The Reliance New Energy Briefing Book

A Strategic Preparation Guide for the Incoming Strategy Lead

Written for deep reading and audio consumption. Every chapter is designed to be read aloud or converted to podcast format — conversational in tone, rigorous in substance.

> **How to use this book:** Each chapter opens with a "The Bottom Line" section — the single most important insight you need to carry into the room. Then the full strategic context follows. If you're short on time, read just the bottom lines. If you're preparing deeply, read end to end. Estimated total read time: 4–5 hours. Each chapter is roughly 20–30 minutes of audio.

Chapter 1: The Strategic Thesis — Why Reliance Is Betting the Next Decade on New Energy

The Bottom Line

Reliance Industries is not dabbling in clean energy as a hedge or a PR play. It is executing one of the largest energy transition bets by any single private company globally — over $10 billion committed since 2021, with the real capital deployment now accelerating to multiples of that figure. The strategic logic is not idealism. It is survival math. India's energy demand is projected to double in the next decade, the country has committed to net-zero by 2070 with aggressive interim targets, and Reliance's own oil-to-chemicals business — the cash engine that funds everything — faces a secular demand question over a 15-to-20-year horizon. The bet is straightforward: use the enormous cash generation of today's hydrocarbon business to build a dominant position in the energy system of tomorrow, before the window of capital advantage closes.

The India Energy Thesis

Let's start with the macro picture, because everything Reliance is doing in new energy is anchored to a single, powerful reality about India.

India generates roughly 1,600 billion units of electricity annually. That number is expected to double within the next decade. Not might double — is expected to, driven by GDP growth,

urbanization, industrialization, and the electrification of transport. This is not a speculative forecast. The power ministry, NITI Aayog, the IEA, and every credible energy modeler converges on essentially the same conclusion: India needs to build more power generation capacity in the next ten years than it built in the previous seventy.

Now layer on the climate commitment. India has pledged to achieve net-zero emissions by 2070 and to source 50% of its cumulative generation capacity from non-fossil-fuel sources by 2030. As of mid-2025, India's renewable energy installed capacity stood at roughly 227 GW, and the country has set a target of 500 GW of non-fossil fuel capacity by 2030. The gap between where India is and where it needs to be is enormous — and that gap is, in business terms, the addressable market.

This is the macro thesis that underpins everything Reliance is building. India needs vast quantities of clean energy, manufactured domestically to reduce import dependence, deployed at a cost that an emerging economy can actually afford. If you can build the infrastructure to supply that energy — the solar panels, the batteries, the hydrogen, the distribution network — you are not building a business. You are building a utility-scale platform at the heart of a $5+ trillion economy.

Why Reliance, Specifically?

This is the question a skeptic would rightly ask. There are dozens of companies chasing India's renewable energy market. Why should Reliance — an oil refining and petrochemicals conglomerate — be expected to win in solar panels, batteries, and green hydrogen?

The answer lies in three structural advantages that are genuinely difficult for competitors to replicate.

First, captive demand. Reliance is one of the largest consumers of energy in India. Its Jamnagar refinery complex alone consumes enormous quantities of power. The company currently produces and consumes large volumes of grey hydrogen in its refining operations. This means Reliance does not need to find external customers to justify its first wave of new energy investments. It is its own anchor customer. The solar panels it manufactures will power its own operations. The batteries it builds will store energy for its own grid. The green hydrogen it produces will replace the grey hydrogen it already buys. This captive demand floor dramatically de-risks the investment — the first several gigawatts of capacity are essentially pre-sold internally.

Second, the balance sheet. Reliance generated over ₹1.7 lakh crore in EBITDA in FY24 across its businesses. It can fund patient, long-cycle capital deployment at a scale that pure-play renewable companies simply cannot. Adani Green, ReNew, Tata Power Renewables — they are all capital-constrained relative to Reliance. When you are building giga-factories that take three to five years to reach full capacity, the ability to absorb early

losses and fund continued buildout without external capital raises is a decisive structural advantage.

Third, the conglomerate integration. This is the piece that pure-play competitors cannot replicate. Reliance's Jio digital platform gives it access to hundreds of millions of consumers — a distribution advantage for residential solar and battery products. Its retail network gives it physical distribution reach. Its Jio-bp fuel station network gives it ready-made infrastructure for EV charging and CBG distribution. Its O2C business gives it deep chemistry and materials science expertise directly applicable to battery manufacturing and carbon fibre. No other player in India's energy transition has this combination of digital reach, physical distribution, chemistry expertise, manufacturing scale, and balance sheet firepower.

The Ambani Conviction Factor

There is a fourth factor that is harder to quantify but strategically real: personal conviction at the top.

Mukesh Ambani has personally positioned the new energy transition as Reliance's defining strategic move for the next era. He announced the $10 billion commitment at the 2021 AGM and has escalated the ambition at every subsequent AGM. His son Anant Ambani now leads the clean energy division and gave his first board-level address at the 2025 AGM. This is not a side project being run by a mid-level business unit. It is the chairman's personal priority, with the next generation of family leadership directly in the operational seat.

In a promoter-driven conglomerate like Reliance, this matters enormously for capital allocation, organizational priority, and speed of execution. When the chairman says this is the company's future, every resource allocation decision across the group tilts accordingly.

What Must Go Right — and What Could Go Wrong

The strategic thesis rests on several assumptions that you should track constantly.

The first is execution at unprecedented scale. Reliance is simultaneously building a solar giga-factory, a battery giga-factory, an electrolyser giga-factory, a mega-scale solar deployment project, 55+ CBG plants, and green hydrogen derivatives infrastructure — all at the same time, mostly from greenfield. The sheer complexity of parallel mega-project execution is the single biggest risk to the strategy. Delays in one part of the chain cascade through the integrated system.

The second is technology performance at scale. The HJT solar technology from REC, the sodium-ion battery chemistry from Faradion, the alkaline electrolyser technology from Nel — these have been proven in labs and pilot lines, but not yet at the giga-scale Reliance is targeting. The gap between pilot and giga-scale production is where many technology bets

fail.

The third is policy stability. The entire economics of green hydrogen, solar manufacturing, and battery production in India depend heavily on PLI subsidies, customs duties on imports, blending obligations, and renewable purchase obligations. These policies are currently favorable. But they are government policies, and governments change. If the PLI payouts are delayed, or import duties are lowered to manage inflation, or blending mandates are relaxed — the unit economics shift materially.

The fourth is Chinese competitive response. Chinese solar manufacturers dominate global markets with cost structures that Indian producers, including Reliance, cannot currently match. If Chinese producers respond to India's domestic manufacturing push with aggressive pricing, dumping, or technology leapfrogging, Reliance's cost competitiveness window could narrow faster than expected.

These are not reasons to be bearish on the strategy. They are the stress-test points you need to monitor relentlessly.

Chapter 2: The Dhirubhai Ambani Green Energy Giga Complex — Jamnagar as the Manufacturing Nerve Center

The Bottom Line

Everything Reliance is building in new energy connects back to one physical location: the Dhirubhai Ambani Green Energy Giga Complex at Jamnagar, Gujarat. This is not a single factory. It is an integrated manufacturing ecosystem spanning solar PV, batteries, electrolysers, power electronics, raw materials, and glass production — all on a single campus. The build area is roughly four times the size of Tesla's gigafactory in Nevada. The steel order alone was reportedly enough to build a hundred Eiffel Towers. When someone asks you "what is Reliance actually building in new energy?" — the answer starts and ends at Jamnagar.

Why Jamnagar?

The choice of Jamnagar is not arbitrary. It is strategically deliberate for several reasons.

Jamnagar is already home to Reliance's integrated refinery and petrochemicals complex — the largest single-site refinery in the world. This means existing infrastructure: power, water (including desalination), port access, logistics, labor pools, and institutional relationships with the Gujarat state government. Building a green energy complex adjacent to the existing O2C complex creates immediate synergies — shared infrastructure, shared utilities, and

critically, a direct pathway for the grey-to-green hydrogen transition within the refinery itself.

There is also a symbolic dimension that matters in a promoter-led conglomerate. As Anant Ambani stated at the 2025 AGM, "Jamnagar is the face of New Reliance and New India." The old Jamnagar complex represents the hydrocarbon era that made Reliance. The new Jamnagar complex represents the clean energy era that Reliance is building toward. Locating both on the same campus sends an unmistakable signal — internally and externally — about strategic direction.

What Is Being Built

Let's walk through each manufacturing pillar, because understanding the integration is what makes this complex strategically distinctive.

Solar PV Manufacturing — the most advanced pillar. A fully integrated value chain that takes raw material (essentially, sand) and converts it all the way to finished solar modules. The chain runs: polysilicon → ingot → wafer → cell → module. Reliance is also manufacturing the specialized glass used in its modules. Initial capacity is 10 GWp per year, scaling to 20 GWp. Four module lines have been commissioned, the first cell line was coming online in Q3 2025, and the polysilicon and other upstream stages are in various stages of commissioning. Production is targeted to be fully running by end-2025 to early 2026.

Battery & Energy Storage Manufacturing — the 40 GWh giga-factory, with modular expansion capability to 100 GWh. This covers the full battery value chain: battery materials, cells, and packs. Significant civil construction has been completed, with production equipment ready for installation. The plan is to start with LFP chemistry (lithium iron phosphate — the safest, most cost-effective chemistry for stationary storage) and simultaneously develop sodium-ion cells based on Faradion's technology. Production is expected to commence in 2026.

Electrolyser Manufacturing — the giga-factory that will produce the machines used to split water into hydrogen and oxygen using renewable electricity. Based on Nel ASA's alkaline electrolyser technology under an exclusive Indian licensing arrangement. The electrolyser plant is being built at a 2,000-acre site in Kandla, with construction progressing and full operations expected by end-2025 or early 2026. Reliance has also qualified under the PLI scheme for manufacturing 300 MWe of electrolysers annually.

Power Electronics & Auxiliary Materials — the often-overlooked but operationally critical components: inverters, transformers, balance-of-plant equipment, and raw materials processing. Reliance is manufacturing these in-house rather than importing, which is unusual and strategically important — it reduces supply chain vulnerability and captures more of the value chain margin.

The “Smart Factory” Approach

One element worth flagging: Reliance is building these as AI-driven smart factories, not conventional manufacturing plants. This means embedded IoT sensors, digital twins of production lines, AI-based quality control and yield optimization, and automated logistics. The strategic significance of this is that it positions the factories for continuous cost reduction through software improvement — a dynamic that has proven enormously powerful in semiconductor and electronics manufacturing but has not yet been fully applied to energy equipment manufacturing.

The In-House EPC Advantage

A distinctive feature of Reliance’s approach: it is handling all engineering, procurement, and construction in-house, rather than contracting to external EPC firms. This is enabled partly by its 40% stake in Sterling & Wilson, one of the largest solar EPC firms globally. The advantage is tighter integration, better cost control, and faster iteration between manufacturing and deployment. The risk is that it concentrates execution complexity within a single organization.

The Integration Logic

Here is the key insight about Jamnagar that makes it strategically different from any other renewable energy manufacturing facility in the world: it is not building four separate products. It is building an integrated energy system.

The solar panels power the electrolysers. The batteries store the intermittent solar energy to enable round-the-clock electrolyser operation. The electrolysers produce green hydrogen. The green hydrogen feeds into the adjacent O2C complex (replacing grey hydrogen) and into downstream derivative plants (ammonia, methanol, SAF). The power electronics tie the entire system together.

No other company globally is building this full stack — from raw material processing through manufacturing through energy generation through green molecule production — at a single integrated site. This vertical integration is the core strategic moat. If it works, it creates a cost structure that disaggregated competitors cannot match.

Chapter 3: Solar PV Manufacturing — From Polysilicon to Module at 20 GW Scale

The Bottom Line

Reliance is building what it claims will be the largest and most vertically integrated single-site solar manufacturing complex in the world. Unlike most Indian solar manufacturers that import cells or wafers from China and assemble modules domestically, Reliance is manufacturing every step of the value chain — from polysilicon (the raw material) to finished modules — in-house at Jamnagar. The technology choice is Heterojunction Technology, or HJT, acquired through the $771 million purchase of REC Solar. As of mid-2025, the first 200 MW of HJT modules have been produced, the first cell line is being commissioned, and the roadmap calls for scaling from 10 GWp to 20 GWp annual capacity. This chapter is about understanding why these technology and integration choices matter, what the numbers tell us about competitiveness, and where the risks lie.

The Technology Bet: Why HJT Matters

Let's talk about the technology choice, because it is one of the most consequential strategic decisions in this entire portfolio.

There are essentially three generations of solar cell technology competing for dominance right now. The first is PERC — Passivated Emitter and Rear Cell — which is the incumbent workhorse that accounts for the majority of global production. It is proven, cheap, and mature, but it is approaching its theoretical efficiency ceiling. The second is TOPCon — Tunnel Oxide Passivated Contact — which is the current industry upgrade path being pursued by most Chinese manufacturers. It offers meaningfully better efficiency than PERC and can often be produced by retrofitting existing PERC lines. The third is HJT — Heterojunction Technology — which uses a different cell architecture entirely, combining crystalline silicon with thin-film amorphous silicon layers.

Reliance has bet on HJT. This matters for three reasons that a strategy lead should understand.

First, performance. Reliance's HJT modules deliver roughly 10% higher energy yield compared to conventional modules, 20% better performance in high-temperature conditions (critical for India's climate), and 25% lower degradation over the module's lifetime. In plain business terms: the same square meter of rooftop or ground space generates meaningfully more electricity with HJT, and it keeps generating more electricity for longer.

Second, long-term cost trajectory. HJT has a higher upfront manufacturing cost than PERC or TOPCon — this is the key challenge. But its cost curve is steeper, meaning it has more room for cost reduction as manufacturing scales. The bet Reliance is making is that at 10-20 GW scale, with fully integrated in-house manufacturing from polysilicon onward, HJT's total cost of ownership (considering the higher yield and lower degradation) becomes competitive with or superior to TOPCon.

Third, future-proofing. HJT's cell architecture is uniquely compatible with perovskite tandem cells — the next-generation technology that could push solar cell efficiency from today's 24-26% range to above 30%. Reliance's acquisition of Caelux, a perovskite technology company, signals it is already positioning for this next leap. If perovskite-tandem technology matures — and many researchers believe it will within five to seven years — Reliance's HJT manufacturing infrastructure becomes the platform for the upgrade, while companies that invested heavily in TOPCon may face a more expensive retooling.

The Numbers That Matter

Three numbers a strategy lead should track to assess whether Reliance's solar manufacturing bet is working:

Module efficiency (%): Reliance's current HJT modules are in the 22-24% efficiency range. The target, using improvements to the REC technology, is to push toward 26% by 2026, and eventually 28% with perovskite-tandem integration. The global frontier is currently around 26-27% for commercial modules. Every percentage point of efficiency improvement translates directly to lower levelized cost of energy — the ultimate measure of competitiveness.

Manufacturing cost per watt (₹/W or $/W): This is the number that determines whether "Made in India" solar can compete with Chinese imports. Chinese manufacturers currently produce TOPCon modules at roughly $0.09-0.12 per watt at factory gate. Reliance's fully loaded cost at scale has not been publicly disclosed, but the integrated value chain (polysilicon to module, plus in-house glass) is designed to close this gap. The PLI subsidies and Basic Customs Duty on Chinese imports provide a buffer, but long-term competitiveness needs to come from the manufacturing cost itself, not from policy protection.

Capacity utilization and ramp speed: The real test of a giga-factory is not its nameplate capacity — it is how quickly it ramps from first production to full utilization. Reliance has commissioned four module lines and is bringing cell manufacturing online. The speed of the ramp from 200 MW of modules produced to the full 10 GWp, and then to 20 GWp, will tell you whether the manufacturing execution is on track or struggling.

The BIS Certification Milestone

One detail worth noting: Reliance has obtained Bureau of Indian Standards (BIS) certification for its modules at up to 720 watt-peak. This is among the highest-rated certifications in the Indian market. BIS certification is required for modules to be sold in India, and it is also a prerequisite for inclusion in the ALMM — the Approved List of Models and Manufacturers — which governs procurement by government and public sector entities. This certification is not just a quality badge; it is a market access gate.

The Competitive Risk: China

Let's be direct about the biggest competitive risk. China dominates global solar manufacturing with roughly 80%+ market share across the value chain. Chinese companies like LONGi, JA Solar, Trina Solar, and Jinko have spent over a decade building scale, driving down costs, and moving faster on technology transitions. They have already transitioned their factories from PERC to TOPCon at enormous scale.

Reliance's counter-arguments are real: vertical integration from polysilicon onward reduces import dependence, the PLI scheme and customs duties provide margin protection, and HJT's performance advantage in Indian climate conditions creates genuine differentiation. But the risk of Chinese manufacturers responding with further price compression — or leapfrogging to tandem technologies faster — is not theoretical. It is the central competitive question for this business.

Chapter 4: The Kutch Mega-Project — From Manufacturing to Generation at National Scale

The Bottom Line

If Jamnagar is where Reliance makes the equipment, Kutch is where it deploys that equipment at a scale that is difficult to overstate. Reliance is developing one of the world's largest single-site solar projects on 550,000 acres of arid land in Kutch, Gujarat — an area roughly three times the size of Singapore. At peak deployment, the plan calls for installing 55 MW of solar modules and 150 MWh of battery storage containers every single day. The project is expected to begin commissioning solar generation in the first half of FY27 (April–September 2026). If executed as planned, this single site could supply nearly 10% of India's electricity needs within the next decade. This chapter is about understanding the scale, the logistics, the strategic function, and the execution risks of this deployment.

The Scale in Context

Let's pause and put 550,000 acres in context, because the number can feel abstract.

This is approximately 2,200 square kilometers. For comparison, the land area of Delhi is about 1,480 square kilometers. The entire city of London is about 1,570 square kilometers. Reliance is developing a solar project on a land area significantly larger than either.

The land is arid, largely barren, and selected precisely because it has limited agricultural or ecological value but receives some of the highest solar irradiance in India. Kutch's geography — flat, dry, cloud-free for most of the year — makes it one of the best solar

resource sites in Asia.

The Deployment Machine

The most striking number in the Kutch project is not the total capacity — it is the deployment rate. At peak operational capacity, Reliance plans to install 55 MW of solar modules and 150 MWh of battery containers every single day.

To put this in perspective: most large-scale solar projects globally take months to deploy a few hundred megawatts. Reliance is targeting a daily installation rate that many countries do not achieve in a quarter. This requires an almost factory-like approach to field deployment — standardized module arrays, pre-assembled battery containers, automated logistics from Jamnagar manufacturing to Kutch deployment, and an army of skilled installation crews operating in parallel across the site.

This is the direct operational link between Jamnagar and Kutch. The solar modules roll off the Jamnagar production lines, travel via road and rail to the Kutch site, and are installed into pre-engineered arrays. The battery containers, also produced at Jamnagar, follow the same supply chain. The marine and land infrastructure at Kandla port — situated between Jamnagar and Kutch — serves as the logistics bridge, and will eventually also be the export gateway for green hydrogen derivatives.

The Strategic Function: Captive Demand + Green Molecules

The Kutch project serves two distinct strategic functions.

The first is captive power. The solar generation will supply Reliance's own operations — its refinery complex, its petrochemical plants, its telecom and retail infrastructure, and the electrolysers producing green hydrogen. This captive demand model means the project does not depend on winning competitive bids or negotiating Power Purchase Agreements with state distribution companies to achieve utilization. The first tranche of generation has a guaranteed internal customer.

The second is green molecule production. A significant portion of the Kutch solar output will feed into electrolysers that produce green hydrogen, which in turn will be converted into green ammonia, green methanol, and sustainable aviation fuel. The marine infrastructure at Jamnagar and Kandla connects directly to the Kutch site, enabling large-scale production and export of these green derivatives. This is how Reliance transforms from a domestic energy player into a global exporter of green molecules.

Reliance has also begun participating in external RE PPAs — Power Purchase Agreements. The first was a 128 MW agreement with MSEDCL (Maharashtra State Electricity Distribution Company) for 25 years. Through its subsidiary Juniper Green Energy, it has also signed agreements with NHPC for a 250 MW firm and dispatchable renewable energy project.

These are early moves into the merchant power market that will expand as generation capacity scales.

The Execution Risks

The Kutch project carries several risks that you should track.

Land development and permitting at this scale is inherently complex, even in arid, low-population areas. Environmental clearances, tribal land rights, grid connectivity infrastructure, water access for module cleaning and electrolyser operations — each of these can create bottlenecks.

Grid evacuation is a critical constraint. Generating hundreds of gigawatts of solar power is meaningless if you cannot evacuate it into the grid. The transmission infrastructure in Kutch will need massive upgrades, and this depends on coordination with central and state transmission utilities. Delays in transmission buildout can strand generation capacity.

Weather and logistics in the Rann of Kutch are non-trivial. Extreme heat, dust storms, and the monsoon cycle create operational windows and downtime that must be factored into deployment schedules.

These are execution risks, not strategic risks — they do not undermine the logic of the project, but they can significantly affect the timeline and cost.

Chapter 5: Battery & Energy Storage — A Multi-Chemistry Bet from Cell to Grid

The Bottom Line

Reliance is building a 40 GWh battery giga-factory at Jamnagar, with a modular expansion path to 100 GWh — which would make it one of the largest battery manufacturing facilities outside China. Rather than betting on a single battery chemistry, Reliance has assembled a portfolio of three distinct technologies through acquisitions: lithium iron phosphate (LFP) via Lithium Werks, sodium-ion via Faradion, and liquid metal via Ambri. Each serves a different market segment and risk profile. The strategic logic is that in an integrated renewables ecosystem, the storage layer is not an accessory — it is the enabler that makes intermittent solar and wind generation viable for 24/7 industrial and grid applications. Owning the storage layer, rather than buying it from Chinese or Korean suppliers, is a critical vertical integration bet.

Why Battery Storage Is the Strategic Linchpin

Here is a foundational concept to internalize: solar panels generate electricity only when the sun shines. India gets roughly 5-7 hours of peak solar generation per day, depending on location and season. But industrial operations, grid demand, and electrolyser operations run around the clock.

The gap between "when solar generates power" and "when that power is needed" can only be bridged by energy storage. Without large-scale, cost-effective batteries, solar remains a part-time energy source. With batteries, it becomes a round-the-clock power platform. This is why Reliance calls its vision "round-the-clock renewable power" — and why the battery giga-factory is not a separate business, but an integral part of the solar-to-hydrogen ecosystem.

The Three Chemistries: What They Are and Why Each Matters

Lithium Iron Phosphate (LFP) — the workhorse. Acquired through the Lithium Werks deal ($61 million for assets including 219 patents, manufacturing facilities, and the Nanophosphate technology platform). LFP is cobalt-free and nickel-free, which makes it cheaper and more ethically sourced than NMC (nickel-manganese-cobalt) chemistries. It offers excellent safety (very low fire risk), long cycle life (thousands of charge-discharge cycles), and proven performance at scale. The tradeoff is lower energy density — meaning more physical space and weight for the same energy stored — but for stationary applications like grid storage and industrial backup, this is a non-issue. LFP is the chemistry Reliance will deploy first and at the largest scale. It is also the chemistry that has taken over the Chinese EV and storage market, driven by CATL and BYD.

Sodium-Ion — the disruptor. Acquired through the Faradion deal (£100 million, later rebranded as Reliance's sodium-ion R&D arm). Sodium-ion batteries use sodium instead of lithium as the charge carrier. Sodium is vastly more abundant and cheaper than lithium, and it is available domestically in India — eliminating import dependence on lithium supply chains concentrated in Australia, Chile, and China. The tradeoff is that sodium-ion has lower energy density and is less mature than LFP. But for grid-scale storage where weight and size matter less than cost per kilowatt-hour, sodium-ion is a potentially game-changing technology. Reliance is targeting MW-level sodium-ion cell production industrialization, with plans to rapidly scale to giga-scale. This is still in the early commercialization phase — watch the pilot line performance data closely.

Liquid Metal (Ambri) — the long-duration play. Ambri's technology uses calcium and antimony electrodes in a molten salt electrolyte. It is designed specifically for long-duration energy storage — 8 to 24+ hours — which is the segment where lithium-ion and sodium-ion batteries are not cost-effective. Long-duration storage is critical for grid reliability during extended periods without solar generation (nights, monsoon season, cloudy stretches). This is the most experimental of the three chemistries. Ambri has demonstrated its technology in

pilot installations, but giga-scale commercial deployment is still ahead. Think of this as Reliance's option on the long-duration storage market.

The Numbers That Matter

Manufacturing cost per kWh: This is the definitive metric for battery competitiveness. Chinese LFP cell prices are currently in the $50-60/kWh range at factory gate. Reliance needs to approach this range at its 40 GWh scale to be competitive without ongoing subsidy support. The PLI scheme for Advanced Chemistry Cells provides initial support, but the long-term business case requires manufacturing cost parity or near-parity with Chinese producers.

Cycle life and degradation: For grid-scale storage, the battery needs to cycle daily for 15-20 years. LFP typically delivers 4,000-6,000 cycles. Sodium-ion is improving but generally sits in the 2,000-4,000 range currently. These numbers directly affect the levelized cost of storage — the metric that determines whether battery-backed solar is cheaper than coal or gas-fired power.

Sodium-ion commercialization timeline: The speed at which Reliance moves sodium-ion from MW-level pilot to GWh-scale production is one of the most important technology signals to track. If sodium-ion reaches cost parity with LFP at scale — which is theoretically possible given the raw material cost advantage — it fundamentally changes the economics of grid storage in India.

The Product Portfolio

Reliance is not just manufacturing cells. It is building a BESS (Battery Energy Storage System) product portfolio across multiple market segments: utility-scale grid storage, commercial and industrial backup, residential storage, telecom tower backup, and mobility (EV battery packs). The company plans to start with assembling BESS for utility-scale applications and pack solutions, then integrate backward into cell manufacturing, and eventually into battery chemicals production. This staged approach — assemble first, integrate backward — is a de-risking strategy that allows revenue generation to begin before the full manufacturing chain is operational.

Chapter 6: Green Hydrogen & Electrolysers — The Fuel of the Future at Giga-Scale

The Bottom Line

Green hydrogen is the most ambitious — and most uncertain — pillar of Reliance's new

energy strategy. The company is targeting 3 million metric tonnes per annum (MMTPA) of green hydrogen equivalent production capacity by 2032, which would make it one of the largest green hydrogen producers globally. The initial focus is replacing the grey hydrogen already consumed in Reliance's own refinery operations — a smart de-risking move, because it creates guaranteed demand without needing external customers. The electrolyser giga-factory, built using technology licensed exclusively from Norway's Nel ASA, is under construction at Kandla with operations expected by late 2025 or early 2026. Reliance has also qualified under the PLI scheme for both electrolyser manufacturing (300 MWe) and green hydrogen production (90 kTPA). The critical question is cost: green hydrogen is currently two to three times more expensive than grey hydrogen. The entire strategy depends on driving that cost down to $2/kg or below — and the timeline for achieving that is the single most important variable in this chapter.

What Is Green Hydrogen and Why It Matters

Let's make sure the fundamentals are clear, because this is a technology where a lot of people nod along without truly understanding the strategic implications.

Hydrogen is the most abundant element in the universe, but on Earth it does not exist freely — it must be extracted from other molecules. Today, the vast majority of hydrogen is produced by steam methane reforming: you take natural gas, heat it, and split it into hydrogen and carbon dioxide. This is called grey hydrogen, and it is carbon-intensive. Reliance already produces and consumes large quantities of grey hydrogen in its refining operations.

Green hydrogen is produced differently. You take water, run an electric current through it using a device called an electrolyser, and it splits into hydrogen and oxygen. If the electricity comes from renewable sources — solar, in Reliance's case — the entire process is zero-carbon. The hydrogen molecule is identical. The difference is how it was made.

The strategic significance of green hydrogen extends far beyond simply replacing grey hydrogen. Hydrogen is a versatile energy carrier that can be used in industrial processes (steel, ammonia, refining), as a transportation fuel (fuel cells for trucks, ships, potentially aviation), as a feedstock for green chemicals, and as a means of storing and transporting renewable energy across long distances and time periods. If green hydrogen becomes cost-competitive with grey hydrogen — and eventually with natural gas — it unlocks a multi-trillion-dollar global market transformation.

Reliance's Electrolyser Strategy

The electrolyser is the machine at the heart of green hydrogen production. Reliance's approach to electrolysers is based on two key technology partnerships.

The primary partnership is with Nel ASA, a Norwegian company that is one of the world's leading manufacturers of alkaline electrolysers. Reliance has an exclusive licensing deal with Nel to manufacture alkaline electrolysers in India. Alkaline electrolysers are the most mature and proven electrolyser technology — they have been used in industrial hydrogen production for decades. They are less efficient than newer PEM (Proton Exchange Membrane) electrolysers, but they are cheaper, more durable, and easier to scale. For a company that needs to deploy electrolysers at giga-scale with high reliability, alkaline is the rational choice.

The secondary partnership is with Stiesdal, a Danish cleantech company, focused on pressurised alkaline electrolyser technology — an advanced variant that offers higher efficiency and a more compact form factor while maintaining the robustness of alkaline systems.

The electrolyser plant is being developed at a 2,000-acre site in Kandla, strategically positioned near both the Jamnagar manufacturing complex and the Kutch solar generation site. Construction is progressing, with full complex operations expected by end-2025 or early 2026.

The Cost Challenge: The Number That Determines Everything

Green hydrogen's commercial viability hinges on one number: the production cost per kilogram.

Grey hydrogen currently costs roughly $1.0-1.5/kg in India, depending on natural gas prices. Green hydrogen currently costs roughly $3-5/kg globally, with India-specific estimates in the $3-4/kg range for well-executed projects.

The magic number that everyone in the industry is targeting is $2/kg — the threshold at which green hydrogen becomes competitive with grey hydrogen in most applications without subsidy support. Some analysts project that India could reach $2/kg by 2028-2030, driven by falling solar power costs, improving electrolyser efficiency, and manufacturing scale.

Reliance's integrated approach — manufacturing its own solar panels, batteries, and electrolysers, and using its own captive solar generation — gives it a structural cost advantage over producers who must purchase each component separately on the open market. The question is whether this integration advantage is enough to close the cost gap faster than the industry average.

Three numbers to track for this business: cost of renewable power feeding the electrolysers (₹/kWh), electrolyser capital cost per megawatt ($/MW), and capacity utilization rate of the electrolysers (hours per year). These three inputs drive the output cost per kg of hydrogen.

The Grey-to-Green Transition

The smartest strategic element of Reliance's hydrogen play is the grey-to-green transition within its own operations. Reliance is already one of the largest hydrogen consumers in India through its refining operations. Transitioning this consumption from grey to green hydrogen creates immediate, large-scale demand for green hydrogen without needing to find external buyers or negotiate offtake contracts.

This captive demand pathway means Reliance can begin producing green hydrogen at whatever cost it achieves and absorb it internally — effectively subsidizing the early production from its own O2C margins. As production scales and costs come down, the economics improve, and eventually surplus production can be sold externally or converted into derivatives for export.

This is a luxury that standalone green hydrogen startups do not have. They must achieve cost competitiveness from day one, because they have no internal demand to absorb above-market-cost production.

Chapter 7: Green Hydrogen Derivatives — Ammonia, Methanol, and Sustainable Aviation Fuel

The Bottom Line

Green hydrogen by itself is difficult to transport and store — it is the lightest element, extremely low density, and requires either high-pressure compression, cryogenic liquefaction, or chemical conversion to move it economically. This is why the downstream derivatives — green ammonia, green methanol, and sustainable aviation fuel (SAF) — are where the real export revenue and global market access lie. Reliance has explicitly stated its ambition to produce and export all three, initially serving its own captive demand and then scaling to 3 MMTPA of green hydrogen equivalent by 2032. The marine infrastructure at Jamnagar and Kandla gives Reliance a natural export advantage. This chapter is about understanding each derivative, its target market, and the commercial timeline.

Green Ammonia: The Hydrogen Carrier and Fertilizer Bridge

Ammonia — NH_3 — is one of the most produced chemicals on Earth, primarily used as fertilizer feedstock. Conventional ammonia production uses grey hydrogen from natural gas, making it one of the most carbon-intensive industrial processes. Green ammonia replaces the grey hydrogen input with green hydrogen.

But the strategic significance of green ammonia extends beyond fertilizer. Ammonia is

increasingly recognized as a hydrogen carrier — a way to chemically "package" hydrogen for long-distance shipping. It is much easier and cheaper to transport ammonia than pure hydrogen, and at the destination, it can be "cracked" back into hydrogen or burned directly as a zero-carbon fuel.

Several major use cases are emerging rapidly. Maritime shipping is beginning to adopt ammonia as a bunker fuel — a transition driven by International Maritime Organization decarbonization targets. Japan and South Korea are planning to co-fire ammonia in coal power plants as a transitional decarbonization measure. And of course, the global fertilizer industry needs to decarbonize.

India's National Green Hydrogen Mission specifically includes provisions for green ammonia, including plans for ammonia bunkering infrastructure at ports. Reliance's port infrastructure at Kandla and Jamnagar positions it naturally for ammonia export.

Green Methanol: The Shipping Fuel and Chemical Feedstock

Green methanol — or e-methanol — is produced by combining green hydrogen with captured carbon dioxide. It is gaining rapid traction as a marine fuel, driven by companies like Maersk ordering methanol-powered container ships. It also serves as a feedstock for the chemical industry, replacing fossil-based methanol.

The key advantage of methanol over ammonia as a maritime fuel is that it is less toxic, easier to handle, and can use existing fuel infrastructure with relatively modest modifications. The disadvantage is that it requires a source of CO_2 — either from industrial capture or direct air capture — which adds complexity and cost.

Reliance's O2C operations are a natural source of concentrated CO_2, creating a built-in feedstock advantage for e-methanol production. This is another example of the conglomerate synergy: the emissions from the legacy business become a raw material input for the new business.

Sustainable Aviation Fuel: The Highest-Value Derivative

SAF is the premium product in the green derivatives portfolio. Aviation accounts for roughly 2-3% of global CO_2 emissions, and unlike road transport, it cannot be easily electrified — batteries are too heavy for long-haul flight. SAF is essentially the only viable decarbonization pathway for aviation in the medium term.

SAF can be produced through multiple pathways, but the one most relevant to Reliance is the Power-to-Liquid (PtL) or e-SAF route: green hydrogen combined with captured CO_2 to produce synthetic kerosene. The global SAF market is being driven by increasingly aggressive blending mandates — the EU's ReFuelEU Aviation regulation mandates 2% SAF blending by 2025, rising to 70% by 2050. India is developing its own SAF policy framework.

The economics of SAF are currently challenging — e-SAF costs three to five times more than conventional jet fuel. But the blending mandates create guaranteed demand regardless of the price premium, and airlines are signing long-term offtake agreements to secure supply. Reliance's aviation fuel business already operates through the air bp-Jio brand, giving it existing airline customer relationships and distribution infrastructure.

The Export Opportunity

This is where the strategic picture comes together. Reliance is not just building green molecule production for domestic consumption. It is positioning itself as a major exporter to energy-importing economies — Japan, South Korea, the EU, and potentially the Middle East.

India has several structural advantages as a green hydrogen and derivatives exporter: some of the world's cheapest solar irradiance, low labor costs, established port infrastructure, and favorable geography for shipping to both European and Asian markets. Reliance's integrated ecosystem — from solar generation through hydrogen production through derivative conversion through port export — creates a cost-competitive pathway that few other producers globally can match.

The Jamnagar and Kandla marine infrastructure, already built for Reliance's oil import and product export operations, can be adapted for ammonia and methanol export. This is another conglomerate advantage — the port infrastructure is already there.

Chapter 8: Compressed Biogas & Bioenergy — The Rural Energy Play

The Bottom Line

While the solar-battery-hydrogen ecosystem gets the headlines, Reliance is simultaneously building what could become India's largest compressed biogas (CBG) business. The immediate target is 55 CBG plants under Phase 1 with 0.5 MMTPA capacity. But the longer-term ambition — announced in April 2025 with a foundation-stone ceremony in Andhra Pradesh — is 500+ CBG plants by 2030, with just the Andhra Pradesh buildout alone representing a ₹65,000 crore ($7.7 billion) investment. This is a fundamentally different business from solar or hydrogen. It is decentralized, rural, agriculture-linked, and politically potent. It connects farmers to the energy value chain, produces organic fertilizer as a by-product, and slots directly into India's existing CNG distribution infrastructure through the Jio-bp network. The strategic significance is not just revenue — it is political and social capital at a time when India's policy environment for clean energy is shaped heavily by the agricultural lobby and rural development priorities.

What Is CBG and Why It Matters for India

Compressed Biogas is produced from organic waste — agricultural residue, cattle dung, sugarcane press mud, municipal solid waste — through anaerobic digestion. The raw biogas is purified and compressed to produce CBG, which has a calorific value and properties essentially identical to Compressed Natural Gas (CNG). It can be seamlessly substituted into any CNG application — vehicles, industrial heating, commercial cooking — without any infrastructure modification.

For India, CBG solves multiple problems simultaneously. It reduces dependence on imported liquefied natural gas. It addresses the chronic problem of agricultural residue burning — one of the major contributors to North India's air pollution crisis. It converts waste into energy, creating a circular economy. And it generates rural income and employment in agricultural communities.

India's government has been pushing CBG aggressively through the SATAT (Sustainable Alternative Towards Affordable Transportation) scheme, launched in 2018, which targets 5,000 CBG plants nationwide. As of 2025, actual deployment has been far below this target — creating the market opportunity that Reliance is now pursuing.

A critical policy development: the CBG Blending Obligation (CBO), introduced by the Ministry of Petroleum and Natural Gas, mandates the mandatory blending of CBG into CNG for transport and PNG for domestic use within the City Gas Distribution sector. Starting April 2025, a 1% blending mandate was introduced, with the percentage set to rise progressively. This creates guaranteed demand growth, independent of market pricing.

Reliance's CBG Strategy

Reliance entered bioenergy in 2023 through Reliance Bioenergy Limited and moved aggressively. It set up two demonstration CBG units at Jamnagar, then built its first commercial-scale plant at Barabanki, Uttar Pradesh, in a record 10 months. Reliance claims to have already become India's largest bioenergy producer.

The Phase 1 rollout targets 55 CBG plants across India, with a combined annual capacity of 0.5 million tonnes. Each plant has a feedstock processing capacity of 250-500 tonnes per day, producing 10-20 tonnes of CBG daily. Investment per plant is roughly ₹100-139 crore.

The Andhra Pradesh mega-commitment — 500 plants, ₹65,000 crore, 250,000 jobs — is the largest single CBG investment announced anywhere globally. The plants will use Napier grass cultivated on barren and waste lands, converting roughly 500,000 acres of unproductive land into energy farms. At full operation, the Andhra Pradesh network alone would produce 4 million tonnes of CBG and 1.1 million tonnes of organic fertilizer annually.

The By-Product Economics

An important detail that elevates the business case: CBG production generates fermented organic manure (FOM) as a by-product. This organic fertilizer has real agricultural value — it improves soil health, reduces dependence on chemical fertilizers, and can be sold to farmers or provided as part of the feedstock procurement arrangement. In a country where soil degradation from overuse of chemical fertilizers is a growing crisis, this by-product creates both economic value and political goodwill.

The "Anna Daata to Urja Daata" Narrative

Reliance has framed the CBG strategy with a politically resonant narrative: transforming India's farmers from "Anna Daatas" (food providers) to "Urja Daatas" (energy providers). This is not just marketing. In a country where agricultural distress is a perennial political flashpoint, a business model that pays farmers for crop residue, creates rural jobs, and converts waste land into productive energy farms carries significant political capital.

For a strategy lead, this matters because it affects regulatory favorability, state government cooperation on land and permits, and Reliance's broader political positioning. The foundation-stone ceremony in Andhra Pradesh was attended by state IT minister Nara Lokesh, signaling high-level government buy-in.

The Jio-bp Distribution Synergy

CBG is chemically interchangeable with CNG. Jio-bp already operates 2,000+ mobility stations across India, many of which dispense CNG. Integrating CBG into this existing distribution network requires minimal incremental investment. This is a textbook conglomerate synergy: the CBG production business creates supply, and the Jio-bp fuel retail business creates the retail distribution channel.

The Quality Benchmark

Reliance's CBG has methane content exceeding 96% by volume, which exceeds industry standards. This is a quality differentiator that matters for customer acceptance and for meeting the specifications of the blending obligation.

Chapter 9: Jio-bp — The Mobility & Fuels Distribution Platform

The Bottom Line

Jio-bp is the customer-facing layer that connects Reliance's upstream manufacturing and generation assets to end consumers. It is a joint venture between Reliance Industries and bp (British Petroleum), operating under the brand "Jio-bp" through the entity Reliance BP Mobility Limited (RBML). The JV combines Reliance's massive Indian distribution network

and digital platform with bp's global energy expertise and advanced fuels technology. As of the latest updates, Jio-bp operates 2,000+ mobility stations, over 5,000 EV charging points (across 500+ stations), an aviation fuel business (air bp-Jio), and a doorstep diesel delivery service (Fuel4U). The strategic relevance for the new energy portfolio is that Jio-bp is the ready-made retail platform for distributing CBG, green hydrogen-based fuels, EV charging, and eventually residential/commercial battery products.

The EV Charging Buildout

Jio-bp has emerged as one of India's fastest-growing EV charging networks. The numbers tell the story of aggressive scaling: the network grew from 1,300 to 5,000 charging points in a single year. Key metrics to note: 95% of the network consists of fast-charging stations (the highest proportion in the Indian industry), and the network maintains a 96% uptime rate. These are not vanity metrics — fast-charging capability and reliability are the two factors that most influence EV driver behavior and fleet operator procurement decisions.

The company is working with fleet operators, last-mile delivery companies, and urban transport systems to provide integrated energy solutions. This fleet-first approach is strategically sound — fleet operators have predictable charging needs, higher utilization rates, and make procurement decisions based on total cost of ownership rather than consumer sentiment. They are the anchor demand segment for EV charging infrastructure in India's current market stage.

A notable development: Jio-bp has made its foray into "green electrons" — EV charging powered directly by Reliance's solar power plants. This allows the JV to market its charging as genuinely zero-emission, not just shifting emissions from the tailpipe to the power plant — a differentiation that matters as corporate ESG commitments increasingly scrutinize Scope 2 and 3 emissions in fleet operations.

The Strategic Role in the Conglomerate

Think of Jio-bp as the distribution and retail layer that multiplies the value of everything else Reliance builds in new energy.

Solar panels on homes and businesses — Jio-bp's customer relationships and physical presence create a retail channel. Battery storage products for homes and SMEs — same distribution logic. CBG blended into CNG at Jio-bp's mobility stations — direct integration with existing infrastructure. Green hydrogen fueling for heavy transport — eventually, Jio-bp stations become hydrogen dispensing points. Aviation fuel — air bp-Jio already supplies ATF and can transition to SAF blending as production scales.

The Jio digital platform integration is the additional multiplier. Jio's ecosystem reaches hundreds of millions of Indian consumers. Embedding energy services — rooftop solar, EV

charging subscriptions, home battery backup — into the Jio app creates a digital distribution channel that no other Indian energy company can replicate.

Chapter 10: Carbon Fibre, Circular Economy & New Materials — The O2C-to-New-Energy Bridge

The Bottom Line

These initiatives do not make headlines the way solar giga-factories or green hydrogen do, but they are strategically significant for two reasons. First, they represent the bridge between Reliance's legacy O2C business and the new energy future — showing how the chemistry and materials expertise of the old business creates competitive advantage in the new. Second, they address a growing investor and regulatory concern: is Reliance's O2C business adapting to the energy transition, or is it just a cash cow waiting to be stranded? The answer, signaled through these initiatives, is that O2C is actively evolving.

Carbon Fibre

Reliance is building its first carbon fibre plant, with Phase 1 completion targeted during 2025. The plant will have the flexibility to produce specialty grades for diverse applications.

Why does carbon fibre matter for energy transition? Because renewable energy equipment — wind turbine blades, hydrogen pressure vessels, EV structural components — increasingly requires lightweight, high-strength materials. Carbon fibre composites are lighter and stronger than steel or aluminum, making them essential for next-generation wind blades (longer blades capture more energy), lightweight vehicle structures (extending EV range), and high-pressure hydrogen storage tanks.

For Reliance, carbon fibre represents a "multi-decade growth engine" that bridges O2C and new energy. The precursor materials for carbon fibre are petrochemicals — specifically polyacrylonitrile (PAN), which Reliance already produces. The downstream applications are in renewable energy and mobility. This is the clearest example of O2C capabilities directly enabling new energy products.

Circular Economy: PET Recycling and Beyond

Reliance is India's largest PET recycler and is scaling its bottle recycling capacity to 5 billion bottles per year. Beyond mechanical recycling, the company has developed a chemical recycling pathway that converts waste plastics into refinery feedstock — essentially closing the loop between plastic waste and petrochemical production.

Additionally, Reliance's scientists have developed pathways to produce biodegradable and compostable plastics to replace single-use plastics. And the company is exploring photosynthetic biological pathways to convert CO_2 captured at Jamnagar into high-value chemical products.

These initiatives matter strategically because they address the ESG narrative head-on. One of the biggest investor concerns about O2C businesses is plastic pollution and carbon emissions. By leading in recycling, chemical recycling, and biodegradable alternatives, Reliance is preemptively addressing these concerns.

Chapter 11: The Technology & Acquisition Playbook — How Reliance Assembled Its Capabilities

The Bottom Line

Reliance did not attempt to develop new energy technologies organically from scratch. Instead, between 2021 and 2023, it executed a rapid-fire series of acquisitions and strategic investments — spending over ₹5,500 crore in FY22 alone — to assemble a portfolio of proven technologies across every pillar of the new energy value chain. Each acquisition was targeted at filling a specific capability gap. Understanding this playbook is essential because it reveals both the strategic logic and the potential vulnerabilities of Reliance's technology position.

The Acquisition Map

Let's walk through each deal and what it brought to Reliance.

REC Solar Holdings (USD 771 million, 2021): The cornerstone acquisition. REC is a Singapore-headquartered solar manufacturer with leading expertise in Heterojunction Technology (HJT). The acquisition gave Reliance proven HJT cell and module designs, polysilicon manufacturing know-how, established global brand recognition in premium solar markets (US, Europe, Australia), and a pathway to next-generation tandem cell integration. This single acquisition transformed Reliance from a solar manufacturing novice to a company with world-class technology overnight.

Faradion Limited (GBP 100 million + GBP 25 million growth capital, 2021): The UK-based sodium-ion battery technology leader. Faradion holds an extensive IP portfolio covering sodium-ion cathode materials, cell designs, and manufacturing processes. The acquisition gave Reliance a proprietary battery chemistry that does not depend on imported lithium — a critical strategic advantage given India's lack of domestic lithium reserves.

Lithium Werks (USD 61 million, 2022): A Dutch-headquartered LFP battery company with 219 patents, a manufacturing facility in China, nearly 200 MWh annual production capacity, and 30+ years of battery expertise (through predecessor companies Valence and A123). This acquisition gave Reliance proven LFP manufacturing know-how and IP, complementing the Faradion sodium-ion capability with a commercially mature chemistry.

Ambri (investment, amount undisclosed, 2022): A US-based liquid metal battery company developing long-duration energy storage. Ambri's technology — calcium-antimony electrodes in a molten salt electrolyte — targets 8-24+ hour storage applications. This is Reliance's bet on the long-duration storage segment, which is expected to be critical for grid stability as renewable penetration increases.

Caelux (investment, amount undisclosed): A California-based perovskite solar technology company. Perovskite-tandem cells represent the next frontier in solar efficiency, potentially pushing commercial cell efficiency above 30%. This investment positions Reliance for the next technology generation in solar PV, building on the HJT platform from REC.

SenseHawk (USD 32 million, majority stake): A California-based developer of software-based management tools for the solar energy industry. SenseHawk's platform manages the entire solar asset lifecycle — from project planning to production monitoring — across 600+ sites globally. This acquisition gives Reliance digital operations management capabilities for its large-scale solar deployments.

Sterling & Wilson Renewable Energy (40% stake): One of the world's largest solar EPC (Engineering, Procurement, and Construction) and O&M (Operations and Maintenance) providers. This stake gives Reliance in-house project execution capability for large-scale solar deployments — critical for the Kutch mega-project.

Nel ASA (exclusive licensing deal): The Norwegian alkaline electrolyser manufacturer. The licensing deal gives Reliance the right to manufacture Nel's proven alkaline electrolysers in India — the core technology for its green hydrogen production.

Stiesdal (partnership): The Danish cleantech company, focusing on pressurised alkaline electrolyser technology. This complements the Nel partnership with an advanced variant that offers higher efficiency.

Brookfield (MoU): An agreement for onshore renewable power and decarbonisation equipment manufacturing in Australia, signaling Reliance's first international deployment of its new energy capabilities.

The Logic: Buy the Technology, Build the Scale

The pattern across these acquisitions is consistent. Reliance identified the most proven or

most promising technology in each domain, acquired it (usually for a relatively modest price compared to the scale of Reliance's investment program), and is now deploying it at giga-scale through its manufacturing infrastructure at Jamnagar.

This is a classic industrializer strategy: let someone else take the technology risk, then acquire the technology once it is proven and apply your manufacturing, capital, and distribution advantages to commercialize it at scale. It is the same playbook that companies like Samsung, TSMC, and indeed Reliance's own O2C business have used in their respective industries.

What Is Missing

A sharp board member might ask: what technology gaps remain? A few areas to watch.

First, PEM electrolysers. Reliance's electrolyser strategy is built on alkaline technology, which is proven but less efficient than PEM. If PEM costs come down faster than expected, Reliance may need to add PEM capability.

Second, solid-state batteries. The battery acquisition portfolio covers LFP, sodium-ion, and liquid metal — but not solid-state, which is the next-generation lithium battery technology being pursued by Toyota, Samsung SDI, and several startups. If solid-state achieves commercial viability (still uncertain), it could leapfrog the chemistries Reliance has invested in for mobility applications.

Third, wind energy. Reliance's new energy portfolio is heavily weighted toward solar. India's renewable energy target requires significant wind capacity as well, and Reliance has no significant wind manufacturing or generation capability. This may be a deliberate choice (focus on solar where you have competitive advantage) or a gap that needs addressing.

Chapter 12: The Competitive Landscape — Who Else Is Playing and Where Reliance Stands

The Bottom Line

Reliance is the most ambitiously integrated player in India's new energy market, but it is not operating in a vacuum. The competitive landscape includes well-funded domestic conglomerates, aggressive pure-play renewable companies, and formidable global players — particularly Chinese manufacturers who dominate the global solar and battery supply chains. Understanding who is doing what, where Reliance has genuine structural advantages, and where it faces real competitive risk is essential for any strategic advice you provide.

The Domestic Competitors

Adani Green Energy / Adani New Industries Limited (ANIL): Reliance's most direct competitor and the one most likely to be discussed in every strategic conversation you have. Adani Green is already the largest renewable energy company in India by installed generation capacity, having scaled rapidly through aggressive project development and acquisition. ANIL, the new energy arm, is pursuing green hydrogen at scale — with a manufacturing ecosystem planned in Khavda, Gujarat, that mirrors Reliance's Jamnagar-Kutch approach. Adani has partnerships with TotalEnergies and has been pursuing solar and wind equipment manufacturing. The key competitive distinction: Adani has been faster to deploy generation capacity (operational solar and wind farms), while Reliance has been more focused on building the manufacturing value chain first (giga-factories). Adani has also faced governance and credibility challenges following the Hindenburg Research report in January 2023, which, while not directly affecting its operational capacity, has affected its access to international capital markets and partner sentiment.

Tata Power Renewable Energy: India's most established industrial conglomerate in the energy space, with a long history in power generation. Tata Power has a growing renewables portfolio (solar, wind, rooftop solar), a solar cell and module manufacturing facility, and an EV charging network. However, Tata's scale of ambition in new energy manufacturing is significantly smaller than Reliance's. Tata is more of a project developer and distributor than an integrated manufacturer.

NTPC Green Energy: NTPC, India's largest power generation company, has created a dedicated green energy subsidiary targeting 60 GW of renewable capacity by 2032. NTPC's advantage is its established relationship with state distribution companies and its experience in managing large-scale power generation infrastructure. Its disadvantage is that it is a government-owned enterprise, which brings slower decision-making and limited ability to pursue aggressive M&A or technology acquisition.

JSW Energy, ReNew Energy (now Renew Private Limited): Significant players in renewable energy project development but not pursuing integrated manufacturing at the scale of Reliance or Adani. More likely to be customers for Reliance's manufactured equipment than direct competitors across the full value chain.

The Global Competitors

Chinese Solar and Battery Manufacturers (LONGi, JA Solar, Trina, Jinko, CATL, BYD, Envision AESC): The elephant in the room. Chinese companies control 80%+ of the global solar manufacturing value chain and are the dominant force in lithium-ion battery production. Their cost advantages come from massive scale, government subsidies, low-cost capital, established supply chains, and years of learning-curve optimization. Any assessment of Reliance's solar or battery competitiveness must be benchmarked against

Chinese costs. The Indian government's policy toolkit — PLI subsidies, Basic Customs Duty, ALMM restrictions — provides a protective buffer, but Reliance's long-term competitiveness must ultimately come from its own cost structure, not from policy protection.

Green Hydrogen Competitors (Air Liquide, Linde, Thyssenkrupp Nucera, Plug Power, ACWA Power): The global green hydrogen market is being pursued by a mix of industrial gas companies, electrolyser manufacturers, and project developers. Reliance's advantage is the integrated production ecosystem and access to some of the world's cheapest solar irradiance. The competitive risk comes from Middle Eastern producers (particularly Saudi Arabia and UAE) who have abundant solar resources and are deploying massive state-backed green hydrogen projects, and from Australia, which has both solar and wind resources and closer proximity to Asian demand centers.

Where Reliance Has Structural Advantages

The genuine structural advantages that are difficult for competitors to replicate: the fully integrated manufacturing value chain (polysilicon to module to battery to electrolyser to deployment — no one else is doing all of these); the captive demand floor from its own O2C, telecom, and retail operations; the Jio digital platform for consumer-facing distribution; the balance sheet to fund patient capital deployment; and the conglomerate infrastructure including port access and existing customer relationships in aviation and transportation fuels.

Where Reliance Is Vulnerable

Execution speed relative to Adani and Chinese competitors. Reliance spent 2021-2024 primarily in the acquisition and construction phase. Adani, by contrast, was deploying generation capacity throughout this period. Reliance's manufacturing-first approach may ultimately prove superior (lower long-term costs, greater supply chain independence), but in the near term, Adani has first-mover advantage in the Indian market for renewable generation and green hydrogen project pipelines.

Technology risk relative to the pace of Chinese innovation. If Chinese manufacturers move to tandem-cell solar or next-generation battery chemistries faster than Reliance ramps its HJT and LFP/sodium-ion production, Reliance could find itself manufacturing equipment that is one generation behind the frontier.

Chapter 13: Policy, Regulation & Industrial Policy — The Tailwinds and Tripwires

The Bottom Line

India's policy environment for new energy is currently one of the most supportive in the world — and Reliance is a primary beneficiary. The PLI (Production Linked Incentive) schemes, import duties, blending mandates, and renewable purchase obligations collectively create a framework that subsidizes domestic manufacturing, protects against Chinese imports, and guarantees demand growth. But policies can change, and the gap between policy intent and implementation is a recurring theme in Indian governance. This chapter maps the full policy stack, identifies which policies are most consequential for Reliance, and flags the political economy dynamics that determine stability.

The PLI Scheme Architecture

Reliance has qualified under multiple PLI tranches, which collectively represent billions of rupees in potential incentive payouts.

Solar PV PLI (Polysilicon to Module): Reliance qualified for the highest integration tier — covering polysilicon, ingot, wafer, cell, and module manufacturing. The PLI payout is linked to achieving domestic manufacturing benchmarks and incremental sales. This is the single most consequential subsidy for Reliance's solar manufacturing economics.

Advanced Chemistry Cell (ACC) PLI: Supports domestic battery cell manufacturing. Reliance qualified for this, supporting its LFP and sodium-ion battery giga-factory.

Electrolyser Manufacturing PLI: Reliance qualified for manufacturing 300 MWe of electrolysers annually.

Green Hydrogen Production PLI: Reliance qualified for 90 kTPA of green hydrogen production, receiving financial incentives per kg of green hydrogen produced.

The PLI structure is designed to incentivize integrated domestic manufacturing and reduce import dependence. For Reliance, which is pursuing the deepest level of integration, the PLI benefits are maximized. The key risk is implementation — PLI payouts depend on meeting specific milestones and benchmarks, and disbursement has historically been slower than announced.

Import Protection: BCD and ALMM

Basic Customs Duty (BCD): India imposed a 40% BCD on imported solar modules and 25% on imported solar cells, effective April 2022. This creates significant price protection for domestic manufacturers like Reliance against Chinese imports. The duty level has been a subject of ongoing policy debate — solar project developers argue it increases costs, while manufacturers argue it is essential for building domestic capability.

Approved List of Models and Manufacturers (ALMM): Government-backed and public

sector solar projects can only procure modules from ALMM-listed manufacturers. Reliance's BIS-certified modules qualify for ALMM inclusion. This effectively creates a captive government market for domestically manufactured modules.

The CBG Blending Obligation

Introduced by MoPNG, the CBG Blending Obligation mandates that CGD (City Gas Distribution) companies blend CBG into their CNG and PNG supply. Starting at 1% in April 2025, the mandate is set to rise progressively. This creates guaranteed demand growth for CBG producers like Reliance, independent of market pricing dynamics.

National Green Hydrogen Mission

India's National Green Hydrogen Mission, launched in January 2023, targets 5 MMTPA of green hydrogen production by 2030. It includes financial incentives for green hydrogen production, electrolyser manufacturing, and green hydrogen derivatives. It also mandates green hydrogen consumption in specific industrial sectors — refineries and fertilizer plants — which directly benefits Reliance's captive demand model.

Renewable Purchase Obligations and Green Energy Open Access

RPOs mandate that electricity distribution companies and large consumers procure a minimum percentage of their power from renewable sources, with specific sub-targets for solar. The percentage is rising annually. Green Energy Open Access rules enable large consumers to procure renewable power directly from generators, bypassing distribution companies. Both policies expand the addressable market for Reliance's solar generation.

Indian Carbon Market

India is developing an Indian Carbon Market framework, with the Bureau of Energy Efficiency as the nodal agency. While still in early stages, a functioning carbon market would create an additional revenue stream for Reliance's green energy operations through the sale of carbon credits.

The Political Economy Lens

The policies supporting new energy in India are currently aligned across the central government, most state governments, and the business community. But several political economy tensions are worth tracking.

Electricity cost sensitivity: India is extremely sensitive to electricity prices. If domestic manufacturing and renewable mandates push electricity costs up in the short term, there will be political pressure to relax import duties or mandates — particularly ahead of elections.

State-center dynamics: Several key policy levers (land, grid connectivity, environmental clearances) are controlled at the state level. Reliance's concentration in Gujarat benefits from a highly aligned state government. Expansions into other states (Andhra Pradesh for CBG, Maharashtra for green hydrogen) depend on state-level cooperation that may be less reliable.

Chinese trade relations: India's import duties on Chinese solar equipment exist in the broader context of India-China trade relations. Any diplomatic thaw or trade deal that reduces tariffs would directly affect Reliance's competitive position.

Policy implementation gap: India has a well-documented gap between policy announcement and ground-level implementation. PLI disbursements, green hydrogen purchase mandates, and ALMM enforcement have all faced implementation delays. The policy intent is clear; the execution timeline is less certain.

Chapter 14: The Conglomerate Playbook — How Jio, Retail, and O2C Power the New Energy Strategy

The Bottom Line

This is arguably the most important analytical chapter for a strategy lead working in the chairman's office. The entire economic logic of Reliance's new energy bet is inseparable from its conglomerate structure. A standalone new energy company with the same technology and the same factories would have a fundamentally different risk profile, cost structure, and market access. The conglomerate advantages are not incremental — they are the reason Reliance can make this bet at this scale. But the conglomerate structure also creates strategic tensions — capital allocation competition, organizational complexity, and the risk of cross-subsidy masking poor economics. Understanding both sides of this equation is your primary job.

The Synergy Map

Let's walk through each major Reliance business and its specific connection to the new energy portfolio.

O2C (Oil-to-Chemicals) — The Cash Engine and Captive Demand Floor. O2C generates the majority of Reliance's EBITDA. It funds the patient capital deployment that new energy requires. More importantly, O2C operations consume vast quantities of energy and hydrogen, creating the captive demand that de-risks the first wave of solar generation and green hydrogen production. The grey-to-green hydrogen transition within O2C is not just a sustainability initiative — it is the anchor customer for the hydrogen business. O2C's

chemistry and materials science expertise directly enables battery manufacturing, carbon fibre production, and chemical recycling. And O2C's port and logistics infrastructure at Jamnagar and Kandla provides ready-made export channels for green derivatives.

Jio Platforms — The Digital Distribution Channel. Jio reaches hundreds of millions of Indian consumers through its telecom and digital services ecosystem. This creates a distribution channel for residential and commercial energy products — rooftop solar, home battery systems, EV charging subscriptions — that no other energy company can replicate. Jio's data analytics capabilities can optimize energy consumption patterns, enable smart grid management, and create digital marketplaces for energy trading. The Jio-bp integration already demonstrates this: EV charging is marketed and managed through the Jio digital ecosystem.

Reliance Retail — The Physical Distribution Network. India's largest retail company, with thousands of physical store locations. These locations serve as potential distribution points for solar products, battery storage systems, and energy management devices. The retail supply chain logistics can be leveraged for last-mile delivery of energy equipment. And the retail customer base represents a massive potential market for residential energy transition products.

Jio-bp — The Mobility Interface. As discussed in Chapter 9, the JV provides fuel retail infrastructure that can distribute CBG, offer EV charging, and eventually dispense hydrogen. It is the customer-facing layer that connects production to consumption.

The Tensions and Risks

Conglomerate advantages come with conglomerate complications.

Capital allocation competition. Every rupee invested in new energy is a rupee not invested in telecom expansion, retail growth, or O2C capacity additions. The telecom business (Jio) is approaching its own IPO and may demand massive capital for 5G network buildout and AI infrastructure. Reliance Retail is in a growth phase requiring sustained investment. The question of how capital is allocated across these competing demands — and whether new energy receives enough to execute at the speed required — is a permanent strategic tension.

Cross-subsidy risk. The captive demand model means new energy products are initially consumed internally at whatever cost they are produced. This makes it difficult, from an external perspective, to assess whether the new energy business is genuinely commercially viable or whether it is being subsidized by O2C margins. A sophisticated investor will ask: what is the true standalone cost of your green hydrogen, and how does it compare to market prices? The conglomerate structure can obscure this answer.

Organizational complexity. Running simultaneous mega-projects across solar

manufacturing, battery manufacturing, electrolyser manufacturing, solar deployment, CBG buildout, EV charging expansion, and green derivatives production — each with different technology stacks, supply chains, regulatory requirements, and customer segments — places extraordinary demands on organizational capability. The risk of stretched management bandwidth, quality lapses, or coordination failures increases non-linearly with the number of parallel initiatives.

Succession and governance. Anant Ambani's assumption of the new energy portfolio represents a generational transition. The quality of leadership and decision-making at the top of the new energy business will be decisive. This is a high-stakes, high-complexity portfolio that requires both strategic vision and operational discipline.

Chapter 15: Open Questions, Unknowns & What to Watch from Week One

The Bottom Line

You are walking into a role where the strategy has been set at the highest level — the commitment to new energy is not up for debate. Your job is to make the execution sharper, the analysis deeper, and the strategic advice more incisive. This chapter gives you the questions to ask, the assumptions to stress-test, and the signals to monitor from your very first week.

The Key Assumptions to Stress-Test

Every strategy rests on assumptions. Here are the ones that underpin Reliance's new energy bet, ranked roughly by how fragile they are:

Assumption 1: Jamnagar giga-factories achieve full commissioning on the stated timeline (end-2025 to 2026). This is the most immediate assumption. Every downstream target — generation, hydrogen production, derivative exports — depends on the manufacturing base being operational. Delays of 6-12 months are common in mega-projects. Ask what the current status is for each factory, what the specific commissioning milestones are, and what the contingency plans are for delays.

Assumption 2: HJT solar modules achieve cost competitiveness with Chinese TOPCon at scale. The entire solar manufacturing strategy depends on this. Ask for the current manufacturing cost per watt vs. the target, the timeline to reach cost parity, and what the sensitivity to polysilicon input prices is.

Assumption 3: Green hydrogen reaches $2/kg within the stated timeframe. The

hydrogen business transitions from captive-demand-subsidized to commercially viable only when this cost target is achieved. Ask what the current cost of production is, what the cost reduction roadmap looks like, and what the key bottlenecks are.

Assumption 4: Policy environment remains supportive. PLI disbursements, import duties, blending mandates, and ALMM requirements could all change with a new government or shifting political priorities. Ask who in the organization is responsible for policy monitoring and government relations, and what the contingency plan is if specific policies are weakened.

Assumption 5: Sodium-ion battery technology commercializes at the projected timeline and cost. This is Reliance's hedge against lithium supply chain dependence. But sodium-ion is still in early commercialization. Ask for the pilot line performance data — actual capacity, cycle life, and cost per kWh vs. targets.

Early Warning Signals to Monitor

These are the specific signals that would indicate the strategy is off track before it shows up in financial results:

Commissioning delays at Jamnagar — any slippage of more than two quarters from stated timelines. Yield issues in solar module production — efficiency or throughput below targets in the initial production runs. Cost overruns at Kutch — particularly in grid evacuation infrastructure. PLI disbursement delays from the government. Aggressive pricing moves by Chinese solar manufacturers targeting the Indian market. Senior leadership departures from the new energy division. Capex allocation shifting away from new energy toward other Reliance segments. State government cooperation breakdowns in Andhra Pradesh or other CBG expansion states.

The Questions to Ask in Your First Meetings

Here are the questions that will signal you understand the business and can add strategic value:

"What is our current all-in manufacturing cost per watt for HJT modules, and what is the glide path to cost parity with Chinese TOPCon?"

"What percentage of our battery giga-factory production is pre-committed to internal captive demand vs. available for external sale?"

"What is the current green hydrogen production cost, and what is the sensitivity to solar LCOE and electrolyser capacity utilization?"

"How are we tracking against PLI milestone requirements, and what is the cash flow timeline for PLI disbursements?"

“What is the current commissioning status of each giga-factory line, and where are we relative to the internal master schedule?”

“How are we managing the capital allocation tension between new energy and the Jio IPO preparation?”

“What is our technology roadmap for the next generation — specifically, perovskite-tandem solar and solid-state batteries?”

“Who are our top three competitive threats, and what would it look like if Adani reaches cost parity in green hydrogen before we do?”

“What is our CBG plant deployment velocity — how many are operational, how many are under construction, and what is the current bottleneck to faster rollout?”

“If the BCD on Chinese solar imports were reduced to 25% tomorrow, what happens to our module unit economics?”

What You Don’t Know Yet — and Should Find Out

There are several dimensions that are difficult to assess from external research and that you should prioritize learning from internal sources:

The actual financial performance and unit economics of the new energy businesses as currently reported internally. The organizational structure — who reports to whom, what decision-making authority sits where, and who the key internal champions and skeptics are. The internal technology assessment — not the AGM-ready version, but the honest engineering assessment of where each technology stands relative to targets. The capital allocation decision-making process — how new energy competes for capital against Jio, Retail, and O2C, and who makes the final call. The relationship with the Chairman’s office — how strategic direction flows from the top, how feedback flows back up, and where there is space for the strategy function to influence decisions.

A Final Note

You are entering an organization that is attempting something genuinely unprecedented: building the world’s most integrated clean energy ecosystem from scratch, in one of the world’s fastest-growing energy markets, funded by one of the world’s most profitable hydrocarbon businesses. The ambition is extraordinary. The execution complexity is enormous. The competitive and policy risks are real.

Your value as a strategy lead is not in validating the vision — the chairman has the vision. Your value is in relentlessly stress-testing the assumptions, identifying the execution risks before they materialize, ensuring the numbers are honest, and making sure the most senior leadership in the room has the sharpest possible picture of where this strategy stands

relative to reality. That is what this briefing book is designed to equip you to do.

End of Briefing Book

This document was prepared using publicly available information as of February 2026. All data points, timelines, and strategic assessments should be verified against internal company information upon joining.