William Blair

August 29, 2024
Initiation Report

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Mixed Data Points and Rising Costs Bring Uncertainty to Solar Industry

Initiating Coverage of First Solar (FSLR), Enphase Energy (ENPH), and SolarEdge (SEDG) With Market Perform Ratings

First Solar, Inc.
Stock Rating: **Market Perform**
Symbol: FSLR (NASDAQ)
Price: $235.42 (52-Wk.: $129.22–$306.77)

Enphase Energy, Inc.
Stock Rating: **Market Perform**
Symbol: ENPH (NASDAQ)
Price: $122.53 (52-Wk.: $73.49–$141.63)

SolarEdge Technologies, Inc.
Stock Rating: **Market Perform**
Symbol: SEDG (NASDAQ)
Price: $25.69 (52-Wk.: $19.81–$167.87)

As the fourth and final subsector in the energy and sustainability group, we are adding energy generation. As part of launch, we are initiating coverage of three solar companies. As outlined in this report and our companion report, The Power Behind Artificial Intelligence, the solar markets represent a mixed bag of data crosscurrents. For example, the recent PJM auction suggests to us that utility-scale solar is likely to underperform expectations. Yet First Solar, which has broad-based exposure here, remains sold out through 2026 and has visibility into 2030. Further, First Solar is the solar reshoring bet that seems to be paying off for the U.S. Inflation Reduction Act. While this presents some volatility around election sentiment, we are initiating at a Market Perform because our analysis reveals headwinds in the U.S. utility-scale solar markets, which account for roughly 85% of First Solar's business. While we believe that First Solar is by far the best-positioned company in the solar supply chain, we are waiting to see if the recent PJM auction results are an anomaly or the start of a broader trend.

Residential and commercial solar has been under intense pressure in Europe and the United States because of the rising cost of capital and a weakening consumer. The market exuberance of 2022 and 2023 has seemingly created an inventory glut at wholesale distributors in the U.S. and Europe. While this narrative has been the focus for investors in both Enphase and SolarEdge over the past few quarters, at the heart of the destocking issue is a drop in demand. While we attribute this to higher cost of capital, it is also associated with a drawdown in savings across all income brackets. As a result, we explore this impact and what it means for both Enphase and SolarEdge.

While both Enphase and SolarEdge continue to draw down on channel inventory and attempt to call the bottom and provide descriptions of a recovery curve, we believe it is best to wait until visibility returns. For Enphase shares, valuation appears full despite the successive misses and reductions in expectations. With SolarEdge, the issue is more balance sheet related in terms of its ability to move finished goods without deflating its own product pricing power and thus margin compression. In both cases, we believe downside risk is not complete and it is too soon to call a bottom, even if central bank rate cuts could lower the cost of capital and act as a temporary catalyst for shares.

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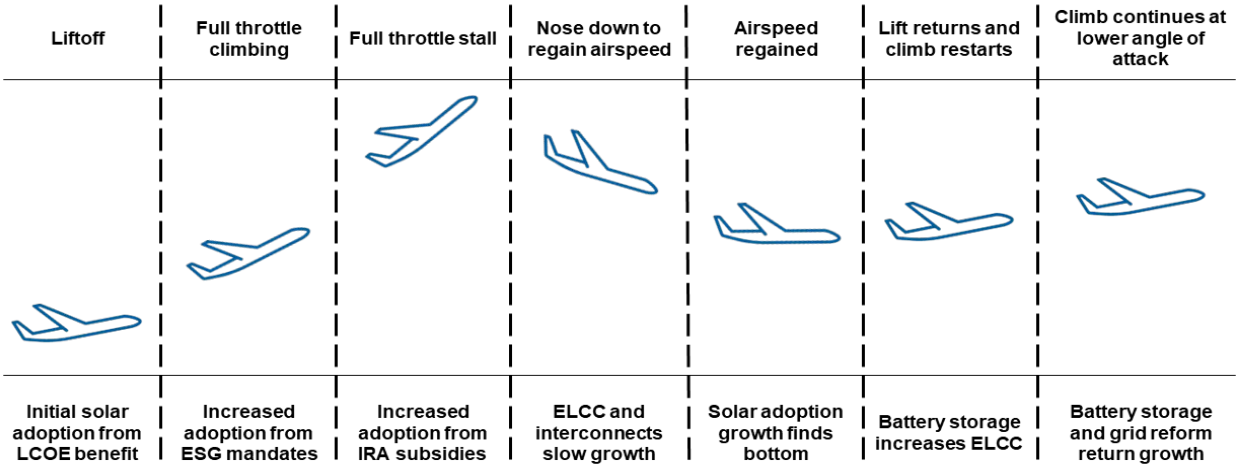
Solar Power Stall

Renewables are entering the "midtransition" power stall. A power stall occurs in an airplane when the angle of attack is too steep and no matter how much throttle is applied, lift begins to fail. The risk is the plane falls out of the sky. However, a skilled pilot can easily correct this, but only by recognizing the signs. While counterintuitive, the corrective action is to reduce throttle, nose forward to ease the angle of attack, and regain lift. Inexperienced pilots might panic and try to power out of the situation only to lock in a fatal outcome.

Exhibit 1
Solar Group Launch
Dynamics of a Power-On Stall in Solar Adoption



Source: William Blair Equity Research

Applying this metaphor to the energy transition is useful, particularly for renewables and grid systems. Let us assume the pilot in this example represents the policymakers/regulators, the fuel for the engines represents the subsidies, and the lift would be the economic return on the energy generated from the technology or energy return on investment (EROI). Early adoption of solar provided great lift due to low penetration of assets on the grid, subsidized capital, the ability for stakeholders to claim victory around ESG/net-zero mandates, and early placement on an "S" curve of technology adoption. However, as we detail in this report and our companion report (The Power Behind Artificial Intelligence), as more solar is added to grid systems, balancing authorities (BAs) are finding that replacement of traditional generation with renewable energy is not one for one, and instead of retiring assets, they must keep legacy generation online to ensure grid reliability. Thus, counterintuitively, the cost of reliable power is increasing, particularly in high solar adoption areas. Despite this concern, and most likely because they have not identified this problem correctly, policymakers are still issuing subsidies for power production, or trying to create more lift through solar production. The plane, however, is stalling out due to these resiliency issues. Evidence of this stall can be seen in actions taken across the country, such as absurdly long interconnection queues, new net metering policies that discourage solar adoption without battery systems, power purchase agreement (PPA) deals to secure dispatchable gas power, and very high integration costs that in some cases completely subsume the underlying asset benefits.

In addition, the companies generating the new electrical demand are under increased pressure to use renewable energy because they are currently failing to meet their own decarbonization targets (ESG). For example, Google's emissions were 48% higher this past year than in 2019, Microsoft's

were 29% higher than in 2020, and Meta's emissions rose 66% between 2021 and 2023. This is creating tension between emission goals and power needs, which we believe will benefit natural gas solutions, as well as energy storage and nuclear as two decarbonized options.

Recently, the Pennsylvania, New Jersey, and Maryland (PJM) regional transmission organization, the country's largest balancing authority, shocked the markets with its 2025/2026 energy auction, with prices up 833% year-over-year. However, only 2% of solar in the queue cleared the auction. At the same time, PJM needs to retire 40 GW of legacy generation, or roughly 21% of total installed capacity, by 2030 while bringing on 40 GW of new demand over the next 15 years. While the goal of this new generation has been to bring on non-dispatchable renewable energy, the instability and challenges from the variability of renewables are forcing the hand of the PJM to bring on more-efficient fossil-based dispatchable power despite its decarbonization goals. In fact, the winners of this last auction were natural gas suppliers, nuclear programs, and demand response programs, while the losing programs were clearly solar and wind. The question is, is this an anomaly or the start of a trend?

Aside from these crosscurrents, the modularity and time to market for solar plus storage remains its primary advantage. Commercial and utility-scale solar photovoltaic (PV) projects can be installed on the one-year time frame, and residential even quicker, while new gas generation will typically take at least four years. Nuclear extends even further at over 10 years.

Renewable Energy Is Fundamentally Different From Fossil Fuels

Investors must first realize that renewable energy (RE) is fundamentally different from fossil energy, aside from the emissions profile. We highlight three significant attributes of RE that will require fundamental changes to electrical grid infrastructure:

1. Intermittency/variability
2. Low density
3. Differing asset life

The current power sector has a very logical and straightforward production pathway. Energy is extracted, manipulated in some way to get it into the chemical makeup required to be transported and stored, and then consumed on-demand when needed. Oil, gas, and coal are also extremely energy dense, meaning they can be transported and stored easily. Over the past 200 years, we have built a power system that metabolizes these fossil fuels—using the transformation of chemical and mechanical energy for kinetic value or work. We use the energy when needed and store it when it is not needed.

Renewable energy is different in almost every way. For simplicity's sake, let's just consider solar and wind, as they are thought to provide the greatest growth opportunities over the next decade. Unlike coal, oil, or gasoline, solar PV panels convert photons to electrons directly and instantaneously. This process circumvents the waste heat element in fossil fuel electricity generation, which can lose over half of the potential energy in waste heat. This direct conversion to a much more useful form of energy, electricity, has tremendous potential value to society. However, despite the benefits, which are many, the inability to control weather patterns has made renewables additive and not substitutive for energy systems. This variability undermines a supply-based grid system that requires power to be called upon at will.

To understand why this is the case, we must first understand what is meant by "grid balancing." In its most basic form, we should think of the grid system as an interconnected bunch of wires with electrons shaking back and forth (alternating current). They shake back and forth at a specific rate—60 times per second in the U.S. This is the frequency of the grid (60 Hz). When demand

comes on the grid, it pulls at those electrons, slowing the frequency (<60 Hz). Conversely, when generation is added to the grid, it speeds up the frequency (>60 Hz). Grid balancing is the role of the BA, which tries to make sure that the demand on the grid is met with exactly the right supply of power so that neither demand nor supply changes the frequency. This is monitored 24/7, 365 days a year. In fact, frequency changes of just a percentage or two can blow up substations, which in turn can start wildfires and cause massive grid failures.

It is important to note that BAs cannot change demand (at least historically—but this is changing in terms of demand response [DR] and distributed energy resources [DER]), so they have only the supply side (i.e., generation) to work with. Given this setup, it should come as no surprise that BAs carefully examine the amount and type of generation assets when planning the future supply of power. In broad strokes, BAs have historically tried to make sure that there is: a) ample generation to meet demand on the highest demand day of the year—this is called peak demand; and b) that there is enough dispatchable supply to meet the fluctuations in demand throughout the day.

While battery storage systems can help solve the variability of solar and wind, it adds to the system cost (remember, renewables also stack costs upfront versus fossil-based systems) and the energy density of storage is far lower than the energy density of fossil fuels. Natural gas has roughly 55 MJ per kilogram, while lithium-ion batteries have roughly 1 MJ per kilogram. This difference in energy density means that, at a minimum, more mass of batteries will be required to replace fossil assets, which also carry significant lifecycle emissions to mine, extract, and process into end-product such as batteries.

Though renewable energy is cheap at the margin, its variable nature requires different management than conventional thermal generation. For example, when considering capacity additions to meet peak load, the PJM derates solar by 91%; a 100 MW solar PV array is derated to 9 MW because the PJM assigns an effective load carrying capability (ELCC) of 9% to solar stand-alone projects. The derating of solar power (and wind power) means that meeting increased demand will require more power additions on a MW capacity basis when compared to conventional fossil fuels. This is not the same as capacity factor, as ELCC is a theoretical downrating in calculating peak load.

Adding batteries to solar systems dramatically increases both the capacity factor (CF) and ELCC from 9% for a fixed-tilt PV array to 60% for a four-hour storage system. ELCC is the virtual calculation a BA uses to achieve peak load. However, CF is the actual generation from the underlying asset. The two can be different but tend to be similar. Let's take a look at a hypothetical example: assume a 100 MW solar array has a capacity factor of 9% in Pennsylvania and produces 9 MW after applying the CF at $0.025/kWh at peak pricing and would generate $2 million annually, unleveraged and without subsidies. Then let's assume that the installation is on a capped landfill with an installation cost of $3/W, or $30 million installed. The payback would be 18 years, unleveraged. The cost to this system would add $36 million for a total of $116 million, but the CF would now increase to about 60%. Even if the average economics were lower since the power would include both peak and off-peak rates within the structure of the PPA ($0.015 vs. $0.025 kWh), the payback would drop from 18 years unleveraged to 5-9 years unleveraged depending on the change to the PPA. In addition, the use of a battery would also stabilize the grid. We believe this is why Tesla remains sold out of Megapacks and quite literally cannot add production capacity fast enough.

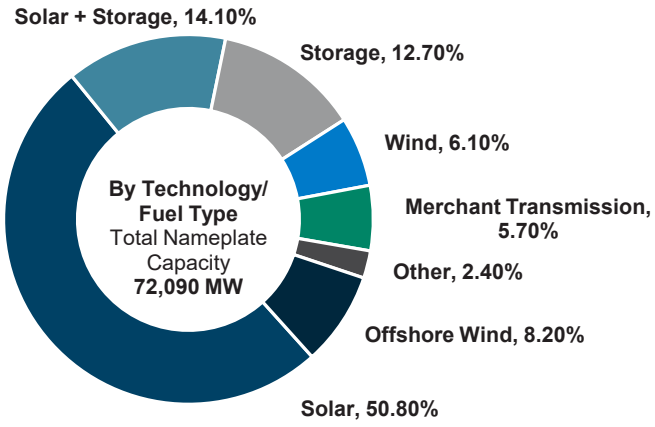
Interconnection Queue Paralysis

Interconnection is the process of taking a generation asset, such as a utility-scale PV facility or a combined-cycle gas generator, and hooking it up to the grid system—i.e., interconnecting those assets with the grid. This process must be done with care for obvious grid balancing reasons, but the time that developers are waiting to interconnect has ballooned in some areas to almost a decade. There is currently more generation in queues than there is existing capacity in the grid. For example,

as exhibit 2 shows for the PJM, currently over 72 GW of capacity in renewables alone exist. Yet of the 136 GW that cleared auction for 2025/2026, only 2% of solar (2.5 GW) including with battery backup and 1% of wind (1.8 GW) cleared interconnection at auction. This represents only 6% of potential adds, highlighting systemic problems within the interconnect process and all the hidden costs.

Exhibit 2
Solar Group Launch
Projects to Clear PJM Interconnection Process in 2024 and 2025

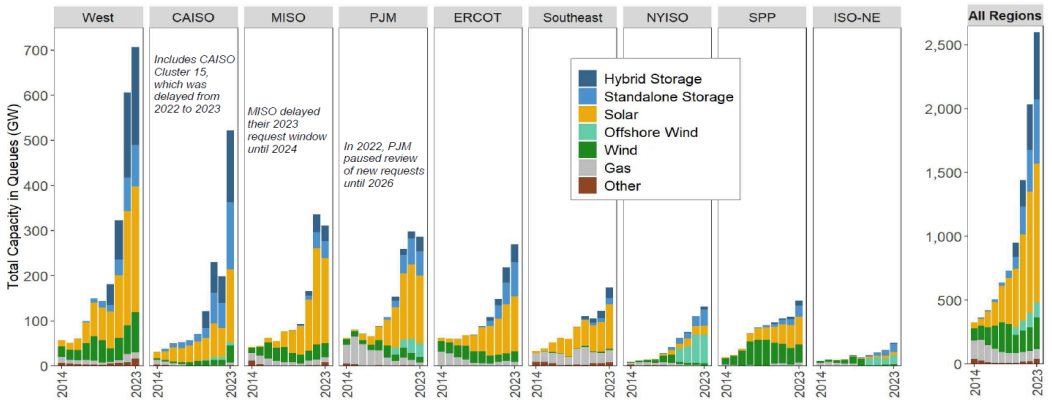
By State	Number of Projects	Total Nameplate Capacity (in MW)
DE	5	1,184
IL	82	13,798
IN	69	13,475
KY	39	4,125
MD	6	1,288
MI	8	887
NC	25	1,775
NJ	25	1,528
OH	72	8,613
PA	108	5,055
VA	162	19,012
WV	15	1,350
Total	616	72,090



Sources: Canary Media & PJM

Largely in response to these large queue times (and also very poor completion rates for utility-scale projects), the Federal Energy Regulatory Commission (FERC) developed and issued Order 2023, which has changed the way interconnection requests are evaluated in the hope that queue times will be reduced. Traditionally, utilities would evaluate projects on a first-come, first-served basis, but Order 2023 pivots this to a cluster study process where several projects are evaluated simultaneously. Importantly, Order 2023 has a process called "Allocation of Cluster Network Upgrade Costs," which mandates the use of a "proportional impact method" to allocate the cost of grid upgrades to the projects in the cluster according to how each new interconnection will benefit from the upgrade.

Exhibit 3
Solar Group Launch
Total Capacity in Queues From 2007–2023



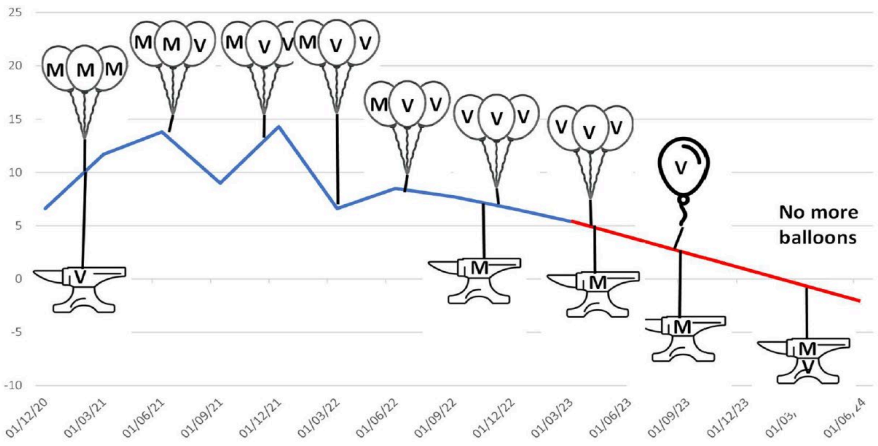
Sources: DOE and Lawrence Berkeley National Labs

Time will tell whether this policy will have its intended effect. Some are skeptical: The cluster study approach allows for the evaluation of multiple projects at one time, but if one project withdraws after the study is completed, then the utility will have to redo the study based on the new cluster, which will, at a minimum, take more time. To be fair, Order 2023 has increased the financial requirements of developers so that fewer unrealistic projects are put into the queue in the first place, but whether the financial requirements are onerous enough is unclear. Early indications suggest that queue times are extending as projects within the cohort are pulled for various financial reasons, triggering a game of musical chairs. Lastly, the 833% increase in auction pricing at the PJM is not a positive sign if it is the start of a trend.

Consumer Wallet and the Correlation to Residential Solar

Below is an exhibit from MacroStrategy Partnership, which argues that the economy, and specifically monetary velocity, can best be understood by either pulling up (inflationary) or pulling down the economy (deflationary). What this analysis highlights is that from a fiscal perspective, there are no balloons left. In fact, the consequence of printing so much is now pulling down the economy in a deflationary manner.

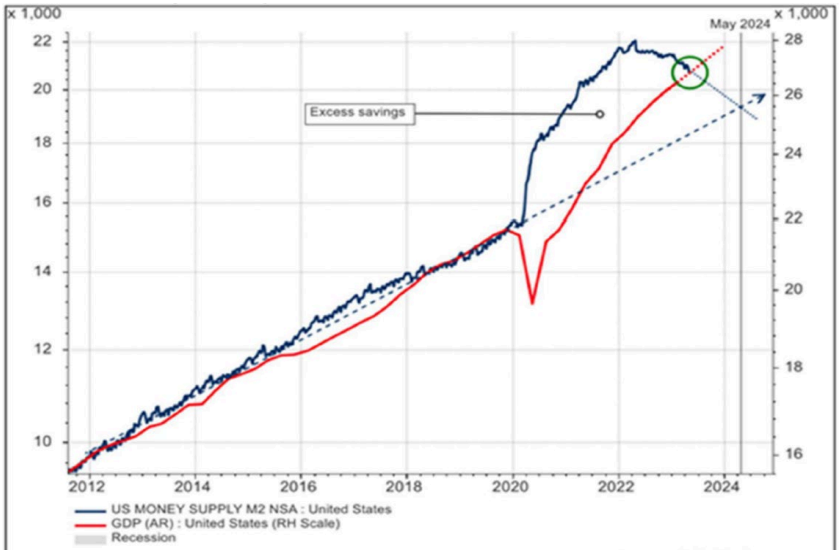
Exhibit 4
Solar Group Launch
U.S. Nominal GDP Growth, Quarter-Over-Quarter, Annualized %



Source: MacroStrategy Partnership

As exhibit 5 shows, as M2 money supply crosses GDP, which it is about to, then the drawdown of excess savings will act as an anvil to pull down the economy, which is deflationary. Why is this important and what does it have to do with residential solar? The expectation is that residential solar is about to bounce back as the Fed and other central banks cut rates to try to stop the economy from having a hard landing. However, this also assumes that current subsidies will continue and the consumer has the excess cash to invest.

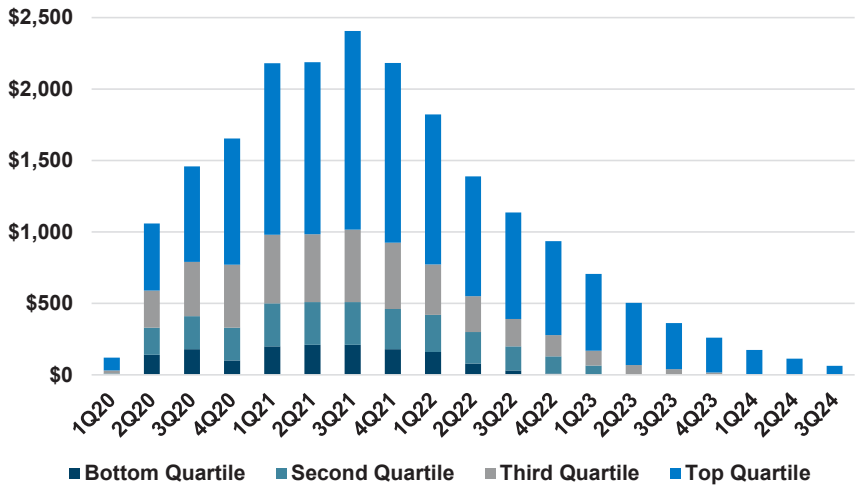
Exhibit 5
Solar Group Launch
M2 Money Supply to GDP



Source: Refinitiv Datastream

As exhibit 6 shows, spending has now come down in every quartile of income. This is important for understanding residential solar because it skews to the top quartile of earners. Since the subsidy incentives target tax savings, having an income high enough to take advantage of the savings favors the top quartile. Given the excess savings drawdown, it will be interesting to see whether we get the expected snapback as a function of lower rates or whether savings has a greater correlation to residential solar adoption than a 50- or 100-basis-point decrease in interest rates.

Exhibit 6
Solar Group Launch
U.S. Consumer Excess Savings by Income Bracket



Note: Figures are in billions, with the third and top quartile figures adjusted for inflation
Sources: New York Fed and The MacroStrategy Partnership

First Solar – Best-in-Class, but Mixed Signals in Utility-Scale Markets Keep Us Cautious; Initiating at Market Perform

Investment Summary

Best in class
First Solar appears to be the best-positioned company in the solar sector, given its ability to ramp up capacity. Further, its low-cost thin-film solution can compete directly with low-cost Chinese imports, while retaining industry-leading margins. This has led to an overwhelmingly positive view from Wall Street analysts (80% Buy, 20% Hold, and no Sell ratings, across 40 analysts).

Subsidy-driven equals enthusiasm and political volatility
We are not surprised by the optimism given that roughly 70% of our projected EPS is direct subsidies from the IRA, combined with the fact that First Solar is hitting its cost and timing milestones ramping up its Ohio and Alabama production facilities, with Louisiana to go.

Where we are different
With just under 50% share of the U.S. utility-scale solar market, based on our analysis, a shift in this sector is likely to have an outsized impact on First Solar. Therefore, if the PJM auction results are the start of a trend, this could have a negative impact on metrics such as backlog, production, and tax credits. While the structure of its contracts may mitigate some of these risks, we do not believe it removes all of them.

Valuation seems reasonable at these levels
If First Solar can sell all of its production, driven from demand in the utility-scale markets, the company will receive its tax incentives and the shares will appear inexpensive relative to its peers. However, if the utility-scale market begins to show signs of stress due to the increased integration costs, then the risk to First Solar would be that production would need to be slowed, rendering the shares fairly valued. This is the stance we are taking at the moment based on our analysis.

Risks suggest a balanced risk/reward profile
We see three key risks associated with First Solar shares: 1) a potential shift in adoption of utility scale solar due to rising integration costs; 2) a diversion between production and sales from slowing demand that would impact the ramp of its 14 GW of incremental demand in new facilities and associated tax credits; and 3) an easing of geopolitical pressure with China that removes or reduces tariffs on imported p-Si PV modules.

Company Overview
Founded in 1999 and based in Tempe, Arizona, First Solar is the world's leading vertically integrated solar technology company that produces and sells thin-film solar modules. Historically, First Solar manufactured exclusively cadmium telluride (CdTe) modules. However, over time, the company has been improving its performance and material sets, and today has achieved 21.3% efficiency using a copper rhenium (CuRe) thin-film chemistry. This is quite important because CdTe, while more economic per watt, has always lagged the conversion efficacy of is monocrystalline silicon competitors. Achieving parity could open new markets previously inaccessible to First Solar.

First Solar has three manufacturing facilities in Ohio and is also building a plant in Alabama and Louisiana, with operations expected to be completed in the second half of this year in Alabama and at the end of 2025 in Louisiana. The company also has manufacturing facilities in Malaysia and Vietnam and opened a manufacturing plant in India in 2023. The company's customers include system developers, independent power producers, utilities, commercial and industrial companies, and other system owners and operators. Third-party module sales contributed about 99% of total

net sales in 2023, as the company sold a majority of its solar modules to customers in the United States. The company has about 6,700 associates, the majority of whom work in the United States, Malaysia, Vietnam, and India.

Products

Series 7 module
First Solar's Series 7 module comes with a carbon and water footprint that is roughly four times lower than conventional crystalline silicon modules manufactured in China and an energy payback time that is about five times faster. It produces more energy than required when kept under high radiation for two months. Series 7 modules, which are made in America exclusively for the U.S. utility-scale market, are optimized for both form and function. Series 7 modules are manufactured at First Solar's most advanced manufacturing facility, in Lake Township, Ohio. These modules are not constrained by industry-standard cell or wafer sizes due to the CdTe technology.

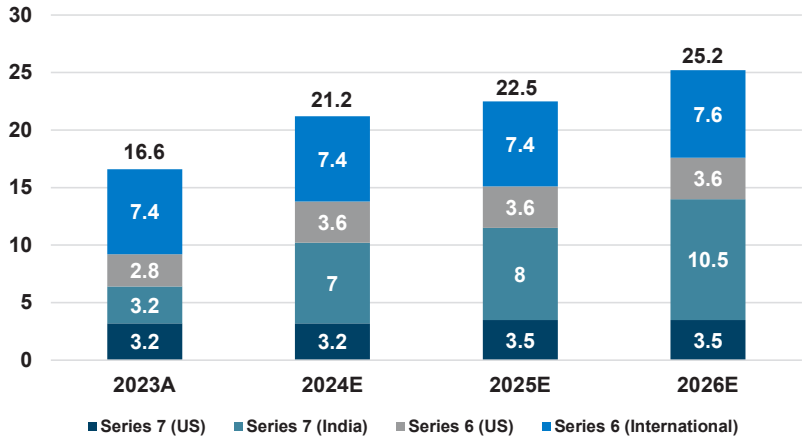
Series 6 module
These modules offer an advanced design that is optimized to balance system and operational costs. The Series 6 bifacial is the world's first bifacial thin-film CdTe module, which can achieve 19% efficiency and represents a 5% increase in energy yield.

Recent Updates
First Solar recent reported revenues of $10 billion for the three months ended June 30, 2024, compared with $8 billion for the same period in 2023, representing 25% year-over-year growth. This was driven by both increases in average selling prices (ASPs) and greater third-party module volumes. First Solar produced a record 3.7 GW in the quarter, which brought its total cumulative production since 2002 to over 60. However, the highlight is the ramp-up of its Ohio manufacturing facility, which triggers the 45X tax subsidies.

Given the nature of First Solar's utility-focused pipeline, it has excellent visibility. At the end of 2023, the company had 66.5 GW in its pipeline, with over 90%, or 55 GW, coming from the U.S. While this level of visibility and take-or-pay contracts certainly help First Solar, occasionally it has cancelations, such as the 400 MW contract in India due to a major European oil company divesting its business. It will be interesting to see if there will be any fallout from the limited solar drawdown on the PJM auction in the U.S.

In 2023, the company started manufacturing Series 7 modules at its third manufacturing facility in Ohio and at the company's first manufacturing facility in India, bringing total installed nameplate production capacity across all facilities to about 16.6 GW. In the second quarter of 2024, the company produced 3.7 GW and sold 3.4 GW of solar modules, and expects to produce between 15.6 GW and 16.0 GW of solar modules and sell between 15.6 GW and 16.3 GW in 2024. The company has already announced its plans to construct its fourth U.S. manufacturing facility in Alabama, which is expected to commence operations in the second half of 2024, along with an expansion of its manufacturing footprint at existing facilities in Ohio, which was commissioned in July 2024. The company also announced its plans to expand its manufacturing capacity by an additional 3.5 GW by constructing a fifth manufacturing facility in the United States. This facility will be in Iberia Parish, Louisiana, and is expected to commence operations in late 2025. Such expansion plans are expected to increase the company's U.S. manufacturing capacity by approximately 8 GW by 2026. The company exited 2023 with total nameplate capacity at 16.6 gigawatts and remains on track to bring its total nameplate capacity to over 25 gigawatts by the end of 2026, with 14 gigawatts in the U.S. and another 11 gigawatts internationally.

Exhibit 7
Solar Group Launch
First Solar Year-End Nameplate Manufacturing Capacity



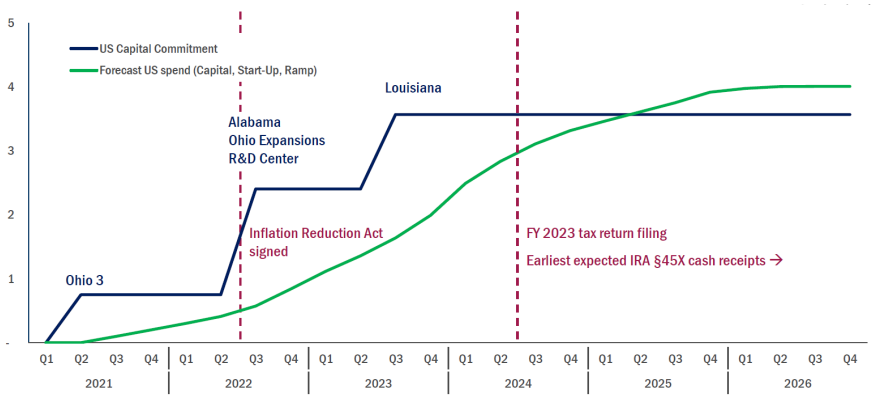
Source: Company reports

The company initiated production of bifacial Series 6 Plus modules at certain manufacturing facilities in the U.S. in October 2023. First Solar also entered an agreement with Fiserv, Inc. in December 2023 for the sale of $687.2 million of Section 45X tax credits the company generated during 2023 for aggregate cash proceeds of $659.7 million.

Reshoring Thin-Film Solar

First Solar has the potential to be the shining success of U.S. reshoring efforts, in our opinion. With three new facilities opening in the U.S. (Ohio, Alabama, and Louisiana), the move is a strategic win for both First Solar and the U.S. government. As a result, First Solar will receive 45X tax credits of $0.17W on its bifacial products, along with all modules produced in the U.S. We estimate that the combination of incentives could contribute 3,000 basis points to First Solar's gross margins, or roughly $14 of EPS, in subsidies alone in 2025.

Exhibit 8
Solar Group Launch
First Solar Forecast Ramp-up Schedule

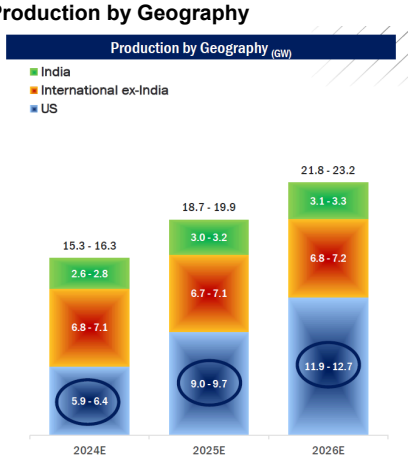


Source: Company reports

These significant investments in expanding capacity are designed to help companies such as First Solar relocate more than half of its production capabilities to the U.S. and stimulate job creation. New facilities in Louisiana and Alabama will contribute 3.5 GW each, while the Ohio facility, which just began producing products last quarter, will provide a total of 7.1 GW of capacity by 2026.

Exhibit 9
Solar Group Launch
First Solar Forecast Tax Credits and Production by Geography

Tax Credit Assumptions	
Eligibility	• Manufactured in United States after 1/1/2023
Amount	• Wafer $6/m2 (Efficiency ↑ = Credit/watt ↓); implies 6.1-6.4 c/w for Series 6 (460W-480W) and S7 (525W-540W) modules • Cell: 4.0 c/w • Module 7.0 c/w
Duration	• 100% credit 2023 → 2029 • Phase out 2030 → 2032 (75% 2030; 50% 2031; 25% 2032)
Structure	• Election for continuous 5 year refundability period, at individual facility level (not corporate level) • Remaining periods (pre or post election of transferability), credits are one-time transferable
Accounting	• Quarterly recognition in financial statements • P&L: Recognized as reduction to cost of goods sold in the period in which modules are sold • BS: Credit reflected as government grant receivable
Cash Timing	• Timing uncertain, linked to annual tax filing plus IRS / treasury period of review • FS full year tax filing expected Q2/Q3 in subsequent year



Source: Company reports

Additional capital from the IRA tax credits will enable First Solar to further develop its CuRe platform. While still at the R&D stage, this technology could provide a competitive solution for utility-scale and commercial solar markets, as more than 20% efficiency would compete well against poly silicon (p-Si), while also providing a market for copper production (rhenium like tellurium is a byproduct of copper refining).

CdTe Thin-Film Supply Chain

The increase in CdTe demand from thin-film solar modules used in utility-scale solar has created a market for tellurium refining, which historically was a waste stream for copper (Cu) refining. Solar is the largest end-market for tellurium, accounting for roughly 60% of the world's Te supply, according to the Fraunhofer Institute for Solar Energy Systems, 2022.

The process of extracting tellurium from Cooper is linked to electrolytic refining, which creates a toxic sludge known as an anode slime. This slime is filled with heavy metals including Te. While some mining operations may refine Cu on premise, most will ship the materials to refiners such as 5N Plus in Canada, which is also a supplier to First Solar.

We believe it is valuable for ecological and environmental impact purposes that First Solar has created a market that is using heavy metals that previously had been discarded as a mining waste stream.

Management Team

First Solar's management team is led by Chief Executive Officer Mark Widmar and Chief Financial Officer Alex Bradley. Both Widmar and Bradely have been in their current roles for eight years and are supported by an experienced management team, including Chief Commercial Officer Georges Antoun.

Exhibit 10
Solar Group Launch
First Solar Management Team

Name	Position	Tenure	Prior Experience	
			Company	Position
Mark Widmar	CEO	8 years	• First Solar • GrafTech International Ltd. • NCR Inc.	CFO CFO Corporate Controller
Alex Bradley	CFO	8 years	• First Solar • HSBC	Vice President of Treasury Various Roles
Georges Antoun	Chief Commercial Officer	8 years	• First Solar • Technology Crossover Ventures • Ericsson	Chief Operating Officer Venture Partner Head of Product Area IP & Broadband Networks
Michael Koralewski	Chief Supply Chain Officer	2 years	• First Solar • First Solar • First Solar	Chief Manufacturing Operations Officer Vice President, Global Site Operations Vice President, Global Quality
Kuntal Kumar Verma	Chief Manufacturing Officer	2 years	• First Solar • First Solar	Chief Manufacturing Engineering Officer Vice President, Global Manufacturing Engineering
Pat Buehler	Chief Product Officer	2 years	• First Solar	Chief Quality and Reliability Officer
Markus Gloeckler	Chief Technology Officer	4 years	• First Solar	Vice President of Research

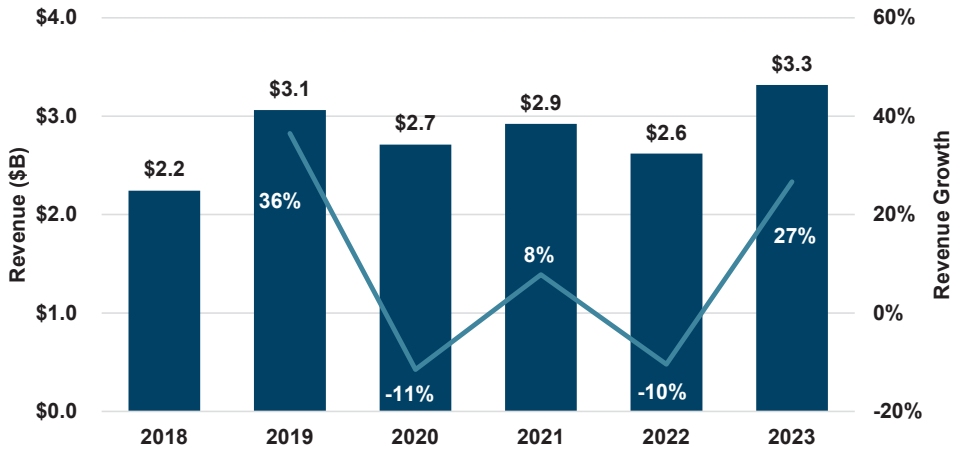
Source: Company reports

Financial Overview

Historical financial overview

First Solar's revenue has grown at an 8.1% compound annual rate from $2.2 billion in 2018 to nearly $3.3 billion in 2023. This growth was primarily driven by an increase in the volume of modules sold to third parties and an increase in the average selling price per watt over the years. Revenue generated from the U.S. was $1.5 billion in 2018 and $3.2 billion in 2023, representing a CAGR of 16.6% over the past five years.

Exhibit 11
Solar Group Launch
First Solar Historical Revenue Growth

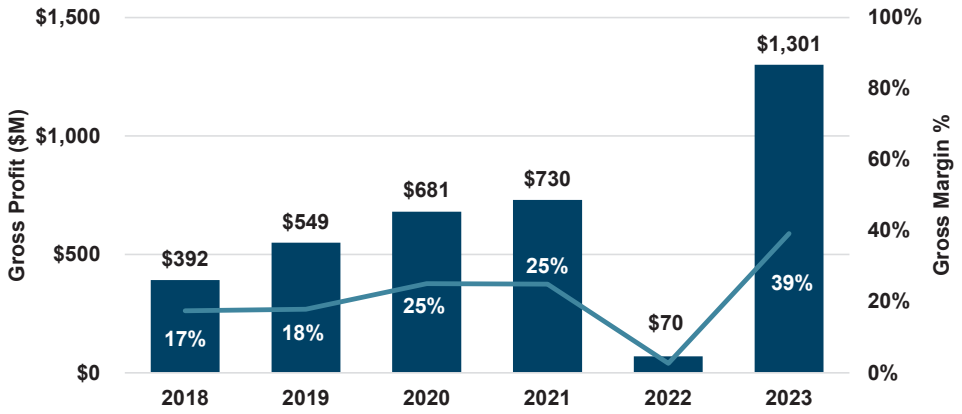


Sources: Company reports and William Blair Equity Research

In 2023, the company produced 12.1 GW of modules, up from 6.1 GW of modules in 2020, representing a staggering 98% increase in production, mainly due to manufacturing excellence at Series 6 factories. Over the same period, nameplate capacity increased from 6.3 GW to 16.6 GW, representing growth of about 163% as the company continues to expand its existing manufacturing facilities in U.S. and is building new facilities internationally.

The company's gross profit was $392 million in 2018 and $1,301 million in 2023, representing a 27% CAGR, with gross margin expanding from 17.5% in 2018 to 39.2% in 2023, a 21.7-percentage-point increase. First Solar's gross profit increased in 2023 as the company was able to recognize advanced manufacturing production tax credits under Section 45X of the ITC. Over the five-year period, operating expenses as a percentage of revenue declined from 15.7% in 2018 to 13.6% in 2023.

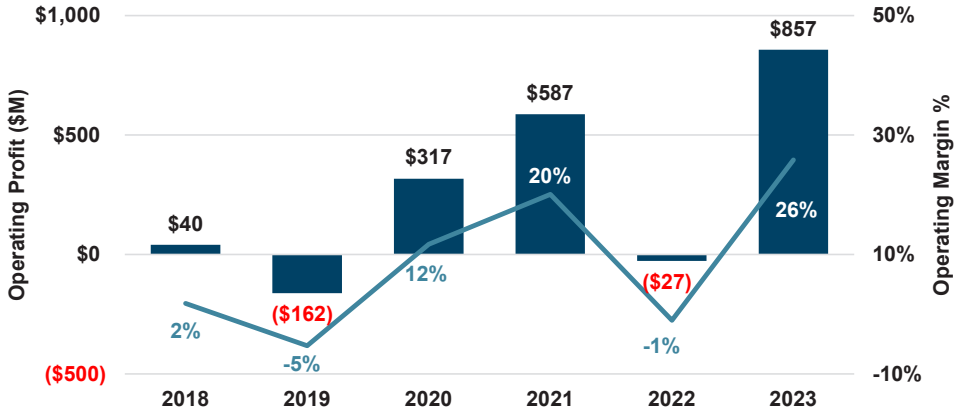
Exhibit 12
Solar Group Launch
First Solar Historical Gross Profit Growth



Sources: Company reports and William Blair Equity Research

The company's operating profit was $40 million in 2018 and $857 million in 2023, representing a CAGR of 84%, with operating margin expanding approximately 24 percentage points to 25.8% in 2023, from 1.8% in 2018. The increase in profitability was largely attributed to higher volumes and a mix shift toward new products with higher efficiency and therefore higher ASPs.

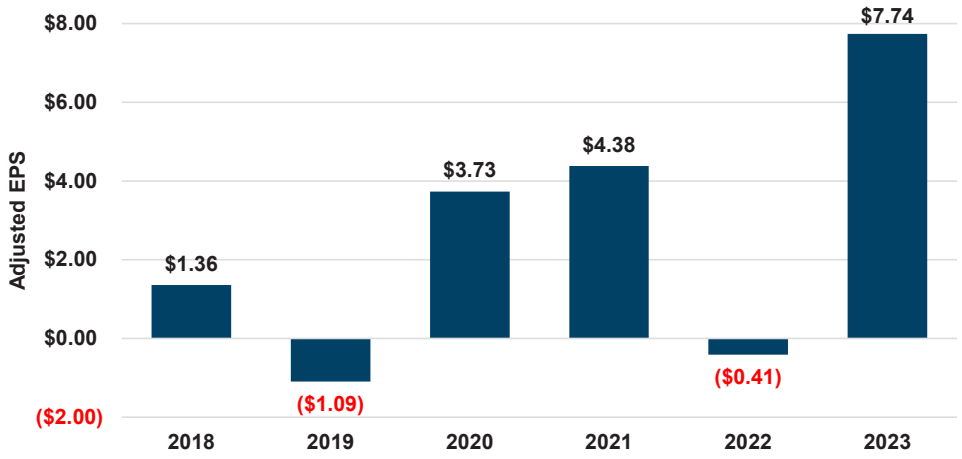
Exhibit 13
Solar Group Launch
First Solar Historical Operating Profit Growth



Sources: Company reports and William Blair Equity Research

The company's adjusted EPS were $1.36 in 2018 and $7.74 in 2023, representing a CAGR of 42%. Adjusted EPS increased primarily because of higher volumes and mix shift to new product with higher efficiency and therefore higher ASPs.

Exhibit 14
Solar Group Launch
First Solar Historical Adjusted EPS



Sources: Company reports and William Blair Equity Research

Current financial condition

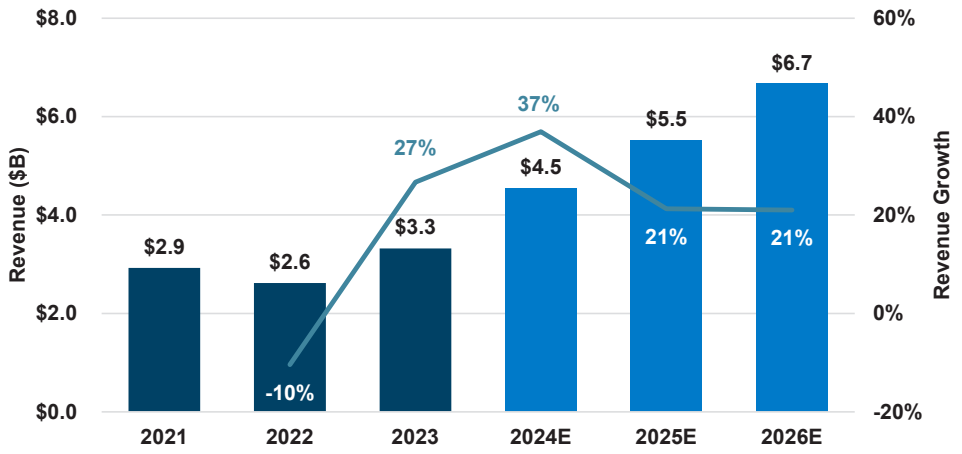
First Solar's cash, cash equivalents, and marketable securities amounted to $1.7 billion as of June 30, 2024, compared with $2.1 billion as of December 31, 2023. The decrease was largely associated with capex needs for its U.S. and Indian facilities, various operating expenditures, and certain advance payments of raw materials, which were partly offset by proceeds from the sale of Section 45X tax credits and cash receipts from module sales.

First Solar entered a credit agreement with several financial institutions in June 2023 that provides the company with a senior secured revolving credit facility with an aggregate borrowing capacity of $1.0 billion. This facility matures in June 2028 and was undrawn as of June 30, 2024. In March 2023, First Solar received financial incentives under India's Production Linked Incentive Scheme (PLI-2). Under the terms of this subsidy agreement, First Solar is investing $684 million, with 70% of the investment already made, to produce 3.5 GW of thin-film modules in India.

Financial outlook

We expect the company to generate revenue of $4.5 billion in 2024 and $6.7 billion in 2026, representing a CAGR of 26% between 2023 and 2026. We believe revenue growth will primarily be driven by sales of its solar modules into the U.S. utility-scale solar markets.

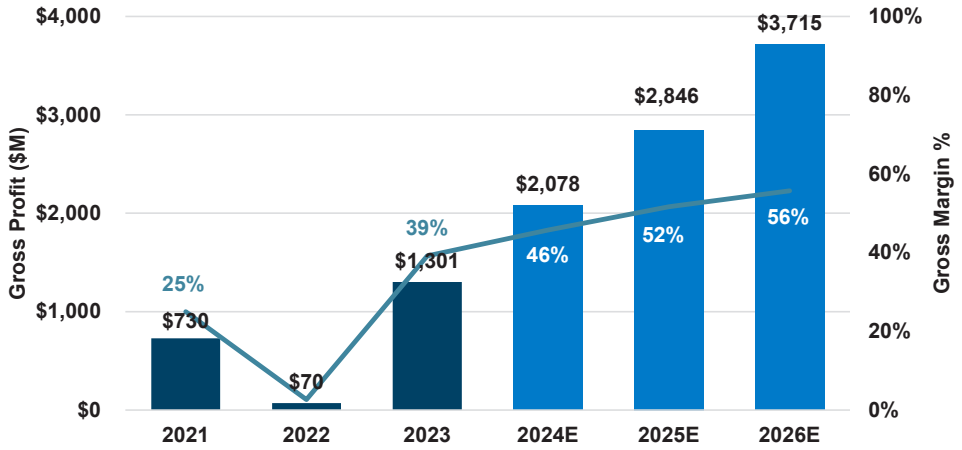
Exhibit 15
Solar Group Launch
First Solar Revenue Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate gross profit of $2.1 billion in 2024 and $3.7 billion in 2026, representing a CAGR of 42% between 2023 and 2026. We estimate gross margins will expand approximately 17 percentage points, from 39% in 2023 to 56% in 2026, primarily driven by 45X tax credits. Excluding the tax credits, we forecast a low- to mid-20% margin on the operating business.

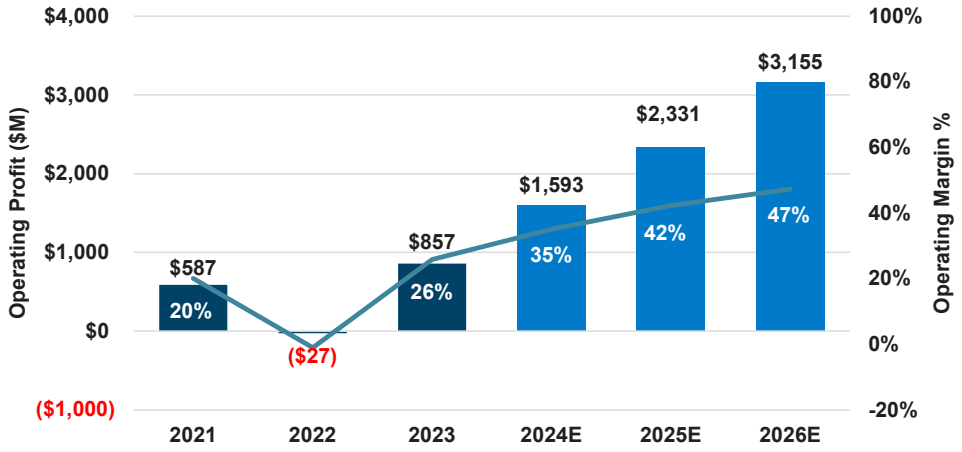
Exhibit 16
Solar Group Launch
First Solar Gross Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate operating profit of $1.6 billion in 2024 and $3.2 billion in 2026, representing a CAGR of 54% between 2023 and 2026. We estimate operating margins will expand approximately 21 percentage points, from 26% in 2023 to 47% in 2026, primarily driven again by the 45X tax credits, along with higher volumes and absorption of investments in new manufacturing facilities.

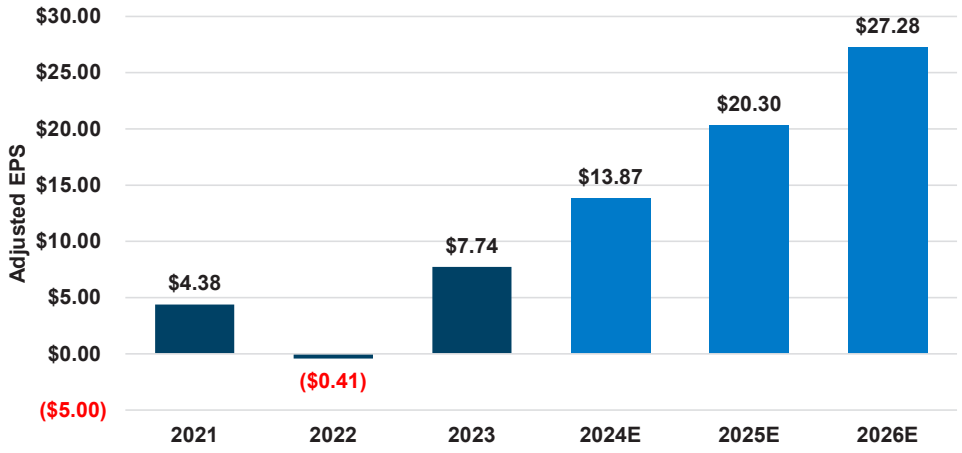
Exhibit 17
Solar Group Launch
First Solar Operating Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate adjusted EPS of $13.87 in 2024 and $27.28 in 2026, representing a CAGR of 52% between 2023 and 2026. We believe earnings growth will primarily be driven by tax credits, which we calculate to be worth $19.66 of our $27.28 estimate.

Exhibit 18
Solar Group Launch
First Solar Adjusted EPS Forecast



Sources: Company reports and William Blair Equity Research

Exhibit 19
Solar Group Launch
First Solar Income Statement Forecast

	2021	2022	2023	1Q24	2Q24	3Q24E	4Q24E	2024E	1Q25E	2Q25E	3Q25E	4Q25E	2025E	2026E
Net Sales	$2,923	$2,619	$3,319	$794	$1,010	$1,118	$1,622	$4,545	$1,142	$1,367	$1,250	$1,753	$5,512	$6,670
Cost of Goods Sold	2,193	2,549	2,018	448	512	615	892	2,467	507	669	568	922	2,666	2,954
Gross Profit	$730	$70	$1,301	$346	$499	$503	$730	$2,078	$635	$698	$682	$831	$2,846	$3,715
Selling, General and Administrative	170	165	198	46	47	48	49	189	49	50	50	48	197	217
Research and Development	99	113	152	43	52	52	51	198	51	55	53	57	216	241
Production Start-Up	21	73	65	15	27	28	28	98	26	25	26	26	104	103
Litigation Loss	0	0	36	0	0	0	0	0	0	0	0	0	0	0
Operating Profit	$587	($27)	$857	$243	$373	$375	$603	$1,593	$511	$568	$553	$699	$2,331	$3,155
Interest Income / (Expense)	(7)	21	85	18	15	14	14	61	17	17	17	17	68	68
Other Expense / (Income)	(8)	15	(51)	(6)	(10)	0	0	(16)	0	0	0	0	0	0
Income Before Taxes	$572	$9	$891	$256	$377	$389	$617	$1,638	$528	$585	$570	$716	$2,399	$3,223
Income Tax Provision	(103)	(53)	(61)	(19)	(28)	(39)	(62)	(147)	(48)	(53)	(51)	(64)	(216)	(290)
Net Income	**$469**	**($44)**	**$831**	**$237**	**$349**	**$350**	**$555**	**$1,491**	**$480**	**$533**	**$518**	**$652**	**$2,183**	**$2,933**
Diluted EPS														
Average Diluted Shares Outstanding	107	107	107	107	108	108	108	108	108	108	108	108	108	108
Diluted EPS	**$4.38**	**($0.41)**	**$7.74**	**$2.20**	**$3.25**	**$3.26**	**$5.16**	**$13.87**	**$4.47**	**$4.95**	**$4.82**	**$6.06**	**$20.30**	**$27.28**
EBITDA	$847	$242	$1,165	$334	$470	$375	$603	$1,593	$511	$568	$553	$699	$2,331	$3,155
Free Cash Flow	($303)	($30)	($785)	($146)	($172)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Effective Tax Rate	-18.1%	-613.7%	-6.8%	-7.4%	-7.4%	-10.0%	-10.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%
% of Sales														
Net Sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	75.0%	97.3%	60.8%	56.4%	50.6%	55.0%	55.0%	54.3%	44.4%	48.9%	45.4%	52.6%	48.4%	44.3%
Gross Profit	25.0%	2.7%	39.2%	43.6%	49.4%	45.0%	45.0%	45.7%	55.6%	51.1%	54.6%	47.4%	51.6%	55.7%
Operating Expenses	9.9%	13.4%	13.6%	13.1%	12.5%	11.5%	7.9%	10.7%	11.0%	9.5%	10.4%	7.5%	9.4%	8.4%
Operating Profit	20.1%	-1.0%	25.8%	30.6%	36.9%	33.6%	37.2%	35.1%	44.7%	41.6%	44.2%	39.9%	42.3%	47.3%
EBITDA	29.0%	9.3%	35.1%	42.0%	46.5%	33.6%	37.2%	35.1%	44.7%	41.6%	44.2%	39.9%	42.3%	47.3%
Net Income	16.0%	-1.7%	25.0%	29.8%	34.6%	31.3%	34.2%	32.8%	42.1%	39.0%	41.5%	37.2%	39.6%	44.0%
Growth Rates														
Net Sales	7.8%	-10.4%	26.7%	44.8%	24.6%	39.6%	40.0%	36.9%	43.8%	35.3%	11.8%	8.1%	21.3%	21.0%
Cost of Goods Sold	8.0%	16.2%	-20.8%	2.7%	2.3%	44.7%	35.9%	22.2%	13.0%	30.8%	-7.7%	3.4%	8.1%	10.8%
Gross Profit	7.2%	-90.4%	1761.9%	208.8%	60.7%	33.7%	45.4%	59.8%	83.6%	39.9%	35.6%	13.8%	37.0%	30.5%
Operating Expenses	-20.0%	20.7%	28.4%	10.6%	-11.0%	23.8%	14.9%	7.9%	20.8%	2.8%	1.0%	3.3%	6.3%	8.7%
Operating Profit	84.8%	-104.6%	-3247.5%	1250.6%	121.1%	37.4%	51.5%	85.9%	110.1%	52.5%	47.4%	16.1%	46.3%	35.3%
EBITDA	53.8%	-71.4%	380.5%	284.2%	95.6%	7.0%	23.6%	36.7%	53.1%	20.9%	47.4%	16.1%	46.3%	35.3%
Free Cash Flow														
Net Income	*17.7%*	*-109.4%*	*-1981.0%*	*455.9%*	*104.8%*	*30.5%*	*58.9%*	*79.5%*	*103.0%*	*52.4%*	*48.0%*	*17.5%*	*46.4%*	*34.3%*
Diluted EPS	*17.2%*	*-109.4%*	*-1976.7%*	*454.7%*	*104.4%*	*30.2%*	*58.6%*	*79.1%*	*102.8%*	*52.4%*	*48.0%*	*17.5%*	*46.4%*	*34.3%*

Note: $ in millions except share price
Source: William Blair Equity Research

Exhibit 20
Solar Group Launch
First Solar Balance Sheet

BALANCE SHEET	2021	2022	2023
Cash and Equivalents	1,450,654	1,481,269	1,946,994
Marketable securities	375,389	1,096,712	155,495
Accounts receivable trade, net	429,436	324,337	660,776
Accounts receivable unbilled	25,273	30,654	0
Inventories	666,299	636,312	819,899
Other current assets	244,192	222,137	1,051,645
Total Current Assets	**$3,191,243**	**$3,791,421**	**$4,634,809**
Property, plant and equipment, net	2,649,587	3,536,902	4,397,285
Deferred tax assets, net	59,162	78,680	142,819
Restricted marketable securities	244,726	182,070	198,310
Government grants receivable	0	0	152,208
Goodwill	14,462	14,462	29,687
Intangible assets, net	45,509	31,106	64,511
Inventories	237,512	260,395	266,899
Other assets	971,545	356,192	478,604
Total non-current assets	**$4,222,503**	**$4,459,807**	**$5,730,323**
Total assets	**$7,413,746**	**$8,251,228**	**$10,365,132**
Accounts payable	193,374	341,409	207,178
Income taxes payable	4,543	29,397	22,134
Accrued expense	288,450	382,782	524,829
Current portion of long-term debt	3,896	0	96,238
Deferred revenue	201,868	263,215	413,579
Other current liabilities	34,747	21,245	42,200
Total Current Liabilities	**$726,878**	**$1,038,048**	**$1,306,158**
Accrued solar module collection and recycling liabilit	139,145	128,114	135,123
Long-term debt	236,005	184,349	464,068
Deferred revenue	95,943	944,725	1,591,604
Other liabilities	256,224	119,937	180,710
Total liabilities	**$1,454,195**	**$2,415,173**	**$3,677,663**
Shareholders equity			
Common Stock	106	107	107
Additional paid-in capital	2,871,352	2,887,476	2,890,427
Accumulated earnings	3,184,455	3,140,289	3,971,066
Accumulated other comprehensive loss	-96,362	-191,817	-174,131
Total shareholders' equity	**$5,959,551**	**$5,836,055**	**$6,687,469**
Total liabilities and shareholders' equity	**$7,413,746**	**$8,251,228**	**$10,365,132**

Note: $ in thousands
Source: William Blair Equity Research

Valuation

First Solar trades at 8x our 2025 EV/EBITDA estimate of $3.1 billion. This is in line with other similar-sized technology manufacturers such as Infineon (not covered) and a slight premium to ST Micro (Market Perform). On a price-to-earnings basis, First Solar trades at 10x, which is a discount to both Infineon and ST Micro, which trade at 14x and 15x, respectively. Our conclusion is that while First Solar receives a significant benefit from the IRA's 45X ITCs, the growth and profitability reflect at minimum a fairly valued stock price. As noted, the reason we are not initiating with a more aggressive Outperform rating is because of the recent signs that the company's largest end-market, U.S. utility-scale solar, is exhibiting mixed signals. As a result, we are initiating with a Market Perform rating.

Exhibit 21
Solar Group Launch
Industry Valuation Table

			Trading Statistics			Valuation								
						EV/Sales			EV/EBITDA			P/E		
Power Semi Companies	Ticker	WB Rating	Price 8/27/2024	Market Cap ($M)	Enterprise Value ($M)	2024	2025	2026	2024	2025	2026	2024	2025	2026
ON Semiconductor Corp.	ON	MP	$74.82	32,050	35,225	5.0x	4.6x	4.1x	15x	13x	11x	19x	16x	15x
STMicroelectronics NV	STM	MP	$31.04	28,154	25,572	1.9x	1.8x	1.6x	9x	8x	6x	19x	15x	12x
Wolfspeed Inc	WOLF	MP	$13.34	1,692	5,719	7.1x	6.2x	4.1x	NM	NM	45x	NM	NM	NM
Infineon Technologies AG	IFX-ETR		€32.39	46,908	50,637	2.9x	2.7x	2.4x	9x	8x	7x	17x	14x	12x
Microchip Technology Incorporated	MCHP		$80.94	43,081	49,683	8.9x	8.6x	7.4x	25x	22x	16x	29x	26x	20x
Analog Devices, Inc.	ADI		$231.84	112,014	119,096	12.5x	11.2x	10.1x	28x	26x	21x	35x	30x	24x
Texas Instruments Incorporated	TXN		$210.69	190,142	197,679	12.5x	11.0x	9.8x	28x	22x	19x	41x	33x	27x
Covered Average						**7x**	**7x**	**6x**	**19x**	**16x**	**18x**	**27x**	**22x**	**18x**
Covered Median						**7x**	**6x**	**4x**	**20x**	**17x**	**16x**	**24x**	**21x**	**17x**
Solar Companies														
Enphase Energy, Inc.	ENPH	MP	$122.53	16,601	16,638	11.5x	8.4x	7.0x	42x	25x	20x	50x	30x	25x
SolarEdge Technologies, Inc.	SEDG	MP	$25.69	1,497	1,375	1.3x	0.8x	0.6x	NM	NM	24x	NM	NM	NM
First Solar, Inc.	FSLR	MP	$235.42	24,962	23,721	5.2x	4.3x	3.6x	12x	8x	8x	17x	12x	9x
Canadian Solar Inc.	CSIQ		$13.04	895	4,513	0.6x	0.5x	0.5x	6x	4x	3x	9x	4x	3x
Sunrun Inc.	RUN		$20.82	4,728	17,770	8.4x	7.2x	6.3x	442x	NM	69x	NM	NM	NM
JinkoSolar Holding Co., Ltd. Sponsored ADR	JKS		$18.21	998	6,430	0.4x	0.3x	0.3x	4x	3x	7x	129x	6x	7x
Sunnova Energy International Inc	NOVA		$10.93	1,418	10,051	11.7x	9.3x	7.7x	17x	15x	13x	NM	NM	NM
Uncovered Average						**6x**	**4x**	**4x**	**87x**	**11x**	**20x**	**51x**	**13x**	**11x**
Uncovered Median						**5x**	**4x**	**4x**	**14x**	**8x**	**13x**	**34x**	**9x**	**8x**
Total Average						**6x**	**5x**	**5x**	**53x**	**14x**	**19x**	**36x**	**19x**	**15x**
Total Median						**6x**	**5x**	**4x**	**16x**	**13x**	**14x**	**24x**	**16x**	**13x**
First Solar, Inc.	**FSLR**	**MP**	**$235.42**	**24,962**	**23,721**	**5.2x**	**4.3x**	**3.6x**	**12x**	**8x**	**8x**	**17x**	**12x**	**9x**

Note: All figures in USD, other than share prices as indicated otherwise. Annual periods represent calendar years. As of market close: 8/27/2024
Sources: FactSet and William Blair Equity Research

Investment Risks

The greatest risk to First Solar shares is a change in policy to claw back IRA subsidies including the 45X tax credits. This could only happen in a Republican sweep (executive and both houses of U.S. Congress), in our opinion. However, given the amount of subsidies, we see this as the greatest risk and therefor, are not surprised that shares tend to trade with election polling. We see this as a low-probability even in the event of a sweep, largely because 1) it is very difficult to repeal large bills without political consequences and 2) most of the jobs created by First Solar U.S. manufacturing are located in red states such as Ohio, Alabama, and Louisiana.

A slowing in the U.S. utility market due to rising integration costs is an indirect risk that could slow demand such that production and sales could decouple and thus pressure the tax credits and the MW of modules sold. Outside the U.S., dumping policies by Chinese p-Si competitors remain a risk, which is frankly not new. Supply disruptions to key materials such as cadmium (Cd), tellurium (Te), and rhenium (Re) are a risk. Each of these materials, Ce, Te, and Re, is a byproduct of copper (Cu) mining and refining. Therefore, shortages or oversupply of Cu can have adverse or positive effects to pricing of these key materials.

Enphase Energy – Timing and Slope of Potential Recovery Lead Us to Initiate With a Market Perform

Investment Summary

Initiating coverage of Enphase Energy at Market Perform on muted U.S. residential solar recovery
Enphase shares have been buoyed from a low of $75 to current levels of $122 largely on a call of the bottom by Enphase management. This has come in the form of inventory drawdown in its distribution channel, which the company has now said is at normal levels. However, the question is, will a recovery be V-shaped recovery, which would be measured in less than a year, or more of a muted U shape, measured longer than a year? With the shares trading at 30x our adjusted 2025 EPS estimate of $4.08, we believe a V-shaped recovery is baked into the stock. Therefore, any signs that a recovery is U-shaped add downside risk to the shares, in our opinion.

Strength of U.S. consumer suggests risk to a V-shaped residential recovery
The U.S. consumer is showing signs of stress with excess savings now spent down in every income quartile. We believe solar has benefited and continues to benefit the wealthiest among us as a result of tax structured incentives. The recent spend-down in this quartile creates concern that we will see a meaningful downtick, even with a higher electricity price backdrop.

A strong balance sheet positions Enphase well for a prolonged downturn
Enphase maintains a solid balance sheet with net cash of $1.5 billion and inventories at only $176 million. Therefore, should a recovery take longer to occur, we believe Enphase is well positioned to weather a storm.

New product introduction and storage are two clear opportunities
Enphase is introducing its IQ9 inverters with gallium nitride (GaN) semiconductors. These allow the company to offer 30% greater energy density in a smaller footprint, thereby increasing the value proposition to customers and potentially boosting the margins to Enphase. In addition, by shifting to GaN from silicon FETs, Enphase is able to halve its chip count. Further, the use of energy storage in residential applications driven by NEM 3.0 policies has also led to better-than-expected strength, surprising estimates by 30% over consensus last quarter alone.

Valuation
Enphase shares trade at a discount to historical levels. However, when comparing against power semiconductor companies with similar profitability and growth profiles, Enphase shares trade at a premium. The counter would be the growth profile versus a cyclical business; however, the latest downturn might suggest that as solar has now matured, it is actually more cyclical than growth oriented. This debate will largely weigh on the multiple, which we believe hinges on the shape of the recovery. Shares trade at 30x our adjusted 2025 EPS estimate of $4.08 and 26x Street consensus of $4.78. It is worth noting that these figures strip out options and tax credits, which contribute just over $2.01 to our estimate, suggesting that the shares are trading at 58x. Given the margin and growth profile, ENPH most closely resembles onsemi (Market Perform), which is trading at only 16x during the same time frame excluding options. Given this analysis, combined with our concerns about the shape of a residential-driven recovery in solar, we are initiating with a Market Perform rating.

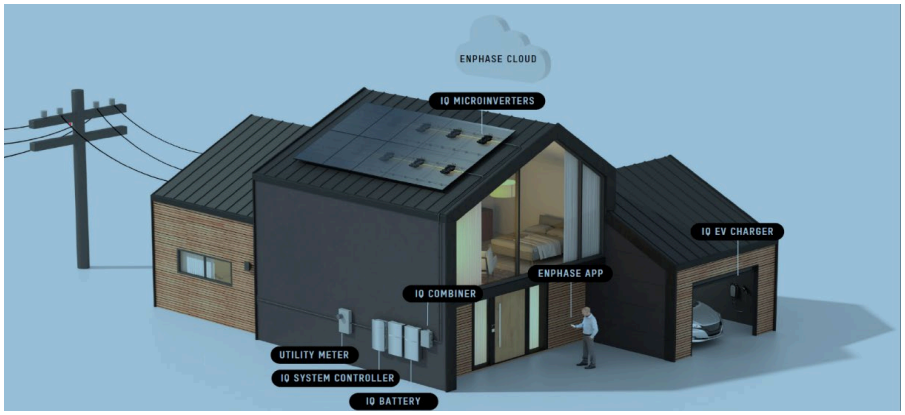
Investment risks
Risks include: 1) competition, particularly from Tesla with an integrated approach; 2) a direct competitor with historically high inventory levels, which may lower prices significantly during this downturn and could cause an adverse effect of market prices, particularly in Europe; and 3) investors that discount non-GAAP earnings given significant use of options, which we calculate make up 60%-70% of the delta between GAAP and non-GAAP estimates.

Company Overview

Enphase Energy is a global energy technology company designing, developing, manufacturing, and selling home energy solutions that manage energy generation, energy storage, control, and communications. Founded in 2006 and based in Fremont, California, Enphase delivers smart, easy-to-use solutions like intelligent microinverters that work virtually with every solar panel made and, when paired with smart technology, results in one of the industry's best-performing clean energy systems.

The company has transitioned into complete energy management solutions, which consist of solar, batteries, load control, electrical vehicle (EV) charging, compatibility with third-party generators, and grid services. Enphase serves the solar wholesale market with two-thirds of the business focused on the U.S. residential and commercial markets. Enphase focuses on designing energy products across solar, storage, and EV charging markets for the residential and commercial markets with product offerings that will expand its footprint in the commercial solar/storage markets.

Exhibit 22
Solar Group Launch
The Enphase Energy System



Source: Company reports

Products

IQ microinverters

The Enphase IQ8 microinverter is designed to maximize energy production and manage a continuous DC current of 14 amperes and is shipped in 21 countries worldwide. The IQ8 microinverters with peak output power of 480 W AC for the small-commercial market are also being shipped in North America, and microinverters with grid-tied applications are being shipped across South Africa, Mexico, Brazil, and India. The company introduced a new IQ8 microinverter, IQ8P-3P, in November 2023. The IQ8P-3P microinverter is designed for the small commercial solar market in North America and enables a peak output power of up to 480 W, supporting small three-phase commercial applications and newer, high-powered solar panels.

Enphase is in the process of introducing its IQ9 series of inverters handling 480V applications, which expands the market opportunity into small commercial solar. IQ9 uses gallium nitride (GaN), which offers higher electron mobility and allows the company to use two bidirectional switches instead of four silicon (Si) field effect transistors (FETs). We believe Enphase is using the same supplier (Infineon) for both products. The company is expected to begin shipments of this product in the second half of 2025 and believes it will be accretive to its margin structure.

Exhibit 23
Solar Group Launch
Enphase Energy IQ Microinverters

Source: Company reports

IQ batteries

Enphase IQ battery storage systems are based on the Ensemble OS energy system, which comes with usable and scalable capacity of 10.1 kWh and 3.4 kWh for the United States, and 10.5 kWh and 3.5 kWh for Europe and other international countries. This product has a customer base in North America, Belgium, Germany, Austria, France, the Netherlands, Switzerland, Spain, Portugal, Sweden, Denmark, and Greece. The company in May 2023 introduced its latest Enphase Energy System, featuring the new IQ battery 5P and IQ8 microinverters. The IQ battery 5P is modular with 5 kWh capacity and the IQ8 microinverters and is available for customers in Australia, the U.S., Puerto Rico, the U.K., Italy, and Australia.

Exhibit 24
Solar Group Launch
Enphase Energy IQ Battery

Source: Company reports

EV chargers

The company began production shipment of EV chargers at its existing manufacturing facility in Mexico. These chargers are compatible with most EVs sold in North America with customers able to purchase these chargers with a charging power range between 32 amperes and 64 amperes. The company introduced the IQ Energy Router family of devices in Germany and Austria in June 2023 and launched smart Enphase IQ EV Chargers in the United States and Canada in October 2023.

Exhibit 25
Solar Group Launch
Enphase Energy EV Chargers

Source: Company reports

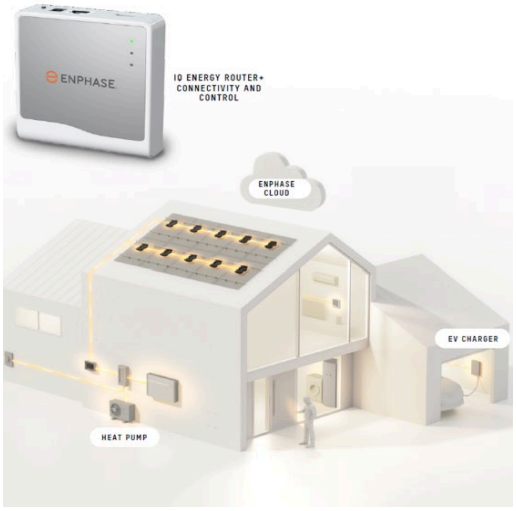
Grid services

Enphase works with local utilities, grid operators, and homeowners to offer its grid services programs, which help electric utilities avoid using power from expensive, polluting power plants at times of higher demand. The participating homeowners receive hundreds to thousands of dollars in return toward their home battery system purchase or as annual incentive payments.

Enphase installer platform

The company is offering Solargraf in the U.S., Canada, Brazil, Germany, and Austria for residential customers and in select regions for commercial customers. Solargraf is a software platform that assists with permitting and installation for both residential and commercial customers. To increase lead volumes and conversion rates, the company is offering another software platform designed to provide high-quality leads to solar installers to drive down the customer-acquisition costs for installers.

Exhibit 26
Solar Group Launch
Enphase Energy Solargraf

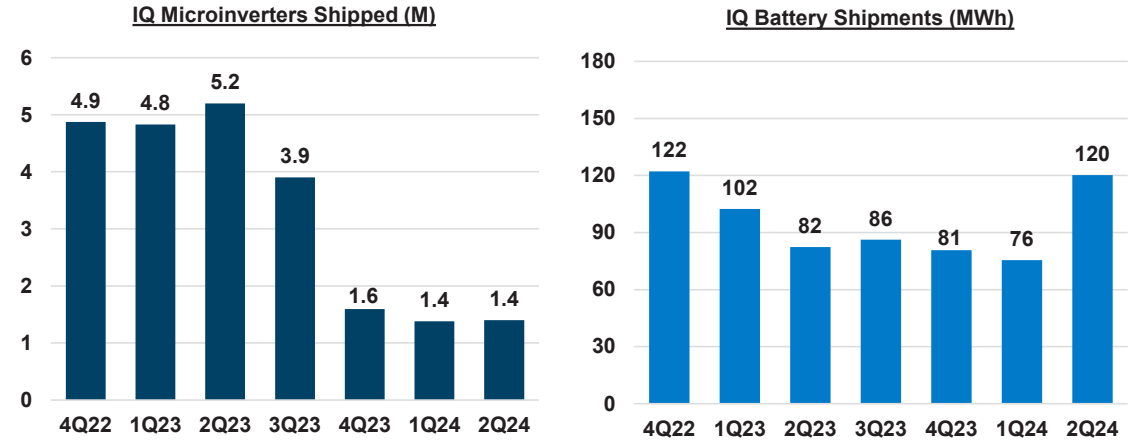


Source: Company reports

Recent Updates

Enphase reported revenue of $303.5 million for the three months ended June 30, 2024, representing a decline of 57%, or $407.7 million, from $711.1 million for the corresponding period in 2023. The decline in revenue was mainly driven by a 73% decrease in microinverter units shipped, partly offset by an increase in ASP for microinverters as the company sold more IQ8 microinverters relative to IQ7 microinverters and a 46% increase in IQ batteries megawatt-hours shipped.

Exhibit 27
Solar Group Launch
Enphase Energy Recent IQ Microinverters and IQ Battery Shipments



Sources: Company reports and William Blair Equity Research

The broad-based slowdown began in the second quarter of 2023 in the U.S. and in the third quarter of 2023 in Europe. This is resulting in elevated inventory with distributors and installers. These inventory levels resulted in the revenue headwinds for microinverters as distributors have had to destock. Enphase has noted that the destocking is complete in the U.S. but not in Europe. As highlighted in the following exhibit, the North American market (predominantly the U.S.) is expected to recover in 2025 but reach a lower steady-state growth rate than in years past. We thus believe there is potential for a more drawn-out recovery in demand levels.

Exhibit 28
Solar Group Launch
Residential Solar Demand Forecast by Geography

Sources: William Blair Equity Research and SEIA Solar Market Insight Reports

The company sold about 1.4 million microinverter units during the three months ended June 30, 2024, compared with roughly 5.2 million microinverter units in the three months ended June 30, 2023. During the three months ended June 30, 2024, the company shipped 120.2 MWh of IQ batteries, versus 82.3 MWh shipped in the three months ended June 30, 2023. Enphase has shipped

more than 76.3 million microinverters, and about 4.3 million Enphase residential and commercial systems have been deployed in more than 150 countries as of June 30, 2024. Enphase implemented a restructuring plan including the shift toward a fab-light model with CEMs in South Carolina and Texas with a quarterly capacity of 7.25 million microinverters. This will also allow the capture of 45X tax credits or $0.09W of AC capacity shipped for microinverters and $0.10W for battery storage.

Management Team

Enphase's management team is led by Chief Executive Officer Badri Kothandaraman and Chief Financial Officer Mandy Yang. Both Kothandaraman and Yang have been with the company for over six years and are supported by an experienced management team including Chief Product Officer Raghu Belur and Chief Technology Officer Hans Van Antwerpen.

Exhibit 29
Solar Group Launch
Enphase Energy Management Team

			Prior Experience	
Name	**Position**	**Tenure**	**Company**	**Position**
Badri Kothandaraman	CEO	7 years	• Enphase Energy • Cypress Semiconductor	COO Executive Vice President
Mandy Yang	CFO	6 years	• Tesla • SunPower Corporation	Senior Director and Group Controller Various Roles
Raghu Belur	SVP, Chief Products Officer	25 years	• Enphase Energy • Cerent	Co-Founder Engineer
Hans Van Antwerpen	SVP, Chief Technology Officer	4 years	• Senior Vice President	Cypress Semiconductor
Aaron Gordon	SVP, Systems Business Unit	3 years	• Infineon Technologies • Cypress Semiconductor	Senior Vice President Vice President of Silicon Product Development
Mehran Sedigh	SVP, Sales	1 year	• Enphase Energy • Cypress Semiconductor	Vice President of the Storage Business Unit SVP, Worldwide Wafer and Subcon Operations
Jayant Somani	SVP, Digital Business Unit	4 years	• Cypress Semiconductor • Conexant Systems	Various Roles Various Roles

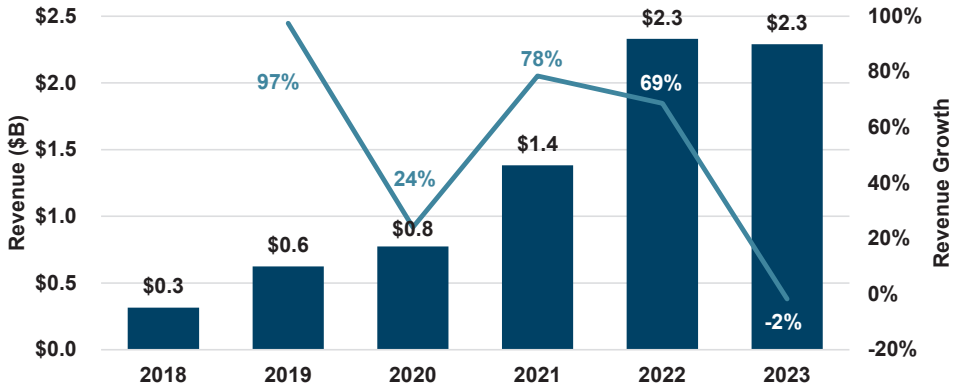
Source: Company reports

Financial Overview

Historical financial overview

Enphase's revenue has grown at a 49% compound annual rate from $0.3 billion in 2018 to nearly $2.3 billion in 2023. This growth was primarily driven by an increase in microinverter unit volume shipped and an increase in Enphase IQ battery storage system megawatt-hours shipped.

Exhibit 30
Solar Group Launch
Enphase Energy Historical Revenue Growth



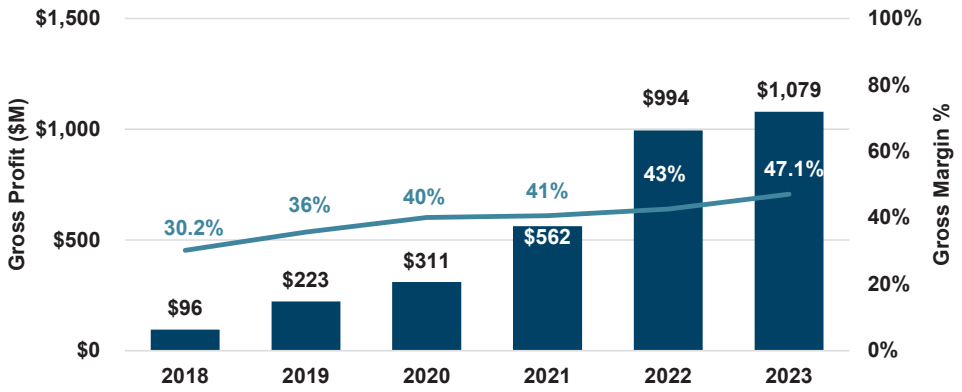
Sources: Company reports and William Blair Equity Research

Revenue generated from the U.S. market has represented 80%, 76%, and 64% of the total revenues for the annual periods ended on December 31 in the years 2021, 2022, and 2023, respectively. During the same period, revenues from the Netherlands and other countries represented 20%, 24%, and 36%, respectively. The decline in revenue recognition from the U.S. and increase in revenue recognition from other countries is due to the company's continuous efforts to expand its international business.

In 2023, the company saw a slight decrease in revenue as higher interest rates and the transition from NEM 2.0 to NEM 3.0 in California resulted in a slowdown in the U.S. However, in Europe, this slowdown was primarily due to a decrease in purchases after the initial surge of sales related to the onset of the armed conflict in Ukraine in 2022, and overall channel inventory correction.

The company's gross profit was $96 million in 2018 and $1,079 million in 2023, representing a CAGR of 62% with gross margin expanding by about 17 percentage points from 30.2% in 2018 to 47.1% in 2023. Gross margin expansion has primarily been driven by an increase in average selling prices due to a favorable shift in product mix, and also due to cost management improvements, which included lower shipping costs.

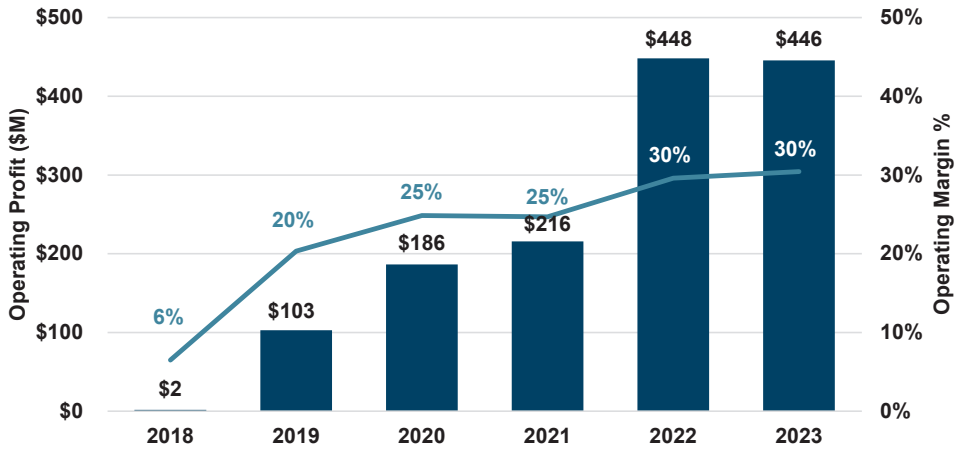
Exhibit 31
Solar Group Launch
Enphase Energy Historical Gross Profit Growth



Sources: Company reports and William Blair Equity Research

The company's operating profit was $2 million in 2018 and $446 million in 2023, with operating margin expanding about 24 percentage points to 30.4% in 2023 from 6.5% in 2018. Enphase's operating profit and margin increased primarily due to the scale and leverage in its business model.

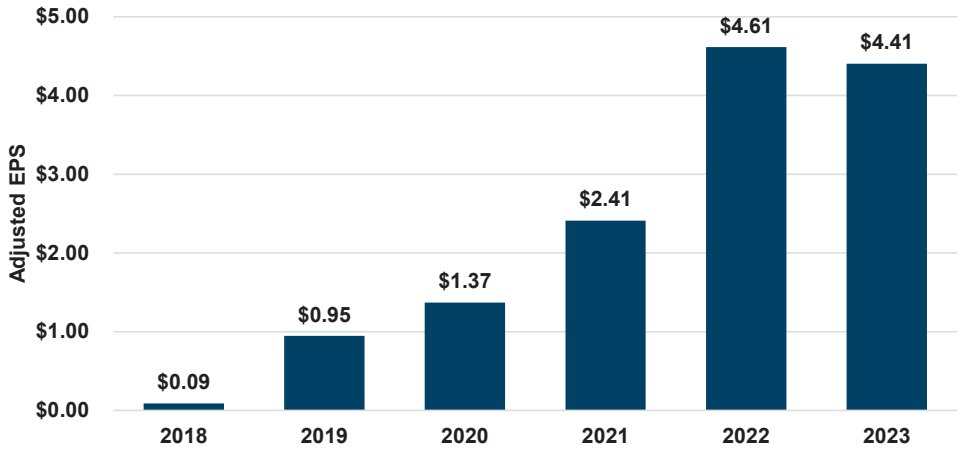
Exhibit 32
Solar Group Launch
Enphase Energy Historical Operating Profit Growth



Sources: Company reports and William Blair Equity Research

The company's adjusted EPS grew from $0.09 in 2018 to $4.41 in 2023. Adjusted EPS increased primarily due to the scale in the operating model.

Exhibit 33
Solar Group Launch
Enphase Energy Historical Adjusted EPS



Sources: Company reports and William Blair Equity Research

Current financial condition

The company had $1.7 billion in net working capital, including cash, cash equivalents, and marketable securities of $1.6 billion, as of June 30, 2024, of which about $1.6 billion were held in the U.S. The company's cash, cash equivalents, and marketable securities, which consist of U.S. Treasuries, money market mutual funds, corporate notes, commercial paper and bonds, and both interest-bearing and non-interest-bearing deposits, decreased by $154 million for the six months

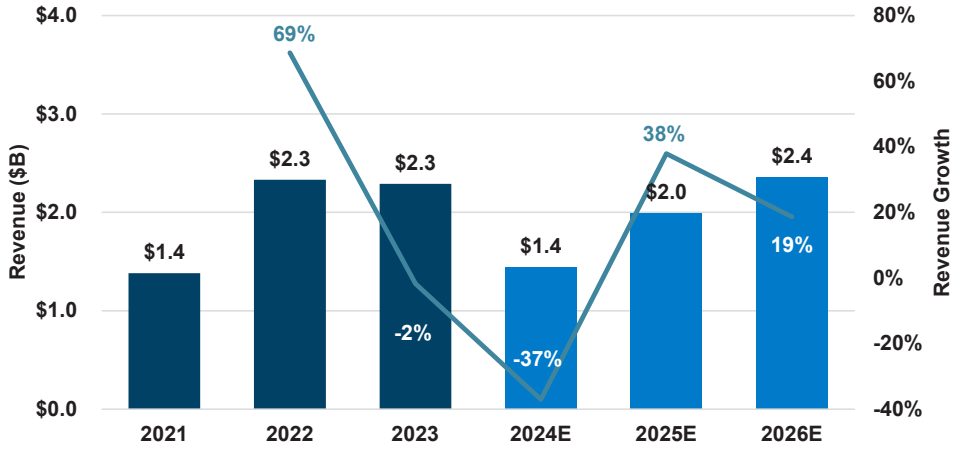
ended June 30, 2024, from the corresponding period in 2023. The decrease was mainly due to the repurchase of common stock pursuant to the company's share repurchase program and payments of withholding taxes related to net share settlement of equity awards, partly offset by cash generated from operations. Total carrying amount of debt declined by $95 million for the six months ended June 30, 2024, from the corresponding period in 2023. The company plans to fund any cash requirements for the next 12 months and longer term from its existing cash, cash equivalents, and marketable securities on hand and cash generated from operations.

The company announced a share repurchase program amounting to $1.0 billion in July 2023, which expires on July 26, 2026. The company plans to execute repurchases from time to time, subject to general business and market conditions. The program will be funded through available working capital. As of June 30, 2024, $648.1 million remained available for repurchase of shares under the 2023 repurchase program as the company repurchased in total 891,896 shares, for an aggregate amount of $99.9 million, during the three months ended June 30, 2024.

Financial outlook

We expect the company to generate revenue of $1.4 billion in 2024 and $2.4 billion in 2026, a CAGR of 1% between 2023 and 2026. This suggests a modest U-shaped recovery from the lows projected for this year and returning to more normalized levels in 2026.

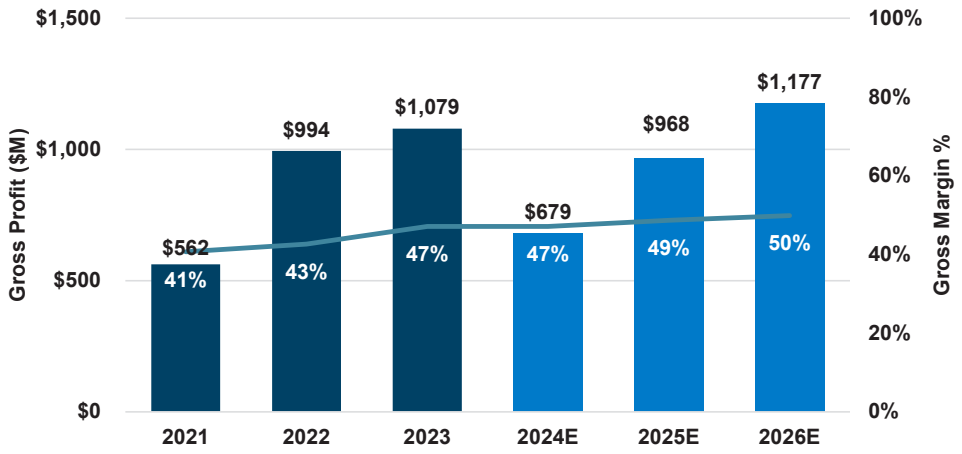
Exhibit 34
Solar Group Launch
Enphase Energy Revenue Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate gross profit of $0.7 billion in 2024 and $1.2 billion in 2026, representing a CAGR of 3% between 2023 and 2026. We believe gross profit will increase from a modest recovery in the business. We estimate gross margins will expand approximately 3 percentage points, from 47% in 2023 to 50% in 2025, primarily driven by ITC tax credits.

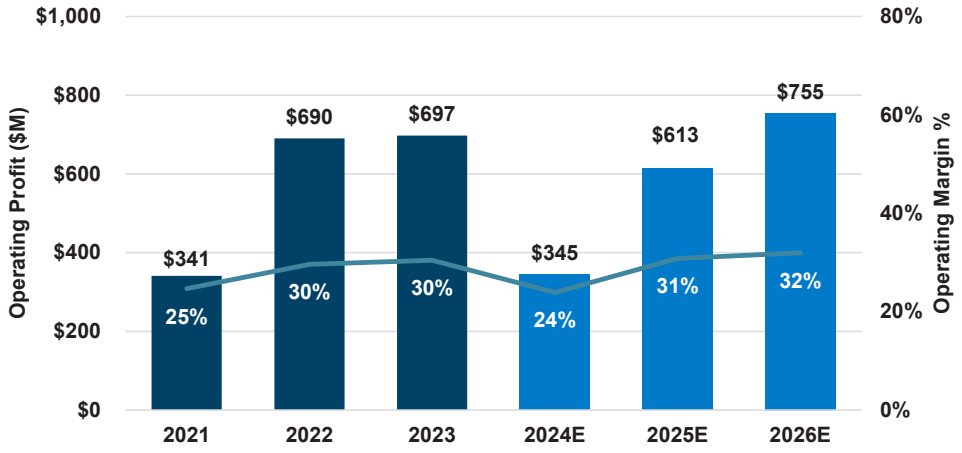
Exhibit 35
Solar Group Launch
Enphase Energy Gross Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate an adjusted operating profit of $0.3 billion in 2024, $0.6 billion in 2025, and $0.7 billion in 2026, representing a CAGR of 2.6% between 2023 and 2026, primarily driven by a return to normal operating levels and a U-shaped recovery in end-market demand.

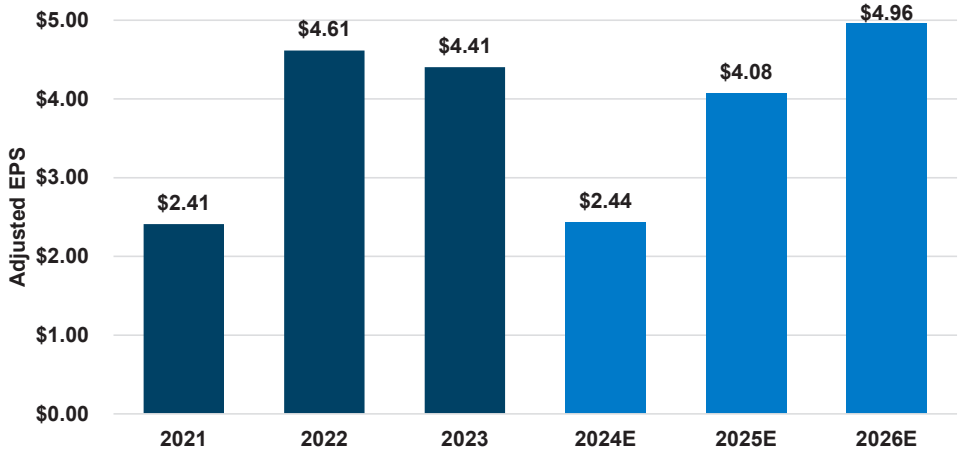
Exhibit 36
Solar Group Launch
Enphase Energy Operating Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate adjusted EPS of $2.44 in 2024, $4.08 in 2025, and $4.96 in 2026, representing a CAGR of 4% between 2023 and 2026. We believe earnings will grow in line with a modest U-shaped recovery in the residential solar market.

Exhibit 37
Solar Group Launch
Enphase Energy Adjusted EPS Forecast



Sources: Company reports and William Blair Equity Research

Exhibit 38
Solar Group Launch
Enphase Energy Income Statement Forecast

	2021	2022	2023	1Q24	2Q24	3Q24E	4Q24E	2024E	1Q25E	2Q25E	3Q25E	4Q25E	2025E	2026E
Net Sales	$1,382	$2,331	$2,291	$263	$303	$410	$465	$1,443	$403	$468	$547	$572	$1,990	$2,361
Cost of Goods Sold	820	1,337	1,211	142	161	217	244	763	203	234	287	298	1,022	1,184
Gross Profit	$562	$994	$1,079	$122	$143	$193	$222	$679	$200	$234	$260	$274	$968	$1,177
Research & Development	72	100	139	30	29	30	30	118	30	33	33	34	130	155
Sales & Marketing	92	136	166	35	35	36	37	143	34	37	38	40	150	179
General & Administrative	58	68	77	18	18	18	19	73	17	19	19	20	75	89
Other Operating Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Profit	$341	$690	$697	$39	$61	$109	$136	$345	$118	$145	$170	$179	$613	$755
Interest Expense / (Income)	0	(12)	(69)	(20)	(19)	(10)	(10)	(59)	(10)	(10)	(10)	(10)	(40)	(40)
Other Expense / (Income)	(6)	0	(7)	(0)	8	0	0	7	0	0	0	0	0	0
Income Before Taxes	$347	$702	$773	$59	$73	$119	$146	$396	$128	$155	$180	$189	$653	$795
Income Tax Provision	7	55	160	11	14	18	22	64	19	23	27	28	98	119
Net Income	**$340**	**$647**	**$613**	**$48**	**$59**	**$101**	**$124**	**$332**	**$109**	**$132**	**$153**	**$161**	**$555**	**$675**
Diluted EPS														
Average Diluted Shares Outstanding	143	144	143	136	136	135	133	133	132	131	129	128	128	123
Adjusted Average Diluted Shares Outstanding	141	140	139	137	136	136	136	136	136	136	136	136	136	136
Diluted EPS	**$2.41**	**$4.61**	**$4.41**	**$0.35**	**$0.43**	**$0.74**	**$0.91**	**$2.44**	**$0.80**	**$0.97**	**$1.12**	**$1.18**	**$4.08**	**$4.96**
EBITDA	$373	$749	$772	$59	$82	$109	$136	$392	$118	$145	$170	$179	$678	$832
Free Cash Flow	$300	$698	$586	$42	$111			$507					$204	$295
Effective Tax Rate	1.9%	7.8%	20.7%	18.3%	19.0%	15.0%	15.0%	16.2%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
% of Sales														
Net Sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	59.3%	57.4%	52.9%	53.8%	52.9%	52.9%	52.3%	52.9%	50.4%	50.0%	52.4%	52.1%	51.4%	50.1%
Gross Profit	40.7%	42.6%	47.1%	46.2%	47.1%	47.1%	47.7%	47.1%	49.6%	50.0%	47.6%	47.9%	48.6%	49.9%
Operating Expenses	4.2%	2.9%	3.4%	6.8%	5.9%	4.5%	4.0%	5.1%	4.3%	4.0%	3.5%	3.5%	3.8%	3.8%
Operating Profit	24.7%	29.6%	30.4%	14.8%	20.1%	26.6%	29.2%	23.9%	29.4%	31.0%	31.1%	31.4%	30.8%	32.0%
EBITDA	27.0%	32.1%	33.7%	22.5%	26.9%	26.6%	29.2%	27.2%	29.4%	31.0%	31.1%	31.4%	34.1%	35.2%
Net Income	24.6%	27.8%	26.8%	18.2%	19.4%	24.7%	26.6%	23.0%	27.1%	28.2%	28.0%	28.1%	27.9%	28.6%
Growth Rates														
Net Sales	78.5%	68.7%	-1.7%	-63.7%	-57.3%	-25.5%	53.8%	-37.0%	53.0%	54.1%	33.3%	23.0%	655.6%	485.9%
Cost of Goods Sold	76.9%	63.0%	-9.4%	-64.0%	-58.0%	-23.6%	61.9%	-37.0%	43.3%	45.5%	32.0%	22.5%	621.0%	483.0%
Gross Profit	80.8%	76.9%	8.6%	-63.4%	-56.6%	-27.6%	45.8%	-37.1%	64.4%	63.7%	34.8%	23.5%	696.1%	488.9%
Operating Expenses	86.8%	37.5%	25.8%	-16.0%	-16.8%	-15.1%	-0.5%	-13.7%	-1.2%	8.7%	7.3%	9.7%	327.0%	421.1%
Operating Profit	77.2%	102.4%	1.0%	-83.3%	-73.5%	-35.0%	106.9%	-50.5%	203.4%	137.3%	56.0%	32.2%	1471.4%	537.9%
Adjusted EBITDA	77.3%	100.6%	3.1%	-76.4%	-67.2%	-41.7%	57.0%	-49.2%	100.1%	77.7%	56.0%	32.2%	1046.0%	603.0%
Free Cash Flow	*53.1%*	*133.0%*	*-16.0%*	*-81.3%*	*-50.8%*	*-100.0%*	*-100.0%*	*0.0%*	*-100.0%*	*-100.0%*	*#DIV/0!*	*#DIV/0!*	*0.0%*	*0.0%*
Adjusted Net Income	*80.5%*	*90.2%*	*-5.3%*	*-75.1%*	*-71.4%*	*-28.7%*	*68.6%*	*0.0%*	*127.4%*	*123.9%*	*51.3%*	*30.0%*	*0.0%*	*0.0%*
Adjusted Diluted EPS	*75.8%*	*91.4%*	*-4.5%*	*-74.3%*	*-70.6%*	*-27.4%*	*69.9%*	*0.0%*	*128.4%*	*123.9%*	*51.3%*	*30.0%*	*0.0%*	*0.0%*

Note: $ in millions except share price
Source: William Blair Equity Research

Exhibit 39
Solar Group Launch
Enphase Energy Balance Sheet Forecast

BALANCE SHEET	2021	2022	2023
Cash and Equivalents	1,016,651	1,612,843	1,695,034
Receivables, net	333,626	440,896	445,959
Inventories	74,400	149,708	213,595
Other current assets	37,784	60,824	88,930
Current Assets	1,462,461	2,264,271	2,443,518
Net property, plant, & equipment	82,167	111,367	168,244
Goodwill	181,254	213,559	214,562
Intangible assets	97,758	99,541	68,536
Deferred taxes	122,470	204,872	252,370
Other non-current assets	133,146	190,670	235,782
Total assets	**$2,079,256**	**$3,084,280**	**$3,383,012**
ST Debt (incl. current LTD)	86,052	90,892	0
Accounts payable	113,767	125,085	116,164
Accrued expenses	157,912	295,939	261,919
Other ST liabilities	82,065	126,303	154,366
Current Liabilities	439,796	638,219	532,449
LT Debt	951,594	1,199,465	1,293,738
Deferred revenues, noncurrent	187,186	281,613	369,172
Other LT liabilities	70,512	139,410	204,029
Total liabilities	**$1,649,088**	**$2,258,707**	**$2,399,388**
Total shareholders equity	**$430,168**	**$825,573**	**$983,624**
Total liabilities and equity	**$2,079,256**	**$3,084,280**	**$3,383,012**

Note: $ in thousands
Source: William Blair Equity Research

Valuation

Enphase shares trade at a discount to historical levels. However, when comparing against power semiconductor companies with similar profitability and growth profiles, Enphase shares trade at a premium. The counter would be the growth profile versus a cyclical business; however, the latest downturn might suggest that as solar has now matured, it is actually more cyclical than growth oriented. This debate will largely weigh on the multiple, which we believe hinges on the shape of the recovery. Shares trade at 30x our adjusted 2025 EPS estimate of $4.08 and 26x Street consensus of $4.78. It is worth noting that these figures strip out options and tax credits, which contribute just over $2.01 to our estimate, suggesting the shares are trading at 58x. Given the margin and growth profile, Enphase most closely resembles onsemi (Market Perform), which is trading at only 17x during the same time frame excluding options. Given this analysis, combined with our concerns of the shape of a residential-driven recovery in solar, we are initiating with a Market Perform rating.

Investment Risks

Risks include: 1) competition, particularly from Tesla with an integrated approach; 2) a direct competitor with historically high inventory levels, which may lower prices significantly during this downturn and could cause an adverse effect of market prices, particularly in Europe; and 3) investors that discount non-GAAP earnings given significant use of options, which we calculate make up 60%-70% of the delta between GAAP and non-GAAP estimates.

Exhibit 40
Solar Group Launch
Industry Valuation Table

			Trading Statistics			Valuation								
						EV/Sales			EV/EBITDA			P/E		
Power Semi Companies	Ticker	WB Rating	Price 8/27/2024	Market Cap ($M)	Enterprise Value ($M)	2024	2025	2026	2024	2025	2026	2024	2025	2026
ON Semiconductor Corp.	ON	MP	$74.82	32,050	35,225	5.0x	4.6x	4.1x	15x	13x	11x	19x	16x	15x
STMicroelectronics NV	STM	MP	$31.04	28,154	25,572	1.9x	1.8x	1.6x	9x	8x	6x	19x	15x	12x
Wolfspeed Inc	WOLF	MP	$13.34	1,692	5,719	7.1x	6.2x	4.1x	NM	NM	45x	NM	NM	NM
Infineon Technologies AG	IFX-ETR		€32.39	46,908	50,637	2.9x	2.7x	2.4x	9x	8x	7x	17x	14x	12x
Microchip Technology Incorporated	MCHP		$80.94	43,081	49,683	8.9x	8.6x	7.4x	25x	22x	16x	29x	26x	20x
Analog Devices, Inc.	ADI		$231.84	112,014	119,096	12.5x	11.2x	10.1x	28x	26x	21x	35x	30x	24x
Texas Instruments Incorporated	TXN		$210.69	190,142	197,679	12.5x	11.0x	9.8x	28x	22x	19x	41x	33x	27x
Covered Average						**7x**	**7x**	**6x**	**19x**	**16x**	**18x**	**27x**	**22x**	**18x**
Covered Median						**7x**	**6x**	**4x**	**20x**	**17x**	**16x**	**24x**	**21x**	**17x**
Solar Companies														
Enphase Energy, Inc.	ENPH	MP	$122.53	16,601	16,638	11.5x	8.4x	7.0x	42x	25x	20x	50x	30x	25x
SolarEdge Technologies, Inc.	SEDG	MP	$25.69	1,497	1,375	1.3x	0.8x	0.6x	NM	NM	24x	NM	NM	NM
First Solar, Inc.	FSLR	MP	$235.42	24,962	23,721	5.2x	4.3x	3.6x	12x	8x	8x	17x	12x	9x
Canadian Solar Inc.	CSIQ		$13.04	895	4,513	0.6x	0.5x	0.5x	6x	4x	3x	9x	4x	3x
Sunrun Inc.	RUN		$20.82	4,728	17,770	8.4x	7.2x	6.3x	442x	NM	69x	NM	NM	NM
JinkoSolar Holding Co., Ltd. Sponsored ADF	JKS		$18.21	998	6,430	0.4x	0.3x	0.3x	4x	3x	7x	129x	6x	7x
Sunnova Energy International Inc	NOVA		$10.93	1,418	10,051	11.7x	9.3x	7.7x	17x	15x	13x	NM	NM	NM
Uncovered Average						**6x**	**4x**	**4x**	**87x**	**11x**	**20x**	**51x**	**13x**	**11x**
Uncovered Median						**5x**	**4x**	**4x**	**14x**	**8x**	**13x**	**34x**	**9x**	**8x**
Total Average						**6x**	**5x**	**5x**	**53x**	**14x**	**19x**	**36x**	**19x**	**15x**
Total Median						**6x**	**5x**	**4x**	**16x**	**13x**	**14x**	**24x**	**16x**	**13x**
Enphase Energy, Inc.	**ENPH**	**MP**	**$122.53**	**16,601**	**16,638**	**11.5x**	**8.4x**	**7.0x**	**42x**	**25x**	**20x**	**50x**	**30x**	**25x**

Note: All figures in USD, other than share prices as indicated otherwise. Annual periods represent calendar years. As of market close: 8/27/2024
Sources: FactSet and William Blair Equity Research

SolarEdge – Despite Washed-Out Expectations, Uncertainty of Timing and Slope of Potential Recovery Lead Us to Initiate at Market Perform

Investment Summary

Initiating coverage of SolarEdge with a Market Perform rating on weak visibility
Over the past 18 months, SolarEdge has gone from just under $1 billion in quarterly sales in the second quarter of 2023 to $265 million last quarter. This has been driven by a combination of inventory destocking at distributors and lack of direct demand. Both of these are a function of weak end-market demand, particularly in the European markets that SolarEdge focuses on most acutely. While SolarEdge could be reaching a bottom, we also believe it is too soon to call, so we are initiating coverage with a Market Perform rating.

Balance sheet is not well positioned for a prolonged downturn
Our hope is that the downturn may be nearing a bottom and a protracted recovery is unlikely. A prolonged recovery would stress SolarEdge's balance sheet and risk technological obsolesce with distribution inventory versus finished goods. A sharp rebound would allow SolarEdge to use its record inventory levels as a source of cash versus overhang. SolarEdge must work hand in hand with its distributors to make sure it does not impinge on their business by discounting existing inventory greater than channel inventory.

End-market health
SolarEdge targets both the residential and commercial solar markets. While most of our report highlights the challenges in the utility-scale markets, we also note that a weaker consumer across all income quartiles presents a challenge for residential solar demand. Further, Europe, which is the primary target for SolarEdge, does not use financing much in solar applications, rendering savings a key variable to demand. Higher energy prices should help the arbitrage, and lower rates in the U.S. market may help too.

Valuation
Despite the strong pullback in shares that began last year, we believe the risk/reward profile of the business is neutral, as we see concern about the shape and timing of a potential recovery. As a result, we are initiating with a Market Perform rating. SolarEdge shares trade at 0.6x our 2026 sales estimate of $2.3 billion and 24x our EV/EBITDA estimate of $58 million in 2026. This is the lowest multiple of any name in our covered comparative analysis and a slight premium to two noncovered companies, JA Solar and Canadian Solar. We believe these low expectations reflect the market's washed-out expectations and balance sheet concerns. We believe upside could exist should a rebound in demand and return to more normal levels occur sooner than forecast.

Investment risks
Risks include: 1) competition, particularly from Tesla with an integrated approach; 2) end-market demand and the ability to draw down on historically high inventory levels; and 3) geopolitical risks with operations located in Tel Aviv, Israel.

Company Overview
SolarEdge Technologies, based in Israel and listed on Nasdaq under the ticker "SEDG," engages in the development of energy technology and provides inverter solutions. The company operates through two reportable segments: solar (95% of sales in 2023) and energy storage (5% of sales in 2023). The solar segment primarily consists of two main products, inverters and DC optimizers. The company acquired battery storage company Kokam in 2018. Initial success was strong, but a

shift in technology to lithium iron phosphate (LFP) battery chemistry for stationary backup and energy storage has rendered Kokam's nickel manganese cobalt (NMC) chemistry less competitive in mass market storage and limited to niche applications such as frequency regulation and demand response. While important, these uses are relatively niche. This business has declined to roughly 5% of sales today.

SolarEdge goes to market through its network of distributors and large installers. The company's customer base includes leading providers of solar PV systems to residential and commercial end-users, key solar distributors, and electrical equipment wholesalers. The company began its commercial shipments in 2010 and since then has shipped about 52.6 GW of DC optimized inverter systems.

Product Offering

SolarEdge power optimizer
Power optimizers represent the largest contribution by revenue to SolarEdge's business, at 30% of sales in 2023. These DC/DC converters allow each solar panel to maximize the efficiency. For example, if a cloud shades on panel in an array different than the next, these electronic components allow for adjustment of the system.

SolarEdge inverter
Designed to work exclusively with the company's optimizers, SolarEdge's inverters are DC to AC power electronics. SolarEdge is moving to silicon carbide chips to boost the efficiency in some of the higher-voltage applications.

Storage solutions
SolarEdge acquired Kokam in 2022; unfortunately, the technology that Kokam uses is not cost competitive for the general battery storage markets, rendering its products niche.

SolarEdge software solutions
To support the complete PV planning, installation, monitoring, and maintenance processes of DC optimized inverter solutions, the company offers a variety of professional software tools like its Monitoring platform, MySolarEdge app, Designer platform, Mapper application, and SetApp application.

Inverter and Optimizer 101
A solar inverter, like any inverter, is converting alternating current to direct current or, in the case of solar, direct current to alternating current. This is critical because a solar panel will generate electricity in direct current wave form, and worldwide residential grids are almost entirely alternating current.

There are generally three types of solar inverters: 1) string inverters, 2) microinverters, and 3) direct current power optimizers. The string inverter is the most common type of inverter in the market. Just like a strand of Christmas tree lights, a string inverter links together an array of solar panels in series like a string. The DC power is then transferred back to a centrally located inverter that converts the power to AC. String inverters tend to be much larger, as the benefits are realized with scale. Therefore, these systems tend to lean toward larger, utility-scale or commercial applications but can be used in residential systems too. The downside of string inverters is that they do not optimize panel efficiency. In other words, if a solar array is near trees or some other object that will cause shading difference during the day as the Earth rotates around the sun, a string inverter will not adjust for these changes.

Microinverters, on the other hand, are located at each panel but are not paired with a string inverter. The microinverter is handling the conversion from DC to AC at the panel, which can optimize for each panel. This solution can increase reliability of a system because, unlike the string inverter, it will treat all panels the same. Therefore, underutilization of one or more panels will bring the total array efficiency down.

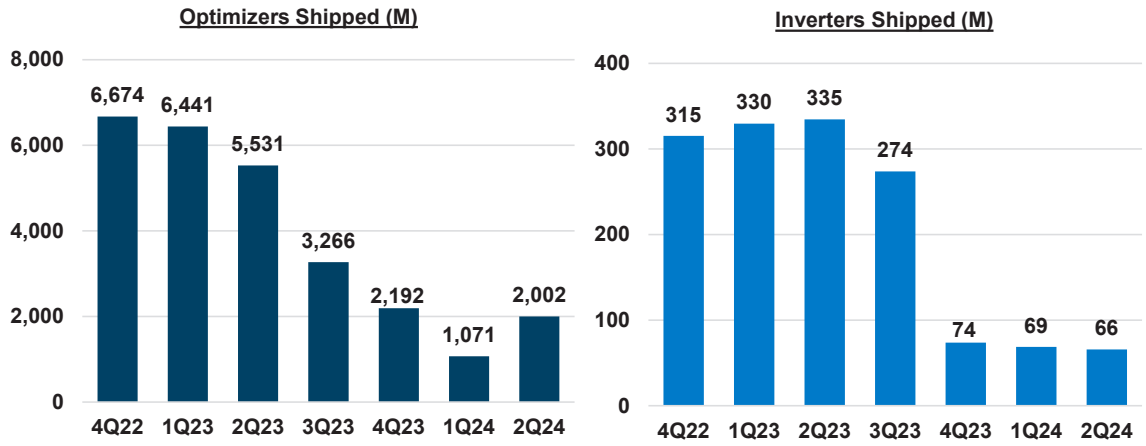
In 2013, SolarEdge developed DC optimizers to improve the efficiency of a string or central inverter system. Unlike microinverters, the optimizer is not converting the power from DC to AC; instead, it is conditioning the power to stabilize the voltage before sending to the inverter to handle the conversion.

String inverters tend to operate at larger voltage ratings, and this technology is in the process of converting from silicon-based designs to silicon carbide. This transition will help increase efficiency much like the transition from insulated-gate bipolar transistors shifted to SiC-based metal oxide field effect transistors in EV traction inverters. Micro inverters and DC optimizers both operate at much lower voltages, making SiC chips over-engineered and thus perhaps not as attractive for these applications. This is where gallium nitride (GaN) chips are slated to have a greater impact. SolarEdge has begun transitioning some of its high-voltage inverters to SiC, while its main competitor Enphase has begun transitioning its next-generation IQ9 (soon to be released) microinverter to GaN. The idea in both cases is to be able to offer greater power density with a smaller design for a reduced price but at a higher gross margin; same strategy, two different companies, two different market approaches, for the same potential outcome (greater gross margins).

Recent Updates

SolarEdge recently missed second quarter 2024 estimates across the board, driven by weak European demand and inventory destocking at distributors, a dynamic that has caused a sharp pullback in shipments of both optimizers and inverters over the last few quarters. Specifically, sales of $265 million missed Street expectations by 23%, leading to a weaker gross margin of -4.1% on a GAAP basis and 0.2% when adjusting for stock options. The continued drawdown of inventory in the European channel from weak commercial solar demand and the inability to absorb the overhead have led to the precipitous drop in profitability.

Exhibit 41
Solar Group Launch
SolarEdge Recent Solar Optimizer and Inverter Shipments

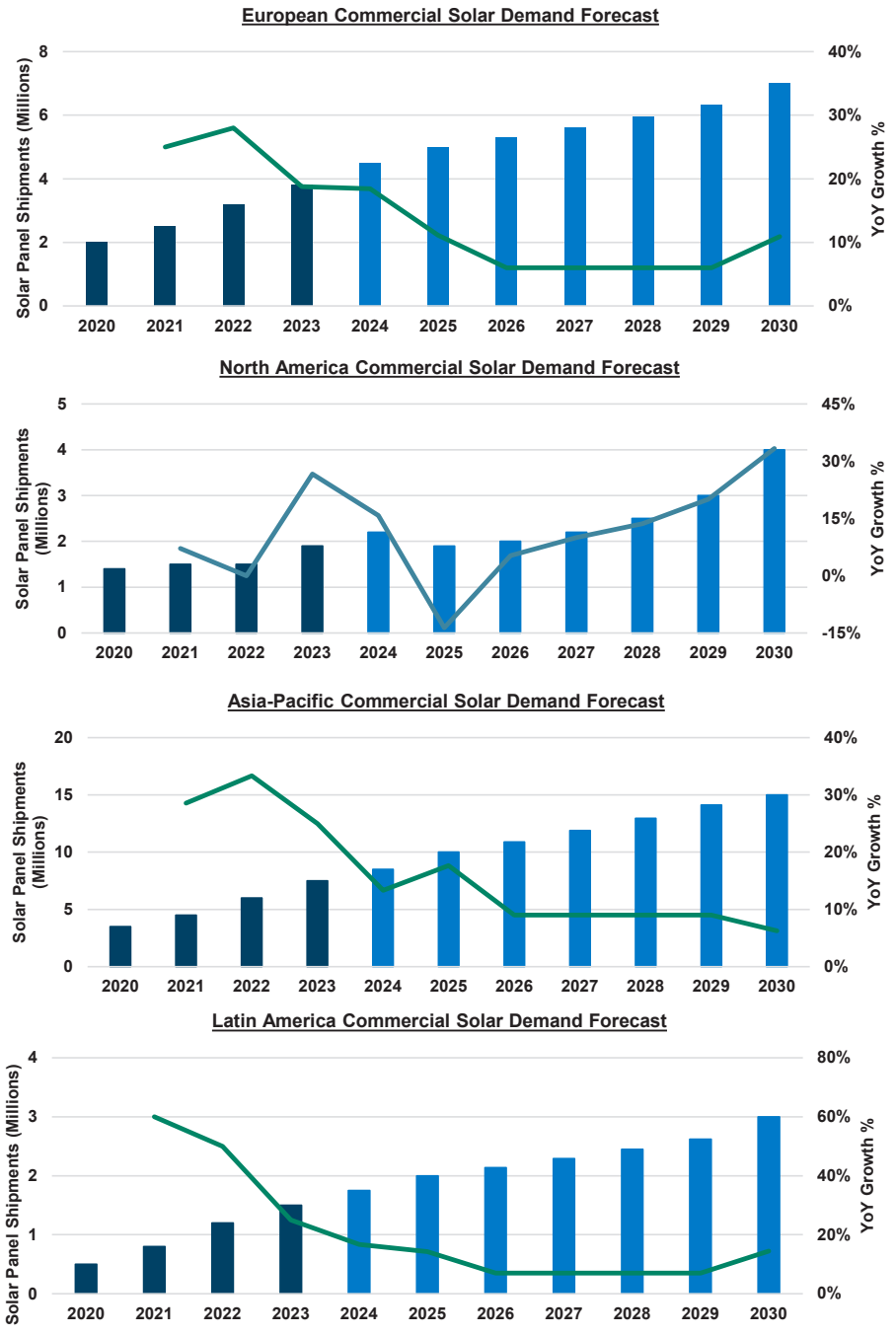


Sources: Company reports and William Blair Equity Research

As exhibit 42 highlights, the European commercial market decelerated starting in 2023, and we forecast it will not reaccelerate until 2026. Given the likely inventory build in 2022 and 2023 from accelerating growth, it suggests at least another six to nine months of destocking. This creates the obvious risk of inventory obsolescence or at least pricing arbitrage risk at SolarEdge. While the company has reiterated its shelf life, we believe risk exists should the company need to try to move the $1 billion of inventory faster than the market can handle naturally. While the company is

hopeful to return to more normalized revenue levels of more than $500 million in second quarter 2025, we forecast a one-quarter buffer, which may still be optimistic. How this transpires will have a material effect on the company's cash needs.

Exhibit 42
Solar Group Launch
Commercial Solar Demand Forecast by Geography



Sources: William Blair Equity Research and SEIA Solar Market Insight Reports

Management Team

Solar Edge's management team is led by Chief Executive Officer Zvi Lando and Chief Financial Officer Ronen Faier. Lando has been with the company for over five years and is supported by an experienced management team including Chief Operating Officer Uri Bechor and Chief Technology Officer Ilan Yoscovich.

Exhibit 43
Solar Group Launch
SolarEdge Management Team

			Prior Experience	
Name	**Position**	**Tenure**	**Company**	**Position**
Zvi Lando	CEO	5 years	• SolarEdge • Applied Materials	VP of Sales Vice President & General Manager
Ronen Faier	CFO	13 years	• modu Ltd • Msystems	CFO Various Roles
Rachel Prishkolnik	VP General Counsel & Corporate Secretary	14 years	• Gilat Satellite Networks Ltd.	VP General Counsel & Corporate Secretary
Uri Bechor	COO	5 years	• Flex	Senior Vice President, Global Operations
Ilan Yoscovich	Chief Technology Officer	16 years	• Slyde Technologies	Chief Technology Officer
Shuli Ishai	Chief Human Resources Officer and Corporate VP	4 years	• Stratasys • Netafim	Executive Vice President of HR and MIS Chief Resource Officer

Source: Company reports

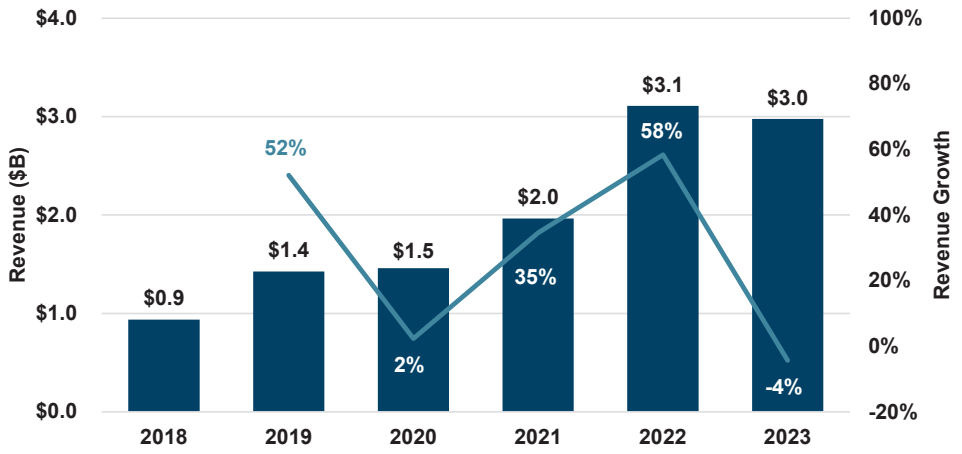
Financial Overview

Historical financial overview

SolarEdge's revenue has grown at a 26% compound annual rate from $0.9 billion in 2018 to nearly $3.0 billion in 2023. This growth was driven by revenues coming from U.S. and Europe and an increase in revenues related to the number of residential batteries sold mainly in the U.S. and Europe. Solar revenues have decreased recently, mainly because of slower-than-expected installation rates beginning in the third quarter of 2023, but still have grown at a 10% compound annual rate since 2020.

In 2023, SolarEdge shipped 17.4 million power optimizers and 1.01 million inverters, representing growth of 10% and 52%, respectively, since 2019. The revenue contribution from the U.S. increased from $613 million in 2020 to $760 million in 2023, representing growth of 24%.

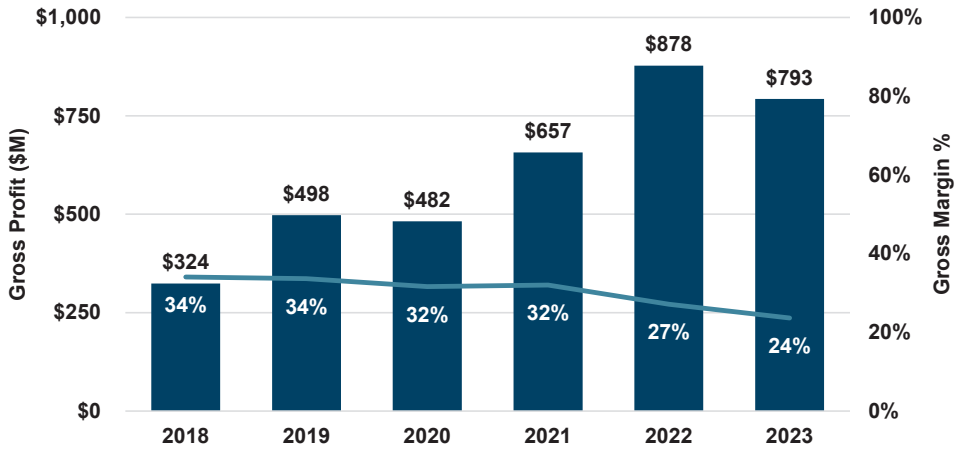
Exhibit 44
Solar Group Launch
SolarEdge Historical Revenue Growth



Sources: Company reports and William Blair Equity Research

The company's gross profit was $324 million in 2018 and $793 million in 2023. Non-GAAP gross margins remained relatively stable around 33% until 2021, where despite the increased volumes, gross margins dropped to 24% in 2023. This was largely due to a mix shift from residential to commercial inverters, which carry lower gross margins, and the addition of the Kokam business, which also carried lower gross margins and is now underutilized. Lastly, during COVID, SolarEdge used expedited shipping, which also weighed on margins.

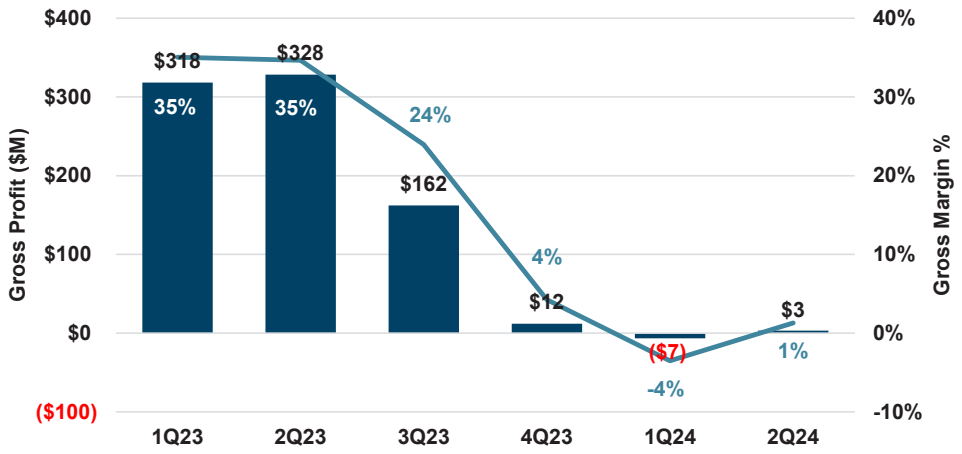
Exhibit 45
Solar Group Launch
SolarEdge Historical Gross Profit Growth



Sources: Company reports and William Blair Equity Research

Recently, solar gross margins peaked at just under 35% in the first quarter of 2023 and have collapsed under the weight of the reduced volume to 1.4% in the second quarter of 2024. This makes clear that a recovery is predicated on volume returning, which starts with channel destocking.

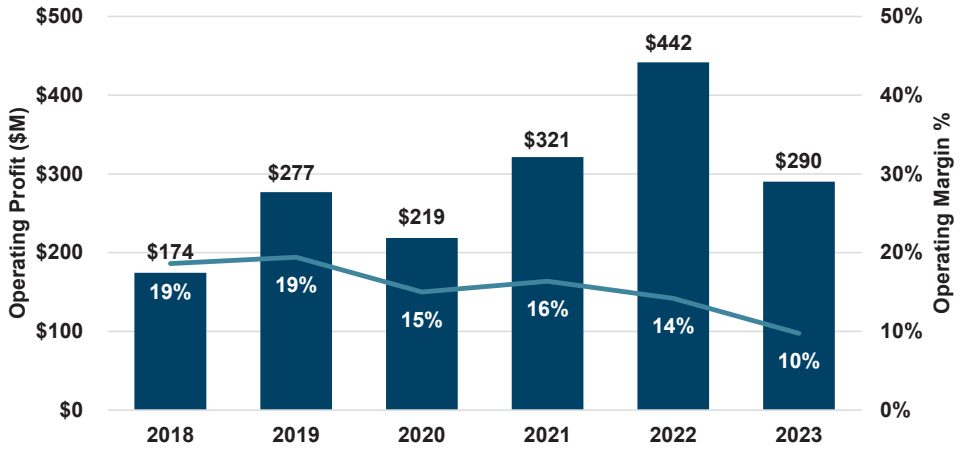
Exhibit 46
Solar Group Launch
SolarEdge Recent Solar Gross Profit Margin



Sources: Company reports and William Blair Equity Research

The company's operating profit was $174 million in 2018 and $290 million in 2023, with operating margin contracting approximately 9 percentage points to 10% in 2023 from 19% in 2018. SolarEdge's operating profit increased primarily due to the treatment of options expensing.

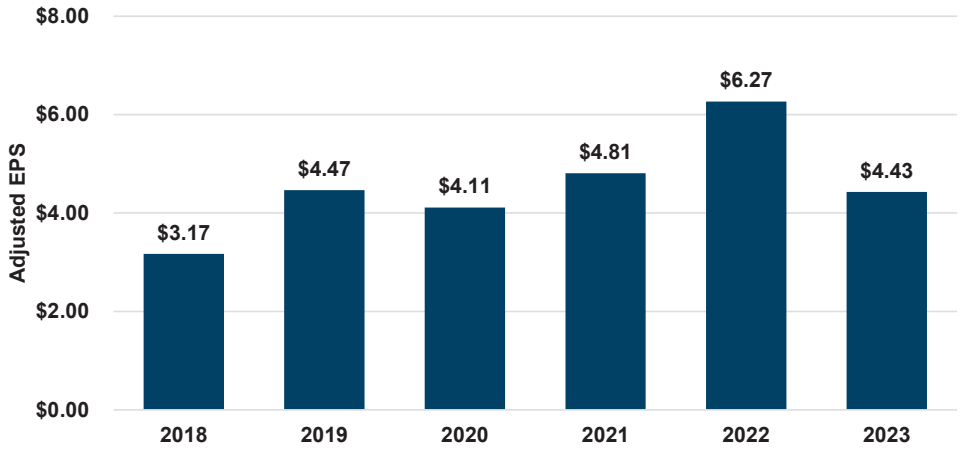
Exhibit 47
Solar Group Launch
SolarEdge Historical Operating Profit Growth



Sources: Company reports and William Blair Equity Research

The company's adjusted EPS grew from $3.17 in 2018 to $4.43 in 2023. Adjusted EPS increased primarily due to increased volumes.

Exhibit 48
Solar Group Launch
SolarEdge Historical Adjusted EPS



Sources: Company reports and William Blair Equity Research

Current financial condition

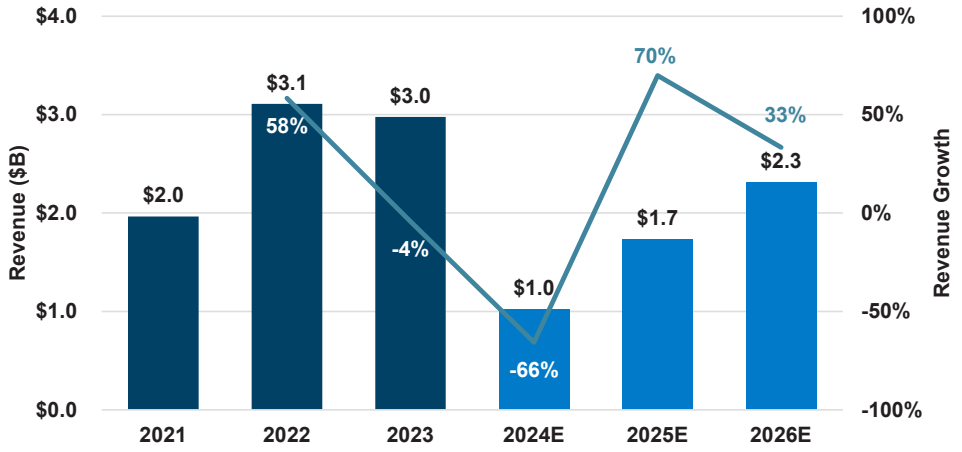
As a result of the drop in share price, which has traded well below book value for a period of time, SolarEdge is undergoing an asset impairment review. While the review may find impairment in line items such as PP&E associated with the underutilization, it is unlikely to reveal impairment in the inventory, according to SolarEdge management. Still, the longer the destocking is prolonged, the greater the risk to potential impairment, which to us suggests it is likely to begin more aggressively discounting existing finished goods. The challenge, however, is working with its distributors so that new products are not stocked at lower pricing than the same product that was sold previously. This challenge seems to be most acute with the company's three phase inverters, suggesting there may be an opportunity to move some of the power optimizers.

Management reported a $140 million use in free cash flow in the most recent quarter, but roughly half of this was discretionary, and therefore cash burn is expected to fall to between $70 million and $90 million in the third quarter and lower yet in the fourth quarter. The company has cash and investments of $690 million heading into the third quarter. The greatest risk on the balance sheet seems to be the inventory level of $1.5 billion, which represents over 400 days of inventory. Given that this should be a source of cash, how the company manages through this inventory correction will be key.

Financial outlook

We expect the company to generate revenue of $1.0 billion in 2024 and $2.3 billion in 2026, representing a compound annual rate of decline of 8% between 2023 and 2026 because of the falloff from 2023, but off its current base the growth represents a 50% increase.

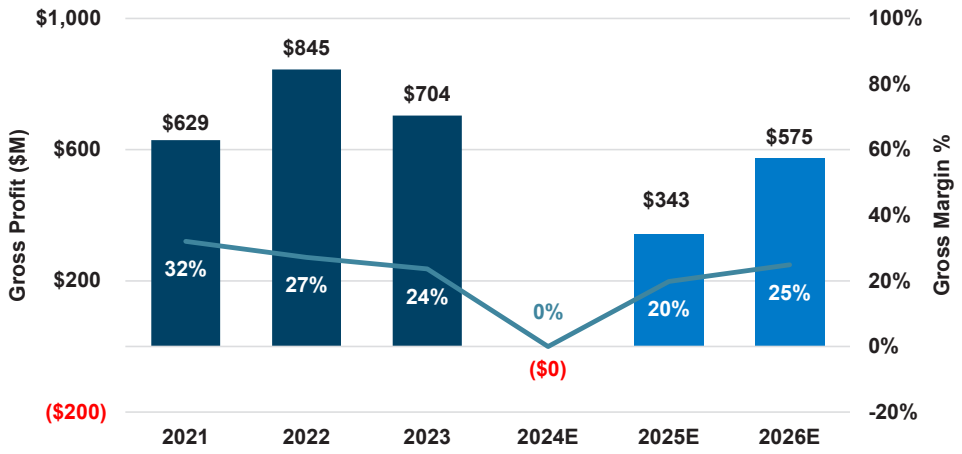
Exhibit 49
Solar Group Launch
SolarEdge Revenue Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate flat gross profit in 2024 and $575 million in 2026, representing a compound annual rate of decline of 10% between 2023 and 2026. The decline is largely a function of the market correction that SolarEdge is in the midst of. We estimate gross margins will expand about 1 percentage point, from 24% in 2023 to 25% in 2026, primarily driven by higher volumes and a return to more normalized rates.

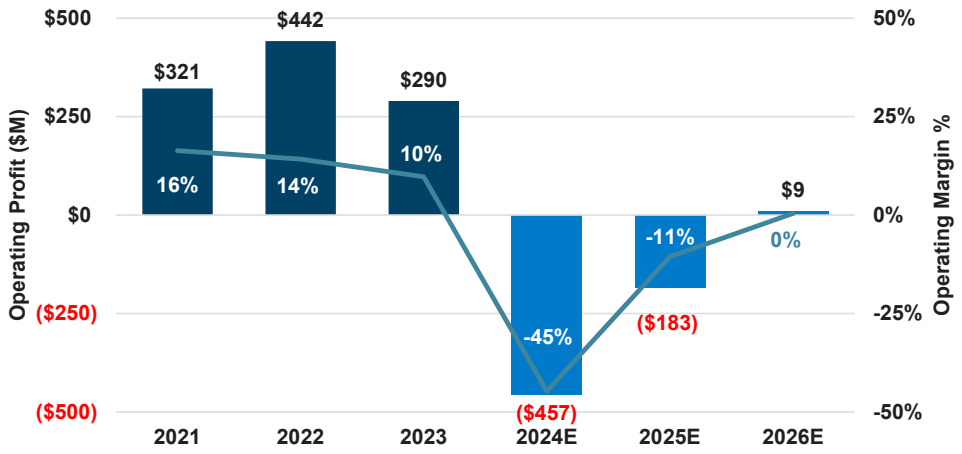
Exhibit 50
Solar Group Launch
SolarEdge Gross Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate an operating loss of $457 million in 2024 and reach operating breakeven in 2026, primarily because of higher volumes and absorption of its fixed cost structure.

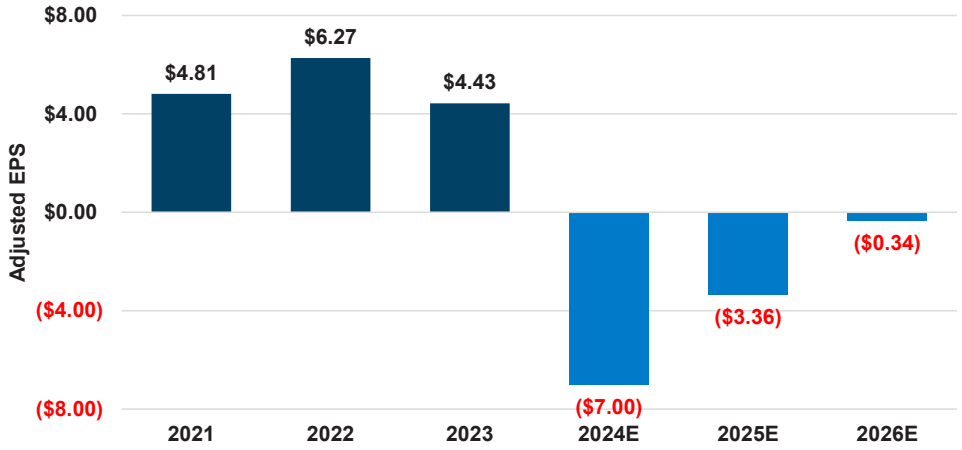
Exhibit 51
Solar Group Launch
SolarEdge Operating Profit Forecast



Sources: Company reports and William Blair Equity Research

We expect the company to generate adjusted losses of $7.00 per share in 2024 and $0.34 per share in 2026, primarily because of greater sales and lower operating costs as a percentage of sales.

Exhibit 52
Solar Group Launch
SolarEdge Adjusted EPS Forecast



Sources: Company reports and William Blair Equity Research

Exhibit 53
Solar Group Launch
SolarEdge Income Statement Forecast

	2021	2022	2023	1Q24	2Q24	3Q24E	4Q24E	2024E	1Q25E	2Q25E	3Q25E	4Q25E	2025E	2026E
Net Sales	$1,964	$3,110	$2,977	$204	$265	$256	$295	$1,021	$298	$335	$501	$600	$1,735	$2,314
Cost of Goods Sold	1,307	2,233	2,183	218	276	262	299	1,056	296	288	403	480	1,467	1,819
Gross Profit	$657	$878	$793	($13)	($11)	($6)	($4)	($34)	$2	$46	$98	$121	$267	$495
Research & Development	174	225	254	58	51	51	50	211	51	50	50	54	205	208
Sales & Marketing	95	128	132	32	31	26	30	118	30	32	35	39	136	162
General & Administrative	67	83	118	24	32	27	27	110	27	27	28	29	110	115
Other Operating Expense	0	(0)	(1)	(5)	(0)	0	0	(5)	0	0	0	0	0	0
Adjusted Operating Profit	$321	$442	$290	($123)	($126)	($110)	($110)	($468)	($105)	($62)	($15)	($1)	($183)	$9
Interest Expense / (Income)	10	(2)	(51)	5	(1)	8	8	20	8	8	8	8	32	32
Other Expense / (Income)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income Before Taxes	$312	$444	$341	($127)	($125)	($118)	($118)	($488)	($113)	($70)	($23)	($9)	($215)	($23)
Income Tax Provision	39	92	92	(19)	(12)	(24)	(24)	(79)	(11)	(7)	(2)	(1)	(22)	(2)
Adjusted Net Income	**$273**	**$351**	**$248**	**($109)**	**($113)**	**($94)**	**($94)**	**($409)**	**($102)**	**($63)**	**($21)**	**($8)**	**($194)**	**($20)**
Diluted EPS														
Average Diluted Shares Outstanding	56	58	58	57	57	57	57	57	57	57	57	57	57	57
Adjusted Average Diluted Shares Outstanding	57	56	56	57	57	57	57	57	57	57	59	59	58	60
Reported Diluted EPS from Continuing Operations	$3.02	$1.61	$0.59	($2.75)	($2.31)	($2.39)	($2.40)	($10.18)	($2.72)	($2.04)	($1.32)	($1.09)	($7.16)	($4.17)
Nonrecurring Income (Expense)	2	5	4	1	1	1	1	3	1	1	1	1	4	4
Adjusted Diluted EPS	**$4.81**	**$6.27**	**$4.43**	**($1.90)**	**($1.79)**	**($1.65)**	**($1.66)**	**($7.00)**	**($1.79)**	**($1.12)**	**($0.35)**	**($0.13)**	**($3.36)**	**($0.34)**
Adjusted EBITDA	$373	$504	$352	($108)	($99)	($95)	($93)	($436)	($99)	($55)	($4)	$12	($147)	$58
Free Cash Flow	$65	($138)	($351)	($243)	($67)			$191					($928)	($666)
Effective Tax Rate	12.4%	20.8%	27.1%	14.7%	9.5%	20.5%	20.5%	16.2%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
% of Sales														
Net Sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cost of Goods Sold	66.5%	71.8%	73.4%	106.5%	104.1%	102.4%	101.3%	103.4%	99.2%	86.2%	80.5%	79.9%	84.6%	78.6%
Gross Profit	33.5%	28.2%	26.6%	-6.5%	-4.1%	-2.4%	-1.3%	-3.4%	0.8%	13.8%	19.5%	20.1%	15.4%	21.4%
Operating Expenses	3.4%	2.7%	4.0%	11.9%	12.2%	10.5%	9.0%	10.8%	9.0%	8.0%	5.5%	4.8%	6.3%	5.0%
Adjusted Operating Profit	16.4%	14.2%	9.7%	-59.9%	-47.4%	-42.9%	-37.3%	-45.9%	-35.2%	-18.7%	-3.0%	-0.1%	-10.6%	0.4%
Adjusted EBITDA	19.0%	16.2%	11.8%	-52.6%	-37.3%	-37.1%	-31.5%	-42.7%	-33.1%	-16.6%	-0.9%	2.0%	-8.5%	2.5%
Adjusted Net Income	13.9%	11.3%	8.3%	-53.1%	-42.4%	-36.6%	-31.8%	-40.0%	-34.1%	-18.9%	-4.1%	-1.3%	-11.2%	-0.9%
Growth Rates														
Net Sales	35%	58%	-4%	-78%	-73%	-65%	-7%	-66%	46%	26%	96%	103%	749%	676%
Cost of Goods Sold	34%	71%	-2%	-66%	-59%	-54%	-2%	-52%	36%	4%	54%	60%	574%	515%
Gross Profit	32%	27%	24%	-13%	0%	4%	5%	0%	7%	19%	24%	23%	20%	25%
Operating Expenses	26%	34%	4%	-12%	-14%	-19%	-10%	-11%	-2%	-5%	9%	14%	326%	443%
Adjusted Operating Profit	16%	14%	10%	-60%	-43%	-43%	-37%	-45%	-35%	-19%	-3%	0%	-11%	0%
Adjusted EBITDA	46%	35%	-30%	-155%	-148%	-390%	67%	-224%	-8%	-44%	-95%	-113%	37%	-158%
Adjusted Net Income	*14%*	*11%*	*8%*	*-53%*	*-38%*	*-37%*	*-32%*	*-39%*	*-34%*	*-19%*	*-4%*	*-1%*	*-11%*	*-1%*
Adjusted Diluted EPS	*17%*	*30%*	*-29%*	*-166%*	*-168%*	*198%*	*81%*	*-258%*	*-6%*	*-37%*	*-79%*	*-92%*	*77%*	*-81%*

Note: $ in millions except share price
Source: William Blair Equity Research

Exhibit 54
Solar Group Launch
SolarEdge Balance Sheet Forecast

BALANCE SHEET	2021	2022	2023
Cash and Equivalents	697,817	1,024,229	860,038
Receivables, net	456,339	905,146	622,425
Inventories	380,143	729,201	1,443,449
Other current assets	176,992	241,082	378,394
Current Assets	1,711,291	2,899,658	3,304,306
Net property, plant, & equipment	410,379	543,969	614,579
Goodwill	129,629	31,189	42,996
Intangible assets	58,861	19,929	35,345
Deferred taxes	27,572	44,153	80,912
Other non-current assets	563,221	727,051	509,593
Total assets	**$2,900,953**	**$4,265,949**	**$4,587,731**
ST Debt (incl. current LTD)			
Accounts payable	252,068	459,831	386,471
Accrued expenses	183,844	299,270	282,877
Other ST liabilities	89,269	130,616	223,883
Current Liabilities	525,181	889,717	893,231
LT Debt	621,535	624,451	627,381
Deferred tax liabilities			
Other LT liabilities	444,198	575,415	655,210
Total liabilities	**$1,590,914**	**$2,089,583**	**$2,175,822**
Total shareholders equity	**$1,310,039**	**$2,176,366**	**$2,411,909**
Total liabilities and equity	**$2,900,953**	**$4,265,949**	**$4,587,731**

Note: $ in thousands
Source: William Blair Equity Research

Valuation

Despite the strong pullback in shares that began last year, we believe the risk/reward profile of the business is neutral, given the risk to even a protracted recovery. We are initiating coverage with a Market Perform rating.

Investment Risks

Risks include: 1) competition, particularly from Tesla with an integrated approach; 2) end-market demand and the ability to draw down on historically high inventory levels; and 3) geopolitical risks with operations located in Tel Aviv, Israel.

Exhibit 55
Solar Group Launch
Industry Valuation Table

			Trading Statistics			Valuation								
						EV/Sales			EV/EBITDA			P/E		
Power Semi Companies	**Ticker**	**WB Rating**	**Price 8/27/2024**	**Market Cap ($M)**	**Enterprise Value ($M)**	**2024**	**2025**	**2026**	**2024**	**2025**	**2026**	**2024**	**2025**	**2026**
ON Semiconductor Corp.	ON	MP	$74.82	32,050	35,225	5.0x	4.6x	4.1x	15x	13x	11x	19x	16x	15x
STMicroelectronics NV	STM	MP	$31.04	28,154	25,572	1.9x	1.8x	1.6x	9x	8x	6x	19x	15x	12x
Wolfspeed Inc	WOLF	MP	$13.34	1,692	5,719	7.1x	6.2x	4.1x	NM	NM	45x	NM	NM	NM
Infineon Technologies AG	IFX-ETR		€32.39	46,908	50,637	2.9x	2.7x	2.4x	9x	8x	7x	17x	14x	12x
Microchip Technology Incorporated	MCHP		$80.94	43,081	49,683	8.9x	8.6x	7.4x	25x	22x	16x	29x	26x	20x
Analog Devices, Inc.	ADI		$231.84	112,014	119,096	12.5x	11.2x	10.1x	28x	26x	21x	35x	30x	24x
Texas Instruments Incorporated	TXN		$210.69	190,142	197,679	12.5x	11.0x	9.8x	28x	22x	19x	41x	33x	27x
Covered Average						**7x**	**7x**	**6x**	**19x**	**16x**	**18x**	**27x**	**22x**	**18x**
Covered Median						**7x**	**6x**	**4x**	**20x**	**17x**	**16x**	**24x**	**21x**	**17x**
Solar Companies														
Enphase Energy, Inc.	ENPH	MP	$122.53	16,601	16,638	11.5x	8.4x	7.0x	42x	25x	20x	50x	30x	25x
SolarEdge Technologies, Inc.	SEDG	MP	$25.69	1,497	1,375	1.3x	0.8x	0.6x	NM	NM	24x	NM	NM	NM
First Solar, Inc.	FSLR	MP	$235.42	24,962	23,721	5.2x	4.3x	3.6x	12x	8x	8x	17x	12x	9x
Canadian Solar Inc.	CSIQ		$13.04	895	4,513	0.6x	0.5x	0.5x	6x	4x	3x	9x	4x	3x
Sunrun Inc.	RUN		$20.82	4,728	17,770	8.4x	7.2x	6.3x	442x	NM	69x	NM	NM	NM
JinkoSolar Holding Co., Ltd. Sponsored ADF	JKS		$18.21	998	6,430	0.4x	0.3x	0.3x	4x	3x	7x	129x	6x	7x
Sunnova Energy International Inc	NOVA		$10.93	1,418	10,051	11.7x	9.3x	7.7x	17x	15x	13x	NM	NM	NM
Uncovered Average						**6x**	**4x**	**4x**	**87x**	**11x**	**20x**	**51x**	**13x**	**11x**
Uncovered Median						**5x**	**4x**	**4x**	**14x**	**8x**	**13x**	**34x**	**9x**	**8x**
Total Average						**6x**	**5x**	**5x**	**53x**	**14x**	**19x**	**36x**	**19x**	**15x**
Total Median						**6x**	**5x**	**4x**	**16x**	**13x**	**14x**	**24x**	**16x**	**13x**
SolarEdge Technologies, Inc.	**SEDG**	**MP**	**$25.69**	**1,497**	**1,375**	**1.3x**	**0.8x**	**0.6x**	**NM**	**NM**	**24x**	**NM**	**NM**	**NM**

Note: All figures in USD, other than share prices as indicated otherwise. Annual periods represent calendar years. As of market close: 8/27/2024
Sources: FactSet and William Blair Equity Research

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DOW JONES: 41091.40
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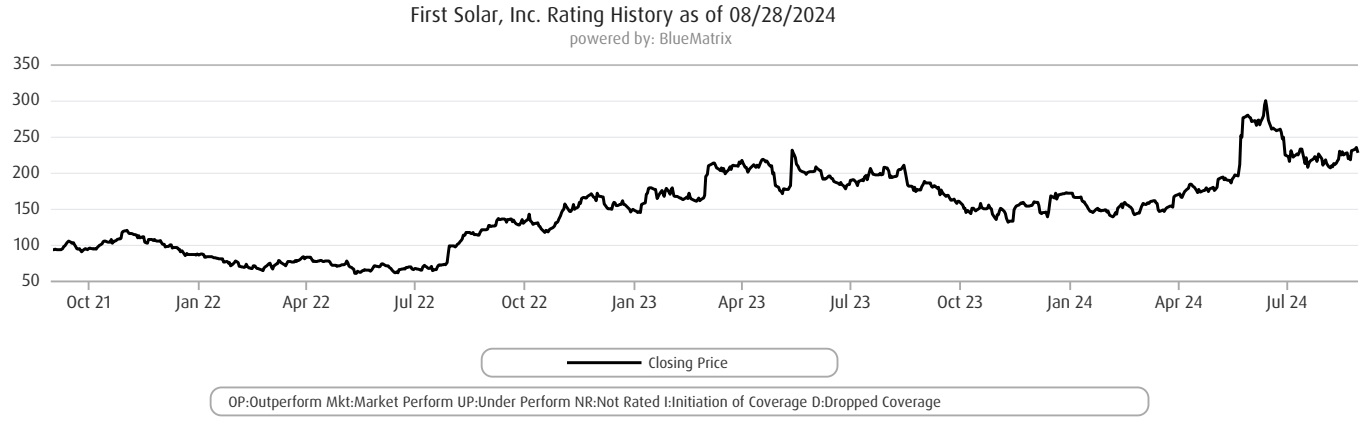

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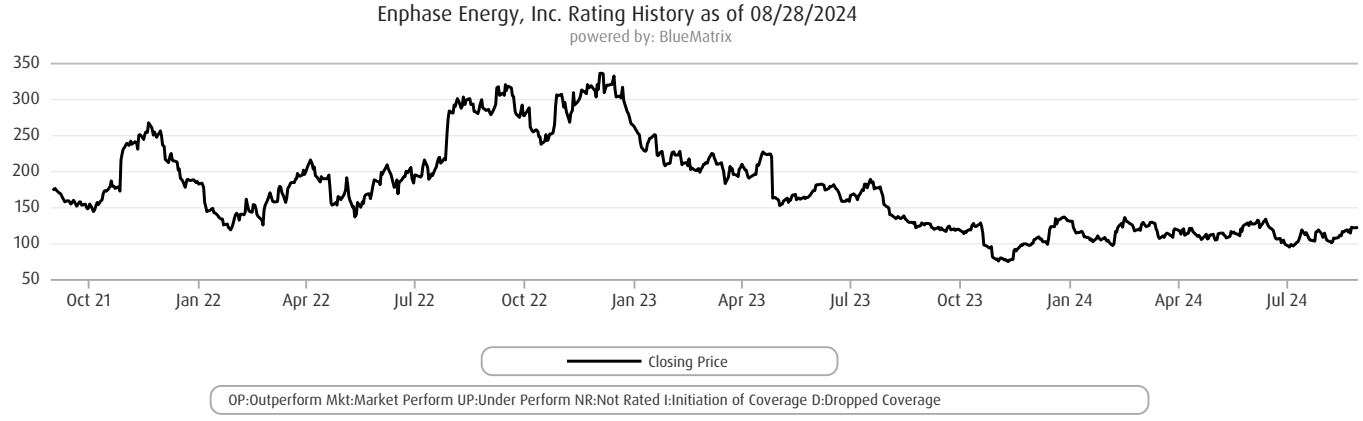

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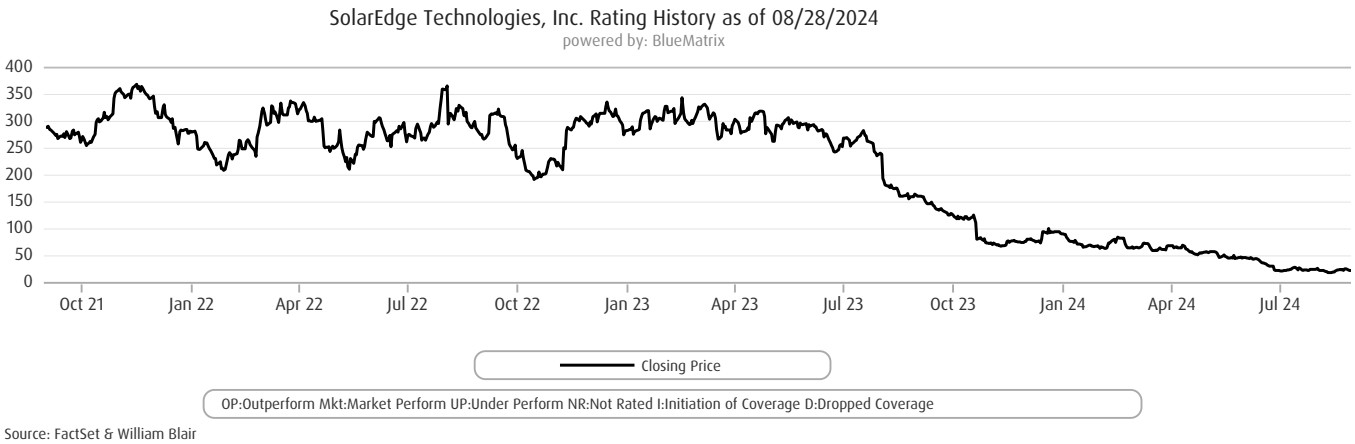

Source: FactSet & William Blair

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