically connected to the system of State Transmission Utility (STU) or a Distribution Licensee, as the case may be, and at which metering, protection and grid interface equipment are installed and energy accounting is carried out;

(ll) **"Interoperability"** means the technical ability of BESS components, systems, software, monitoring devices, and control systems, including those supplied by different vendors, to communicate, exchange information and function seamlessly with each other and with grid infrastructure and market systems;

(mm) **"Merchant BESS"** means a Grid connected standalone BESS that operates independently without long-term capacity or energy contracts, and participate primarily in short-term energy and ancillary services markets, subject to applicable market and open access Regulations;

(nn) **"Minimum Voltage"** and **"Maximum Voltage"** means the lower and upper system voltage limits respectively, as specified in the applicable Grid Code;

(oo) **"Net Metering"** means a metering arrangement that measures the difference between the energy consumed by an eligible consumer from the Grid and the energy fed into the Grid from a renewable energy system, with

bidirectional measurement of power flows, in accordance with the relevant Regulations of the Commission;

(pp) **"Nodal Agency"** means the Tamil Nadu State Load Despatch Centre (System Operator), responsible for grid operation, scheduling, and dispatch of ancillary services and such other functions as may be assigned under the Regulations;

(qq) **"Non-Spinning Reserve"** means generating or storage capacity that is not currently synchronized to the Grid but is available for dispatch within a specified lead time, as defined in the applicable Ancillary services Regulations or procedures;

(rr) **"Operational service agreement"** means, means an agreement entered into between System Operator and a generator and/or BESS developer, as applicable, in accordance with the Electricity Act, 2003, the applicable Grid Code, Ancillary Services Regulations and guidelines issued by the Government of India, for the provision, scheduling, dispatch, coordination, monitoring and settlement of energy storage, grid support, flexibility and ancillary services, including bidirectional charging and discharging of BESS, and for ensuring compliance with all applicable technical, operational, metering, communication, protection and commercial requirements, as amended from time to time;

(ss) **Optimization of BESS"** means the determination of the optimal charging and discharging schedules, dispatch and utilization of a BESS using mathematical or computational techniques so as to maximize economic efficiency, system reliability or grid support services, subject to applicable technical, operational and market constraints, over specified time horizons including real–time, intra-day and day-a-head;

(tt) **"Open Access Consumer"** means a consumer or prosumer who is eligible to receive supply of electricity through open access and who avails open access

in accordance with the Intra-State Open Access Regulations of the Commission, as amended from time to time;

(uu) **"Performance Warranty"** means the manufacturer's or supplier's guarantee that the usable capacity and performance of the battery will remain at or above an agreed level (typically at least eighty percent of the initial nameplate capacity) during the specified warranty period, under defined operating conditions;

(vv) **"Power Converter System"** means an integrated assembly of power electronic devices together with associated control, protection and auxiliary equipment that enables bidirectional conversion of electrical energy between alternating current (AC) and direct current (DC), while regulating voltage, current, frequency and power quality, to facilitate controlled exchange of power between energy resources, storage systems, loads and the electrical grid;

(ww)**"Primary Reserve Ancillary Service" (PRAS)** means automatic frequency response provided within a very short time of a frequency deviation, typically through governor action or equivalent control systems, in accordance with the applicable Ancillary Services Regulations and Grid Code;

(xx) **"Procurer"** means, in relation to a Battery Energy Storage System or BESS-based service, a person or entity that enters into a Battery Energy Storage Purchase Agreement, Battery Energy Storage Service Agreement, Power Purchase Agreement or other contractual arrangement for the purchase of energy, capacity, storage or ancillary services from such BESS, and includes, as applicable, a Distribution Licensee, Transmission Licensee, generator, Open Access Consumer, or a designated agency, as approved or recognised by the Commission.

(yy) **"Prosumer"** means a consumer who generates electricity, primarily from renewable energy sources, for own use and may inject surplus electricity into the grid, and who may also install and operate a BESS;

(zz)**"QCA"** means a Qualified Coordinating Agency as defined in the TNERC (Forecasting, Scheduling and Deviation Settlement for Wind and Solar Generation) Regulations, 2024, as amended from time to time;

(aaa) **"Ramp rate of BESS"** means the maximum rate at which a Battery Energy Storage System can increase or decrease its active power output or input at the interconnection point, expressed in megawatts per minute (MW/min) or as a percentage of Contracted Power Capacity per minute, as specified in the Grid Code, Ancillary Services Regulations and the relevant BESSA, BESPA or PPA;

(bbb) **"Rated Capacity"** means the total amount of energy that can be stored in the BESS, as specified by the original equipment manufacturer under standard test conditions, expressed in kilowatt-hours (kWh) or megawatt-hours (MWh);

(ccc) **"Renewable Energy" (RE)**means electricity generated from wind, solar, hydro, biomass, waste-to-energy and such other renewable sources as may be notified by the Central or State Government or the Commission;

(ddd) **"Reserve Margin"** means the excess generating and/or storage capacity maintained above the forecast peak demand in order to ensure system reliability and security of supply;

(eee) **"Response Time"** means the duration between the receipt of a dispatch instruction or control signal and the time at which the BESS achieves the requested power level output or input within specified tolerances;

(fff) **"Round-trip Efficiency"** means the ratio, expressed as a percentage, of the total electrical energy delivered by the BESS to the total electrical energy supplied to the BESS for charging, measured on an AC-input to AC-output basis

over a defined period, and calculated in accordance with the procedures approved by the Commission.

(ggg) **"Secondary Control Signal"** means an automated control signal generated by System Operator through which the power injection or drawal of an SRAS provider is modulated by Automatic Generation Control (AGC) or an equivalent control system;

(hhh) "**Storage Energy Charge Rate ($SECR_e$)"**means the effective per-unit cost of electrical energy discharged from a BESS, expressed in Indian Rupees per kilowatt-hour (INR/kWh), derived by adjusting the cost of charging energy to account for round-trip efficiency, auxiliary energy consumption and such other factors as may be specified in the Tariff section of these Regulations;

(iii) **"Secondary Reserve Ancillary Service" (SRAS)** means an automatic frequency control service provided within a specified response time following a frequency deviation, typically through AGC, and is further classified as:

(i) **SRAS-UP:** an increase in power injection or decrease in drawal;

(ii) **SRAS-DOWN**: a decrease in power injection or increase in drawal;

(iii) **SRAS Provider** means an entity that provides SRAS-UP and/or SRAS-DOWN services in accordance with these Regulations and the applicable Ancillary Services Regulations and procedures;

(jjj) **"Spinning Reserve"** means generating or storage capacity that is synchronized to the grid and is capable of increasing or decreasing its output within a short time, typically within a few minutes, as may be defined in the applicable Ancillary Services Regulations or procedures;

(kkk) **"Standalone BESS"** means a BESS that is not co-located with a generating station and that can operate independently as a grid-connected asset,

with capability to engage in energy trading and/or provide ancillary and other grid support services, subject to applicable regulations;

(lll) **"State-of-Charge" (SOC)** means the present level of charge of a battery at a given time, expressed as a percentage of its rated usable capacity;

(mmm) **"State of Health"** means an indicator of the condition of a battery, expressed as a percentage of its initial rated capacity or performance at the time of first use, calculated in accordance with the manufacturer's or agreed test procedures;

(nnn) **"System Availability"** means the percentage of time during the contracted period for which the BESS is technically capable of delivering the contracted services and is available for dispatch, as measured in accordance with the applicable agreement and procedures;

(ooo) **" System Operator"** means the entity responsible for real–time operation of the power system, including frequency control and security of the grid, which in the State of Tamil Nadu is the Tamil Nadu State Load Despatch Centre (System Operator);

(ppp) **"Tertiary Reserve Ancillary Service" (TRAS)** means a manually or automatically dispatched frequency or load response service with a response time longer than that of SRAS, as specified in the applicable Ancillary Services Regulations or procedures, and is further classified as:

(i) TRAS-UP: an increase in power injection or decrease in drawal; and

(ii) TRAS-DOWN: a decrease in power injection or increase in drawal;

(qqq) **"Third-party BESS"** means a BESS facility that is owned and operated by an entity that is independent of the generator whose output may be stored, the Transmission Licensee, the Distribution Licensee and the end consumer, subject to applicable regulatory and contractual arrangements;

(rrr) **"Transmission Licensee"** means a person or entity licensed under the Act to transmit electricity within the State of Tamil Nadu or whose transmission system is used for conveyance of electricity within the State;

(sss) **"Up Regulation"** means an increase in active power injection into the grid or a decrease in active power consumption by a BESS in response to control signals issued by the System Operator;

(ttt) **"Viability Gap Funding"** means financial support provided by the Central or State Government or its agencies to bridge the gap between the project cost and the expected revenue from sale of power or services, so as to make a BESS project financially viable, in accordance with the applicable policy or scheme;

3.2 Words and expressions used in these Regulations but not defined herein shall have the meanings assigned to them in the Electricity Act, 2003, the rules made thereunder, the Grid Code, and other Regulations of the Commission in force, and, failing that, shall be construed in accordance with ordinary usage in the electricity industry.

PART II: APPLICABILITY AND CLASSIFICATION

4.0 APPLICABILITY:

4.1 General Applicability

These Regulations shall apply throughout the State of Tamil Nadu to all Battery Energy Storage Systems (BESS) connected, or seeking connection, to the intra-State transmission or distribution system, and to all entities engaged in the planning, development, installation, ownership, operation, utilisation or procurement of such BESS, including:

(a) Transmission Licensees;

(b) Distribution Licensees;

(c) Generators, including thermal, hydro, gas, renewable energy and merchant generators, having BESS co-located with generating stations or otherwise integrated with their facilities;

(d) Independent Energy Storage Service Providers and Merchant BESS operators;

(e) Open Access Consumers and Prosumers utilising BESS;

(f) the System Operator; and

(g) such other persons or entities as may be brought within the jurisdiction of the Commission under the Act and these Regulations.

4.2 Functional Applicability

Without prejudice to Regulation 4.1, these Regulations shall apply, in particular, to BESS which:

(a) provide services for meeting peak demand, reserve margin or other Resource Adequacy obligations notified by the Commission;

(b) provide ancillary services or other grid support services in accordance with the applicable Regulations of the Commission or of the Central Electricity Regulatory Commission, to the extent such services are rendered using BESS connected to the intra-State system;

(c) are used for energy arbitrage, congestion management, black-start, reactive power support, or other grid operations functions under the directions of the System Operator or a Licensee;

(d) are procured, directly or indirectly, by a Licensee or other Procurer under a tariff or competitive bidding framework regulated or adopted by the Commission; or

(e) are utilised for open access transactions, market-based services, or other commercial arrangements involving injection into or drawal from the intra-State transmission or distribution system.

4.3 Behind-the-Meter BESS

These Regulations shall apply to Behind-the-Meter BESS only in respect of:

(a) grid connectivity, metering, protection and safety at and beyond the interface point with the distribution system;

(b) participation in ancillary services, open access, market-based services or any other grid-related services or tariff benefits availed by the consumer or prosumer using such BESS; and

(c) compliance with the Tamil Nadu Electricity Supply Code, the Grid Code and other applicable Regulations of the Commission, to the extent such BESS interact with the grid.

Internal consumer-side wiring and utilisation of BESS solely for internal loads, without any physical connection to the intra-State system, shall be governed by applicable electrical safety laws and standards and shall not, by themselves, attract these Regulations.

4.4 Negative Boundary

These Regulations shall not apply to purely off-grid BESS installations which have no physical connection to the intra-State transmission or distribution system, except where such installations are specifically notified by the Commission to be subject to these Regulations in whole or in part.

4.5 Coordination with other TNERC Regulations

In matters not expressly provided for in these Regulations, the provisions of other applicable Regulations of the Commission, including but not limited to the Grid Code, Open Access Regulations, Deviation Settlement Mechanism Regulations, Resource Adequacy Regulations, Tariff Regulations and Supply Code, shall apply mutatis mutandis to BESS, to the extent they are not inconsistent with these Regulations.

5.0 BESS CLASSIFICATION:

For the purpose of application of these Regulations, BESS shall be classified under the categories specified in Regulations 5.1 to 5.6, based on their point of interconnection, physical configuration and functional use. Entities may develop, own and operate BESS within permissible rated capacity under the following categories:

5.1 Grid-connected Standalone BESS:

5.1.1 grid-connected standalone BESS means a Battery Energy Storage System directly connected to the transmission system or bulk power system, operating as an independent grid resource capable of injecting or absorbing power under System Operator control, without being associated with a specific load or generating station.

5.1.2 A grid-connected standalone BESS shall operate independently as a merchant energy storage facility and shall be physically separate from generation installations. Such BESS shall ordinarily be connected at transmission voltage levels, preferably at 66 kV and above, or as may be specified by the State Transmission Utility (STU) and approved by the Commission.

5.1.3 Standalone BESS commissioned on or before 30-06-2028 shall be eligible for such preferential tariff treatment, if any, as may be specified by the

Commission, and shall be permitted to participate in energy and ancillary services markets in accordance with applicable Regulations and market rules.

5.2 Co-located BESS:

5.2.1 A co-located BESS means a Battery Energy Storage System installed at the same premises as a generating station and connected either on the DC side or the AC side of a renewable energy (wind, solar PV, or hybrid) or conventional generating plant, sharing the point of interconnection with the grid and operating in coordination with the generating facility to manage, store and dispatch electrical energy.

5.2.2 Co-located BESS shall be operated as an integrated unit with the associated generating station under single operational control, and may be used, inter alia, for round-the-clock (RTC) power supply, peak-hour supply obligations, enhancing grid stability during high renewable energy penetration, and providing ancillary and other grid support services, in accordance with applicable scheduling, dispatch and metering provisions.

5.3 Embedded BESS:

5.3.1 An embedded BESS means a Battery Energy Storage System connected within the distribution network (33 kV and below), including both consumer-side and utility-side installations, which primarily supports local voltage control, reduction of technical losses and enhancement of distribution system reliability and flexibility.

5.3.2 Embedded BESS may be owned by a Licensee or by a third-party developer and shall be integrated into transmission and distribution planning frameworks for grid support, in accordance with procedures issued by the STU and DISCOMs and approved by the Commission.

5.4 Behind-the-Meter BESS:

5.4.1 A Behind-the-Meter Battery Energy Storage System (BTM BESS) means a Battery Energy Storage System installed on the consumer's side of the interface meter, downstream of the point of supply, used primarily for meeting the consumer's own electricity requirements at the same premises, and configured such that any injection of power into the distribution system, if permitted, is in accordance with the applicable Regulations of the Commission.

5.4.2 The installation of BTM BESS shall require prior approval or intimation, as specified by the Commission, to the Distribution Licensee and shall comply with all applicable safety, metering, protection and technical connectivity standards specified by the Commission, the Distribution Licensee, the STU and/or the Central Electricity Authority.

5.5 Hybrid RE-Battery Energy Storage System (Hybrid RE-BESS):

5.5.1 A Hybrid RE-BESS means a system comprising one or more renewable energy generating sources, including but not limited to solar or wind, combined with a Battery Energy Storage System (BESS), which are integrated at a single interconnection point or multiple interconnection points and operated in a coordinated manner for injection of power into the grid, in accordance with applicable scheduling, dispatch and metering provisions.

5.5.2 A Hybrid RE-BESS may be configured to supply power in a firm and dispatchable manner, optimise utilisation of transmission and distribution infrastructure, reduce variability and intermittency of renewable energy output, and enhance grid reliability and system flexibility.

5.6 Multi-location BESS

5.6.1 A Multi-location BESS means a configuration comprising dispersed BESS facilities located at multiple sites within the grid, which are coordinated and operated as a single aggregated system under the management of a Qualified Coordinating Agency (QCA) or such entity as may be approved by the Commission.

5.6.2 Multi-location BESS configurations may be used, in particular, for portfolios of renewable energy generators or distribution network assets, and shall be subject to aggregated forecasting, scheduling and dispatch through the System Operator in accordance with applicable Regulations and procedures.

6.0 Ownership and Business Models:

6.1 **Captive Model**: A model in which the BESS is owned and operated by a consumer or entity for meeting its own electricity requirements, including for peak-shaving, reliability improvement or other on-site applications, subject to applicable captive and open access Regulations.

6.2 **Utility owned Model**: A model in which the BESS is owned or procured by a Distribution Licensee, Transmission Licensee or other utility for system operation, reliability enhancement, network support or other regulated purposes, and the associated costs and benefits are treated in accordance with the Commission's Tariff Regulations and specific orders.

6.3 **Third-party / Developer owned Model**: A model in which the BESS is developed, owned and operated by an independent entity and the storage capacity and/or services are sold, leased or contracted to utilities, consumers or other entities through bilateral arrangements or competitive bidding, on terms approved or adopted by the Commission where required.

6.4 **Merchant Model**: A model in which the BESS operates independently and derives revenue primarily through participation in electricity markets, including energy arbitrage and ancillary and other system services, subject to applicable market, open access and grid code Regulations.

6.5 **Hybrid Model**: A model in which the BESS operates under a combination of two or more of the above arrangements, including integration with renewable energy systems and/or multiple revenue streams, in accordance with the applicable regulatory framework and contractual arrangements.

PART III: PLANNING AND INSTALLATION

7.0 Planning Criteria

7.1 System Planning Responsibilities

The Distribution Licensee, the Transmission Licensee and the System Operator shall undertake periodic assessment and update of the requirement for deployment of Battery Energy Storage Systems (BESS) within their respective areas of operation, as part of their transmission and distribution planning processes and Resource Adequacy planning, where applicable.

7.2 Planning Parameters for BESS

For the purpose of identification of suitable locations and configurations for BESS, the planning studies referred to in Regulation 7.1 shall, inter alia, take into account:

(a) the occurrence and magnitude of reverse power flow, being the flow of power from lower voltage levels to higher voltage levels at substations;

(b) peak demand management requirements, including contribution to reserve margin and system reliability;

(c) integration of renewable energy sources, including mitigation of variability and intermittency and firming of renewable output;

(d) reduction of technical losses, improvement of voltage profile and congestion relief in transmission and distribution networks;

(e) system stability and power quality considerations, including frequency control, voltage control and black-start capability; and

(f) Central and State Government schemes, policies, incentives and guidelines relating to BESS, including the National Framework for Promoting Energy Storage Systems and the Guidelines for Procurement and Utilisation of Battery Energy Storage Systems, to the extent applicable to intra-State planning and operations.

8.0 Installation Framework

8.1 General Requirements

No Battery Energy Storage System shall be installed, commissioned or operated in connection with the intra-State transmission or distribution system unless it complies with these Regulations, including the technical, safety, metering and connectivity standards specified in Part VI , XI and XIV of these Regulations, the applicable technical standards of the Central Electricity Authority, the Grid Code, the Tamil Nadu Electricity Supply Code and other applicable laws and standards.

8.2 Minimum Project Size

8.2.1 Specialised and scheme-based applications: Notwithstanding sub-clause (2), a Battery Energy Storage System (BESS) deployed for any of the following applications may be implemented with a rated power capacity of not less than 125 kW, and such capacity shall be deemed to satisfy the minimum project size requirement under this Regulation:

(a) feeder-level solarisation;

(b) agricultural demand management;

(c) distributed generation with BESS at the distribution or feeder level; and

(d) BESS deployed under the PM-KUSUM Scheme or any successor scheme notified by the Central or State Government.

8.2.2 A BESS project for an application listed in items (a) to (d) with a rated power capacity below 125 kW may be permitted only with the prior approval of the Commission, which shall be granted after considering the applicable scheme guidelines, a cost–benefit analysis and grid requirements.

8.2.3 General minimum for grid-connected BESS: Save as otherwise provided in sub-clauses (1) and (3), a grid-connected BESS shall, ordinarily, have a rated power capacity of not less than 1 MW. This minimum shall not apply to Behind-the-Meter BESS.

8.2.4 Other sub-MW distribution-level and pilot projects: Without prejudice to sub-clause (1), the Commission may permit a BESS with a rated power capacity of not less than 125 kW and below 1 MW for distribution-level applications other than those covered under sub-clause (1), including, but not limited to, distribution transformer or section-level support, community, township or campus-level projects, and pilot or demonstration projects.

8.2.5 Behind-the-Meter BESS: Behind-the-Meter BESS shall not be subject to the minimum project size specified in sub-clause (2) and may be installed at such capacities as are technically feasible, subject to the Tamil Nadu Electricity Supply Code and these Regulations.

8.3 Requirement of Grid Forming (GFM) PCS

8.3.1 Distribution Licensees may install Battery Energy Storage Systems (BESS) at Extra High Tension (EHT) or High Tension (HT) feeder levels for storing excess grid power. For BESS projects having capacity of 25 MW or more, the Power Conversion System (PCS) used in the respective projects shall be of Grid Forming (GFM) type PCS.

8.3.2 All BESS projects proposed with a capacity of 5 MW and above but less than 25 MW shall either provide Grid Forming PCS or Grid Following (GFL) PCS. In case a Grid Following PCS is provided, an undertaking shall be executed by the developer to ensure that, at a later stage, if the Distribution Licensee or the System Operator requires Grid Forming capability in their project, the existing Grid Following (GFL) PCS shall have the provision to be upgraded to Grid Forming PCS by means of modifying the required software, without any need for hardware component replacement.

8.4 Approval of Installation

8.4.1 No BESS shall be connected to the intra-State transmission or distribution system without prior approval of the appropriate authority, in accordance with these Regulations and other applicable laws.

8.4.2 For the purpose of clause (a), the appropriate authority shall include, as applicable:

(i) the Transmission Licensee, in respect of BESS connected to the State transmission system;

(ii) the Distribution Licensee, in respect of BESS connected to the distribution system, including Behind-the-Meter installations to the extent of interface arrangements;

(iii) the System Operator, in respect of scheduling, dispatch and operational integration; and

(iv) any other statutory authority, including electrical safety authorities, as may be required under applicable laws.

8.4.3 The procedures, timelines and documentation for obtaining such approvals, including connectivity agreements and protection/metering clearances, shall be in accordance with these Regulations, the Grid Code, the Tamil Nadu Electricity Supply Code and orders or directions issued by the Commission.

8.5 BESS Co-located with Conventional Generators:

8.5.1 The integration of Battery Energy Storage Systems (BESS) with conventional generators shall enhance system efficiency and provide flexibility services, including ramping support, peak power support, improvement in fuel efficiency, support for part-load operation, reduction in start-stop cycles and provision of ancillary services. Such integration shall also contribute to reduction in the effective tariff through improved plant loading and operational efficiency.

8.5.2 Existing conventional generators may establish BESS facilities with the required capacity, subject to approval of the Commission. In such cases, separate tariffs shall be adopted for the conventional generation component and the energy supplied through the BESS, as may be approved or adopted by the Commission.

8.6 BESS Co-located with RE-Hybrid Projects

8.6.1 To ensure adequate storage capacity to supply reliable power, new renewable energy (RE) projects with an installed capacity of 5 MW and above are mandated to install an energy storage system with a minimum storage capacity of 25 percent of the RE capacity, to manage variability and peak demand.

8.6.2 Existing RE plants may commission new BESS plants with the required capacity by adopting two separate tariffs, one for RE generation and the other for energy discharged from the BESS. For new co-located RE and BESS plants, either two separate tariffs or a composite tariff may be adopted, as specified in the applicable Power Purchase Agreement and Battery Energy Storage Service or Purchase Agreement, and approved by the Commission.

8.6.3 In the case of RE integrated with Battery Energy Storage Systems projects:

(a) AC Capacity shall mean the contracted project capacity approved under the Power Purchase Agreement.

(b) Prior to commissioning, the Developer shall submit the following documents for verification by the Procurer:

(i) detailed module layout and DC capacity calculations (for Solar-BESS projects);

(ii) certification confirming compliance with the prescribed DC-AC ratio (for Solar-BESS projects);

(iii) inverter specifications (for wind, solar or hybrid projects);

(iv) Single Line Diagram (SLD) (for wind, solar or hybrid projects); and

(v) Capacity Utilisation Factor (CUF) of the generation plant (for wind, solar or hybrid projects).

8.6.4 Solar–Battery Energy Storage System (BESS) projects shall be configured using either Direct Current (DC)-coupled or Alternating Current (AC)-coupled arrangements. For existing solar photovoltaic projects, the integration of BESS may generally be undertaken through AC-coupled configurations, in order to minimise retrofitting requirements and associated costs.

8.6.5 Notwithstanding the above, DC-coupled Solar–BESS configurations may be permitted, particularly for new projects, in view of their relatively higher efficiency and cost-effectiveness over the project lifecycle. However, such configurations shall require adequate space for installation, and the developer shall ensure compliance with all spatial and technical requirements.

8.6.6 In all cases where DC-coupled Solar–BESS systems are deployed, bi-directional PCS shall be mandatorily provided to enable charging of the BESS from both renewable energy generation and the grid. Charging of BESS from the grid shall be subject to mutual agreement between the developer and Procurer and to the applicable Regulations of the Commission.

8.7 Energy Rating Justification

The energy rating, or storage duration, of a BESS shall be determined based on the specific application, including whether it is intended for frequency regulation or peak shifting, the renewable energy generation profile and variability, and grid requirements as specified by the System Operator and the concerned Licensee, in accordance with these Regulations and the Grid Code.

PART IV: PROCUREMENT AND CONTRACTS

9 Procurement Framework

9.1 Competitive Bidding under Section 63:

9.1.1 Procurement of BESS projects and BESS-based services by the Transmission Licensee, Distribution Licensee, TNPGCL and other procuring entities shall, as a general rule, be undertaken through transparent tariff-based competitive bidding in accordance with Section 63 of the Act, the Guidelines for Procurement and Utilisation of Battery Energy Storage Systems and other applicable guidelines

issued by the Ministry of Power, Government of India, and these Regulations, so as to ensure transparency, competitiveness and discovery of optimal tariff.

9.1.2 Procurement of standalone BESS projects shall ordinarily be undertaken based on storage capacity, discharge duration, availability, response capability, ancillary service capability and such other technical and operational parameters as may be specified in the bidding documents.

9.1.3 Procurement of co-located Renewable Energy-BESS projects, including Solar-BESS, Wind-BESS and Hybrid RE-BESS projects, may be undertaken through composite tariff bidding or separate tariff bidding structures for generation and storage components, considering dispatchability requirements, firm and schedulable renewable power obligations, peak supply commitments, storage duration, Capacity Utilization Factor (CUF), and such other operational parameters as may be specified in the bidding documents.

9.1.4 The tariff structure and payment mechanisms for co-located Renewable Energy-BESS projects shall be governed in accordance with Regulations 13 and 14 of these Regulations.

9.1.5 The Commission shall adopt the tariff discovered through such competitive bidding, subject to satisfaction that the bidding process has been conducted in a transparent manner, in accordance with the applicable guidelines, and that the discovered tariff is reasonable and in the interest of consumers.

9.2 Procurement under Section 62:

The Commission may permit procurement of BESS under Section 62 of the Electricity Act, 2003, when BESS is integrated with existing regulated infrastructure as mentioned in Regulation 9.3 of these Regulations, or under such other circumstances as may be specified by the Commission, subject to prior approval of the Commission and prudence check of costs and benefits.

9.3 Procurement through self-ownership / EPC model

9.3.1 The Transmission Licensee, Distribution Licensee, TNPGCL and other procuring entities may undertake procurement of BESS under a self-ownership model, where the estimated project cost of an individual BESS project is less than INR 200 crore, subject to prior approval of the Commission.

9.3.2 Capital expenditure for such BESS shall be proposed as part of the capital investment plan or equivalent filing of the concerned Licensee or generating company, and shall be subject to prudence review and specific approval by the Commission under the applicable Tariff / MYT Regulations. Only the capital expenditure found prudent shall be considered for recovery through tariff or charges.

9.3.3 The physical procurement of BESS assets and associated works under the self-ownership model shall be carried out through transparent and competitive bidding in accordance with the procurement procedures approved by the Commission, and in no case shall such procurement be undertaken on a nomination basis, except where expressly permitted by an Order of the Commission in exceptional circumstances.

9.4 Single-bid and pilot projects

9.4.1 In respect of procurement under Regulations 9.1 and 9.2, a single-bid outcome may be accepted, or a pilot / demonstration project may be approved, only with the prior approval of the Commission, duly supported by:

(a) evidence that adequate notice and reasonable bid conditions were provided;

(b) a comparison of the discovered tariff or cost with relevant benchmarks, including similar bids, CERC norms and national / international reference prices, where available; and

(c) an assessment by the procuring entity of the reasonableness of the tariff or cost.

9.4.2 The Commission may, where it considers appropriate, direct the procuring entity to undertake a re-tender or to conduct a Swiss-challenge or other competitive process before approving a single-bid or developer-specific proposal.

9.5 Procurement through Central or State agencies:

Procurement of BESS capacity or BESS-based services may be undertaken through Central or State agencies, including SECI or other designated agencies, in accordance with applicable Government of India or Government of Tamil Nadu schemes, guidelines and procedures, subject to approval of the Commission. In such cases, the Commission shall, while according approval, assess the reasonableness of the tariff or charges, the allocation of risks and obligations, and the consistency of the proposed procurement with these Regulations and the Commission's Resource Adequacy framework.

9.6 Developer-led procurement (DLP)

9.6.1 Under developer-led procurement, a developer may suo motu propose a BESS project specifying the proposed tariff, technical specifications, location, interconnection point and implementation timeline.

9.6.2 The concerned Licensee or procuring entity shall evaluate the proposal by undertaking, at a minimum:

(a) load-flow and system-stability studies;

(b) an assessment of the contribution of the proposed BESS to peak-load management, congestion relief, renewable integration and Resource Adequacy; and

(c) an economic and financial assessment comparing the proposal against alternative options, including comparable competitive bids where available.

9.6.3 The Licensee shall submit the proposal, along with its evaluation, to the Commission for approval. The Commission may grant approval only after being satisfied, based on a prudence check, that:

(a) the tariff or charges are reasonable having regard to benchmarks such as similar bids, CERC norms and prevailing market prices; and

(b) the proposal is consistent with these Regulations, the Commission's Tariff / MYT Regulations, the Framework for Resource Adequacy Regulations, 2025 and applicable Central guidelines.

9.6.4 For the purpose of assessment of tariff reasonableness, the Commission may consider:

(a) benchmark tariffs discovered through recent competitive bidding for similar BESS or RE-BESS projects;

(b) cost-plus evaluation of capital cost, financing cost, operation and maintenance expenses, degradation assumptions and other relevant project parameters; and

(c) prevailing market conditions and consumer interest considerations.

The Commission may approve, modify or reject such proposal based on the outcome of such assessment.

9.7 Request for Selection / Request for Proposal:

9.7.1 The Procurer shall issue a Request for Selection (RfS) or Request for proposal (RfP) specifying, inter alia, the following:

(a) Contracted capacity in MW and/or MWh, and the required discharge duration(s);

(b) Contract period, including:

(i) for standalone BESS projects, a term typically in the range of 12 to 15 years, or such other term as may be specified by the Commission; and

(ii) for renewable energy or conventional plants co-located with BESS, a term up to 25 years, or such other term as may be specified by the Commission;

(c) Ownership and business model, including BOO/BOOT or any other structure as may be permitted under applicable guidelines and these Regulations;

(d) performance requirements and grid connectivity conditions, and key operational parameters, including availability, efficiency and degradation, as specified in these Regulations and relevant technical standards;

(e) payment security mechanism, including, but not limited to, Letter of Credit, Insurance Surety Bonds (ISBs), escrow arrangement, or other instruments as permitted under the General Financial Rules, 2017, as amended from time to time.

(f) scheduling, dispatch and metering arrangements, including responsibilities of the procurer, the developer and the System Operator; and

(g) any specific obligations relating to ancillary services, peak supply, or time-of-day commitments.

(h) where the procurer is a Distribution Licensee, regulatory approval for the Power Sale Agreement (PSA) shall be obtained within thirty (30) days of signing;

(i) the Performance Bank Guarantee (PBG) shall not exceed three percent (3%) of the estimated project cost for the relevant financial year, unless otherwise specified by the Commission

Provided that any deviation from the standard bidding framework or model bidding documents, including in respect of the above provisions, shall be subject to the prior approval of the Commission, in accordance with the applicable guidelines and these Regulations;

9.8 Tariff Structure in Bids:

9.8.1 The financial bid shall specify the tariff structure, including, as applicable, one or more of the following components:

(a) fixed capacity charge (for example, INR/MW/month);

(b) energy charge (for example, INR/kWh discharged); and

(c) such other charges or price components as may be specified by the Commission or in the applicable guidelines.

9.9 Minimum Operational and Performance Parameters:

9.9.1 The bidding documents shall specify minimum operational and performance parameters applicable to the BESS, which may include, inter alia:

(a) Minimum Round-Trip Efficiency (RTE) of 85% on an AC-to-AC basis, or such other level as may be specified by the Commission;

(b) Minimum Plant Availability Factor (PAF) of 95% or such other level as may be specified by the Commission;

(c) Minimum dispatchable capacity over the contract period, taking into account capacity degradation (2.0% per annum as per CERC guidelines), and including provisions for degradation trajectory, monitoring, and augmentation or replacement of battery modules and/or PCS, as specified in the bidding documents;

(d) Grid-forming or Grid-supporting capability, where required by the procurer or the System Operator;

(e) minimum storage duration (for example, number of hours of discharge at rated power);

(f) time-of-day or peak-supply obligations, where applicable;

(g) minimum dispatch compliance requirements, including tolerance bands and penalties for non-compliance; and

(h) seasonal or time-of-day dispatch obligations, particularly where BESS is co-located with wind or solar projects, considering the variability of such resources.

9.10 Eligibility and Technical Requirements

9.10.1 Bidders shall meet the technical and financial eligibility criteria specified in the bidding documents, including, inter alia, minimum net worth and relevant experience in development or operation of power projects or energy storage systems.

9.10.2 The BESS and associated systems shall comply with:

(a) applicable standards and safety requirements specified by the Central Electricity Authority (CEA);

(b) applicable guidelines issued by the Ministry of Power;

(c) domestic content requirements under applicable schemes;

(d) Use of new battery cells;

(e) applicable provisions of the Grid Code and standards relating to grid connectivity and operation.

(f) where the BESS project is supported under the Viability Gap Funding (VGF) scheme, a minimum of twenty percent (20%) local content, including indigenously developed Energy Management System (EMS) application software, shall be maintained as per Ministry of Power guidelines issued from time to time.

9.10.3 Notwithstanding anything contained in these Regulations, bidders using lithium-ion cell technology under transfer-of-technology arrangements with entities from countries sharing a land border with India shall be exempt from DPIIT registration requirements for a period of one year from January 9, 2026, or as extended by the Ministry of Power, subject to compliance with all other eligibility criteria.

9.11 Indicative Procurement Timeline:

9.11.1 The indicative timeline for procurement of BESS through competitive bidding shall, subject to the provisions of the bidding documents and applicable guidelines, be as follows:

Step	Timeline	Key Elements
Issue of RfS/RfP	As per procurement plan	Capacity, performance requirements, and bidding conditions

Bid Submission	30–60 from issuance of Rfs/Rfp	Technical & financial bids
Bid Evaluation	As per bidding document	Technical qualification
Tariff Discovery	As per bidding process	Discovered tariff (including e-reverse auction, where applicable)
LoI Issuance	Post evaluation	Selectionand notification of successful bidder
Agreement Signing	Within 30 days of LoI	Applicable agreements (BESSA/BESPA/BESCA/PPA/connectivity and operational service agreement for generators / hybrid generators with BESS, as applicable)

These agreements shall incorporate the tariff structure and performance obligations specified in Part V, including SCCess, SECRess and norms under Regulation 12.2, as applicable.

9.11.2 The procurer may adopt a different procurement timeline where justified, in accordance with the applicable guidelines and subject to the overall timelines approved by the Commission, wherever required.

10.0 Contractual Framework:

10.1 For each BESS project or BESS-based service procured under these Regulations, the following agreements shall be executed, as applicable:

(a) Battery Energy Storage Service Agreement (BESSA);

(b) Battery Energy Storage Purchase Agreement (BESPA) or Power Purchase Agreement (PPA), as applicable;

(c) Connectivity Agreement for grid interconnection of the BESS (BESCA or other applicable connectivity agreement); and

(d) Separate power procurement agreement and operational service agreement for renewable energy or conventional generating stations co-located with BESS, as applicable.

10.2 The Transmission licensee, TNPGCL, Distribution licensees and other procuring entities shall prepare draft standard agreements under this Part within 60 days from the date of notification of these Regulations and submit the same to the Commission for approval prior to implementation.

10.3 The approved contracts and project-specific agreements shall, inter alia, specify:

(a) contracted capacity and contract period;

(b) performance guarantees and minimum availability requirements;

(c) metering, scheduling, dispatch and operational coordination procedures;

(d) tariff structure, payment terms and payment security mechanisms;

(e) provisions for liquidated damages and other remedies for non-performance;

(f) force majeure events and their treatment;

(g) change-in-law, taxation and regulatory changes;

(h) termination events and consequences of termination; and

(i) dispute resolution mechanisms.

PART V: TARIFF AND COST RECOVERY

11.0 Tariff Framework:

11.1 General Principles

11.1.1 Tariff for procurement of energy storage services from Battery Energy Storage Systems (BESS) by the Transmission Licensee, Distribution Licensee, TNPGCL or any other procurer under the jurisdiction of the Commission shall, as a general rule, be discovered through transparent tariff-based competitive bidding and adopted by the Commission under Section 63 of the Act, in accordance with

the Guidelines for Procurement and Utilisation of Battery Energy Storage Systems and other applicable guidelines issued by the Ministry of Power, Government of India, and these Regulations.

11.1.2 Where procurement of BESS or BESS-based services is undertaken through modes other than tariff-based competitive bidding, including self-ownership, developer-led procurement or any other method as may be approved by the Commission under Part IV of these Regulations, tariff for BESS shall be determined by the Commission under Section 62 of the Act, in accordance with Regulation 11.2, Regulation 12 and the applicable Tariff / MYT Regulations of the Commission.

11.2 Tariff Components under Section 62:

11.2.1 Where tariff for BESS is determined by the Commission under Section 62 of the Act, such tariff shall comprise the following components:

(a) Storage Capacity Charge (SCC_{ess}), expressed in INR/MW-month or INR/MW-day; and

(b) Storage Energy Charge Rate ($SECR_{ess}$), expressed in INR/kWh or INR/MWh, where applicable.

11.3 Storage Capacity Charge (SCC_{ess});

11.3.1 The Storage Capacity Charge payable for contract year n shall be computed as:

$$\mathbf{SCC\_ess(n) = (AFC\_ess) \times (n/12) \times (PAF\_ess(n)/NAPAF\_ess)}$$

subject to ceiling of

$$\mathbf{\{AFC\_ess \times n/12\} - \sum_{(i=1)}^{(n-1)} SCC\_ess(i)}$$

Where,

SCC_ess(n) = Storage Capacity Charges for the n^{th} month;

AFC_ess = Annual Fixed Cost of the BESS;

PAF_ess(n)= Plant Availability Factor achieved up to the end of the n^{th} month;

NAPAF_ess = Normative Annual Plant Availability Factor of the BESS.

11.4 Storage Energy Charge Rate (SECR_ess):

11.4.1 The Storage Energy Charge Rate (SECR_ess) shall recover the variable costs of operating the BESS, including the cost of energy used for charging and, where applicable;

The SECR_ess shall be computed as:

SECR_ess=[(Weighted Avearge ECR) / ((RTE)

Where,

RTE = Round-Trip Efficiency;

$$\textbf{Weighted Average ECR} = \frac{\sum(\mathbf{E_i} \times \mathbf{ECR_i})}{\sum \mathbf{E_i}}$$

Where,

E_i = Quantum of electrical energy charged into the BESS from source "i during the billing period, expressed in kWh.

ECR_i = Energy Charge Rate shall be determined based on the source of charging energy, as follows:

(a) Where the BESS is charged from an associated generating station whose tariff is determined or approved by the Commission, the ECR shall be equal to the applicable tariff of such generating station or the levelised energy charge as approved by the Commission;

(b) Where the BESS is charged from the allocated share of a generating station whose tariff is determined or approved by the Commission, and such generating station is not co-located with the BESS, the ECR shall be equal to the applicable tariff of such generating station corresponding to the allocated share, as approved by the Commission;

(c) Where the BESS is charged by procuring electricity from the open market or any other source, the ECR shall be equal to the discovered tariff, in Rs./kWh.,subject to approval of the Commission and shall not exceed the Average Power Purchase Cost (APPC) approved by the Commission for the relevant financial year, unless otherwise specifically approved;

(d) Where the BESS is charged through drawal of electricity from the grid during high-frequency conditions, the ECR shall be equal to the applicable Deviation Settlement Mechanism (DSM) rate, in INR./kWh, as directed by the State Load Dispatch Centre in accordance with applicable Grid Code and DSM Regulations.

(e) Auxiliary Energy Consumption (AEC) is not deducted in the SECR formula. AEC is governed exclusively under Regulation 18.10 as a performance compliance obligation.

11.4.2 Auxiliary Energy Consumption (AEC_ess) shall include consumption of internal auxiliaries of the BESS such as cooling and ventilation systems, Battery Management System (BMS), control, communication and fire protection systems, but shall exclude losses in the Power Conversion System (PCS) and grid-side transformers, which shall be dealt with separately under the applicable technical standards and energy accounting framework.

11.5 Allocation of costs and revenues and sharing of gains

11.5.1 Where a BESS is used to provide more than one service or serves more than one beneficiary, the Commission shall, at the time of tariff determination or approval of the procurement, specify the methodology for allocation of SCC_ess and SECR_ess among such services and beneficiaries, having regard to their respective contracted capacities, energy usage, call-off rights and benefits derived.

11.5.2 Any net gains realised by the Licensee or procurer from the sale of BESS-based services or energy in excess of the contracted quantities, or from market-based participation (including day-ahead, real-time and ancillary service markets), after adjusting for the incremental costs of providing such services, shall be treated as non-tariff income in the determination of Aggregate Revenue Requirement or the equivalent tariff filing for the concerned entity, and shall be shared between the Licensee and consumers or users in such proportion as the Commission may specify, guided by the principles for sharing of gains and losses under the applicable Tariff / MYT Regulations.

11.5.3 Any losses arising on account of merchant or market-based participation shall not be passed through to consumers unless the Commission, after prudence check and for reasons recorded in writing, considers such losses to have arisen from uncontrollable factors.

11.5.4 Nothing in this Regulation shall prevent the Commission from approving specific incentive or penalty mechanisms linked to performance of BESS (including availability, response time, efficiency and adherence to dispatch instructions), provided that such mechanisms are clearly defined in the relevant tariff order or procurement approval and are consistent with these Regulations and the applicable Tariff / MYT Regulations.

12.0 Cost Components and Normative Parameters:

12.1 Cost Components:

(a) Debt-Equity Ratio and Interest on Loan:

For the purpose of tariff determination, a normative debt–equity ratio of seventy to thirty (70:30) shall be considered. Provided that where the actual equity deployed exceeds thirty per cent (30%) of the capital cost, net of grant, subsidy and Viability Gap Funding (VGF), the excess equity shall be treated as normative loan for the purpose of tariff determination. The rate of interest on loan shall be considered equal to the one-year Marginal Cost of Funds based Lending Rate (MCLR) of the State Bank of India as applicable on the 1st April of the relevant financial year, unless otherwise specified by the Commission.

(b) Depreciation:

Depreciation shall be computed annually on a straight-line basis from the date of commercial operation of the BESS at a rate of 6.33per cent per annum of the capital cost of the BESS.

Provided that the unrecovered depreciation as on 31st March of the year closing after a period of 12 years from the date of operation of battery energy storage system shall be spread over the balance useful life of the battery energy storage system, subject to the condition that the total depreciation shall be limited to 90% of the capital cost of the BESS, and the salvage value at the end of the useful life shall be considered as 10% of the capital cost.

(c) Return on Equity: Return on equity for the BESS shall be computed at the base rate of 14.00 per cent per annum, or such other rate as may be specified by the Commission from time to time.

(d) Operation and Maintenance (O&M) Expenses:

Operation and maintenance expenses on account of BESS shall be 2.0 per cent of the admitted capital expenditure as on the date of commercial operation

(excluding land cost), which shall be escalated annually @ 5.25 per cent or such other rate as may be specified by the Commission. The escalation factor may be revised by the Commission at the beginning of each control period having regard to indices such as CPI and WPI and sector-specific O&M trends.

(e) Interest on Working Capital:

The working capital for BESS shall comprise:

(i) Receivables equivalent to forty-five (45) days of tariff, comprising fixed capacity charges and, where applicable, variable energy charges associated with the BESS;

(ii) Maintenance spares equal to ten per cent (10%) of operation and maintenance expenses;

In case of inconsistency between this sub-clause and the provisions relating to working capital in the applicable Tariff / MYT Regulations of the Commission for the concerned Licensee or generating company, the Commission may, for reasons to be recorded in writing, apply the provisions of such Tariff / MYT Regulations to BESS projects of that entity; and

(iii) Operation and maintenance expenses for one (1) month.

(1) The rate of interest on working capital shall be considered on a normative basis and shall be equal to the State Bank of India one-year MCLR plus two hundred and five (205) basis points as on the 1st April of the financial year for which the tariff is being determined.

(2) In case of inconsistency between this sub-clause and the provisions relating to working capital in the applicable Tariff / MYT Regulations of the Commission for the concerned Licensee or generating company, the Commission may, for reasons to be recorded in writing, apply the provisions of such Tariff / MYT Regulations to BESS projects of that entity.

12.2 Normative Parameters for standalone BESS:

12.2.1 Unless otherwise specified by the Commission for a particular project or control period, the following normative parameters shall be considered for tariff determination of standalone BESS under Section 62 of the Act and as guiding benchmarks for tariff-based competitive bidding under Section 63:

(a) Useful life period : fifteen (15) years;

(b) Round-trip Efficiency (RTE) : eighty-five per cent (85%);

(c) Normative Annual Plant Availability Factor (NAPAF_ess) : ninety-five per cent (95%);

(d) Annual degradation of usable BESS capacity: two per cent (2%) per annum;

(e) Normative Auxiliary Energy Consumption (AEC) limit: 5% of charging energy on a rolling monthly average basis. Exceeding this limit attracts penalties under Regulation 18.10. This is a technical performance norm and shall not be used as a deduction in tariff calculation.

(f) The normative parameters specified in this Regulation are minimum benchmarks for the purpose of tariff determination under Section 62 of the Act and shall be used as reference in the design of tariff-based competitive bidding documents under Section 63.

(g) Where the performance standards specified in the bidding documents or contractual agreements are more stringent than the normative values specified above, the higher standards shall apply for the purpose of performance monitoring and liquidated damages, but the tariff shall continue to be determined with reference to the normative values, unless otherwise approved by the Commission.

Provided that the Commission may, for reasons to be recorded in writing, approve project-specific deviation from the normative parameters specified under

this Regulation, considering the technology characteristics, climatic conditions, operating profile, manufacturer performance warranties, design configuration and applicable technical standards or guidelines.

12.3 Discount Factor: Discount Factor for a given year (t) shall mean the factor used to convert future cash flows into their present value and shall be computed as follows:

$$\text{Discount Factor}_t = 1 / (1+r)^t$$

where:

r = discount rate (expressed as a decimal), as specified or approved by theCommission;

t = year index (t = 0, 1, 2, …), with t = 0 representing the base year.

13.0 Tariff for BESS Co-located with Solar Power Projects;

13.1 In case of Solar Power Projects co-located with Battery Energy Storage Systems (Solar-BESS), the tariff may be adopted either as:

(i) a composite tariff (INR/kWh) for firm and dispatchable energy supplied in accordance with the contracted schedule; or

(ii) separate tariffs for the solar generation component and the BESS component.

13.2 Where a composite tariff is adopted, payment shall be made only for energy delivered in accordance with the scheduled dispatch profile within the contracted capacity, including compliance with storage obligations as specified in the bidding documents and the Power Purchase Agreement (PPA) and shall be consistent with the contractual framework specified in Regulations 9.7, 9.8 and 10.1–10.3.

13.3 Where separate tariffs are adopted:

(a) Solar energy shall be paid at the tariff discovered through competitive bidding under Section 63 of the Electricity Act, 2003 and adopted by the Commission in accordance with Regulations 9.1 and 11.1.

(b) BESS shall be compensated through capacity charges and/or energy charges as determined under these Regulations.

Provided that in the event of non-availability of BESS due to outage, maintenance, degradation, battery replacement, etc., any energy injected into the grid without utilization of BESS, where required under the contract, shall not be eligible for composite tariff and shall be compensated in accordance with the applicable provisions of these Regulations as follows;

(i) the composite tariff applicable shall not be payable for the period of such non-availability;

(ii) the energy exported from the solar energy in the Grid shall be compensated at lower of the following limited to the contracted capacity:

(a) the latest tariff discovered for solar energy through tariff-based competitive bidding under Section 63 of the Electricity Act, 2003; or

(b) the weighted average tariff discovered during the relevant Financial Year through competitive bidding conducted by Central or State agencies, or

(c) the weighted average Area Clearing price of the GDAM Markets,

whichever is lower.

Provided that such tariff shall apply only within the permitted monthly CUF trajectory for the relevant period without exceeding the contracted capacity, as specified in the bidding documents and approved by the Commission. If the bidding documents or the applicable Power Purchase Agreement specify a fallback tariff or compensation mechanism for non-availability of BESS or non-compliance with storage-backed supply obligations, such tariff or compensation mechanism, as approved or adopted by the Commission, shall apply.

13.4 For the purpose of this sub-clause, the weighted average Area Clearing Price shall be computed for the relevant delivery period in the Green Day-Ahead Market, and such compensation shall not be treated as a benchmark for future procurement of solar or wind power.

13.5 The bidding documents shall specify minimum operational and performance parameters as provided under Regulation 9.9 of these Regulations.

14.0 Tariff for BESS Co-located with Wind Power Projects;

14.1 In case of Wind Power Projects co-located with Battery Energy StorageSystems (Wind-BESS), the tariff may be adopted either as:

(a) a composite tariff (INR/kWh) for firm and dispatchable energy supplied in accordance with the contracted schedule; or

(b) separate tariffs for the wind generation component and BESS component.

14.2 Where a composite tariff is adopted:

(a) payment shall be made only for energy delivered in accordance with the scheduled dispatch profile;

(b) variability of wind generation shall be managed through BESS to meet contractual obligations specified in the bidding documents and PPA.

Provided that any unscheduled or non-firm wind energy shall not be eligible for composite tariff and shall be compensated at applicable fallback tariff as specified in the bidding documents and approved by the Commission.

14.3 Where separate tariffs are adopted:

(a) wind energy shall be paid at the tariff discovered through competitive bidding in accordance with Section 63 of the Electricity Act 2003and adopted by the Commission; and

(b) BESS shall be compensated through Storage Capacity Charge (SCCess) and/or Storage Energy Charge Rate (SECRess) determined or adopted in accordance with Regulations 11.2 to 11.4

14.4 In the event of non-availability of BESS due to outage, maintenance, degradation, battery replacement, etc., tariff shall be payable as under:

(a) the latest tariff discovered for wind energy through tariff-based competitive bidding under Section 63 of the Electricity Act, 2003; or
(b) the weighted average tariff discovered during the relevant Financial Year through competitive bidding conducted by Central or State agencies, or
(c) the weighted average Area Clearing price of the GDAM Markets, whichever is lower.

Provided that where the bidding documents or the applicable Power Purchase Agreement specify a fallback tariff or compensation mechanism for non-availability of BESS or non-compliance with storage-backed supply obligations, such tariff or compensation mechanism, as approved or adopted by the Commission, shall apply.

14.5 The bidding documents for Wind–BESS projects shall specify minimum operational and performance parameters as provided under Regulation 9.9 of these Regulations.

15.0 Tariff for BESS co-located with Conventional Generators;

15.1 Applicability to New and Existing Projects;

(a) Existing conventional generating stations may establish BESS, subject to approval of the Commission;

(b) New conventional generating stations may be planned with BESS, and the tariff may be discovered under Section 63 or determined under Section 62, as the case may be.

15.2 Existing conventional generating stations co-locating the BESS:

The tariff for the combined generating station and the BESS shall be determined separately, unless a composite tariff is expressly permitted under these Regulations or specified in the bidding documents.

15.3 Tariff Structure:

15.3.1 The tariff for such projects may be determined under any of the following structures:

(a) Separate Tariff Model (Preferred):

(i) Generation tariff for the conventional generating station shall be determined separately or adopted, as the case may be, in accordance with the applicable Regulations;

(ii) BESS shall be compensated through additional capacity charges (Rs./MW/month), linked to Plant availability factor, and/or additional energy charges (Rs./kWh), based on energy discharged and scheduled dispatch, in accordance with the methodology specified in Regulation 11.3 of these Regulations.

(b) Composite Tariff Model:

15.3.2 A single composite tariff (INR./kWh) may be adopted for supply of firm and dispatchable power, subject to compliance with storage obligations as specified in the bidding documents and approved by the Commission.

Provided that the bidder or generating company shall separately indicate the weighted cost composition attributable to storage capacity-related cost components and storage energy-related cost components forming part of the composite tariff.

15.3.3 The Commission may, at the time of tariff adoption, examine the reasonableness of such weighted cost composition with reference to cost-plus principles, prevailing market benchmarks, charging energy arrangements, operational characteristics of the BESS, storage duration, cycling profile, dispatch obligations and such other factors as may be considered appropriate in the interest of consumers and grid efficiency.

15.4 Payment Principles;

(a) Payment for BESS shall be linked to:

(i) availability of the contracted storage capacity; and

(ii) scheduled discharge of energy as per dispatch instructions.

(b) No payment under BESS tariff shall be admissible for energy supplied directly from the conventional generating station without utilization of storage, where storage-backed supply is contracted.

(c) The capital cost, interest on loan, depreciation, operation and maintenance expenses, return on equity and interest on working capital pertaining to BESS shall not be recovered through the tariff of the conventional generating station, unless specifically approved by the Commission.

(d) The generator is required to maintain separate accounting for energy supplied through conventional generation and storage components.

15.5 Energy Accounting

Energy accounting shall be carried out as follows:

(a) Energy generated by the conventional generating station shall be accounted separately in accordance with applicable tariff Regulations;

(b) Energy used for charging the BESS shall be treated as consumption or auxiliary usage, as specified in the applicable framework;

(c) Energy discharged from the BESS shall be treated as a separate injection into the grid.

15.6 Non-Availability of BESS

(a) In the event of non-availability of BESS, the composite tariff, where applicable, shall not be payable;

(b) Energy supplied by the conventional generating station shall be compensated only at the applicable generation tariff or as per market-linked rates specified in the bidding documents.

16.0 Recovery of Charges for Licensee owned BESS:

16.1 In case of implementation of BESS projects by the Transmission Licensee or Distribution Licensee, the fixed charges corresponding to such BESS implementation and any additional energy charges, if applicable, shall be included as part of the Annual Revenue Requirement (ARR) or equivalent tariff filing of the respective Licensee or System Operator.

16.2 The concerned Licensee shall file a Petition before the Commission for approval of the capital cost and tariff for such BESS and for recovery of the associated charges, in accordance with the Commission's applicable Tariff / MYT Regulations and these Regulations.

16.3 The Commission may permit recovery of these charges either:

(a) as part of existing transmission or wheeling charges or consumer tariffs, as the case may be; or

(b) through a separate charge or surcharge, including but not limited to a dedicated BESS charge,

as it may consider appropriate, having regard to the impact on different consumer categories and the benefits derived from the BESS.

17.0 Third-Party Commercial Agreements and Settlement:

17.1 Third-Party Commercial Agreements

17.1.1 Qualified Coordinating Agencies (QCAs), Ancillary Service Providers, merchant BESS operators and other eligible entities may enter into commercial agreements with Licensees, the System Operator or other market participants for provision of BESS-based services, including but not limited to energy shifting, ancillary services, peak shaving and congestion management.

17.1.2 Such agreements shall:

(a) comply with these Regulations, the Tamil Nadu Electricity Grid Code, the applicable Open Access Regulations, and the relevant CERC and TNERC regulations governing power markets, ancillary services and deviation settlement; and

(b) clearly specify the technical performance obligations, metering and communication requirements, scheduling and dispatch protocols, financial settlement arrangements and dispute-resolution mechanisms.

17.1.3 The parties shall place such agreements before the Commission for information or approval, as may be specified by the Commission by general or specific order. The Commission may, where it considers necessary, require modifications to such agreements to ensure consistency with the Act, these Regulations and consumer interest.

17.2 Settlement and timelines

17.2.1 Unless otherwise specified by the Commission or in the relevant power-market regulations, charges and revenues in respect of ancillary services and energy trading under such agreements shall be settled on a monthly basis.

17.2.2 Settlement statements shall be issued within five (5) days of the end of each month, and payments shall be made by the Licensee, System Operator or other obligated party within thirty (30) days from the date of issuance of the settlement statement, unless a different timeline is approved by the Commission.

17.2.3 Delayed payments shall attract a late payment surcharge at the rate specified under the applicable Regulations or as approved by the Commission, and such surcharge shall not be passed through in tariff unless specifically allowed by the Commission after prudence check.

PART VI: TECHNICAL STANDARDS

18.0 Technical Standards Specifications

The minimum project sizes applicable to grid-connected Battery Energy Storage Systems shall be as specified in Regulation 8.2 of these Regulations, and all BESS installations permitted thereunder, including sub-MW projects, shall comply with the technical, safety, metering and connectivity standards set out in this Part.

18.1 Applicable Standards

18.1.1 BESS installations under these Regulations shall conform to the technical and safety standards prescribed by the Central Electricity Authority (CEA), including, as applicable, the CEA (Measures relating to Safety and Electric Supply) Regulations, the CEA (Technical Standards for Connectivity to the Grid) Regulations, the CEA (Installation and Operation of Meters) Regulations, 2006, as amended from time to time, the Indian Electricity Grid Code (IEGC), the Tamil Nadu Electricity Grid Code, the relevant Bureau of Indian Standards (including IS

16270:2023 and any successor standards), guidelines issued by the Ministry of New and Renewable Energy (MNRE), and all other Regulations and Orders of the Commission that are relevant to BESS.

18.1.2 All BESS installations connected at voltages exceeding 650 V shall, in addition, comply with BESS-specific safety requirements notified by the CEA under Section 73 of the Act, including provisions relating to two-fault tolerance of the Power Conversion System (PCS), unattended operation, enclosure design, explosion and fire protection, ventilation, ingress protection and minimum spatial separation, as amended from time to time.

18.1.3 In case of any inconsistency between applicable technical standards, the technical standards specified by the CEA under the Act shall prevail in respect of design, safety and connectivity of BESS installations, subject to the provisions of the Act. For matters not covered by such CEA standards, the provisions of these Regulations, other Regulations and Orders of the Commission and the Tamil Nadu Electricity Grid Code shall apply.

18.2 Minimum Performance Specifications

The minimum performance specifications set out in this Regulation shall apply to all grid-connected BESS installations covered under these Regulations, unless the Commission specifies different norms for particular applications or pilot projects, for reasons to be recorded in writing.

18.3 Power Conversion System (PCS) Requirements

The Power Conversion System (PCS) shall be compatible with the battery chemistry employed and shall support automatic, unattended operation with built-in protective, diagnostic and safe shutdown features, in accordance with the applicable CEA BESS safety and connectivity standards.

18.4 Power and Energy Rating

(a) Every grid-connected BESS installation shall, unless otherwise provided in this Regulation or in specific schemes approved by the Commission, have a minimum rated power capacity of 125 kW.

(b) For utility-scale applications, including but not limited to Resource Adequacy, ancillary services and transmission-level congestion management, the minimum sizes to be adopted for BESS projects shall be specified in the relevant schemes or bidding documents issued by the concerned procuring entities, consistent with these Regulations and any general or specific Orders of the Commission, and having regard to technical feasibility and cost-effectiveness.

(c) For specialised applications, including feeder-level solarisation, agricultural demand management and distributed generation with BESS at distribution or feeder level, and for BESS deployed under the PM-KUSUM Scheme or any successor scheme, the minimum sizes may be lower or different from those specified in sub-clause (a), as may be provided in the applicable scheme guidelines or Orders of the Commission, subject to compliance with the technical and safety standards specified in Regulation 18.1 and other applicable Regulations.

18.5 Efficiency Requirements

(a) The round-trip AC-to-AC efficiency of the BESS shall not be less than eighty-five percent (85%) on a monthly average basis.

(b) The DC-AC inverter efficiency shall not be less than ninety-seven percent (97%), and where a DC-DC converter is employed, its efficiency shall not be less than ninety-eight percent (98%).

(c) These minimum efficiency requirements shall be verified through performance tests conducted in accordance with these Regulations, the applicable contractual arrangements and relevant BIS/IEC test protocols.

18.6 System Availability

The BESS shall maintain a minimum annual system availability of ninety-five percent (95%) during the contracted period, excluding planned maintenance outages that have been notified and approved in advance by the System operator or the concerned Licensee, as applicable, in accordance with the Tamil Nadu Electricity Grid Code and contractual provisions.

18.7 Response Characteristics

(a) The BESS shall be capable of providing, where contracted for such services:

(i) Primary Reserve Ancillary Service (PRAS);
(ii) Secondary Reserve Ancillary Service (SRAS); and
(iii) Tertiary Reserve Ancillary Service (TRAS).

(b) Response times and ramp rates for provision of PRAS, SRAS and TRAS shall be consistent with the applicable CERC Ancillary Services and Power Market Regulations and the Commission's Regulations, as specified in Regulation 22.1 of these Regulations.

(c) The BESS shall be capable of sustaining contracted power delivery for the agreed storage duration, typically not less than two (2) hours at rated power, or such duration as specified in the applicable contract or procurement document.

18.8 C-Rate

For responsive grid-support services, the BESS shall maintain a C-rate commensurate with the contracted storage duration and operating mode. As a general guideline:

(a) for four-hour storage applications, the BESS shall be designed for a minimum C-rate of 0.25; and

(b) for fast frequency response and high-ramp applications, a higher C-rate of 0.5 or above may be required, as specified in the bidding documents, contract or operational requirements.

18.9 Cycle Life

(a) The battery system shall be capable of achieving a minimum of five thousand (5,000) complete charge-discharge cycles at a depth of discharge (DoD) of eighty percent (80%), while maintaining not less than eighty percent (80%) of the rated capacity at the end of the cycle life period, under specified operating conditions as per the manufacturer's datasheet or agreed test protocol.

(b) In addition, the BESS shall, at a minimum, retain not less than ninety percent (90%) of rated output at the end of five (5) years and eighty percent (80%) at the end of ten (10) years of commercial operation, or such other performance benchmarks as may be specified by the CEA from time to time.

18.10 Auxiliary Energy Consumption (AEC):

(1) Definition

Auxiliary Energy Consumption (AEC) shall mean the percentage of input charging energy consumed by BESS auxiliary systems, including thermal management systems (HVAC and cooling), battery management systems (BMS), power conditioning and control systems, fire protection systems, lighting and communication systems required for safe and reliable operation, excluding losses in the Power Conversion System (PCS) and grid-side transformers, unless otherwise specified by the Commission, measured at the dedicated auxiliary billing meter.

(2) AEC Metering

AEC shall be metered separately for all grid-connected BESS installations. The metering point for each BESS category shall be as specified in sub-regulation (3)(ii). The metering shall comply with the CEA (Installation and Operation of Meters) Regulations and applicable TNERC Regulations.

(3) Parasitic Cap Rule – Auxiliary Energy Consumption Limit

(i) The BESS shall maintain AEC at or below five percent (5%) of total charging energy, calculated on a rolling monthly average basis.

(ii) The metering point for each BESS category shall be as follows:

S.No.	BESS Category	AEC Metering Point
1	Standalone BESS (grid-connected)	DC side of Power Conversion System (PCS)
2	Co-located RE-BESS (DC coupled)	DC side of PCS (battery side)
3	Co-located RE-BESS (AC coupled)	Dedicated BESS auxiliary meter (LT side of BESS transformer)
4	Co-located with thermal generating station	Dedicated BESS auxiliary meter (separate from station auxiliaries)
5	Embedded in transmission substation	Dedicated BESS auxiliary meter (separate from substation auxiliaries)
6	Embedded in distribution network	Dedicated BESS auxiliary meter (separate from distribution auxiliaries)
7	Behind-the-Meter (BTM) BESS	Not mandatory (optional for systems >10 kW) – performance monitoring only

(iii) The BESS operator shall submit monthly AEC reports to the System Operator and the concerned Licensee within seven (7) days of the end of each month.

(iv) Consequences of Exceeding the Cap:

Excess AEC (above 5%)	Penalty / Consequence
Up to 1 percentage point (5%–6%)	Warning notice; cure period of 30 days
1–2 percentage points (6%–7%)	For every 1 kWh of excess AEC, 1 kWh of "green charging" credit is forfeited (if applicable); financial penalty of ₹0.50 per excess kWh
Above 2 percentage points (>7%)	System Operator may restrict dispatch or require demonstration of corrective action; penalty of ₹1.00 per excess kWh; repeat violations may attract suspension of green credit eligibility for up to 3 months

The penalties specified in this table shall not apply to Behind-the-Meter (BTM) BESS, which are subject only to performance monitoring under Regulation 18.10(3)(ii).

(v) Explanation:

(a) The Parasitic Cap Rule is a performance compliance obligation, not a tariff adjustment mechanism.

(b) The Storage Energy Charge Rate (SECR_ess) under Regulation 11.4.1 shall not include any deduction for AEC. AEC is deemed to be embedded within the measured Round-Trip Efficiency (RTE) at the interconnection point.

(c) No separate charge or tariff for AEC shall be levied by the Licensee, unless explicitly approved by the Commission for a specific project or category.

(d) For co-located BESS categories listed at serial numbers 4, 5, and 6 in sub-regulation (3)(ii), the BESS owner shall install a dedicated auxiliary energy meter. Shared auxiliary consumption shall not be allocated to BESS unless a specific allocation methodology is approved by the Commission.

(e) The penalty amounts specified in sub-regulation (3)(iv) may be revised by the Commission from time to time by separate order.

18.11 Performance Obligations Testing:

(1) The Initial Performance Test and all Periodic Performance Tests shall be conducted at set-points not exceeding the Contracted Power Capacity (MW) and the Contracted Energy Capacity (MWh), as defined in the applicable agreement.

(2) The Performance Tests shall verify, at a minimum:

(a) rated discharge capacity at the Contracted MW for the duration corresponding to Contracted MWh;

(b) rated charge capacity at the Contracted MW;

(c) round-trip efficiency (AC-to-AC) at specified operating points;

(d) response time and ramp rate as per the Grid Code and applicable Ancillary Services Regulations or procedures; and

(e) availability at ambient conditions specified in the BESS Power Purchase Agreement or Battery Energy Storage Service Agreement.

(3) The BESS shall be deemed to have failed the Performance Test if it cannot continuously deliver or absorb the Contracted Capacity for the guaranteed duration at the specified ambient temperature and cycling conditions.

(4) The consequences of failure of any Performance Test, including but not limited to liquidated damages, reduction in capacity payment, revision of contracted capacity or termination, shall be as specified in the applicable BESS Power Purchase Agreement, Battery Energy Storage Service Agreement or other contract, and shall be consistent with these Regulations and Orders of the Commission.

(5) Developers shall submit type-test and routine-test certificates for the PCS, battery modules, containers and protection systems from accredited laboratories or certification bodies recognised under applicable CEA/BIS/MNRE frameworks, in accordance with procedures specified by the Commission or the System Operator.

18.12 Grid Compliance

(a) Harmonic Control

(1) The Total Harmonic Distortion (THD) of voltage and current at the Point of Interconnection shall comply with the limits stipulated in the CEA (Technical Standards for Connectivity to the Grid) Regulations, relevant IEEE standards and the Tamil Nadu Electricity Grid Code, as amended from time to time.

(2) The BESS shall incorporate appropriate filtering and control strategies to minimise harmonic injection into the grid.

(3) In the event of non-compliance by the BESS, the penalties specified under Regulation 4(iv) of the Tamil Nadu Electricity Supply Code shall be applicable.

(b) Reactive Power Capability and Support

(i) Scope and Applicability

(1) The provisions under this clause shall apply to all Battery Energy Storage Systems (BESS) connected or seeking connection to the grid in the State of Tamil Nadu, whether:

(a) co-located with renewable energy generating stations; or

(b) developed as standalone grid-connected BESS; or

(c) providing services under Power Purchase Agreements, Energy Storage Service Agreements or any other commercial arrangement.

(2) These provisions shall be read in conjunction with the CEA (Technical Standards for Connectivity to the Grid) Regulations, the Indian Electricity Grid Code (IEGC) and the Tamil Nadu Electricity Grid Code, as amended from time to time.

(ii) Technical Requirements

(1) In view of the technical standards specified by the Central Electricity Authority for inverter-based resources, including BESS, all grid-connected BESS shall provide reactive power support and voltage control within their technical capability as an inherent grid-support obligation and, in particular:

(a) the Power Conversion System (PCS) of the BESS shall be capable of operating within a power factor range of 0.95 lagging to 0.95 leading at the Point of Interconnection during the entire charging and discharging period;

(b) the BESS shall possess reactive power capability of not less than thirty-three per cent (33%) of its installed MW capacity, as applicable to inverter-based resources under CEA connectivity standards;

(c) the PCS shall be equipped with automatic voltage regulation functionality and associated control systems so as to maintain voltage at the Point of Interconnection within the limits specified in the Grid Code or as instructed by the State Load Despatch Centre (System Operator); and

(d) the reactive power response shall be dynamic and shall operate during normal operation as well as during low-voltage and high-voltage ride-through conditions, as may be applicable.

(2) The BESS Developer shall, at the time of commissioning, demonstrate compliance with the above requirements to the System Operator and the

transmission or distribution licensee, as the case may be, through appropriate tests and submission of reactive capability curves, as may be specified in the Connectivity Agreement and procedures approved by the Commission.

(c) Obligation to Provide Reactive Power Support

(1) Every BESS shall:

(a) provide reactive power support, to the extent technically feasible, in charging mode, discharging mode and idle / standby mode, as required for grid security and voltage regulation; and

(b) respond to automatic voltage control signals and other grid support signals, where such functionality has been enabled, in accordance with the instructions of the System Operator and the provisions of the Grid Code.

(2) The System Operator shall have the authority to issue operational instructions to BESS for provision of reactive power support for voltage regulation, grid security, contingency management and system balancing, in accordance with the Grid Code.

(3) The reactive power capability and voltage control obligations under this Regulation are technical pre-conditions for connectivity under the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2007, for inverter-based resources including BESS.

(4) No separate payment shall be admissible for:

(a) maintaining power factor within 0.95 lagging to 0.95 leading at the Point of Interconnection; and

(b) reactive power support and voltage regulation in charging, discharging or idle mode, within technical limits as specified in this Regulation and the applicable Grid Code, and subject to any reactive power compensation schemes or pricing mechanisms notified by the Commission under the Grid Code.

(5) Where a BESS having connectivity with co-located renewable energy generation persistently absorbs reactive power from the grid beyond reasonable auxiliary and conversion requirements, thereby imposing a burden on the grid, the System Operator or the licensee may levy charges or penalties for such excessive reactive power absorption, in accordance with the Grid Code or any specific order of the Commission.

(d) Reactive Power Beyond Standard Capability

(1) Where the System Operator or a licensee requires reactive power support beyond the standard technical capability specified in this Regulation, necessitating additional reactive power equipment or augmentation of Power Conversion System (PCS) capacity specifically for reactive power, such requirement shall be treated as an ancillary service and shall be subject to separate commercial arrangements, as may be approved by the Commission.

(e) Voltage and Frequency Compliance; GFM/AGC/Black-start for Larger BESS

(1) The BESS shall operate within the voltage and frequency bands specified in the Indian Electricity Grid Code (IEGC) and the Tamil Nadu Electricity Grid Code, as amended from time to time. The BESS shall possess voltage and frequency ride-through capability in accordance with the CEA (Technical Standards for Connectivity to the Grid) Regulations and applicable Grid Code provisions, and

shall provide frequency support during system frequency deviations as required by the System Operator.

(2) For BESS projects with installed capacity equal to or exceeding 25 MW (as specified in Regulation 8.3.1), the PCS shall:

(i) support grid-forming operation with virtual inertia and system strength contribution, as specified by the CEA and the Grid Code;

(ii) be compatible with Automatic Generation Control (AGC) signals issued by the System Operator, where Secondary Reserve Ancillary Service participation is envisaged; and

(iii) provide black-start capability where required by the System Operator and specified in the applicable contract or procedures, in alignment with CEA and CERC requirements for large-scale BESS.

(f) State-of-Charge (SoC) Management and Charge / Discharge Control

(1) SoC control logic, charge and discharge limits and operational philosophy for BESS shall be declared in advance by the Developer or Operator in the Connectivity Agreement and relevant operational documents.

(2) During low-voltage or contingency events, BESS operating in charging mode shall not draw power from the grid, and shall operate in accordance with instructions issued by the System Operator. The Energy Management System (EMS) shall restrict power injection to the approved capacity and shall follow System Operator scheduling and dispatch instructions. Subject to the above, BESS may be charged from the grid during off-peak or non-solar hours, where permitted under applicable connectivity and scheduling procedures and in accordance with System Operator instructions.

(g) DC Component Injection

The DC component injected at the point of connection shall not exceed 0.5 per cent of the RMS value of the AC current, in accordance with applicable standards, so as to ensure waveform quality and grid stability.

(h) LVRT / HVRT Compliance

(1) All inverter-based renewable energy generating stations with BESS shall mandatorily comply with Low Voltage Ride Through (LVRT) and High Voltage Ride Through (HVRT) requirements as per the CEA (Technical Standards for Connectivity to the Grid) Regulations, 2013 and subsequent amendments.

(2) LVRT / HVRT compliance certificates issued by an approved testing laboratory or certification agency shall be submitted to the System Operator prior to the declaration of the Commercial Operation Date (COD).

(i) Load Flow Studies as Pre-condition for Grid Connectivity

(1) For all renewable energy projects having BESS with a capacity of two megawatts (2 MW) and above for 11 kV feeders and four megawatts (4 MW) and above for 22 kV and higher voltage level feeders, a Load Flow Study by a CEIG-approved agency shall be submitted to the concerned Licensee. The study shall demonstrate that there is no thermal overloading under simultaneous full-output operation of wind, solar and BESS, and that the voltage profile remains within ±5 per cent at all buses.

(2) The study shall, at a minimum, include steady-state load flow and short-circuit level assessment and, for projects of capacity ten (10) MW and above or as specified by the Commission, dynamic simulations to assess voltage

and frequency behaviour and ride-through capability in accordance with CEA Technical Standards for Connectivity to the Grid and applicable Grid Code provisions.

(3) Grid connectivity shall not be granted, and commercial operation for tariff purposes shall not commence, until the Licensee has accepted the Load Flow Study and associated system studies and confirmed that the proposed connection complies with system planning and security criteria.

19.0 Operational Obligations and Performance Requirements for RE-BESS Projects

19.1 Operation and Utilisation of BESS

(1) BESS shall be operated in accordance with applicable Grid Code provisions, including scheduling, dispatch and energy accounting, under the directions of the System Operator.

(2) BESS may be utilised for ancillary services, balancing services and flexible grid operations, including frequency control, voltage support and congestion management, as determined by the System Operator in accordance with applicable regulations and procedures.

19.2 Minimum Capacity Utilisation Factor for RE-BESS Projects

(1) Every Solar–BESS and Wind–BESS project shall maintain the Annual Capacity Utilisation Factor (CUF) specified in the applicable Power Purchase Agreement or Battery Energy Storage Service Agreement.

(2) In the event that the Developer fails to achieve the prescribed Annual CUF for any operational year, the Developer shall be liable to pay liquidated damages as specified in the applicable agreement.

(3) The Developer shall, at least one (1) month prior to the commencement of each financial year, submit to the Procurer a month-wise CUF trajectory. The aggregate of the monthly CUF values shall not exceed the Annual CUF specified in the Power Purchase Agreement.

19.3 Minimum Peak Energy Supply Obligation:

(1) The BESS associated with a RE-BESS Project shall discharge energy during peak hours designated by the State Load Despatch Centre.

(2) The Developer shall ensure that not less than ninety-five percent (95%) of the contracted peak energy obligation is supplied during such peak hours in each settlement period, subject to force majeure and system-related constraints as specified in the applicable agreement.

(3) Failure to meet the minimum peak energy obligation in any month shall attract liquidated damages as specified in the Power Purchase Agreement or Battery Energy Storage Service Agreement.

19.4 Round-Trip Efficiency Requirement:

(1) The BESS shall maintain a minimum round-trip efficiency of eighty-five percent (85%) on a monthly basis, measured on an AC-to-AC basis in accordance with the metering and testing procedures approved by the Commission and the System Operator.

(2) In the event that the round-trip efficiency falls below the prescribed level, liquidated damages or other contractual remedies shall be applied in accordance with the methodology provided in the Power Purchase Agreement or Battery Energy Storage Service Agreement, as approved by the Commission.

19.5 Battery Replacement and Degradation Management:

(1) The Developer shall submit a Battery Replacement and Augmentation Plan prior to the Commercial Operation Date (COD). The plan shall include, at a minimum:

(a) expected battery life cycle;

(b) degradation trajectory;

(c) battery replacement or augmentation schedule; and

(d) performance warranty obligations.

(2) Any battery replacement or augmentation undertaken during the project life shall ensure that the BESS continues to meet the contracted storage capacity and performance obligations specified in these Regulations and in the applicable contractual documents.

(3) Degradation monitoring, augmentation and cost recovery shall also be governed by the provisions of Part V of these Regulations, including any specific orders of the Commission relating to additional capitalisation and tariff adjustments.

19.6 Renewable Energy Character in Charging

(1) Renewable Energy utilised for charging BESS shall retain its Renewable Energy character upon discharge, subject to compliance with applicable CEA, MNRE and Commission guidelines. Obligated entities or designated consumers shall be eligible for Renewable Purchase Obligation (RPO) or Renewable Consumption Obligation (RCO) benefits in respect of such energy, subject to verification and applicable Regulations.

(2) Renewable Energy Certificates (REC) may be generated for energy stored and discharged from BESS as permitted under prevailing Regulations. Energy charged from non-renewable sources shall not be eligible for Renewable Energy benefits.

(3) The BESS operator's claim for Renewable Energy Certificates (REC) or RPO benefits shall be adjusted downward by the quantum of excess AEC beyond the

5% cap, as determined under Regulation 18.10. The System Operator or QCA shall verify AEC compliance before certifying any green credit claim.

19.7 Energy Accounting for RE Charging

The BESS operator shall maintain monthly records specifying:

(a) total energy injected into the BESS;

(b) the source of charging energy, distinguishing between renewable and conventional sources;

(c) total energy discharged to the grid as per System Operator instructions; and

(d) calculations supporting any RPO or RCO claims, which shall be furnished to System Operator and the concerned Licensee as required.

PART VII: SYSTEM OPERATION AND DSM:

20.0 Scheduling and Dispatch Procedures

20.1 Forecasting Requirements

20.1.1 Every grid-connected BESS installation of such capacity as may be specified by the Commission, including BESS associated with renewable energy projects and standalone BESS participating in scheduling and dispatch, shall submit a day-ahead forecast of available capacity in megawatts (MW) and projected State-of-Charge (SoC) in percentage terms to the System Operator by 06:00 hours on the day preceding the delivery day (D-1).

20.1.2 The forecast shall cover the entire twenty-four (24)-hour period of the delivery day and shall take into account maintenance schedules, anticipated system conditions, and any constraints declared by the BESS operator, the concerned Licensee or the System Operator.

20.1.3 The target forecast accuracy shall be within plus or minus ten percent (±10%) of forecasted available capacity, subject to revisions permitted by the SLDC in accordance with applicable procedures. Persistent forecast errors exceeding twenty percent (20%) deviation on a sustained basis may attract financial disincentives, enhanced reserve requirements or restrictions on future participation in certain services, in accordance with Orders of the Commission or detailed procedures notified by the System Operator, except in cases of force majeure events.

20.1.4 The SLDC shall issue day-ahead charging and discharging schedules to BESS operators by 18:00 hours on (D-1) for the delivery day. The schedule shall specify the designated time-blocks for charging and discharging, target power in MW, and ramp-rate requirements, consistent with the Grid Code and applicable scheduling procedures.

20.1.5 The System Operator may revise dispatch schedules on an intra-day basis, having regard to actual system conditions, variations in renewable generation, demand patterns and system security considerations, in accordance with the Grid Code and applicable Regulations.

20.1.6 In the event of emergency frequency deviations, contingency events or grid disturbances, the System Operator may issue revised instructions with a minimum advance notice of fifteen (15) to thirty (30) minutes, or such shorter notice as may be necessary in an emergency, and BESS operators shall comply with such instructions, subject to technical feasibility and safety requirements.

20.2 Charging and Discharging Coordination

20.2.1 For Licensee-owned BESS, charging shall be scheduled from the Licensee's power portfolio, identified generators or market procurement sources, in coordination with the System Operator, with the objective of optimising system

operation and minimising overall power procurement cost, while meeting reliability and security requirements.

20.2.2 For developer-owned BESS, charging may occur through market purchases, bilateral contracts, captive or co-located renewable energy generation, or such other sources as permitted under applicable Regulations and contracts, subject to scheduling and dispatch instructions of the System Operator.

20.2.3 Charging shall ordinarily be scheduled during off-peak hours or during periods of high renewable generation, unless otherwise directed by the System Operator. Charging during peak demand periods may be restricted or re-scheduled in the interest of grid stability and system security.

20.2.4 All scheduling and despatch of BESS shall be subject to the provisions of the Commission's Deviation Settlement Mechanism Regulations and applicable CERC regulations in respect of inter-State transactions, and BESS operators shall be responsible for deviations attributable to them, to the extent provided in such Regulations and relevant contracts.

20.3 Charging Framework

(1) Charging Options

(a) Licensee-owned BESS may be charged from the Licensee's generation portfolio, committed power purchase agreements or short-term market purchases, including Day-Ahead Market and Term-Ahead Market transactions, with the objective of minimising overall system cost while meeting grid requirements and complying with the Grid Code.

(b) Developer-owned standalone BESS may be charged from co-located renewable generation, bilateral power purchase agreements, Day-Ahead Market or other approved market purchases, or captive generation sources,

subject to applicable Open Access and Grid Code provisions and scheduling under the System Operator.

(c) Behind-the-Meter (BTM) BESS may be charged from:

(i) on-site renewable energy sources; and

(ii) the distribution grid during periods permitted under the applicable Time-of-Day tariff regime, provided that charging from the grid is not undertaken during the peak hours notified by the Commission or the Distribution Licensee, except as may be otherwise permitted by the Commission.

(d) A BTM BESS shall be configured and operated so as to prevent export of power into the distribution grid, unless such export is expressly permitted under applicable Regulations (including net-metering, gross-metering or other grid-export frameworks) and duly approved by the Distribution Licensee. Where a BTM BESS persistently injects power into the grid in contravention of this requirement, the Distribution Licensee may, after due notice, treat such installation as a grid-connected BESS and require compliance with the Regulations applicable to such systems, including connectivity, metering, Open Access and DSM provisions.

20.4 Charging Schedule Coordination

(1) The System Operator shall designate charging hours for grid-connected BESS, in coordination with the concerned Licensees and BESS operators, so as to optimise grid operations, manage peak loads and facilitate integration of renewable energy, consistent with the Grid Code and the Commission's Time-of-Day tariff framework.

(2) The System Operator may, in coordination with the concerned Licensees, specify separate scheduling windows or priority rules for BESS providing Resource Adequacy services, ancillary services or other grid-support services, to avoid conflicts between obligations, and shall, where necessary, issue detailed procedures to this effect.

20.5 Deviation Settlement Mechanism

(1) Applicable Framework

All deviations between scheduled and actual ex-bus delivery of BESS power, including deviations in both energy injection into the grid and energy withdrawal from the grid, shall be settled in accordance with the TNERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2019, and any subsequent amendments or re-enactments thereof, and in accordance with any specific Orders of the Commission issued in this regard.

(2) Accounting for Deviations

(a) Deviation settlement accounts shall be prepared for the entire BESS capacity, covering both injections and withdrawals at the ex-bus or Point of Interconnection, in accordance with the TNERC DSM Regulations and applicable metering and energy accounting procedures.

(b) For the purpose of deviation accounting, the BESS operator shall ensure that metering arrangements capture active energy injection and drawal, taking into account auxiliary energy consumption and applicable losses in accordance with the metering scheme approved by the Commission and the System Operator.

(3) Deviation Charges

(a) Deviation charges shall be levied based on the magnitude and direction of deviation in accordance with the rates, price bands and other conditions

notified under the TNERC DSM Regulations and relevant Orders of the Commission.

(b) Settlement of deviation charges for BESS shall be carried out at such periodicity as may be specified in the TNERC DSM Regulations or as otherwise directed by the Commission.

(4) Attribution of deviation charges and incentives (optional but useful)

In case of Licensee-owned BESS, deviation charges or incentives shall be attributed to the concerned Licensee and treated as controllable or uncontrollable, as the case may be, in accordance with the applicable Tariff / MYT Regulations. In case of developer-owned BESS participating in markets or providing contracted services, deviation charges or incentives shall be borne or retained by the BESS operator, unless otherwise provided in the relevant contract approved by the Commission.

PART VIII: ANCILLARY SERVICES

21.0 Ancillary Services

21.1 Provision of Ancillary Services by BESS

21.1.1 The Tamil Nadu State Load Despatch Centre (TNSLDC) shall be responsible for assessment of ancillary service requirements, and for the procurement, scheduling, despatch and settlement of ancillary services, including Primary Reserve Ancillary Service (PRAS), Secondary Reserve Ancillary Service (SRAS) and Tertiary Reserve Ancillary Service (TRAS), in accordance with these Regulations, the Tamil Nadu Electricity Grid Code, the Commission's Regulations and Orders, and the relevant regulations of the Central Electricity Regulatory Commission (CERC) to the extent applicable.

21.1.2 Grid-connected BESS installations that comply with the technical and performance standards specified in these Regulations and applicable Grid Code provisions shall be eligible to provide ancillary services, subject to qualification and registration with TNSLDC or the relevant market platform, as per procedures notified by TNSLDC and approved by the Commission.

21.1.3 Where a BESS is contracted to provide multiple services, including but not limited to Resource Adequacy capacity, peak-shaving, congestion management and ancillary services, the priority of despatch and the resolution of conflicts between such services shall be as specified in the relevant contracts and detailed procedures approved by the Commission, having due regard to grid security and economic operation. In case of conflict, TNSLDC's instructions issued in the interest of grid security shall prevail.

21.2 Participation in CERC-regulated ancillary services and markets

(1) BESS located in Tamil Nadu may participate in ancillary service markets and other power-market segments operated under the jurisdiction of CERC, including but not limited to ancillary service markets, Day-Ahead Market, Real-Time Market and Green Day-Ahead Market, subject to compliance with CERC regulations, applicable market rules and these Regulations.

(2) TNSLDC shall coordinate the scheduling, despatch and settlement of such transactions in accordance with the Indian Electricity Grid Code, applicable CERC regulations and the Tamil Nadu Electricity Grid Code.

21.3 Qualification and performance requirements

(1) BESS units providing ancillary services shall meet the minimum technical and performance standards specified in Part VI of these Regulations, including response times, C-rate, availability and state-of-charge management requirements specified in the relevant contracts or procedures.

(2) TNSLDC may, with the approval of the Commission, specify additional qualification criteria and performance benchmarks for BESS providing PRAS, SRAS and TRAS, including minimum response times, ramp-rates, telemetry and communication standards, and test protocols for demonstrating compliance.

(3) Non-compliance with performance requirements may attract financial disincentives, reduction in scheduled ancillary capacity, temporary suspension from ancillary service provision or de-registration, as may be provided in detailed procedures approved by the Commission.

21.4 Pricing and settlement of ancillary services from BESS

(1) Pricing and settlement of ancillary services provided by BESS shall be carried out in accordance with:

(a) the relevant CERC regulations and market rules, where such services are provided through CERC-regulated markets; or

(b) Orders of the Commission and specific contracts approved by the Commission, where such services are procured under bilateral or intra-State arrangements.

(2) In the case of BESS assets owned or contracted by Licensees or TNPGCL, any net revenues earned from the provision of ancillary services, after deducting incremental costs and applicable market charges, shall be treated as non-tariff income for the concerned entity and shall be shared with consumers or users in accordance with Regulation 11.3 of these Regulations and the applicable Tariff / MYT Regulations.

(3) In the case of developer-owned BESS providing ancillary services directly to markets or Licensees under approved contracts, pricing and settlement shall be

governed by the relevant market rules or contracts, and such revenues shall accrue to the BESS operator, subject to any sharing provisions explicitly approved by the Commission.

21.5 Commercial Settlement for Ancillary Services

(1) Settlement components

TNSLDC shall undertake settlement of ancillary service charges through payment mechanisms approved by the Commission, which may include one or more of the following components:

(a) availability-based or capacity-based charges for making contracted ancillary capacity available;

(b) utilisation-based or energy-based charges for actual delivery of ancillary services; and

(c) performance-based incentives or penalties linked to response time, accuracy and other performance parameters, as may be specified by the Commission.

(2) Pricing methodologies

The pricing of ancillary services provided by BESS may be based on any one or a combination of the following methodologies:

(a) the weighted average Day-Ahead Market (DAM) price for the relevant time-blocks;

(b) a fixed tariff or benchmark rate determined or approved by the Commission; or

(c) such other methodology as may be specified by the Commission, having regard to the CERC Ancillary Services Regulations, prevailing market conditions and consumer interests.

(3) Interim reliance on CERC framework

Until such time as the Commission notifies a specific pricing and settlement framework for ancillary services under these Regulations, the settlement of ancillary service charges involving BESS shall, to the extent applicable and with necessary modifications, be carried out in accordance with the Central Electricity Regulatory Commission (Ancillary Services) Regulations, 2022, as amended from time to time, and relevant Orders of the Commission.

(4) Scheduling, metering and accounting

Ancillary service transactions involving BESS shall be scheduled, metered, accounted for and settled in accordance with the Tamil Nadu Electricity Grid Code, the TNERC DSM Regulations, applicable power-market regulations and procedures notified by the Commission or TNSLDC.

(5) Treatment of ancillary revenues for regulated entities

In the case of BESS assets owned or contracted by Licensees or TNPGCL, net revenues from ancillary services, after deducting incremental costs and market charges, shall be treated as non-tariff income and shared with consumers or users in accordance with Regulation 11.3 of these Regulations and the applicable Tariff / MYT Regulations.

PART IX: OPEN ACCESS AND MARKET PARTICIPATION

22.0 Open Access Framework for BESS

(1) Battery Energy Storage Systems connected at transmission or distribution voltage levels shall be eligible to avail Open Access in accordance with the provisions of the TNERC (Terms and Conditions for Green Energy Open Access) Regulations, 2025 and the TNERC (Grid Connectivity and Intra-State Open Access) Regulations, 2014, as amended from time to time.

(2) Such BESS installations shall be liable to pay all applicable transmission charges, wheeling charges, scheduling and system operation charges, and any other charges, surcharges or fees as may be specified by the Commission, to the concerned Licensee or System Operator, in accordance with the aforesaid Regulations and the relevant orders of the Commission.

(3) BESS availing Open Access shall be subject to the technical, metering, protection, communication and congestion-management provisions of the TNERC Grid Connectivity and Intra-State Open Access Regulations, 2014 and the Tamil Nadu Electricity Grid Code, including provisions relating to curtailment or rescheduling in the interest of grid security.

(4) Deviations between scheduled and actual injection or drawal by BESS availing Open Access shall be settled in accordance with the TNERC (Deviation Settlement Mechanism and Related Matters) Regulations, 2019 and any amendments or re-enactments thereof, and applicable CERC regulations in respect of inter-State transactions.

22.1 Charges for Co-located Distributed Generation with BESS

Prosumers installing BESS in conjunction with co-located distributed generation sources such as solar power plants with grid-following (GFL) inverters shall be liable to pay network charges and all other charges as specified in the relevant Regulations and Orders of the Commission applicable to distributed generation consumers, including but not limited to the Commission’s Regulations on

grid-interactive rooftop and small-scale solar systems. These charges shall be payable in addition to the regular consumer tariff charges.

22.2 Energy Arbitrage and Market Participation

(1) Where a BESS operator engages in energy trading by charging during low-price periods and discharging during high-price periods, including participation in Day-Ahead Market (DAM), Real-Time Market (RTM), Green Day-Ahead Market (GDAM), Green Term-Ahead Market (GTAM) or other approved market segments, the difference between the sale price and purchase price of energy shall accrue to the BESS operator, subject to applicable Regulations, Open Access conditions and power-market rules.

(2) Settlement of such transactions shall be carried out in accordance with the rules, procedures and settlement calendar of the concerned power exchange or bilateral market platform, as applicable.

(3) Such participation shall be subject to the technical, metering and DSM requirements specified in these Regulations, the TNERC Open Access Regulations, the TNERC DSM Regulations and applicable CERC regulations in respect of inter-State transactions

(4) The allocation of costs, revenues, gains and losses arising from such market participation shall be governed by Regulation 11.5 and the relevant commercial agreements, including BESSA, BESPA and operational service agreements, as approved by the Commission.

22.3 Transmission, Wheeling, Reactive power, Scheduling and System Operation Charges

(1) BESS operators utilising the transmission and distribution networks under Open Access shall be liable for:

(a) transmission charges for use of the State transmission network;

(b) wheeling charges for use of distribution infrastructure;

(c) reactive power charges for excessive reactive power import or export, in accordance with the Grid Code and applicable Regulations;

(d) scheduling charges for SLDC scheduling services; and

(e) system operation charges for grid operation and system security services,

as determined by the Commission from time to time under the applicable Tariff and Open Access Regulations.

(2) Transmission, wheeling, scheduling and system operation charges shall be determined and reviewed by the Commission in accordance with the applicable Tariff Regulations and Orders, and shall generally be considered as part of the Annual Revenue Requirement (ARR) process of the respective Licensees or System Operator.

(3) Any concessions or rebates in respect of such charges for BESS projects, if allowed by the Commission, shall be specified through separate Orders or schemes, and may be adjusted in the event of significant changes in base rates, subject to prior notification of at least sixty (60) days to affected BESS operators

PART X: DATA AND CYBER SECURITY

23.0 Data Submission Requirements

(1) At the execution stage, the BESS developer shall submit to the concerned Licensee and the System Operator, as applicable, all relevant technical parameters of the system, including:

(a) manufacturer specifications relating to rated power and energy capacity, efficiency, performance warranty and cycle life; and

(b) details of control-system architecture, response characteristics, telemetry and communication systems, including protocols and interfaces,

in such format and within such timelines as may be specified by the Commission, the Licensee or the System Operator, consistent with applicable CEA Regulations and Guidelines.

(2) Any modification to technical parameters after commissioning that materially affects performance, control or communication shall be reported to the concerned Licensee and the System Operator within fifteen (15) days of such change, accompanied by justification and supporting documentation.

23.1 Data Transmission

(1) The BESS developer or operator shall furnish complete and accurate real-time operational data to the System Operator, as required for system operation, monitoring and grid security, in accordance with the Grid Code and applicable Regulations.

(2) Each grid-connected BESS shall be integrated with suitable metering and communication infrastructure, and shall be equipped with RS-485 or higher-specification communication ports, or equivalent interfaces, to enable reliable data transmission through Wide Area Network (WAN), optical fibre or any other communication medium, in accordance with applicable Regulations and guidelines.

23.2 Real-Time Data Requirements

(1) The real-time telemetry data, comprising both analog and digital signals, shall include, but shall not be limited to, the following parameters, as applicable:

(a) State of Charge (SoC);

(b) active and reactive power injection and drawal;

(c) status of circuit breakers and key switching devices;

(d) voltage and system frequency at the Point of Interconnection;

(e) Battery Management System (BMS) and Energy Management System (EMS) status and alarms; and

(f) such other parameters as may be specified by the System Operator in accordance with the Central Electricity Authority (Technical Standards for Communication System in Power System Operation) Regulations, 2020, the "Guidelines for Interfacing Requirements" issued by the Central Electricity Regulatory Commission on 19.01.2024, and other applicable amendments and guidelines issued from time to time.

(2) Failure by the developer or operator to communicate reliable data to System Operator in accordance with the above requirements shall invite penalties or other remedies as specified in the BESS Service Agreement, Operational Service Agreement or other applicable contractual documents, and as may be directed by the Commission.

23. 3 Cyber-security Compliance requirements:

(1) All Battery Energy Storage Systems (BESS) shall comply with applicable cyber security standards and guidelines issued by the Ministry of Power, including the Cyber Security Guidelines for the Power Sector, 2021, and directives issued by the Central Electricity Authority, the Central Electricity Regulatory Commission and the Indian Computer Emergency Response Team (CERT-In), including the CERT-In Cyber Security Directions, 2022, as amended from time to time.

(2) The BESS installations shall also adhere to relevant international cyber security standards, including, where applicable, IEC 62443, IEC 62351, ISO/IEC 27001 and ISO/IEC 27019, as may be specified by the Commission or required under sectoral guidelines.

(3) The Licensee or developer shall ensure reliable, secure and resilient operation of the BESS and associated control and communication infrastructure, and shall implement appropriate cyber security measures to prevent unauthorised access, including the use of secure communication protocols, access controls, monitoring systems, logging, incident detection and other necessary safeguards.

(4) BESS developers and operators shall promptly report cyber security incidents affecting BESS, control systems or communication links to CERT-In, the sectoral Computer Emergency Response Team (as applicable), the CEA and such other authorities as may be specified in the applicable cyber security guidelines, and shall comply with reporting timeframes and incident handling procedures laid down therein.

23.4 Cyber Crisis Management Plan (C-CMP)

(1) Each Transmission Licensee, Distribution Licensee and System Operator responsible for BESS integration, and each BESS developer or operator of such capacity as may be specified by the Commission or under applicable cyber-security guidelines, shall prepare and maintain a Cyber Crisis Management Plan (C-CMP) for coordinated response to cyber incidents affecting BESS and associated systems.

(2) The C-CMP shall, at a minimum, include:

(a) incident-classification criteria, including criteria for declaring a "cyber crisis", having regard to potential grid impact and compromise of EMS/BMS or associated systems;

(b) a response structure identifying the designated officer to declare a cyber crisis and the roles and responsibilities of the Chief Information Security Officer (CISO) or Information Security Division (ISD), and other response teams;

(c) procedures covering detection and alert mechanisms, including use of security information and event management (SIEM) and intrusion detection systems (IDS);

(d) containment measures, including segregation of affected zones, separation of operational technology (OT) and information technology (IT) networks, and preservation of forensic evidence and logs for a minimum period as specified in applicable guidelines;

(e) eradication and recovery procedures, including vulnerability remediation, patching, restoration from backups and post-incident Root Cause Analysis (RCA); and

(f) arrangements for periodic mock drills, including at least one table-top or simulation exercise annually, and mechanisms for updating policies and procedures based on lessons learned.

(3) The C-CMP shall be prepared, submitted for review to the sectoral CERT (where applicable) and CERT-In, and approved by the Board of the concerned entity, in accordance with the timelines and procedures specified in applicable cyber-security guidelines, and shall be reviewed and updated at least once in every year.

PART XI: SAFETY AND ENVIRONMENT

24.0 Safety and Environmental Norms

24.1 General Safety Requirements

(1) The BESS shall incorporate automatic isolation systems that disconnect the installation upon grid supply failure or extreme voltage conditions within

prescribed response-time limits, typically less than one hundred (100) milliseconds, to prevent back-feeding and protect personnel and infrastructure

(2) Adequately rated fuses, fast-acting circuit breakers, DC and AC disconnect switches, earthing systems, surge protection devices, DC ground-fault detection mechanisms and transient-protection systems shall be installed in accordance with CEA safety regulations and applicable electrical safety codes, as amended from time to time.

(3) Anti-back-feeding mechanisms shall include automatic sensing and isolation during grid failure and manual isolator switches that may be locked during Licensee maintenance activities.

(4) All Battery Energy Storage Systems covered by these Regulations, including Behind-the-Meter BESS and sub-MW projects, shall comply with the applicable provisions of the CEA (Measures relating to Safety and Electric Supply) Regulations, the CEA technical standards for connectivity and safety of BESS, the Bureau of Indian Standards, and the safety and environmental requirements specified in this Part and in any other applicable Regulations and Orders of the Commission

24.2 Developer and Consumer Obligations

(1) The BESS developer shall ensure full compliance with safety standards during design, installation, commissioning and operational phases, and shall conduct safety testing prior to commissioning. The developer shall maintain continuous compliance with the CEA (Measures relating to Safety and Electric Supply) Regulations, as amended from time to time, Chief Electrical Inspector to Government (CEIG) requirements and Licensee safety specifications.

(2) Consumers installing behind-the-meter BESS shall maintain internal safety mechanisms, comply with CEA, TNERC and CEIG requirements, notify the

Licensee of any safety concerns and permit access for safety inspections as and when reasonably required by the Licensee or other competent authorities.

24.3 Licensee Authority

(1) The Licensee shall have the authority to disconnect any BESS installation in cases of safety exigency, detected back-feeding during grid supply failure, unauthorised operation or non-compliance with regulatory provisions or safety requirements.

(2) The Licensee shall not be liable for accidents resulting from consumer failure to isolate BESS during grid-outage conditions or failure to comply with safety instructions issued by the Licensee or competent authorities.

24.4 Safety Requirements:

(1) Battery Energy Storage Systems (BESS) shall be designed, installed, operated and maintained in accordance with applicable national and international safety standards, including those specified in the CEA (Measures relating to Safety and Electric Supply) Regulations, 2023 and subsequent amendments, relevant Bureau of Indian Standards (BIS), guidelines of the Ministry of Power and other directions issued by competent authorities.

(2) BESS installations shall incorporate adequate electrical and thermal protection, including proper earthing and grounding, protection systems, isolation arrangements and access control. Fire detection and suppression systems shall be provided in accordance with CEA regulations, Ministry of Power guidelines and CEIG requirements. Annual inspections by CEIG or other competent authorities shall be complied with, and non-compliance may trigger immediate disconnection by the Licensee and penalties as applicable.

(3) Adequate provisions for hazardous-gas detection and ventilation, and for safe handling and disposal of battery materials, shall be ensured in accordance with

applicable safety and environmental-protection standards. Regular safety audits and third-party certifications shall be conducted where required under applicable standards or as directed by the Commission.

(4) All Battery Energy Storage Systems (BESS) operating at voltages above 650 volts shall comply with the relevant provisions of the CEA (Measures relating to Safety and Electric Supply) Amendment Regulations, 2026, or any subsequent amendments, for installations operating above 650 volts, ensuring protection against electrical, thermal and fire hazards. Key mandates include, inter alia:

(a) Power Conversion System (PCS) suitably matched to the battery chemistry (for example, lithium-ion), providing two-fault tolerance (system remains in a safe state after any two failures), enabling automatic unattended synchronisation and disconnection from the grid, and incorporating self-diagnostics and appropriate cooling systems;

(b) Battery Management System (BMS) providing continuous monitoring of voltage, temperature, current and thermal runaway at cell, module and pack levels, with automatic alarms, shutdowns and audio-visual alerts; and

(c) container and physical safety measures, including suitable enclosures with forced ventilation where required, ingress-protection (IP) rating appropriate to the site conditions, chemistry-specific spatial separations to prevent propagation of faults and hazardous-gas or spill detection, as specified in the applicable CEA standards.

(5) Site-security measures, including perimeter fencing, access control, surveillance and fire-rated barriers, shall be provided in accordance with CEA safety requirements, CEIG directions and any applicable local regulations or Orders of the Commission.

24.5 Battery Technology Safety

(1) BESS installations employing different battery chemistries, including but not limited to lithium-ion, flow batteries and solid-state batteries, shall comply with

chemistry-specific safety standards and guidelines issued by the CEA, BIS, Ministry of Power and other competent authorities, as applicable.

(2) The developer shall ensure that manufacturer safety instructions and limitations relating to each battery chemistry are incorporated into the design, installation, operation and maintenance practices for the BESS.

24.6 Environmental Compliance

(1) BESS projects shall obtain applicable environmental clearances, where required, and shall comply with Environmental Impact Assessment requirements issued by the Ministry of Environment, Forest and Climate Change (MoEFCC) and other competent authorities, adhere to land use and zoning regulations and, where applicable, undertake community safety and environmental impact assessments.

(2) The BESS owner shall be responsible for safe disposal, recycling or reuse of batteries upon reaching end-of-life in accordance with applicable battery waste management rules and guidelines issued by the Central Government, the Government of Tamil Nadu or other competent authorities. Second-life battery applications shall be encouraged where technically and environmentally feasible and compliant with applicable safety and environmental standards.

(3) The BESS owner shall maintain appropriate records of battery procurement, replacement, recycling and disposal, and shall furnish such information to the Commission or other competent authorities as may be required under applicable Regulations and guidelines.

PART XII: ROLES AND RESPONSIBILITIES

25.0 Role of BESS Developers and Operators:

25.1 Installation and Operational Responsibilities

(1) System Design and Installation

Every BESS developer or operator shall design and install the Battery Energy Storage System in compliance with the minimum technical specifications prescribed under these Regulations, the technical standards issued by the Central

Electricity Authority (CEA), and the applicable Grid Code. The developer shall obtain *approval from the concerned Transmission Licensee or Distribution Licensee, as applicable, and coordinate trial run schedules with the System Operator.*

For the avoidance of doubt, the requirement to obtain environmental clearances under Regulation 25.6 and applicable laws is separate from and additional to the trial run approval under this Regulation. No trial run shall be scheduled unless all required environmental clearances have been obtained.

(2) Interconnection Options

BESS may be connected:

(i) At pooling substation / Transmission substation

(ii) At Distribution substation

(iii) with Distribution feeders

(a) For interconnection at pooling substations or Transmission substations and at Distribution substations, the developer shall be responsible for establishing the dedicated feeder connectivity to the substation of the Distribution Licensee or Transmission Utility, as applicable, in compliance with CEA connectivity and Grid standards. The entire cost towards establishment of the dedicated feeder and associated bay shall be in the scope of the developer. Any augmentation on the upstream network shall be within the scope of the Distribution Licensee or Transmission Utility, as applicable. The mandatory Connectivity Agreement shall specify, inter alia, injection and drawal limits, short-circuit contribution limits, dynamic reactive power capability and voltage regulation requirements.

(3) Protection and Integration of BESS co-located in Licensee Substations

(a) Where a Battery Energy Storage System (BESS) is proposed to be installed within an existing substation, the integration shall be carried out in a manner that

ensures system safety, reliability and protection coordination. Wherever the BESS is connected by extending an existing bus, a dedicated bay shall be created, to the extent technically feasible. Direct tapping to an existing bus without appropriate isolation arrangements shall be discouraged.

(b) The BESS feeder shall be provided with an independent protection system. Such protection system shall be adequately coordinated with the existing substation protection schemes, including, but not limited to, bus-bar protection, line protection and transformer protection systems, so as to ensure selective isolation of faults.

(c) At a minimum, the protection scheme for the BESS shall include, to the extent applicable, differential protection, overcurrent and earth fault protection, LVRT/HVRT, over-voltage, under-voltage, over-frequency, under-frequency, reverse power protection, anti-islanding protection and suitable protection systems on the DC side, including for battery strings. The developer shall carry out and submit a detailed protection coordination study, including fault level analysis, relay coordination scheme and protection grading analysis, for approval by the State Load Despatch Centre (System Operator), State Transmission Utility (STU) or the concerned Distribution Licensee, as applicable.

(d) A detailed BESS Power Purchase Agreement and Connectivity Agreement for grid interconnection of the BESS shall be executed with the procurer and a Battery Energy Storage Service Agreement with the System Operator, in the prescribed formats approved by the Commission.

(4) Fault Attribution and Outage Responsibility

(a) All faults associated with BESS integration shall be classified as internal faults, external faults or interface faults. Internal faults shall refer to faults occurring within the BESS boundary, external faults shall refer to grid-side faults and interface faults shall refer to faults occurring at the interconnection point between the BESS and the grid.

(b) In the case of internal faults attributable to the BESS, the developer or operator shall bear full responsibility, including loss of capacity payments, loss of energy-based revenues and any applicable penalties, in accordance with the contractual arrangements and applicable Regulations. In the case of external grid faults, the responsibility shall lie with the concerned Licensee or utility, and the BESS shall be considered under deemed availability without penalty, subject to the terms of the applicable agreement. In the case of interface faults, responsibility shall be determined based on detailed investigation.

(c) Where a bus fault or similar grid-side event is established, on the basis of investigation, to be attributable to the BESS, the developer or operator shall bear the outage consequences and shall compensate for loss of supply and restoration costs, wherever negligence is established, in accordance with the Commission's Orders and the applicable contractual arrangements.

(d) A joint fault investigation committee comprising representatives from the SLDC, the concerned Transmission Licensee or Distribution Licensee and the BESS developer or operator shall be constituted for investigation of such incidents. A preliminary report shall be submitted within forty-eight (48) hours and a final report shall be issued within seven (7) days, or within such time as may be directed by the Commission.

(e) In case of disputes or pending determination of fault responsibility, a provisional classification (as internal, external or interface fault) shall be applied for the purpose of billing and settlement, and necessary adjustments shall be made in subsequent billing cycles based on the final determination by the investigation committee or by the Commission, as the case may be.

(5) Land Lease within Utility Premises

(a) Where land is provided for BESS installation within a substation or in adjacent utility premises, such land shall remain under the ownership of the concerned

Distribution Licensee or Transmission Utility. The use of such land shall be governed by a lease agreement executed between the utility and the developer.

(b) The lease agreement shall specify the tenure, which shall be aligned with the BESPA or other relevant project agreements, the annual lease rent with appropriate indexation, access control protocols and compliance obligations. The developer shall ensure that the BESS installation does not obstruct existing utility operations and shall provide for unhindered emergency access at all times.

(c) The developer shall be responsible for any damage caused to substation equipment, civil structures or personnel arising out of BESS installation, operation or maintenance. Upon termination or expiry of the agreement, the developer shall restore the site to its original or agreed condition, to the satisfaction of the utility.

(6) Terminal Equipment and End-of-Contract Treatment

(a) For the purpose of this Regulation, terminal equipment shall include BESS units, power conversion systems (PCS), transformers, switchgear and associated control systems. The treatment of such assets at the end of the contract period shall be clearly specified at the bid stage and in the corresponding agreements, and shall conform to one of the following options:

(i) Transfer option, under which the assets shall be transferred to the concerned Licensee or utility at a pre-agreed residual value or at a nominal value where the assets are fully depreciated;

(ii) Removal option, under which the developer shall decommission and remove all assets from the site and ensure safe disposal in accordance with applicable environmental and recycling regulations; or

(iii) Extension option, under which the contract may be extended, subject to performance evaluation and tariff renegotiation, as approved by the Commission.

(b) The selected end-of-contract option shall be specified in the bidding documents and the project-specific agreements and shall not be altered except with the prior approval of the Commission.

(c) Irrespective of the option exercised, no assets shall be abandoned at the site. The developer shall comply with all environmental requirements and ensure full restoration of the site to its original or agreed condition, to the satisfaction of the concerned Licensee or utility. All batteries shall be mandatorily recycled or disposed of in accordance with applicable battery-waste management regulations, and necessary certification of compliance shall be submitted to the appropriate authority and, where required, to the Commission.

(7) Data Transmission and Real-Time Monitoring

The BESS developer shall furnish complete and accurate real-time operational data to the System Operator, as required for system operation and monitoring. The developer shall be responsible for the seamless communication of both analog and digital signals to System Operator and the concerned Licensee, in accordance with Part X of these Regulations and applicable communication standards.

(8) Operational Compliance

The BESS or hybrid operator shall operate the system in accordance with dispatch instructions and schedules issued by System Operator. The operator shall maintain State-of-Charge within prescribed operational limits and shall comply with active power ramp limits, frequency control limits and other operational parameters as specified by System Operator. The BESS developer shall avoid sudden power surges or absorption, voltage fluctuations and actions that may cause frequency excursions. The BESS or hybrid operator shall respond to dispatch instructions within specified response times and shall participate in grid exercises and mock drills as required by the System Operator.

(9) Maintenance and Performance

The developer shall carry out preventive maintenance in accordance with manufacturer recommendations and shall endeavour to ensure minimum annual system availability of ninety-five percent (95%), subject to contractual provisions. The operator shall monitor battery health using appropriate monitoring systems and shall notify System Operator of planned maintenance outages at least twenty-four (24) to forty-eight (48) hours in advance, or as specified in the applicable agreement.

(10) Financial Obligations

All connection charges, interface metering costs and bidirectional meter installation expenses for third-party or merchant BESS shall be borne by the developer, unless otherwise specified by the Commission. The developer shall compensate for intra-State transmission and distribution line losses as determined by the Commission and shall comply with the Deviation Settlement Mechanism Regulations, including payment of applicable deviation charges as specified in the TNERC DSM Regulations, 2019, as amended from time to time.

25.2 Role of System Operator

(a) Planning and Requirement Assessment

(1) System Operator shall estimate system requirements for PRAS, SRAS and TRAS within the State and publish such requirements periodically on its website, with updates based on real-time system conditions. System Operator shall specify technical eligibility criteria for BESS participation in ancillary services and define operational performance standards, in accordance with these Regulations and the Grid Code.

(2) System Operator shall endeavor to ensure that a minimum proportion of BESS projects contracted after the date of publication of these Regulations are equipped with Grid-forming (GFM) PCS, in accordance with the GFM Threshold

Capacity and other provisions specified in these Regulations, and subject to approval of the Commission.

(3) The costs associated with BESS services approved by the Commission for system operation and ancillary services shall be eligible for recovery through System Operator system operation and scheduling charges, subject to approval of the Commission.

(b) Procedures and Guidelines

(1) Within sixty (60) days from the date of notification of these Regulations, or within such extended period as the Commission may allow for reasons to be recorded in writing, the System Operator shall submit to the Commission for approval detailed procedures and standard formats, including:

(i) Battery Energy Storage System Power Purchase Agreement (BESPA) and Battery Energy Storage Service Agreement (BESSA) formats;

(ii) detailed BESS operating procedures, including forecasting, scheduling, despatch, energy accounting and deviation settlement; and

(iii) ancillary service agreement formats covering settlement procedures, reporting formats, dispute-resolution mechanisms and performance-monitoring provisions.

(2) System Operator shall implement the procedures and formats approved by the Commission and may, from time to time, propose modifications to the Commission based on operational experience, changes in Regulations or market design, with reasons recorded in writing.

(c) Real-Time Dispatch and Control

(1) System Operator shall have authority to dispatch BESS resources for grid support and shall issue day-ahead schedules to BESS operators, with the power

to revise schedules in real time based on system conditions, in accordance with these Regulations and the Grid Code.

(2) System Operator shall coordinate charging and discharging schedules to optimise grid operations and ensure compliance with system security requirements. System Operator shall maintain real-time visibility of BESS State-of-Charge and other operational parameters through SCADA or EMS systems and metering data communicated by BESS developers.

(3) The required communication systems and associated infrastructure for BESS monitoring at the System Operator end shall be established by System Operator in coordination with the concerned Licensees and developers.34.0 Role of Qualified Coordinating Agencies (QCAs)

25.3 Role of Qualified Coordinating Agencies (QCAs)

(a) Functions of QCA

(1) In addition to the functions prescribed under the TNERC (Forecasting, Scheduling and Deviation Settlement for Wind and Solar Generation) Regulations, 2024, the Qualified Coordinating Agency (QCA) may aggregate BESS resources from multiple renewable energy generator sites, consolidate capacity for joint scheduling and market participation and coordinate charging and discharging operations across its portfolio to maximise revenue and system efficiency.

(2) The QCA shall forecast aggregate BESS available capacity for the day-ahead period, provide State-of-Charge projections to System Operator and submit schedules as per System Operator procedures. The QCA shall comply with System Operator -issued operational protocols, maintain compliance with Grid Code requirements, submit real-time data in prescribed formats, represent aggregated BESS in ancillary service markets, bid in the Day-Ahead Market (DAM) and settle deviation charges and ancillary service payments, as applicable.

(b) Accountability of QCA

The QCA shall be responsible for the accuracy of forecasts and schedules for the aggregated BESS resources under its portfolio and shall be subject to penalty mechanisms for significant forecast errors, as specified in the applicable Regulations and Orders of the Commission.

25.4 Role of Transmission Licensee:

(a) Planning and Requirement Assessment

(1) The Transmission Licensee shall incorporate Battery Energy Storage Systems (BESS) into its transmission planning framework as part of long-term and medium-term transmission planning. The Transmission Licensee shall identify suitable locations for BESS deployment within the transmission network, particularly in areas requiring congestion management, Available Transfer Capability (ATC) enhancement, voltage support and reactive power management, based on system studies and grid requirements.

(2) The Transmission Licensee shall identify and, where appropriate, publish potential substation locations for BESS deployment on its official website, considering availability of land, transformer capacity, feeder capability, grid requirements and other technical considerations.

(3) The Transmission Licensee shall submit capital investment proposals for BESS deployment to the Commission for approval as part of its transmission planning and Annual Revenue Requirement (ARR) filings. The costs associated with BESS projects approved by the Commission shall be eligible for recovery through transmission tariff, in accordance with the applicable Tariff Regulations and subject to approval of the Commission.

(b) Procedures and guidelines

Within sixty (60) days from the date of notification of these Regulations, the Transmission Licensee shall submit detailed procedures and formats for BESS integration at different transmission voltage levels, including but not limited to: application procedures for connectivity, connectivity agreement formats, technical feasibility assessment criteria, execution of connectivity works, safety compliance requirements including CEIG clearance, BESS power purchase Agreement formats, energy accounting and settlement procedures, reporting formats, dispute resolution mechanisms, and performance monitoring provisions.

25.5 Role of Distribution Licensee (DISCOM)

(a) BESS Planning and Procurement

(1) he Distribution Licensee shall incorporate Battery Energy Storage Systems (BESS) in its Resource Adequacy Plan and shall undertake load flow, short-circuit and stability studies to identify optimal locations for BESS deployment. The Distribution Licensee shall identify suitable locations for BESS in the vicinity of the Extra High Tension (EHT) grid for peak load management and energy shifting, and within the distribution network for congestion management, peak load reduction and integration of Distributed Renewable Energy (DRE).

(2) The Distribution Licensee shall publish the identified potential locations for BESS deployment on its official website for stakeholder information, to the extent practicable.

(3) The Distribution Licensee shall seek approval of the Commission for capital-investment plans related to BESS deployment through appropriate Petitions filed under the applicable Tariff / MYT Regulations. The Distribution Licensee shall also be responsible for payment coordination, settlement and other commercial arrangements associated with BESS procurement and operation. The capital expenditure and associated costs of BESS projects shall be eligible for

recovery through the Annual Revenue Requirement (ARR) of the Distribution Licensee to the extent approved as prudent by the Commission, in accordance with the applicable Tariff / MYT Regulations and these Regulations.

(4) Within sixty (60) days from the date of notification of these Regulations, the Distribution Licensee shall submit to the Commission for approval application procedures for connectivity, connectivity agreement formats, technical feasibility assessment criteria, execution of connectivity works, safety compliance requirements including CEIG clearance, BESS power purchase agreement formats, energy accounting and settlement procedures, reporting formats, dispute resolution mechanisms and performance monitoring provisions for BESS projects.

(5) The Distribution Licensee shall maintain a database of all BESS contracted or installed within its licensed area, including relevant technical and operational details required for system planning and grid operation.

25.6 Behind-the-Meter BESS Database

The Distribution Licensee shall maintain a comprehensive database of all Behind-the-Meter BESS installations established within its licensed area. The Licensee shall collect data on capacity, location and operational status at such periodicity as may be specified by the Commission and shall utilise such data for distribution network planning and grid forecasting. The Licensee shall furnish periodic reports to the Commission in such format and at such intervals as the Commission may specify.

25.7 Operational Support

The Distribution Licensee shall provide connectivity and metering facilities in a timely manner, coordinate with System Operator for scheduling of BESS charging and discharging, monitor BESS performance, address technical issues, and maintain effective communication channels with BESS operators.

25.8 Consumer Support

The Distribution Licensee shall process applications for Behind-the-Meter BESS installations in a timely manner and issue approvals or rejections in accordance with prescribed procedures. The Distribution Licensee shall provide technical guidelines for safe BESS installation and process modifications to existing installations in accordance with these Regulations and applicable standards.

25.9 Role of Consumers and Prosumers;

(a) Behind-the-Meter (BTM) BESS Installation

(1) All categories of consumers, other than such subsidized categories as the Commission may specify, shall be eligible to install BESS with or without distributed generation resources, subject to prior written approval of the Distribution Licensee. Installation shall comply with CEA technical standards, execution of a Behind-the-Meter agreement and adherence to safety requirements including isolators and earthing.

(2) Metering arrangements for BTM BESS shall be as follows:

(a) The consumer shall install, at its own cost, such metering as the Distribution Licensee may require to:

(i) measure the energy drawn from the grid for charging the BTM BESS; and

(ii) verify that no energy is exported to the grid, unless such export is expressly permitted under applicable Regulations.

(b) Where the consumer also has an on-site renewable energy system, the metering shall be arranged to separately account for:

(i) energy generated from the renewable source;

(ii) energy stored in and discharged from the BESS; and

(iii) energy drawn from the grid.

(c) All meters shall comply with the Central Electricity Authority (Installation and Operation of Meters) Regulations and shall, where required by the Distribution Licensee, be capable of remote reading and time-differentiated recording of energy flows.

(3) Such BESS shall primarily be used for self-consumption. Excess energy may be fed to the grid subject to obtaining approval from the concerned Licensee in accordance with applicable net or gross metering provisions. Demand management shall be maintained within contractual limits.

PART XIII: BEHIND-THE-METER BESS

26.0 Approval and Intimation Requirements

(1) The procedure for approval shall be simplified and, for systems up to such capacity (in kW/kWh) as may be specified by the Commission, may be limited to online application or intimation through a web portal, subject to submission of the information specified in Regulation 27(2).

(2) The application or intimation shall be accompanied by:

(i) a single-line diagram of the installation;

(ii) detailed equipment specifications, including battery chemistry, capacity (kW/kWh), power conversion system, and battery management system;

(iii) protection schemes and settings designed to ensure non-export to the grid; where applicable; and

(iv) a certificate from the manufacturer or system integrator confirming compliance with the applicable technical and safety standards.

(3) The Distribution Licensee shall process the application within [12] working days. A deemed approval may be provided if no communication is received within the stipulated period, subject to the consumer's compliance with all technical and safety requirements.

26.1 Protection Requirements

(1) The BTM BESS shall be equipped with a reverse power protection relay and/or an export-limiting device that prevents any power flow from the consumer's installation to the distribution grid, unless such export is expressly permitted under applicable Regulations. The protection settings shall be sealed or password-protected and shall not be alterable by the consumer without the consent of the Distribution Licensee.

(2) The system shall have anti-islanding protection, over-voltage and under-voltage protection, over-frequency and under-frequency protection and earth-fault protection, all conforming to the standards specified by the Central Electricity Authority (CEA) and the Bureau of Indian Standards (BIS), and to the applicable Grid-interconnection standards.

(3) In the event of any inadvertent injection of power, the system shall automatically disconnect from the grid within the time specified in the applicable grid-interconnection standards.

26.2 Compliance with technical and safety requirements:

(1) The BTM BESS shall conform to the technical and safety standards specified by the appropriate authority, including the CEA (Measures relating to Safety and Electric Supply) Regulations, CEA connectivity standards, relevant BIS standards and any directions issued by the Commission.

(2) Without limiting the generality of the foregoing, the system shall incorporate:

(a) a Battery Management System (BMS) that monitors cell or module voltage, temperature, state-of-charge and thermal runaway conditions and that automatically disconnects the battery in the event of a fault;

(b) a Power Conversion System (PCS) that supports safe grid synchronisation, self-diagnosis and unattended shut-down; and

(c) adequate fire detection, suppression and emergency isolation arrangements, and clear signage and access for emergency responders.

(3) The consumer shall maintain the BTM BESS in good operating condition and shall promptly rectify any deficiency that may affect the safety or reliability of the distribution system. The consumer shall also comply with any end-of-life disposal and recycling obligations prescribed under applicable law and with any battery-waste management rules.

26.3 Participation in Ancillary Services:

Consumers or prosumers owning eligible BTM BESS, preferably those connected at 11 kV supply and above or such voltage level as may be specified by the Commission, may participate in ancillary services either directly or through aggregation by a Qualified Coordinating Agency, subject to technical feasibility, metering and communication requirements and prior approval by the System Operator, in accordance with Part VIII of these Regulations and subject to any additional safeguards that the Commission or SYSTEM OPERATOR may specify for BTM resources.

26.4 Status of BTM BESS

(1) A BTM BESS shall be treated as a consumer-side asset and shall not be considered a part of the distribution system. The legal status as a consumer-side asset is contingent upon continued compliance with the conditions set out in this Part and other applicable provisions of these Regulations.

(2) Upon any material deviation from the conditions specified for BTM BESS, including persistent export of energy to the grid without requisite approvals, the system may be re-classified as a grid-connected energy storage system and shall thereafter be governed by the Regulations applicable to such systems, including the requirement to obtain all necessary approvals and enter into the requisite agreements with the Distribution Licensee.

26.5 Regularisation of Existing BTM BESS:

(1) A consumer who has installed a battery energy storage system behind the meter before the date on which these Regulations come into force shall, within such period as may be specified by the Commission, declare the installation to the Distribution Licensee and bring it into conformity with the requirements of these Regulations. Failure to do so may result in disconnection of the BESS from the consumer's installation and/or imposition of penalty as determined by the Commission.

26.6 Operational Restrictions and Energy Arbitrage

(1) The BTM BESS shall not be charged from the grid during the peak hours notified by the Commission or the Distribution Licensee, except where specifically permitted under applicable Tariff Orders or by the Commission. The Distribution Licensee may, with the approval of the Commission, specify additional restrictions on the charging or discharging rates, particularly where the BTM BESS is connected to a constrained portion of the distribution network.

(2) The BTM BESS shall primarily be used for meeting the captive electricity needs of the consumer and shall not be used for energy arbitrage, i.e., the purchase of electricity from the grid for storage with the intent of selling it back to the grid or to third parties, unless such activity is expressly permitted under applicable Regulations and the requisite approvals have been obtained from the Commission and the concerned Licensee. Any sale of stored energy, whether directly or indirectly, shall render the system subject to the Regulations governing grid-connected storage and Open Access, as applicable.

(3) The total load of the BTM BESS, together with the consumer's other connected load, shall not exceed the sanctioned load or contract demand. The consumer shall be liable for any excess demand charges that may arise from a

breach of this condition, in accordance with the applicable Tariff Orders and Regulations.

PART XIV: METERING

27.0 Interface Meter Installation

(1) For High Tension prosumers, generators and BESS developers connected at 11 kV and above, a bidirectional interface meter shall be installed on the High Tension side of the transformer to measure both power injection into and withdrawal from the grid, thereby enabling accurate energy accounting.

(2) Meters and metering sets proposed for all categories of BESS projects shall conform to the class and accuracy requirements prescribed under the Tamil Nadu Electricity Grid Code Regulations and shall comply with the CEA (Installation and Operation of Meters) Regulations, 2022, as amended from time to time, and applicable BIS specifications.

(3) In co-located projects, separate metering arrangements shall be provided, as required by System Operator and the concerned Licensee, for:

(a) solar energy;

(b) wind energy;

(c) BESS charging energy;

(d) BESS discharging energy; and

(e) net injected grid energy.

27.1 Meter Cost and Installation

For all grid-connected BESS installations, the cost of interface meters shall be borne by the BESS developer, unless otherwise specified by the Commission. The meter specifications shall conform to standards of the concerned Licensee and to

the CEA (Installation and Operation of Meters) Regulations, and installation shall be carried out at the developer's expense under the supervision of the Licensee.

27.2 Meter Replacement and Maintenance

(1) The developer shall be responsible for replacement of interface meters in cases of defect, failure or damage, in coordination with the concerned Licensee. Meter warranty and serviceability shall comply with manufacturer standards, the CEA metering regulations and Licensee procedures in accordance with the procedures of the concerned Licensee and the CEA (Installation and Operation of Meters) Regulations.

(2) The developer shall notify the concerned Licensee within forty-eight (48) hours of detecting any meter defect, and shall extend full cooperation to the Licensee for testing, sealing, replacement and data retrieval as may be required.

27.3 Energy Accounting During Meter Defects

(a) Single Device Failure

(1) In the event that the interface meter becomes defective while the inverter or BESS remains operational, energy during the defect period shall be determined based on readings from a check meter, if available, or from authenticated inverter or BESS records, and billing shall be based on such recorded data, subject to verification by the Licensee and System Operator, as applicable.

(2) The meter defect shall be rectified within seven (7) days of detection, or within such time as may be specified by the Commission or under the Supply Code.

(b) Dual Device Failure

(1) Where both the meter and inverter or BESS monitoring device become defective and data are retrievable from the meter's internal storage, billing shall be based on retrieved data, subject to verification by the Licensee.

(2) Where data are not retrievable, energy accounting shall be determined in accordance with the relevant provisions of the Tamil Nadu Electricity Supply Code and applicable Orders of the Commission. All details of the defect, retrieval attempts and reasons for non-retrieval shall be properly documented.

27.4 Record Preservation

All meter-defect incidents shall be recorded with details including date, time, nature of defect, remedial actions taken and data-retrieval efforts. Such records shall be preserved for a minimum period of seven (7) years for audit and dispute-resolution purposes.

PART XV: ENFORCEMENTS AND DISPUTES

28.0 Force Majeure:

(1) Standard force majeure and force majeure exclusion clauses specified in the "Guidelines for Procurement and Utilization of Battery Energy Storage Systems as part of Generation, Transmission and Distribution assets, along with Ancillary Services" issued by the Ministry of Power dated 22.03.2022 shall be incorporated in BESS Service Agreements and Operational Service Agreements.

(2) Force majeure shall apply in cases of events beyond the reasonable control of the parties, in accordance with the said guidelines and the applicable contractual provisions. Battery degradation beyond the manufacturer’s performance warranty shall not constitute a force majeure event. Battery degradation beyond the manufacturer’s performance warranty shall not v constitute a force majeure event, and shall be managed under the performance and maintenance provisions of the relevant contract.

(3) Maintenance outages shall be pre-approved by System Operator and coordinated to minimise impact on grid operations, in accordance with the scheduling and dispatch procedures specified under these Regulations.

28.1 Dispute Resolution Framework

(a) Consumer-Related Disputes

(1) Any grievance arising between a consumer/prosumer and the Distribution Licensee in relation to billing, metering, energy accounting, settlement of charges, or any other consumer-service-related matter concerning a Behind-the-Meter Battery Energy Storage System (BESS), shall be dealt with in accordance with the Tamil Nadu Electricity Regulatory Commission's Regulations for Consumer Grievance Redressal Forum and Electricity Ombudsman (CGRF & EO), as amended from time to time.

(2) Such grievances shall, in the first instance, be filed before the Consumer Grievance Redressal Forum (CGRF) constituted under Section 42(5) of the Electricity Act, 2003.

(3) Any consumer or prosumer aggrieved by an order of the CGRF, or by non-redressal of the grievance within the time specified under the applicable CGRF & EO Regulations, may prefer a representation before the Electricity Ombudsman in accordance with Section 42(6) of the Electricity Act, 2003 and the applicable TNERC CGRF & EO Regulations.

(4) Matters relating to technical standards, connectivity approval, operational restrictions, scheduling, dispatch instructions, grid security, safety compliance, or system operation shall not fall within the jurisdiction of the Consumer Grievance Redressal Forum and shall be governed by the provisions of the Act, rules, regulations, codes, orders, directives and directions issued by the Commission or by any competent authority authorised by the Commission in exercise of its powers under Section 97 of the Electricity Act, 2003, provided that such authority

shall exercise only such executive or operational functions as are specifically delegated by the Commission and shall not exercise any legislative or adjudicatory power, which remains exclusively with the Commission

(b) Disputes Involving BESS Developers or Operators

(1) Disputes between BESS developers, BESS operators, Licensees, Qualified Coordinating Agencies (QCAs), the State Load Despatch Centre (System Operator), or other system stakeholders, not falling within the jurisdiction of the Consumer Grievance Redressal Forum under Regulation 29.1(a), shall be resolved as follows:

Category of Dispute	First Instance Forum
i) Disputes concerning scheduling, dispatch, operational directions, or system operation	System Operator (sub-regulation (2))
(ii) Disputes arising exclusively from tariff determination, cost recovery, or charges under Part V	directly to the Commission (Regulation 29.1(c))
(iii) All other disputes not covered by (i) or (ii)	directly to the Commission (Regulation 29.1(c))

(2) Where a dispute under sub-regulation (1)(i) is referred to the System Operator:

(a) The System Operator shall provide a reasonable opportunity of hearing to the concerned parties;

(b) The System Operator shall issue a reasoned written order within thirty (30) days of reference, or within such extended time as the Commission may permit for reasons recorded in writing;

(c) Such order shall be binding upon the parties unless appealed before the Commission under Regulation 29.1(c).

(3) For the avoidance of doubt:

(a) Disputes under sub-regulation (1)(ii) shall be filed directly with the Commission without any prior reference to the System Operator;

(b) The Commission may, in its discretion, refer any dispute filed under sub-regulation (1)(ii) or (1)(iii) to the System Operator for technical input or preliminary assessment, but the Commission shall retain final adjudicatory authority.

(c) Appeals to the Commission

(1) Any person aggrieved by an order issued by System Operator, a Licensee or any other authority under these Regulations may file an appeal or petition before the Commission in accordance with applicable procedures and the Conduct of Business Regulations of the Commission.

(2) The Commission shall adjudicate the dispute on merits after providing an opportunity of hearing to all concerned parties. The order passed by the Commission shall be final and binding, subject to the right of judicial review before the appropriate judicial forum, in accordance with the Electricity Act, 2003.

(d) Fees for Adjudication

The Commission may, by separate order or notification, prescribe a schedule of fees to be paid by the petitioner or appellant for filing appeals, petitions or other proceedings under this Part. Such fees shall be reasonable and shall not operate as a barrier to access to justice. The Commission may, for reasons recorded in writing, waive or reduce the fee in appropriate cases, including for individual consumers or prosumers.

28.2 Categories of Disputes

(1) For the purposes of clarity and administrative convenience, disputes arising under these Regulations may include, but shall not be limited to:

(a) technical disputes relating to metering accuracy, efficiency verification, technical standard compliance, data submission requirements or performance specification verification;

(b) commercial disputes relating to tariff determination, payment of charges, capacity allocation, settlement statements or scheduling conflicts;

(c) operational disputes relating to dispatch instructions, charging or discharging schedules, maintenance approvals, telemetry data transmission or forecast compliance; and

(d) safety and compliance disputes relating to safety certification, environmental clearance requirements, unauthorised operation or violations of applicable statutory standards.

28.3 Inspection Monitoring and Enforcement by Licensee:

(1) The Distribution Licensee, or any person authorised by it, shall have the right to enter, inspect and test BESS installations, including Behind-the-Meter BESS installations, at any reasonable time to verify compliance with these Regulations and applicable standards. The consumer or developer shall afford all reasonable assistance for such inspection subject to reasonable notice, except in cases of emergency or imminent safety risk.

(2) The Distribution Licensee may require the consumer or developer to install communication equipment that enables remote monitoring of non-export protection settings and any other parameter that the Distribution Licensee considers necessary for the secure operation of its network, subject to approval of the Commission where required.

(3) Any breach of these Regulations, including any unauthorised injection of power into the grid, shall be treated as a violation and the Distribution Licensee may take such action as is permitted under the Electricity Act, 2003, including disconnection and levy of charges or penalties, subject to these Regulations and Orders of the Commission.

28.4 Monitoring by the Commission:

(1) The Commission may conduct, or cause to be conducted, periodic technical, operational and financial audits of BESS installations to verify compliance with technical standards, safety norms, performance specifications and operational requirements prescribed under these Regulations. Such audits and inspections may be conducted at such frequency as the Commission deems appropriate, having regard to the size, criticality and performance of the projects and may appoint independent experts or auditors for this purpose.

(2) The Commission, either directly or through System Operator or the concerned Licensee, may undertake monitoring of BESS performance metrics including system availability, efficiency, response time and forecast accuracy. Performance data may be analysed to assess grid support effectiveness, operational reliability and regulatory compliance.

28.5 Penalties for Non-Compliance

(1) Without prejudice to the provisions of the Electricity Act, 2003, including Section 142 thereof, in cases of non-compliance with the provisions of these Regulations or any order or direction issued thereunder, the Commission may, after giving a reasonable opportunity of being heard, impose such penalties and enforcement measures as specified in this Part or under Section 142 of the Act, having regard to the nature and gravity of the violation, its impact on the grid and consumers, and any mitigating circumstances.

(a) Technical Non-Compliance

(i) In cases of non-compliance with prescribed technical standards, efficiency requirements, response time obligations or safety specifications, the Commission may issue a warning notice for the first instance, granting a cure period of thirty (30) days.

(ii) For a second occurrence, a financial penalty ranging from Rupees one lakh to Rupees five lakhs may be imposed. For repeated or serious violations, a financial penalty ranging from Rupees five lakhs to Rupees twenty lakhs may be levied. In appropriate cases, the Commission may restrict participation in new BESS projects or market operations for a period ranging from three (3) to six (6) months.

Technical non-compliance includes, but is not limited to, failure to meet minimum round-trip efficiency (Reg. 18.5), system availability (Reg. 18.6), response characteristics (Reg. 18.7), or auxiliary energy consumption limits (Reg. 18.10)

(b) Operational Non-Compliance

(i) Where forecast errors exceed twenty percent (20%) deviation without justifiable cause on a sustained basis, a financial penalty ranging from Rupees fifty thousand to Rupees two lakhs per instance may be imposed.

(ii) Failure to comply with dispatch instructions issued System Operator may attract a penalty ranging from Rupees one lakh to Rupees five lakhs per incident. Repeated operational violations may result in temporary restriction from System Operator dispatch scheduling or market participation, for such period as the Commission may determine

28.6 Data and Reporting Non-Compliance

(1) Delay in submission of required data, reports or returns under these Regulations may attract a penalty ranging from Rupees ten thousand to Rupees fifty thousand per day of delay.

(2) Submission of incorrect or misleading data may attract a penalty ranging from Rupees fifty thousand to Rupees two lakhs per instance. Persistent non-compliance may lead to suspension of grid connectivity or disconnection, subject to due process.

28.7 Safety Violations

(1) Failure to maintain mandated safety standards may attract a penalty ranging from Rupees two lakhs to Rupees ten lakhs.

(2) Unauthorised back-feeding or operation posing immediate safety risks may attract a penalty ranging from Rupees five lakhs to Rupees twenty lakhs, in addition to forced disconnection. In cases of serious or repeated safety violations, the Commission may order immediate disconnection and prohibit the entity from undertaking future BESS projects for a specified duration.

28.8 Penalty for delay in Grid connectivity:

The Licensee shall ensure the provision of grid connectivity within the timeframe stipulated in the Power Purchase Agreement or Connectivity Agreement, or as otherwise specified under the applicable Regulations and Orders of the Commission. In the event of any delay in providing grid connectivity, whether attributable to the Licensee or the developer, an appropriate compensation or penalty may be imposed on the party responsible for the delay, in accordance with the applicable provisions specified by the Commission under the relevant Tariff Regulations, Grid Connectivity or Open Access Regulations, or by specific Order.

28.9 Unauthorized Behind-the-Meter Operation and Penalties

(1) Behind-the-Meter BESS shall operate only with prior written approval of the Distribution Licensee. Parallel operation without authorisation shall be deemed unauthorised usage of electricity supply.

(2) Where unauthorised operation is detected, the Licensee shall issue a notice specifying a reasonable period for compliance and may disconnect the consumer supply if compliance is not achieved within the stipulated time. The consumer shall isolate the BESS from the supply system and shall be liable to pay penalty for the unauthorised usage period, along with Belated Payment Surcharge as per the Tamil Nadu Electricity Supply Code, as may be determined by the Commission.

28.10 Enforcement Measures

The Commission may enforce compliance with these Regulations through the System Operator and the Licensees by issuance of written warnings, compliance directions, suspension of grid services or market participation on a temporary basis, partial or full disconnection from the grid, initiation of proceedings for contraventions in accordance with the Electricity Act, 2003 and recovery of financial penalties through appropriate billing or adjustment mechanisms.

28.11 Progressive Enforcement Mechanism

(1) Enforcement actions shall ordinarily follow a graduated approach, beginning with warning notices and opportunity for rectification, followed by financial penalties, suspension of services and, where necessary, disconnection from the grid. However, in cases of serious violations affecting grid security, public safety or deliberate misrepresentation, the Commission may impose higher-level enforcement measures without following intermediate steps.

(2) Force majeure circumstances or documented hardships beyond the control of the regulated entity may be considered by the Commission while determining the quantum of penalties or granting waiver or reduction, subject to the satisfaction of the Commission

28.12 Power Quality Penalties

Non-compliance with prescribed power quality standards shall attract penalties as specified under the State Grid Code and Orders of the Commission. Reactive energy charges (VArh charges) shall be applicable where reactive power injection or absorption exceeds contracted or permissible limits. Sustained violations of power quality norms may result in financial penalties or operational restrictions as determined by the Commission.

28.13 Consumer Demand Modification

(1) Consumers or prosumers installing BESS may seek enhancement of contracted demand from the Distribution Licensee to accommodate BESS charging load, or may operate the BESS within the existing contracted demand.

(2) Where the actual recorded demand exceeds the contracted demand, penalties shall be levied in accordance with the provisions of the Tamil Nadu Electricity Supply Code, including imposition of network charges at the applicable higher rate for excess demand, without prejudice to any other action permissible under law.

PART XVI: MISCELLANEOUS

29.0 Post-2030 Regime

The Commission shall review the concession framework on or before 30-11-2029 and shall, based on such review, issue appropriate notification regarding extension, modification, or discontinuation of concessions at least ninety days prior to 01-01-2031. A transition toward a market-based pricing framework may be introduced thereafter, in accordance with the provisions of the Act and applicable Regulations.

30. Savings

On and from the commencement of these Regulations, any earlier provisions governing BESS, to the extent inconsistent with these Regulations, shall stand superseded; provided all actions taken, petitions filed, and orders issued under the earlier framework shall remain saved unless otherwise directed by the Commission.

31. Power to Relax

The Commission may by general or special order, for reasons to be recorded in writing, and after giving an opportunity of hearing to the parties likely to be affected, relax any of the provisions of these Regulations on its own motion or on an application made before it by an interested person.

32. Issue of Orders and Practice directions

Subject to the provisions of the Act, the Commission may from time to time issue Orders and Practice Directions with regard to the implementation of these Regulations.

33. Power to Amend

The Commission may, at any time, vary, alter, modify or amend any provisions of these Regulations. Provided that any such amendment shall be made in accordance with the procedure prescribed under Section 181 of the Act

34. Power to Remove Difficulties

If any difficulty arises in giving effect to provisions of these Regulations, the Commission may, by an order, make such provisions, not inconsistent with the provision of the Act and these regulations, as may appear to be necessary for removing the difficulty

EXPLANATORY STATEMENT

1. Background and policy context

1.1 The Tamil Nadu Electricity Regulatory Commission (hereinafter "the Commission") has prepared the draft Tamil Nadu Electricity Regulatory Commission Battery Energy Storage Systems Regulations, 2026 ("BESS Regulations") in exercise of its powers under Sections 32, 33, 61, 62, 63 and 181 of the Electricity Act, 2003, read with the applicable Rules, policies and directions of the Central Government.

1.2 This Statement of Reasons sets out the background, rationale and key design elements underlying the provisions of the draft BESS Regulations, including the choices made with respect to classification of BESS configurations, minimum project size thresholds, procurement and tariff frameworks, technical and safety standards, system operation and ancillary services, treatment of behind-the-meter BESS, roles and responsibilities of sector participants, and the proposed post-2030 review of concessions.

1.3 At the central level, the Central Electricity Regulatory Commission (CERC) has progressively brought energy storage resources under the regulatory framework by allowing them to provide ancillary services and by specifying tariff structures for integrated energy storage systems under its Tariff Regulations.

1.4 The Central Electricity Authority (CEA) has also initiated amendments to the CEA (Measures Relating to Safety and Electric Supply) Regulations and draft technical standards for BESS construction and connectivity, with a view to standardising safety and design practices for BESS installations.

1.5 In this context, the Tamil Nadu Electricity Regulatory Commission (TNERC) has prepared the draft Tamil Nadu Electricity Regulatory Commission

Battery Energy Storage Systems Regulations, 2026 (hereinafter "the BESS Regulations" or "these Regulations"), in exercise of its powers under Sections 32, 33, 61, 62, 63 and 181 of the Electricity Act, 2003, read with the applicable Rules and policy directives. These Regulations propose a comprehensive framework for planning, installation, procurement, tariff determination, operation, safety and utilisation of BESS within the State of Tamil Nadu.

2. Objectives and scope of the Regulations

2.1 The primary objectives of the BESS Regulations are to:

(a) enable cost-effective deployment of BESS in various configurations (standalone, co-located with generation, embedded in networks and behind-the-meter);

(b) support grid stability, peak load management, congestion management, frequency regulation, voltage control, black-start capability and other ancillary services;

(c) provide a transparent and competitive framework for procurement of BESS and BESS-based services by utilities and other procurers, including through Section 63 bidding and Section 62 tariff regulation;

(d) specify minimum technical performance, power-quality and safety standards for BESS installations in line with CEA and BIS standards; and

(e) protect consumer interests while enabling innovation in business models and ownership structures.

2.2 These Regulations apply to all entities engaged in planning, installation, ownership, operation or utilisation of BESS connected to the intra-State transmission and distribution systems in Tamil Nadu, including distribution licensees, transmission licensees, generators, independent storage providers, consumers and prosumers.

3. Classification, applicability and minimum project size

3.1 The Regulations provide a clear classification of BESS configurations into grid-connected standalone BESS, co-located BESS with generating stations, embedded BESS within distribution networks, behind-the-meter (BTM) BESS, hybrid RE-BESS and multi-location BESS. This classification is necessary to differentiate technical, commercial and regulatory treatment across use-cases.

3.2 To avoid proliferation of very small grid-connected projects that are difficult to plan, monitor and settle, the draft Regulations prescribe that, ordinarily, grid-connected BESS (other than BTM BESS) shall have a minimum rated power capacity of 1 MW. At the same time, recognising the importance of distribution-level and scheme-based storage applications, the Regulations propose:

(a) a structured sub-MW window (125 kW to 1 MW) for distribution-level applications such as feeder, distribution transformer or section-level support, community or campus-level projects, and pilot or demonstration projects, subject to Commission approval; and

(b) an express carve-out for specialised and scheme-based projects such as feeder-level solarisation, agricultural demand management and BESS deployed under PM-KUSUM or successor schemes, which may be implemented at 125 kW and above, with specific approval for capacities below 125 kW.

3.3 Behind-the-meter BESS is kept outside the minimum project size requirement, in order to allow consumers and prosumers to adopt BESS at capacities suited to their premises and usage, subject to the Tamil Nadu Electricity Supply Code and safety and connectivity requirements. At the

same time, BTM BESS is brought within a clear approval/intimation, safety and operational discipline framework (Part XIII).

4. Procurement framework and tariff determination

4.1 The draft Regulations adopt the national policy position that procurement of BESS-based services by utilities should be primarily through transparent competitive bidding under Section 63 of the Electricity Act, 2003, in line with the MoP BESS procurement guidelines. Accordingly, procurement frameworks for BESS by transmission licensees, distribution licensees and other procurers are specified, with explicit reference to Section 63 bidding; and the Commission may adopt discovered tariffs subject to scrutiny of process transparency and consumer interest.

4.2 At the same time, the Regulations retain the Commission's power to determine tariff under Section 62 in specific cases, such as BESS integrated with existing regulated infrastructure or other circumstances where competitive bidding is not practicable or appropriate.

For such cases, the Regulations:

(a) define Storage Capacity Charge (SCC_ess) and Storage Energy Charge Rate (SECR_ess);

(b) specify normative parameters (useful life, round-trip efficiency, availability, degradation, auxiliary consumption, O&M norms, RoE, working capital) consistent with emerging national practice; and

(c) provide formulas for deriving SECR_ess from the cost of charging energy, adjusted for round-trip efficiency and auxiliary energy consumption.

4.3 For co-located RE-BESS and conventional-BESS projects, the draft Regulations allow both composite tariff structures and separate tariffs for

generation and storage components, with explicit provisions for CUF, peak-supply obligations, degradation management and treatment of non-availability of BESS. This is aligned with MoP and CEA guidance on using storage to firm renewable output and improve dispatchability.

5. Technical standards, safety and performance obligations

5.1 Part VI of the Regulations lays down technical standards for BESS, drawing upon CEA safety and connectivity regulations, BIS standards (including IS 16270:2023) and relevant IEEE and Grid Code requirements. All BESS installations, regardless of capacity or category (including BTM and sub-MW projects), are required to comply with these standards.

5.2 Key technical requirements include:

(a) minimum performance specifications on power and energy rating, round-trip efficiency, system availability, response characteristics, C-rate, cycle life and auxiliary energy consumption;

(b) harmonics limits, DC injection limits, and LVRT/HVRT compliance in line with CEA and Grid Code standards;

(c) reactive power capability and voltage control obligations for inverter-based BESS, with no separate compensation within standard capability, consistent with CEA connectivity standards; and

(d) load-flow and system studies as pre-conditions for grid connectivity above specified capacity thresholds, to ensure that BESS integration does not compromise system security.

5.3 Part XI complements these provisions by specifying safety and environmental norms, including compliance with CEA (Measures Relating to Safety and Electric Supply) Regulations, site safety measures, battery chemistry-specific safety requirements, hazardous-gas detection and

ventilation, and obligations for safe recycling and disposal of batteries under applicable national rules.

5.4 Performance obligations are further reinforced through:

(a) periodic performance testing;

(b) minimum peak-energy supply obligations for RE-BESS projects;

(c) round-trip efficiency requirements; and

(d) degradation management and battery replacement plans.

6. System operation, ancillary services and market participation

6.1 The draft Regulations explicitly integrate BESS into system operation and ancillary services. BESS is recognised as a provider of Primary, Secondary and Tertiary Reserve Ancillary Services (PRAS, SRAS, TRAS), with technical obligations around response times, duration of sustained output and AGC compatibility for larger systems.

6.2 Part VII specifies forecasting, scheduling and dispatch procedures for BESS, including day-ahead forecasting of available capacity and state-of-charge, coordination of charging and discharging schedules, and linkage to the Deviation Settlement Mechanism. Persistent forecast errors or non-compliance with dispatch instructions may attract penalties under the Enforcement Part.

6.3 Part VIII provides a framework for participation of BESS in ancillary services, with provisions for frequency regulation, reserve services and commercial settlement, consistent with CERC Ancillary Services Regulations and MoP guidelines.

6.4 Part IX addresses open access and market participation by BESS, including principles for charging, wheeling, reactive power, scheduling and system

operation charges, in alignment with TNERC's Open Access and Green Open Access Regulations.

7. Behind-the-meter BESS, consumer protection and dispute resolution

7.1 Given the rapid emergence of BTM storage for backup, self-consumption, peak-shaving and prosumer applications, Part XIII sets out a dedicated framework for BTM BESS.

(a) This includes:

(i) approval or intimation requirements to the distribution licensee;
(ii) protection, metering and safety obligations;
(iii) conditions for participation in ancillary services;
(iv) clear rules on status as consumer-side assets and consequences of misuse; and
(v) operational restrictions, including on arbitrage and demand exceeding contract demand.

7.2 Consumer protection is ensured by routing BTM-related consumer disputes through existing TNERC Consumer Grievance Redressal Forum (CGRF) and Ombudsman mechanisms, while system-level disputes involving BESS developers, operators, licensees and the System Operator are handled by TNSLDC in the first instance and, thereafter, by the Commission.

7.3 Part XV sets out a graduated enforcement and penalty framework for technical non-compliance, operational non-compliance, data and reporting failures, safety violations, power-quality non-compliance and unauthorised BTM operation, with due process safeguards and consideration of force majeure and hardship.

8. Roles and responsibilities

8.1 Part XII clearly delineates the roles of BESS developers and operators, the System Operator (TNSLDC), transmission and distribution licensees, QCAs, consumers and prosumers.

Among other responsibilities:

(a) developers must ensure compliant design, installation, protection, performance and reporting;
(b) TNSLDC must integrate BESS into scheduling, dispatch, ancillary services and system strength planning;
(c) licensees must identify BESS needs in their planning and resource adequacy processes and maintain BTM BESS databases; and
(d) consumers and prosumers must adhere to safety, metering and operational requirements and avoid unauthorised injection.

8.2 This role clarity is necessary to avoid ambiguity in responsibilities for planning, operation and safety of BESS installations across the value chain.

9. Post-2030 regime and concessions

9.1 Recognising that current national and State policies provide various concessions and incentives for early BESS deployment, the Regulations contain a Post-2030 review clause under which the Commission shall review the concession framework by 30.11.2029 and notify the regime applicable from 01.01.2031.

9.2 This is intended to provide regulatory certainty for investments in the near term, while preserving flexibility to move towards more market-based pricing frameworks and evolving national policies in the longer term.

9.3 The provisions contained in the draft BESS Regulations seek to align the State-level framework for battery energy storage systems with national policy directions and emerging central-level regulatory practice, while taking into account the specific requirements of Tamil Nadu's power system, resource adequacy needs and consumer interest.

Sd/-
Secretary
Tamil Nadu Electricity Regulatory Commission