KSERC (Renewable Energy and Related Matters) Regulations 2025

The KSERC notified draft on (Renewable Energy and Related Matters) Regulations 2025. Issued on 30th May, 2025

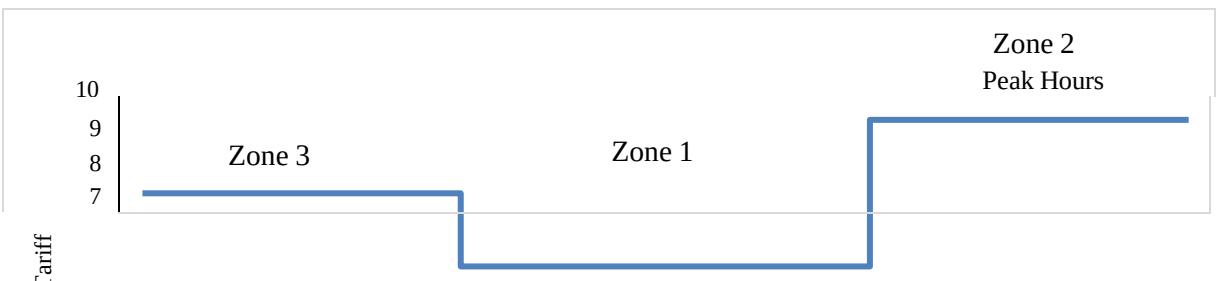
Objective: The draft documents to regulate the promotion, integration, and operation of renewable energy systems in Kerala, ensuring their safe and efficient grid connectivity. It aims to streamline processes for Net Metering, Gross Metering, Virtual Net Metering, and Open Access for various renewable energy generators. The regulations promote energy storage, grid stability, and consumer participation in renewable energy adoption through prosumer models. They also support Kerala's clean energy transition by setting guidelines for Renewable Purchase Obligations (RPO), tariff determination, and market facilitation.

The document can be accessed here

1. **Dynamic Peak hours:** As per the proposed Clause3 (68) "*Peak Hours' means the period from 18:00 hours to 23:30 hours on the same day:*
   Provided that, the time period specified above shall be applicable wherever ABT meters or smart meters or ToD meters programmed for the above time zone are installed and in all other cases the 'peak hours' shall be zone 2 (18:00 hrs to 22:00 hrs)".

   The electricity demand as well as market dynamics vary across seasons as well as time of the day. Peak/off-peak hours are to be guided by the relative electricity demand that may itself vary across the seasons. This would necessitate that the time zones mentioned in these regulations based on price or peak hours should be dynamic, be adjusted on a seasonal basis with observed/expected demand variation and the market prices.

2. **Arbitrage opportunity through V2G:** As per the proposed Clause 23(23.6) "*The A special Time-of-Use (ToU) tariff shall be introduced to encourage V2G participation, offering incentives for energy export during peak demand periods. Dynamic pricing mechanisms shall be explored to compensate EV owners based on real-time grid conditions.*
   Provided that, as an initial measure, the ***tariff for EV Charging stations during non-solar hours*** *shall be applicable for export of energy from V2G systems during peak hours, at appropriate voltage level". (emphasis added)*



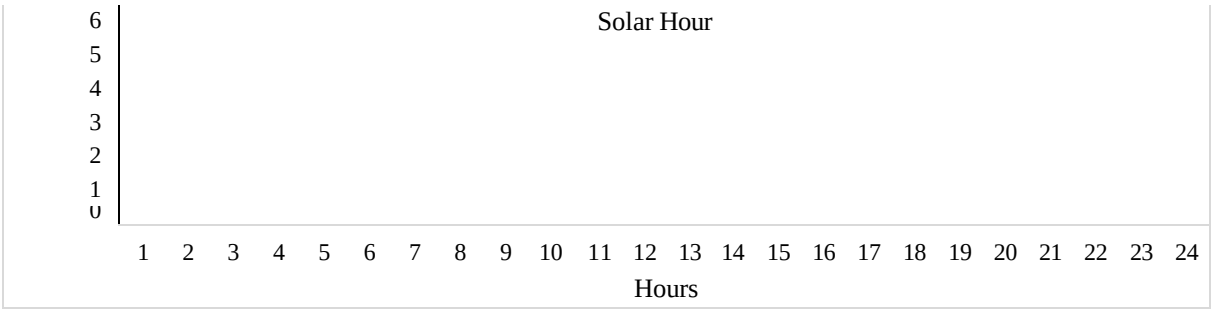


Figure 1: Zone-wise tariff for electric vehicle charging stations

Attractiveness of V2G export can only be ensured, if the vehicle owners are provided sufficient arbitrage in tariff (to be paid) for EV charging during the solar hours and price (to be received) for energy export during non-solar hours. If EVs are expected to charge during Solar hours and export electricity during peak-hours, the proposed tariff/price structure would not be attractive. Also note that such charging and export would also take a toll on the life and performance of the batteries.

Since discom's marginal cost of power procurement during peak hours is high (either due to market procurement or schedule of the most expensive PPA contract), the tariff offered for electricity export by EVs should be aligned to the same as the exported energy would replace such costly procurement. A treatment similar to the consumers with BESS system may be provided in such case as well i.e. compensation for energy injected by the EV owners is sufficiently higher than the tariff they have paid for EV charging.

3. **Challenges in ESO Accounting and the Case for REC-Based Compliance:** In the Proposed Clause 3(33) " '*Energy Storage Obligation' or 'ESO' means the obligation of an obligated entity to source a* ***portion of the energy from Energy Storage Systems*** *established as standalone ESS or in combination with RE sources, which shall be calculated as a percentage of the total consumption of electricity and shall be treated as fulfilled only when at least 85% of the total energy stored in the ESS is procured from RE sources, on annual basis". (Emphasis added)*

The energy stored by an ESS should include a minimum of 85% share of renewable energy to permit this to be accounted towards Energy Storage Obligation (ESO). While the energy injected and utilized form an ESS would be accounted towards the ESO, accounting of green energy stored and its sale/utilization would present a significant challenge. For example, how would be the energy sold by ESS (against that procured from RE and non-RE sources) across DAM/GDAM be accounted for. We have earlier suggested implementation of a REC-based compliance[1] mechanism that would provide a guarantee of origin and would address the accounting challenge for green energy and RPO compliance. This is further complicated by the fact that renewable energy procured from the ESS, would also be accounted towards RPO/RCO of the obligated entity. It becomes imperative to implement a mechanism ensuring guarantee of origin.

Regulatory Conclave on Energy Transition and Framework for RPO organized in March. 2025, CER, IIT Kanpur suggested a mechanism for REC-based RPO compliance to ensure

leakage proof accounting to help address such issues. Such a mechanism would be critical in preventing double counting or leakage, thereby strengthening the credibility and accuracy of RPO fulfilment

4. **Guarantee of Origin for non-electrical Renewable Energy:** [1]As per the proposed Clause 3(34) "*Energy Storage System' or 'ESS' means a device that stores the energy from variety of energy sources, including solar, wind and other RE sources etc., utilizing the methods and technologies like; solid state batteries, flow batteries, pumped storage,* ***compressed air, fuel cells, hydrogen storage or any other technology to store various forms of energy,*** *and to deliver the stored energy in the form of electricity to the grid or installation as and when needed". (Emphasis added)*

   Production and storage of non-electrical renewable energy cannot be monitored easily in the absence of a broader framework that provides a guarantee of origin. If an energy storage system, broadly defined here to include those capable of storing non-electrical energy (especially green hydrogen or compressed air), verification of renewable nature of the energy would become challenging for the nodal entity and would leave room for incorrect classification as well as disputes. A nation-wide mechanism, in line with the RECs, should be put in place to ensure guarantee of origin for non-electrical form of energy as well. The following input submitted to JSERC on its draft regulation on green energy open access[2] is relevant in the current context as well and may be considered
   "*mechanism to verify the purchase and use of green hydrogen or green ammonia by the obligated entity would also be required for considering them for meeting the RPO. The existing REC registry may be empowered to certify the same. Relevant procedures, protocols and accounting framework would be required to be specified for the same under the relevant CERC regulations*".

5. **Grid Support Charges and ESS:** In the Proposed Clause 3(41) "*Grid Support Charges' means the charges to be paid by the prosumers, CPPs and other users of the grid, for recovering the costs related to* ***energy storage****, grid balancing etc., for facilitating energy injection into the grid".*

   Grid support charges[3] are justifiable if, among other factors, grid-level energy storage is deployed by the distribution licensee to address uncertainty associated with the demand of CPPs and other users of electricity. In case, sufficient storage has been put in place by such users and is being utilized to address the uncertainty on their behalf, the consumer/CPP should not be required to pay for the uncertainty it has addressed at its end. **Grid support charges**

[1] Singh, A. (Ed.). (2024). Opinion on JERC (Terms and Conditions for Green Energy Open-Access) Regulations, 2024 [Draft], In *Regulatory Insights* (Vol. 06, Issue 04, pp. 22-24), Centre for Energy Regulation (CER), Indian Institute of Technology Kanpur. https://cer.iitk.ac.in/newsletters/regulatory_insights/Volume06_Issue04.pdf

[2] Singh A. (ed.). (2024), Opinion on JSERC (Terms and Conditions for Green Energy Open-access) Regulations, 2024, Regulatory Insights (Vol. 06, Issue 04, pp. 22-24), Centre for Energy Regulation (CER), Indian Institute of Technology Kanpur. https://cer.iitk.ac.in/periodicals/regulatory_insights/Volume06_Issue04.pdf

[3] Clause 33(33.2)(iv)The grid-support charge be applicable for energy storage systems the regulation Grid support charges at Rs. 1/- per unit until the Commission determines the Grid support charges based on an application of the licensee

can thus be differentiated for CPPs/consumers with storage, particularly BESS, which can quickly respond to address RE/demand uncertainty.

Cost incurred by the discom in procuring storage services used for 'balancing' needs, excluding that on account of energy arbitrage, should only be considered for calculation of grid support charges.

The clause may be rephrased as *"Grid Support Charges' means the charges to be paid by the prosumers, CPPs and other users of the grid, for recovering the costs related to grid balancing, and the associated costs including that for energy storage system, for facilitating energy injection into the grid".*

6. **Applicability of Tariff to Infirm Power:** As per the draft Clause 3(47) "*Infirm Power' means the power injected by a generation project into the grid prior to the Date of Commercial Operation (COD), for testing, trial run and commissioning of the project. Since power from renewable energy sources is non- firm in nature, the tariff fixed by the Commission post COD shall also be applicable for the power injected into the licensee system prior to COD for a maximum period of; one month for solar and wind projects, and six months for hydro projects, subject to the condition that the RE generator enters into an agreement with the licensee to supply power from the RE plant at the tariff determined by the Commission".*

   The approach and applicability of tariff determination should be addressed in a dedicated section of the Tariff Regulations specific to infirm power supply. Any related stipulations or provisions should be clearly outlined there.

   The infirm power from RE plants (especially solar and wind) brings greater uncertainty as this would not be scheduled, and hence should be subject to a Deviation Settlement Mechanism (DSM) as applicable, capped by the regulated applicable RE tariff for in-firm power determined by the Commission for the respective technology. To account for system wide impact of such in-firm power, the applicable tariff for the same should be lower than the regulated RE tariff determined by the Commission. This would also incentivize the developer to ensure timely commissioning of the project.

   Until specific regulations for intra-state DSM are notified, the tariff for infirm power may be determined based on inter-state DSM charges with the applicable regulated tariff for in-firm power being cap on the same.

7. **Status update via messaging:** In the Proposed Clause 17(17.5) "*The Distribution Licensee*

shall acknowledge the receipt of the application along with application reference number for tracking purpose, automatically through online mode".

This may be amended as,

"*The Distribution Licensee shall acknowledge the receipt of the application along with application reference number* ***through SMS/whatsapp message*** *for tracking purpose, automatically through online mode".*

8. **Duties and Obligations of a Virtual Power Plant (VPP):** In the Proposed Clause 21(21.2) "*The VPP shall be registered with the Distribution Licensee and shall also be allowed to provide services such as energy supply, frequency regulation, and demand response, subject to the conditions specified by the Commission".*

As per draft clause (21.1) a Virtual Power Plant (VPP) is an arrangement where distributed energy resources (DERs) such as rooftop solar, ESS, electric vehicles, and demand response systems are aggregated by a VPP operator. This aggregation would enable their collective participation in the market for electricity as well as ancillary services.

Several questions arise with respect to the duties and obligations of a VPP. Some of the key questions and their response are listed below

Table 1: Criteria for VPPs - Duties and Obligations

No.	Questions	Remarks
1	Would there be a minimum criteria for registering and functioning as a VPP?	Yes. Based on multiple criteria including – aggregated load, aggregated SPV capacity and aggregated storage capacity. Since a VPP would have 'open access' to the network, this should be related to the limit for green energy open access i.e. 100 kW load, x factor of 100 kW (x-related to the ratio between the permitted solar rooftop capacity wrt to the connected load/sanctioned demand)
2	Would the VPP have deemed 'open access' and hence the associated obligations?	Yes. Based on conditions similar to those applicable for green energy open access consumers.
3	Would there be restrictions to a VPP functioning as a load?	A VPP may transform into a 'competing retailer', if it can seamlessly access the power market, and more so if it enters into contracts for procurement of energy for 'charging of storage capacity'?
4	Would a VPP be treated like a	Both and hence respective obligations would

	consumer (and load during net charging mode), or generating company, or both? Would it have obligations and privileges as in the case of a captive power plant based on RE?	apply.
5	Would it be obligated to ensure adherence to grid code?	Yes.
6	Would there be scheduling obligations for the VPP and hence be subjected to the applicable DSM regulations?	Yes.
7	What would be the reporting obligations?	Yes. Similar to those applicable to a generating company with additional information disclosure about operation of the aggregated storage including storage status and charging/discharging.
8	Would a VPP be allowed to supply energy to open access consumers? Would it be treated like a trader in that case with applicable obligations?	Needs regulatory clarity.

To ensure transparency and accountability in the operation of a Virtual Power Plant (VPP) to its members, a VPP shall be registered with the Distribution Licensee, and would also have disclosure requirements to the discoms as well as its members in terms of its schedule and actual transaction with the grid and within its members. Such information should be disclosed through a centralized portal/webpage with SLDC.

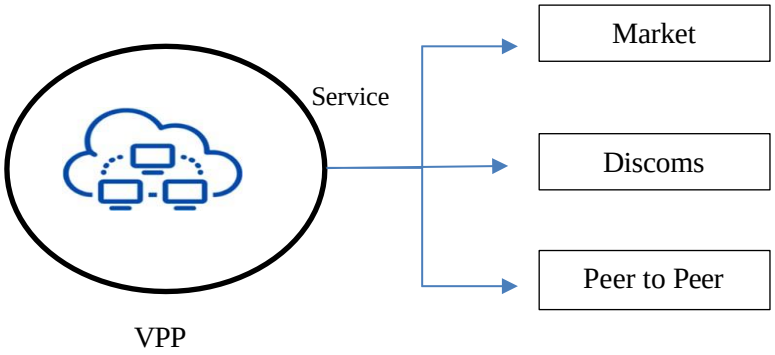


Figure 2: Role of Virtual Power Plant (VPP)

9. **Regulation of P2P transactions by Distribution licensee:** In the Proposed Clause 22(22.3) "*The distribution licensee shall act as the nodal agency for monitoring**, regulating**, and facilitating P2P energy transactions within its jurisdiction. It shall ensure grid stability, maintain power quality, and address any operational challenges arising from P2P transactions. The distribution licensee shall provide technical support to prosumers and consumers for smooth integration into the grid and ensure compliance with safety standards".*

While one would agree that the distribution licensee should monitor and facilitate P2P transactions, 'regulation' of such transactions would have far reaching consequences giving unbridled power to the distribution licensee. In the absence of a clear definition of 'regulating', in this context, P2P transactions may face hurdles. This includes specifying aspects such as the permissible time periods or days when P2P trading can occur, the quantum of energy that may be traded, and the margins or fees that may be charged by P2P trading platforms.

The regulation should outline a dispute resolution framework for P2P transactions as well for the Virtual Power Plant. Can disputes between consumers be taken up by a CGRF?

10. **Normalization factor for Energy Banking and its Drawal:** As per the proposed Clause 28(28.4) *"The exported energy in each time zone remaining after settlement as per clause (ii) above, if any, shall be normalized based on the normalization factor for the three time zones as indicated in Column A in Table 3 below to arrive at the banked quantum of energy*".

Time Zone		*Normalization factor to arrive at the banked quantum of energy*	*Normalization factor for taking back banked energy for energy offsetting*
		A	***B***
Solar Hours		*1.0*	*1.0*
Non-Solar Hours	*Peak Hours*	*1.5*	*0.667*
	Off Peak Hours	*1.15*	***0.85***

Differentiation in the normalization factor for banking/drawing banked energy across different times zones is justified as it assigns differentiated value based on time of the day. The product of the normalization factor (i.e. A * B) across the solar and peak hours (non-solar) is unity, whereas this does not translate to unity in the case of Off-peak hours (See Table 2 below). **To ensure parity in the conceptual framework, normalization factor for taking back banked energy for energy offsetting during off-peak hours should be 0.87.**

Table 2 – Normalisation Factor for Banked Energy and its Drawal

Time Zone		Normalization factor to arrive at the banked quantum of energy	Normalization factor for taking back banked energy for energy offsetting	
		A	B	A*B
Solar Hours		1.0	1.0	1
Non-Solar Hours	Peak Hours	1.5	0.667	1
	Off Peak Hours	1.15	**0.85 (draft regulation)**	0.977
			0.87 (proposed)	**1**

From an investment and incentive perspective, the normalization factor applicable during peak and off-peak hours must be sufficiently high to incentivize adoption of storage technologies. The current normalization factor does not provide adequate compensation to justify investments in such storage systems. Consider two scenarios for net metering one involving only rooftop solar, and another including energy storage.

* Rooftop Solar Only: In this scenario, the consumer's load profile and solar generation are as shown in Figure 3. During solar hours, surplus energy is directly injected into the grid. During other periods, energy is imported from the grid.

* Net Metering with Storage: In the presence of energy storage, surplus energy generated during solar hours is likely to be stored in the battery and discharged during peak (less, likely during off-peak hours). In this case, the normalization factor must account for battery charging and discharging losses to adequately compensate for energy losses. (Figures 3 - 5)

For example, given a level of charging and discharging efficiencies, and loss in storage, the actual energy available for export from 1 kWh of energy charged into the battery would be as follows.

Exported energy (kWh) = 1 (energy stored) × 0.95 (inverter charging efficiency) × 0.95 (storage losses in battery) x 0.95 (inverter discharging efficiency) = 0.857 kWh (1)

If the current compensation factor for peak hours is 1.5, the compensation received would be = 0.857 × 1.5 = 1.286 kWh (2)

In case of tariff for solar and non-solar hours is not significantly differentiated, there would be sufficient incentive for investment in storage technology. For example, tariff during solar hours is 20% lower than that applicable for other hours (including peak hours). The value of stored energy would be,

= (1.286 – 1) x P /0.8 = 0.3575 x P

where, P is the base energy charge (Rs. / kWh) and would depend on the applicable block-wise tariff

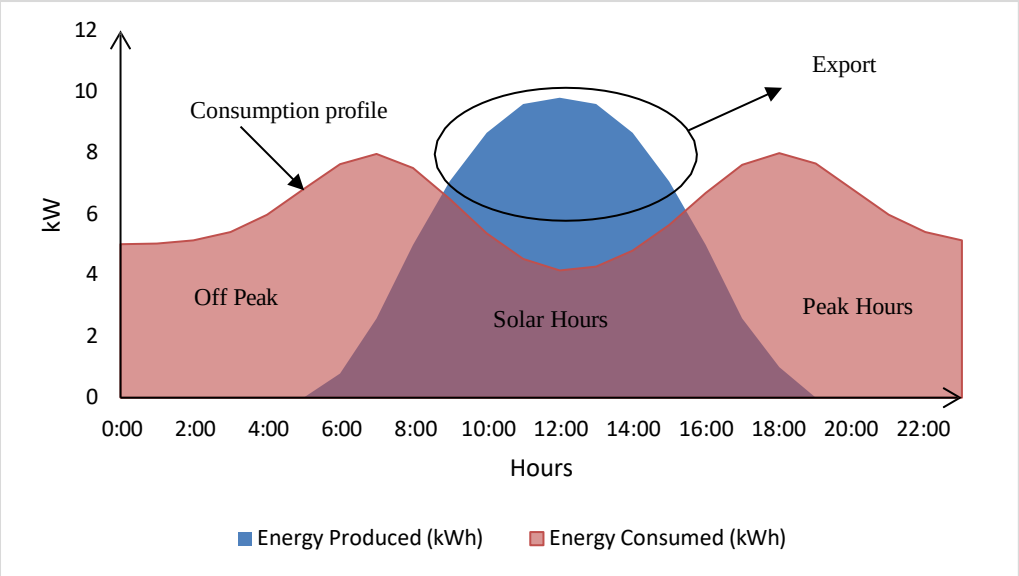


Figure 3: Scenario without ESS

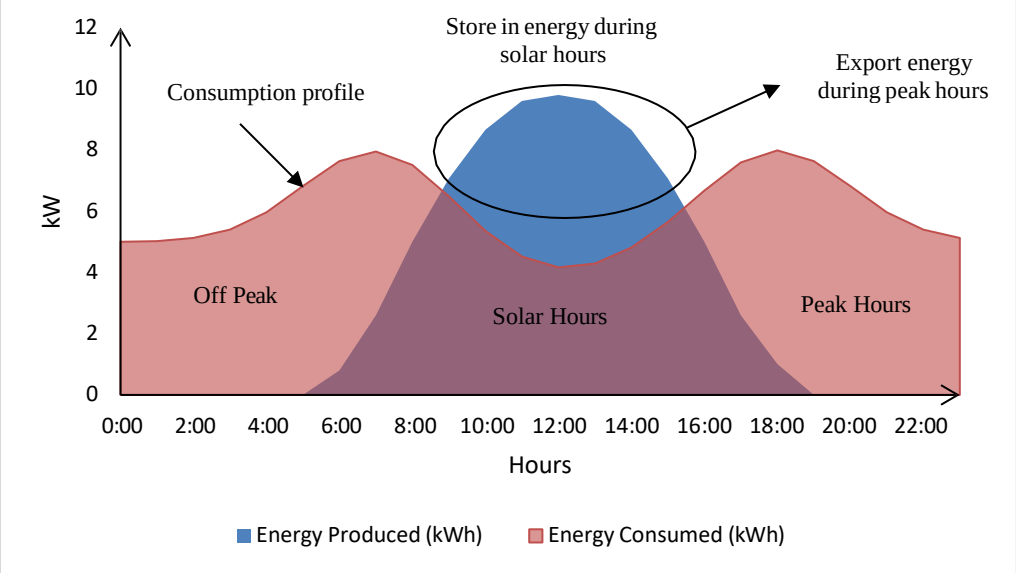


Figure 4: Scenario with ESS

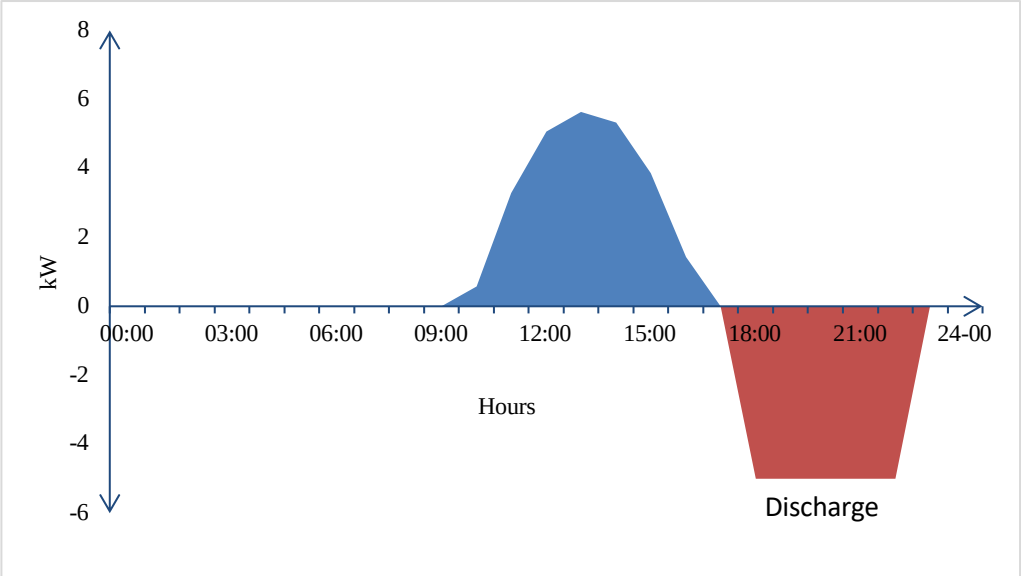


Figure 5: Charging and discharging of an ESS

The economics of storage would be based on cost of storage technology, expected utilization, consumer tariff and cost of financing. The existing normalization factor is insufficient to account for charging and discharging losses and to ensure the economic viability of installing such storage systems. **As an alternate, tariff can be differentiated across solar, peak and off-peak hours (depending on metering capability) along with corresponding tariff for injection of power to the distribution system.**

11. **Adjustment amount of Consumer Credits Below and Above ₹500:** In the Proposed Clause 28(28.4 (vi) *The amount, if any, at the credit of the prosumer at the end of the financial year shall be paid by the distribution licensee to the prosumers before 30th April of the subsequent financial year*

Adjustment of credit, in case of payment would involve administrative overheads, more specifically in terms of verification of the bank account of the consumer supported with necessary documents. Furthermore, each credit would also require multiple cross-checks/approvals. Against this adjustment against consumer's bill would have significantly lower administrative burden. **Furthermore, credit to be adjusted against future bills should earn a rate of interest equivalent to that applicable for working capital.**

The following approach may be adopted.

- Credit below Rs. 500* – to be adjusted against future bills with applicable interest rate
- Credit above Rs. 500 (after adjustment against current bill),
- - to be adjusted against future bills with applicable interest rate.
- - to be paid to the consumer immediately to consumer’s bank account

*- The Commission may determine the limit based on likely size of a PV installation, expected bill etc. Consumer's consent including the choice for credit above the selected limit to be selected at the time of application for behind the meter installation.