ICEA
INDIA CELLULAR & ELECTRONICS ASSOCIATION

ENERGY STORAGE AND EV'S

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EVs and Energy Storage Work Together

- Growth in the EV market has important implications for the electricity grid
- The electric grid is facing a need for extra generation to produce the power EVs need
- Using energy storage for EV charging has some notable synergies with other benefits

Driver: Reducing the cost of EV batteries

Restraint: Lack of EV charging infrastructure

Opportunity: Government initiatives pertaining to EV's

Challenge: Standardization of EV charging infrastructure

- A smarter, more responsive grid backed by energy storage resources will provide the monitoring, communications, control, and computational capabilities to accommodate fast EV charging during peak demand periods.

EV and Electricity Storage Market Interactions

- EVs that are connected to the grid could be used in lieu of or in conjunction with electricity storage in emergencies or extreme supply shortages, to supply power to the grid.
- Proliferation of EVs could also lead to economies of scale and lower prices for advanced batteries and battery systems, including system management and grid integration (*i.e.*, monitoring, control, communications, interconnection, and computer algorithms).
- EVs and storage complement each other, and they may also drive more competition in the battery market.
- Energy storage will play a key role in responding to challenges that will arise as EV charging during on-peak hours becomes more common.

Types of Energy Storage Systems

- **Lithium-Ion Batteries –** cell phones and laptops because of their high energy per unit mass, relative to other electrical energy storage systems, high energy efficiency, good high-temperature performance, and low self-discharge

Concerns - relatively high cost, extend their useful life, and address safety concerns in regard to overheating.

- **Nickel-Metal Hydride Batteries -** in computer and medical equipment, offer reasonable specific energy and specific power capabilities

Concerns- high cost, high self-discharge and heat generation at high temperatures

- **Lead-Acid Batteries -** designed to be high power and are inexpensive, safe, and reliable

Concerns - low specific energy, poor cold-temperature performance, and short lifecycle

- **Ultracapacitors -**Energy storage capacity increases as the liquid's surface area increases. Ultracapacitors can provide vehicles additional power during acceleration and hill climbing and help recover braking energy

Concerns - useful as secondary energy-storage devices in electric-drive vehicles because they help

- electrochemical batteries level load power.

Growing importance of energy storage

- With sustainable energy sources in the energy mix, and a move towards more decentralized electricity systems, the need for energy storage becomes increasingly important in order to balance supply and demand.
- **Ways to store energy** - thermal storage, compressed air energy storage, hydrogen, pumped hydroelectric storage, flywheels and batteries.
- **Two ways that the batteries from EVs can be used in energy storage:**

1. Through a vehicle-to-grid (V2G) system

2. Batteries at the end of their first life powering the EVs, can be reused as stationary energy storage batteries.

Stationary Energy Storage (SES) with batteries - are considered to be among the best ways to meet the challenges of energy storage.

EV batteries and ES- Advantages

- Cost efficiency
- Reduced carbon footprint
- Financial incentives
- Supply security
- Circular economy

DDG's

- Increasing value of renewable energy
- Solar
- Wind
- Any DDG available at the location

The Indian context

- Consolidated energy storage roadmap

	Consolidated Energy Storage Roadmap					
	Applications		Energy Storage (GWh)			
			2019-2022	2022-2027	2027-2032	Total by 2032
Stationary storage	Grid Support	MV/LV	10	24	33	67
		EHV	7	38	97	142
	Telecom Towers		25	51	78	154
	Data Centres, UPS and inverters		80	160	234	474
	Miscellaneous Applications (Railways, rural electrification, HVAC application)		16	45	90	151
	DG Usage Minimization		–	4	11	14
	Total Stationary (GWh)		138	322	543	1002
Electric Vehicle	E2W		4	51	441	496
	E3W		26	43	67	136
	E4W		8	102	615	725
	Electric Bus		2	11	44	57
	Total Electric Vehicles (GWh)		40	207	1167	1414
Total Energy Storage Demand (GWh)			**178**	**529**	**1710**	**2416**

PLI - ACC

- In order to push ahead domestic manufacturing of storage batteries, the government has approved a Rs 18,100 crore production-linked incentive (PLI) scheme that includes advanced chemistry cell (ACC) manufacturing.
- A National Mission on Transformative Mobility and Battery Storage has been launched to promote electric vehicle penetration in India and to support 50 GWh of domestic ACC manufacturing.

The features of the PLI scheme include:

- Cash subsidy offered on output or the volume of cells manufactured and sold
- Cells with higher performance specifications are eligible to avail incentives
- Subsidy benchmarks to consider quality or performance characteristics of cells

- **Three Companies signed Program** Agreement under (PLI) Scheme - Reliance New Energy Limited, Ola Electric Mobility Private Limited and Rajesh Exports Limited.
- In addition to the capacities allocated by the Ministry of Heavy Industries under the PLI Program, **private players are expected to create battery manufacturing capacity to the tune of~95 GWh.**
- This will be favorable to EV ecosystem and energy storage market as it will support the demand for EVs and renewable and attract investment in this sector.

In a Nutshell..

- **Defining energy storage**—factoring in its flexible nature and applications, and its categorization as generation, transmission and distribution assets.
- National Energy Storage Mission and Policy in the Act to take cognizance of the evolution of policies for energy storage sector over the last few years and the expected performance improvement and cost reduction over the next decade.
- Inclusion of Energy Storage Obligation (ESO) that consists of various existing and emerging cost-effective solutions that provide appropriate flexibility.
- Suggestions on building upon the National Smart Grid Roadmap by requiring state roadmaps to enable consumer production participation, renewable energy integration, future grid connectivity with micro-grids, EV (V2G and charging infra integration with utilities), differentiated supply (time of use, guaranteed supply, power quality, demand response and dynamic load management.
- PLI scheme for Advanced Chemistry Cell (ACC) (₹18,100 crore), PLI Scheme for automotive sector (₹25,938 crore) and Faster Adoption of Manufacturing of Electric Vehicles (FAME) (₹10,000 crore) will enable India to leapfrog from traditional fossil fuel-based automobile transportation system to environmentally cleaner, sustainable, advanced and more efficient Electric Vehicles (EV) based system.