

First Solar, Inc. - Sequencing the Next Expansion

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Decision scope: Sequencing potential manufacturing and technology investments beyond announced plans

Case convention: This is a hypothetical strategy-team exercise. No private deliberations or formal board assignment are represented.

The decision

On March 1, 2024, a hypothetical First Solar strategy team is preparing a recommendation on what should follow the company's current manufacturing buildout. The company has reported an approximately 8 GW expansion in progress, a dedicated U.S. research and development facility under construction, a large contracted backlog, and higher planned production for 2024. It has also warned that module supply may outpace demand and that tax-credit assumptions affect its outlook.

For this exercise, treat the announced expansion and R&D facility as the baseline; the question is not whether to reverse them. This is an explicit case assumption. Public disclosures describe the plans as underway and estimate remaining investment, but do not establish that they are legally or economically irreversible. The hypothetical assignment is to recommend how First Solar should sequence any further discretionary investment beyond that baseline. Should the next increment emphasize ramping and throughput across the expanded footprint, stage additional manufacturing capacity against demand and operating milestones, or place greater emphasis on technology development before adding more factories? Identify what evidence should trigger the next step. [P1]

A different manufacturing path

First Solar designs, manufactures and sells cadmium telluride (CdTe) thin-film solar modules. It describes its continuous manufacturing process and technology as sources of differentiation from conventional crystalline-silicon products. Those performance and environmental comparisons are company claims. [P1]

During 2023, First Solar began producing Series 7 modules at a third Ohio facility and its first India facility. Separately, it said an approximately 8 GW expansion was in progress: a fourth U.S. facility in Alabama, a fifth in Louisiana, and expansion at existing Ohio facilities. The company expected the Ohio expansion to be completed in the first half of 2024, Alabama operations to begin in the second half of 2024, and Louisiana operations to begin in late 2025. These were forecasts as of the cutoff. [P1]

The company also described a dedicated U.S. R&D facility with a high-tech pilot manufacturing line for full-size thin-film and multi-junction prototypes. First Solar expected that facility to be completed in the first half of 2024. It reported \$152.3 million of R&D expense in 2023, up 35% year over year. Spending, facility construction, and prototype capability do not by themselves establish a product's eventual cost, performance or commercial return. [P1]

Production, sales and a long order book

At year-end 2023, First Solar reported approximately 16.6 GW of installed nameplate capacity. It produced 12.1 GW and sold 11.4 GW during the year. For 2024, management expected production of 15.6-16.0 GW and sales of 15.6-16.3 GW. Production, capacity and sales are different measures; the 2024 figures were forecasts. [P1]

First Solar ended 2023 with contracts for 78.3 GW of future module sales, with an aggregate transaction price of \$23.3 billion that the company expected to recognize through 2030 as it delivered the modules. Contracts covering 39.1 GW included potential technology-related price adjustments. If expected module improvements and delivery timing support those adjustments, they could add up to \$0.5 billion, mostly in 2025-2027. The contract value excludes estimates for several other variable factors, and the agreements may be amended. Backlog offers visibility, but does not disclose project-level margins or guarantee every anticipated price adjustment. [P1]

First Solar's 2023 net sales increased 27% to \$3.319 billion from \$2.619 billion. The company attributed the increase mainly to higher module volumes and average selling prices; the prior-period sale of its Luz del Norte project also affects comparison. Gross margin rose to 39.2% from 2.7%. Management attributed that margin increase to Section 45X manufacturing credits, lower freight, higher module prices, cost reductions and the prior-period Luz del Norte sale and impairment. The sales and margin explanations differ, and the margin comparison includes tax-credit and prior-period effects. [P1]

Initial Series 7 ramps in Ohio and India were associated with \$81.5 million of under-utilization charges in 2023. The company also reported \$85.3 million of cost-of-sales reductions from continued module cost reductions. These historical company-wide figures do not isolate the economics of a specific factory, product series or future line. [P1]

A favorable outlook with conditions

First Solar's February 27 release forecast 2024 net sales of \$4.4-4.6 billion, capital expenditures of \$1.7-1.9 billion, and module sales volume of 15.6-16.3 GW. Its gross-margin guidance included \$1.0-1.05 billion of Section 45X credits and \$40-60 million of ramp costs. The company said its outlook depended partly on the amount of available credits and the timing and ability to monetize them. The announced facilities are included in this company-wide capex outlook; it does not identify an incremental budget for any additional proposal. [P2]

The 10-K estimated that roughly 305 GW of module capacity was added worldwide in 2023, primarily in China, and warned that excess capacity could pressure prices. First Solar said near-term U.S. prices remained strong, which it attributed mainly to domestic demand associated with the Inflation Reduction Act. Both the capacity estimate and pricing assessment are the company's statements. [P1]

Competition also involved different technology and manufacturing choices. JinkoSolar reported 21.4 GW of module shipments in the third quarter of 2023 and expected its annual mono-wafer, solar-cell and module production capacities to reach 85, 90 and 110 GW, respectively, by year-end. It highlighted N-type technology and TOPCon cell efficiency in its own release. Those

company-reported figures concern a silicon-based competitor and are not directly comparable to First Solar’s CdTe capacity or product economics. [P3]

Decision evidence

Evidence at the cutoff	What it establishes	What remains unknown
Approximately 8 GW of Alabama, Louisiana and Ohio expansion in progress; R&D facility also underway [P1]	A large manufacturing and technology program was already disclosed.	Site-level completion risk, future line utilization, yield, and project returns.
78.3 GW contracted backlog through 2030 [P1]	Contracted delivery visibility and a substantial order book.	Customer- and contract-level margin, delivery changes, collection timing and realized variable adjustments.
2023 production of 12.1 GW, sales of 11.4 GW, and 2024 sales forecast of 15.6-16.3 GW [P1, P2]	Management expected sales to rise as capacity expanded.	Whether output, demand and profitable utilization would track the forecast.
\$81.5 million in initial Series 7 under-utilization charges [P1]	Ramping new facilities involved costs.	Future ramp costs, mature utilization and whether later lines will reproduce them.
2024 capex forecast of \$1.7-1.9 billion, including facilities, and 45X-dependent outlook [P2]	The buildout had significant near-term capital needs and policy-linked economics.	Available capital for an additional program, credit outcomes, and any project-specific return.
First Solar’s estimate of 305 GW of 2023 global capacity additions and JinkoSolar’s capacity plans [P1, P3]	Competitors were adding substantial capacity through other technology paths.	Future module pricing, the persistence of domestic premiums, and relative unit economics.

The public record does not provide line-level utilization, Series 7 yield trajectories by site, product-level contribution margins, customer-level delivery economics, incremental demand beyond backlog, or project returns for a future factory or technology investment. It also does not reveal a fixed internal capital pool. Any recommendation should separate reported facts, management expectations, and assumptions introduced for the exercise.

The choice

One path is to emphasize execution, utilization and throughput at the announced footprint before making more manufacturing commitments. Another is to stage future capacity against demand, ramp and contract milestones. A third is to prioritize further technology development and efficiency or yield improvements before adding factories. Each path can be argued from the evidence; each exposes the company to different timing and execution risks.

Decision prompt: What sequence should the hypothetical team recommend for investment beyond the announced baseline? State the evidence and milestones that should trigger an increase, pause or change in direction. Make clear which assumptions are yours, and give the strongest counterargument to your preferred sequence.

Sources and conventions

The information cutoff is March 1, 2024; public information through February 29 is included. All forecasts and market estimates are attributed. No post-cutoff outcomes, project-level ROI or management decision beyond disclosed plans are represented.

[P1]: [First Solar FY2023 Form 10-K](#), filed February 27, 2024; Item 1, printed pp. 3-8 and ¶¶197-227, 286-309; Item 1A, printed pp. 18-20 and ¶¶521-553; Item 7, printed pp. 46-60 and ¶¶1131-1143, 1225-1227, 1305-1322, 1340-1349, 1470-1478; Note 1, ¶¶3018-3022. [P2]: [First Solar Q4 and FY2023 results and 2024 guidance](#), February 27, 2024, ¶¶9-29 and 36-57. [P3]: [JinkoSolar Q3 2023 results](#), October 30, 2023, business highlights, operating results and CEO outlook.