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The Battery Race — India Cannot Afford to Be an Assembler in the Energy Transition

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INTERVIEW ANGLE

"India is building domestic battery manufacturing through PLI incentives. But China controls 70%+ of global battery supply chains — from lithium mining to cathode materials to cell manufacturing. Can India achieve genuine battery manufacturing self-sufficiency, or will it replicate the solar panel trap where Indian "manufacturers" are mostly assemblers of Chinese cells?"

When Waaree Energies announced its Rs 8,175 crore lithium iron phosphate battery gigafactory in Andhra Pradesh, the announcement was greeted with the usual round of congratulatory press releases. India's battery manufacturing capacity is indeed expanding. But enthusiasm should be tempered by an honest look at where India stands in the global battery value chain — and where it risks remaining stuck.

THE SOLAR PANEL WARNING — DO NOT REPEAT IT

India's solar panel industry offers a cautionary tale. After years of nominal "manufacturing" growth, a significant share of India's "domestically manufactured" solar panels were in reality **assembled** from Chinese cells and wafers — the high-value components in the supply chain.

The **Approved List of Models and Manufacturers (ALMM)** scheme and the Basic Customs Duty on imported panels (25% on modules, 40% on cells) have been attempts to change this incentive structure. The PLI for Solar PV Manufacturing (Rs 4,500 crore) explicitly requires domestic cell manufacturing.

The risk with batteries is identical. **Cell manufacturing is the value-intensive step** — it requires sophisticated electrode coating, electrolyte filling, formation cycling, and quality control in controlled environments. Pack assembly (connecting cells into battery packs) is relatively low-skill and low-value.

If India's "battery manufacturing" turns out to be mostly **pack assembly with imported Chinese LFP cells**, the Rs 18,100 crore PLI will have generated facilities, not sovereignty.

THE CHINA BATTERY DOMINANCE PROBLEM

The scale of Chinese battery supply chain dominance is staggering:

CATL (Contemporary Amperex Technology Co.) alone accounts for ~37% of global EV battery production

BYD adds another ~15-17%

Chinese companies collectively control ~60% of global lithium-ion battery production

China controls **~70% of global lithium refining** (even lithium not mined in China is often refined there)

China controls **~80% of global anode material** (graphite) production

China controls **~50-60% of global cathode material** (LFP, NMC precursors) production

India currently imports **~90% of its battery cells** from China and to a lesser extent South Korea/Japan. The Rs 8,175 crore Waaree facility and other ACC PLI projects will change the cell manufacturing picture — but only if they also secure upstream material supply.

THE CRITICAL MINERALS CHOKEPOINT

India's battery independence requires solving the **critical mineral supply problem** upstream of manufacturing. LFP batteries require lithium, iron, and phosphate. The iron and phosphate are available domestically. **Lithium is the problem.**

India's domestic lithium discovery in **Reasi, Jammu & Kashmir** (5.9 million tonnes, announced February 2023) is potentially significant — but exploration is early-stage. Converting a geological survey estimate to operational mining production takes **8-12 years** under normal timelines.

KABIL (Khanij Bidesh India Limited) is India's vehicle for overseas critical mineral acquisition. It has signed agreements in **Australia** (cobalt and lithium) and is negotiating in **Argentina and Chile** (lithium). But the pace is slow relative to the urgency.

The structural problem: China began its overseas mineral acquisition strategy in the **1990s-2000s** through CNMC, Chinalco, and dozens of SOE investments across Africa, South America, and Australia. India is starting **20-30 years late**.

WHAT GENUINE MANUFACTURING SOVEREIGNTY REQUIRES

The PLI for ACC Battery Storage, at Rs 18,100 crore, is sized for **50 GWh** of domestic production capacity. India's requirement by 2030 is **411 GWh** (CEA estimate for grid storage alone, before EVs). Even if PLI targets are fully met, it closes less than 15% of the gap.

True battery manufacturing sovereignty requires:

1. Deep localisation requirements, enforced. The ACC PLI already mandates domestic value addition (rising to 50% by Year 5). The government must enforce this rigorously — including by auditing whether "cell manufacturing" is genuine or merely pack assembly with imported cells.

2. Upstream mineral security through a dedicated fund. KABIL needs substantially more capital and a faster deal-closing mandate. India should also create a **Strategic Battery Mineral Reserve** (analogous to the Strategic Petroleum Reserve) to buffer supply disruptions.

3. Recycling infrastructure now. Battery recycling — recovering lithium, cobalt, and other materials from end-of-life batteries — is **urban mining** that reduces import dependence over time. India's battery waste will be substantial by 2030. A recycling ecosystem should be built ahead of, not after, the waste arrives.

4. R&D investment in next-generation chemistries. China dominates LFP and NMC today. Solid-state batteries, sodium-ion batteries, and other post-lithium chemistries are still contested territory. India's investment in basic battery chemistry research — through CSIR, IITs, DRDO — is inadequate relative to the strategic stakes.

India made the renewable energy transition a priority over a decade ago and is now a genuine solar and wind power. The battery transition is beginning. The question is whether India will be a **manufacturer or an assembler**, a **strategic actor or a dependent importer**. The answer depends on decisions made in the next 3-5 years.

UPSC RELEVANCE

ACC PLI (Rs 18,100 crore, 50 GWh), KABIL (NALCO + HCL + MECL), LFP battery chemistry, CATL, CEA (411 GWh BESS estimate), Strategic Petroleum Reserve (India's SPR locations), ALMM scheme (solar).

MAINS GS-3:

Energy transition; critical minerals; PLI policy design; India-China supply chain dependence; EV ecosystem; battery recycling.

INTERVIEW:

"How should India balance speed of energy transition with the need for supply chain sovereignty in batteries and critical minerals?"

📌 FACTS CORNER — KNOWLEDGEPEDIA

INDIA'S BATTERY IMPORT DEPENDENCE:

Cell import dependence: **~90%** (mainly from China and South Korea)

Annual battery imports: **~$5 billion+**

China's share of global battery production: **CATL (~37%) + BYD (~15-17%) + others = ~60%**

ACC PLI VS. NEED:

PLI target: **50 GWh** (by FY27-28)

CEA estimated need by 2030: **411 GWh** (grid storage alone)

Gap: **~360 GWh** — PLI covers <15% of total need

CRITICAL MINERAL SUPPLY CHAIN:

Lithium refining: China controls **~70% globally**

Graphite (anode): China controls **~80% globally**

Cathode materials: China controls **~50-60% globally**

India's domestic lithium: **Reasi, J&K** (5.9 MT, 2023) — still in exploration stage

KABIL:

Full form: **Khanij Bidesh India Limited**

JV: **NALCO + HCL + MECL**

Mandate: Acquire critical mineral assets abroad (lithium, cobalt, nickel, manganese)

Target countries: Australia, Argentina, Chile, Bolivia

SOLAR PLI LESSON:

ALMM: Approved List of Models and Manufacturers (controls panel imports)

BCD: Basic Customs Duty — 25% on modules, 40% on cells

Risk in batteries: Pack assembly using imported cells = not genuine manufacturing

OTHER RELEVANT FACTS:

India's SPR (Strategic Petroleum Reserve): 5.33 million MT at Vishakhapatnam, Mangaluru, Padur (~9.5 days of consumption)

Strategic Battery Mineral Reserve: Proposed (not yet created)

Battery recycling law: Battery Waste Management Rules, 2022 (India) — extended producer responsibility

Sodium-ion batteries: China's CATL commercialising these; no lithium needed; lower energy density but may suit Indian grid storage needs

Sources: Indian Express, Ministry of New and Renewable Energy, CEA

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