How much would energy storage cost in India by ?By , the LCOS for standalone BESS system would be Rs 4.1/kWh and that for co-located system would be Rs 3.8/kWh. This implies that adding diurnal flexibility to ~20-25% of the RE generation would cost an additional Rs 0.7-0.8/kWh by . What is the value of energy storage in India? How would it be dispatched? How much storage is required? How much battery demand will India have by ?According to NITI Aayog and Rocky Mountain Institute estimates, India will account for 800 GW of battery demand per year by . In another report, the Energy Transitions Commission (ETC) projects that the levelized cost of storage systems in India will reduce from $0.41 (~INR30.8)/kWh in to $0.17 (~INR12.8)/kWh in . How much energy storage will be installed by ?An analysis by the IESA estimates that the projected cumulative energy storage installation in the country is expected to be 110GWh by the year under the best-case scenario. The key drivers for BESS deployment are performance improvements, cost-effectiveness, grid modernization, ancillary services, policy, and regulatory support. What is the energy storage demand in India?ter 44%Source: CES analysisEnergy storage market in India witnessed a demand of 23 GWh in with 56% of the battery demand coming from p wer backup inverter segment. During -, the cumulative potential for energy storage in behind the meter and grid side applications is estimated to be close to 190 GWh by I Are energy storage projects being built in India?According to a report published by the Lawrence Berkeley National Laboratory (LBNL), a large number of energy storage projects are being built worldwide, and there is a significant interest among policymakers in India as well. How India is promoting the adoption of energy storage systems?India has begun to invest in energy storage and develop policy to support the development of battery storage. The Ministry of Power in India has taken a significant step in promoting the adoption of energy storage systems (ESS) by introducing an Energy Storage Obligation (ESO) alongside the Renewable Purchase Obligation (RPO). In this context, the dramatic decline in energy storage costs--marked by a nearly 90% reduction in global storage prices over the last decade and recent energy storage auctions in India reflecting a 65% cost reduction since --could be a pivotal moment. In this context, the dramatic decline in energy storage costs--marked by a nearly 90% reduction in global storage prices over the last decade and recent energy storage auctions in India reflecting a 65% cost reduction since --could be a pivotal moment. Storage Requirement: India will need 61 GW of energy storage capacity by and 97 GW by to support its clean power targets By , a total of 61 GW/218 GWh of energy storage is projected to be cost-effective to support 500 GW of clean power capacity. This requirement is expected to grow to aintaining its position as the cheapest form - in terms of $/kWh - of grid-scale energy storage. Of all countries here compared, costs are cheapest in India, which already hosts a large instal ed capacity of MW (the 7th largest in the world) with more projects in the pipeline (CEA). It Recent & projected costs of key grid-scale standalone storage technologies for 4-hr Figure 2. Estimated current & projected LCOS of key grid-scale storage technologies in India 7 Figure 3. Battery supply chain by segment The levelized cost of storage (LCOS) of standalone BESS is estimated to be INR7.12/kWh (~$0.095/kWh) by , INR5.06/kWh (~$0.07/kWh) by , and

INR4.12/kWh (~$0.06/kWh) by . The report further states that the additional per-unit cost for a solar project with a storage system in India will be By , the LCOS for standalone BESS system would be Rs 4.1/kWh and that for co-located system would be Rs 3.8/kWh. This implies that adding diurnal flexibility to ~20-25% of the RE generation would cost an additional Rs 0.7-0.8/kWh by . What is the value of energy storage in India? How would ems (Standalone ESS) emerging as a key enabler. As the country rapidly scales up variable renewable energy (VRE), Standalone ESS offers a dispatchable solution to address the intermittency of renewables, su andalone ESS functions as an independent asset. Utilities, grid operators or third-party Strategic Pathways for Energy Storage in India through In this context, the dramatic decline in energy storage costs--marked by a nearly 90% reduction in global storage prices over the last decade and recent energy storage auctions in India Figure 1. Recent & projected costs of key gridFigure 1. Recent & projected costs of key grid- scale storage technologies in India, China, & the US aintaining its position as the cheapest form - in terms of $/kWh - of grid Roadmap for India: - Developed a detailed Energy Storage Roadmap for India for deployment of different ESS technologies with timelines under various scenarios of VRE and EV penetrations Review of Grid-Scale Energy Storage Technologies Globally Using scenario-based capacity expansion modeling to assess how much energy storage can be cost effectively deployed in India through , the study finds that energy storage becomes Levelized Cost of Storage for Standalone BESS Could The levelized cost of storage (LCOS) of standalone BESS is estimated to be INR7.12/kWh (~$0.095/kWh) by , INR5.06/kWh (~$0.07/kWh) by , and INR4.12/kWh (~$0.06/kWh) by . Grid-Scale Battery Storage: Costs, Value, and Regulatory Estimated LCOS for standalone and co-located BESS in India By , the LCOS for standalone BESS system would be Rs 4.1/kWh and that for co-located system would be Rs The Standalone Energy Storage Market in India 1 Standalone Energy Storage Systems (ESS) are rapidly emerging as a key market, with 6.1 gigawatts of tenders issued in the first quarter of alone, accounting for 64% of the total India's Energy Storage to Grow 5X by , Driven by INR4.79 Costs have decreased dramatically, enhancing the sector's commercial viability. The Stationary Energy Storage India (SESI) conference brought together 200+ global Gap Analysis for Deployment of Grid-Scale Storage To boost the installation of the energy storage system and reduce the cost of storage, MOP introduced the trajectory for Energy Storage Obligation (ESO) up to -30.Levelized Cost of Storage for Standalone BESS Could Levelized Cost of Storage for Standalone BESS Could Reach INR4.12/kWh by : Report Battery energy storage system based on low-cost lithium-ion batteries can enable India to meet the morning and evening peak BESS capital cost in India drops to Rs 3.41/kWhThe latest SECI solar + storage auction results are a testament to this trend, with prices hitting a low of Rs 3.41/kWh. The key question is what BESS capital cost makes these prices possible ? India's battery storage capacity hits 219.1 MWhIndia's installed battery storage capacity reached 219.1 MWh at the end of March . A recent Mercom report predicts that the nation will add 1.6 GWh of standalone battery storage and 9.7 GW BESS Market in India The storage market is already making sustained gains and is expected

to flourish with near term market size of close $160 Billion and grow further to $ 300 Billion by . Interestingly this Cost Projections for Utility-Scale Battery Storage: UpdateExecutive Summary In this work we describe the development of cost and performance projections for utility-scale lithium-ion battery systems, with a focus on 4-hour duration India stand alone energy storage Xcel Energy, stand-alone, COD NVEnergy, COD LADWP, COD HI Electric, COD2021 HI Electric, COD2022 NV Energy, COD SVCECA, COD . 6 Gap Analysis for Deployment of Grid-Scale Storage Key Findings There is a significant potential for BESS deployment in India. An analysis by the IESA estimates that the projected cumulative energy storage installation in the Declining battery costs to boost adoption of battery energy The decline in battery costs over the past decade leading up to helped reduce the cost of energy storage and adoption of BESS projects globally. While the prices Energy Storage: Connecting India to Clean Power on Executive Summary The rapid expansion of renewable energy has both highlighted its deficiencies, such as intermittent supply, and the pressing need for grid-scale energy storage Key to cost reduction: Energy storage LCOS broken downEnergy storage addresses the intermittence of renewable energy and realizes grid stability. Therefore, the cost-effectiveness of energy storage systems is of vital importance, India's First Utility-Scale Standalone Battery Energy The GEAPP Leadership Council (GLC) today officially announced the launch of India's first utility-scale, standalone BESS project. Press Release:Press Information BureauThe disbursement of funds will extend up to -31 in 5 tranches. The cost of BESS system is anticipated to be in the range of INR 2.40 to INR 2.20 Crore/MWh during the period

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