AlphaSense

Why Has 2023 Renewables Profitability Been So Disappointing?

By Xavier Smith, Director of Research, Energy & Industrials

September 2023

Why Has 2023 Renewables Profitability Been So Disappointing?

By Xavier Smith, Director of Research, Energy & Industrials

September 2023

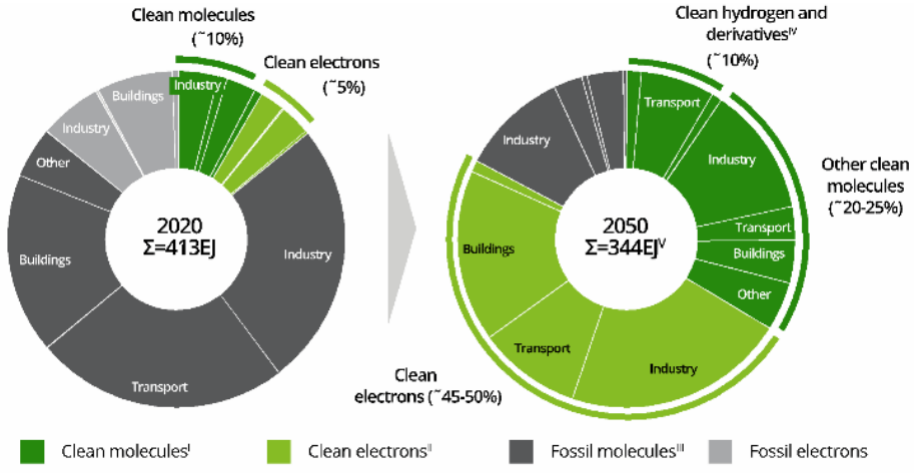
Executive Summary

Despite a policy environment that is favorable towards renewables, renewables industry profitability has missed expectations. Experts at Stream assert that residential solar players should focus on cost reductions to improve their profitability potential, while wind turbine producers should improve their pricing power through higher differentiation resulting from a faster pace of innovation. In hydrogen-powered equipment, experts assert that firms like Plug Power need to reduce maintenance costs and improve reliability by changing their fuel cell membrane material. Going forward, renewables industry participants should expect new pricing strategies and increased nearshoring from renewables firms as they attempt to increase margins. Stream experts argue that if these changes aren't implemented, governments will miss their renewables targets and renewables projects will suffer lower internal rate of returns (IRR).

Context

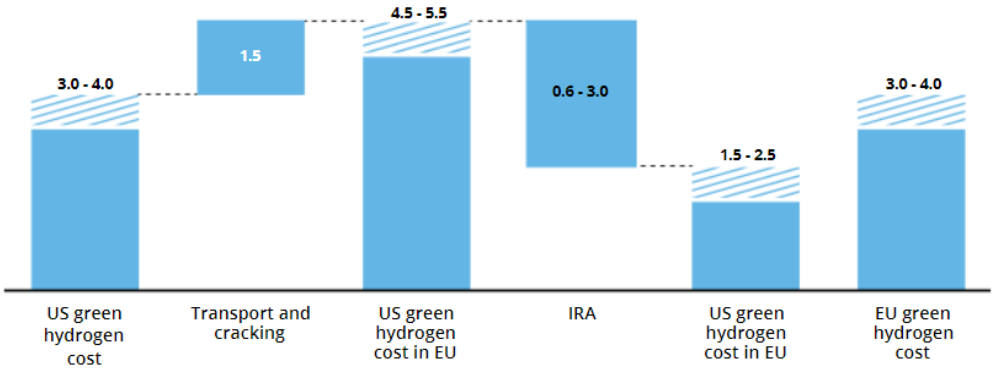
President Biden's 2022 Inflation Reduction Act (IRA), which allocated $369 billion on low carbon energy initiatives, inflated expectations for renewables adoption in 2023. These initiatives included an extension of the 30% investment tax credit for power generation using solar, fuel cells, waste energy, and geothermal. The IRA initiatives also included an extension for the production tax credit for power facilities using wind, biomass, landfill gas, and hydropower. Additionally for projects commissioned after 2024, the IRA created new tax credits: the Clean Electricity Investment Credit and the Clean Electricity Production Credit. IRA renewable energy subsidies were quite generous; for example, subsidies for green hydrogen can reach $3 per kilogram. Several manufacturers announced plans to shift renewable energy production facilities to the US from Asia to benefit from the new tax credits and subsidies.

Projected Clean Energy Consumption, 2050 vs 2020



Source: [Deloitte, "Hydrogen: Making It Happen"]

IRA Effects on Hydrogen Cost, $/kg



Source: Deloitte, "Hydrogen: Making It Happen"

However, despite positive policy announcements in 2022 and 2023, renewables sales growth and profitability newsflow have turned less positive in the second half of 2023. Growth decelerated in solar due to higher interest rates and California's new net energy metering policy (NEM 3.0). Sunrun, the leading residential solar installer in the US, reduced its 2023 growth forecast over the course of the year, due to these market shifts. Sunrun reported a 33% decrease in year-over-year originations in California, the US's largest solar market. Lead generation for residential solar in California fell by 50%, year over year. Installations in other parts of the US have also faced a decline.

The wind turbine sector is also facing profitability challenges. In June 2023, onshore wind turbine quality issues resulted in €1.6 billion in unexpected expenses at Siemens Energy, a top 5 global wind turbine producer. Vestas, another top 5 global wind turbine manufacturer, increased its warranty provisions and lost production factors, implying that reliability could decline going forward resulting in higher repair expenditures. Commodity price inflation has also been problematic in the wind turbine sector. While current wind turbine prices are elevated relative to history, they have been insufficient to offset commodity price inflation.

In the hydrogen space, growth lagged projections created at the beginning of 2023. In Q2 of 2023, top 5 hydrogen electrolyzer manufacturer Nel experienced lower than expected orders. Nel management attributed its slowing order growth to customers deferring orders and to the firm losing competitive tenders due to lower prices from competitors. Plug Power, one of the leading US players in hydrogen-powered forklifts and hydrogen electrolyzers, retracted its earlier gross margin guidance due to challenging market conditions. Additionally, the firm's green hydrogen plant construction is proceeding slower than expected.

Despite the negative newsflow in solar, wind, and hydrogen, the low carbon energy industry does have some bright spots. The energy storage space stands out as a promising subsector. In residential solar, Sunrun's battery attachment rate increased to 18% in Q2 2023 from 15% in Q1 2023. Sunrun indicated that its energy storage + solar customers yielded a higher profit margin than solar-only customers. In commercial solar, implementing battery storage raised project returns.

Enverus Intelligence, an energy consulting firm, noted that their team::

> *Can see a consistent 60%-80% IRR rate for some of the major ISOs across the United States implementing battery storage. The ability to store excess energy and release it during peak demand times not only enhances grid stability but also creates additional revenue streams.*
>
> — Report | Enverus

Meanwhile, a former Sunrun senior manager argues that batteries will create an advantage for Sunrun:

> *With the net metering law change, here's what I think. Crazy enough, I think it actually helps Sunrun. The reason I think it helps Sunrun is because they have the resources to drown out some of the smaller players in California. They have the battery storage options that they offer. I believe I was reading when I was just preparing for this call that battery storage is up like 3X the amount of batteries over the last couple of years, which is crazy.*
>
> — Expert Transcript | Senior Manager, Sunrun (Prior)

Problem Statement

During 2023, renewables firms reported disappointing sales growth and margin progression. If these trends persist, governments will miss their renewables targets and renewables projects will suffer lower IRRs. To reverse these negative trends, Stream experts suggest that:

1. Solar firms need to drive down costs in order to experience margin progression.
2. Wind turbine producers need to create pricing power through product differentiation.
3. Hydrogen-powered equipment firms like Plug Power need to lower maintenance costs through improved reliability.

Drivers

Residential Solar

In the solar sector, margin expansion has proved elusive. A former Sunrun senior manager argues that rooftop solar firms like Sunrun should focus on cost reduction:

> *I think the best-case scenario would be to really lean out. The best-case scenario would probably be to eliminate a lot of the marketing costs associated with lead generation in Home Depot and Costco because they're so expensive to operate that way for such little output.*
>
> — Expert Transcript | Senior Manager, Sunrun (Prior)

The Sunrun senior manager argues that these channels are operationally costly and yield relatively modest results. He argues that in order to accelerate sales growth, rooftop solar installers need to pass on the benefits of lower costs via lower prices to consumers.

> *It just makes it really difficult for the companies that are just so expensive because Sunrun is very expensive. It's a very expensive solar company. When I left, it was like $4 per watt, which is a lot. Smaller can probably be around the $2.50-$2.75 per watt. Tesla was around $2.50 per watt. I think Sunnova and SunPower are roughly around Sunrun.*
>
> — Expert Transcript | Senior Manager, Sunrun (Prior)

Tesla is cheaper because it employs an online sales strategy rather than using an extensive salesforce like Sunrun.

Despite the profitability issues in rooftop residential solar, the former Sunrun executive notes that among the solar value chain, solar inverter firms will do well. "There's one side of the business that will thrive, that is hardware providers like Enphase, SolarEdge. Those companies do the inverters that are needed for solar. They're starting to get into batteries," said the former Sunrun executive.

Wind Turbines

In the wind turbine sector, profitability has proved elusive due to fierce price competition. A former GE Renewables executive director notes:

> *Actually, the pressure on pricing in the market is coming from the competitors and not from an end power price. If you think about the renewable energy market, they're not competing against other forms of power generation. Wind and solar are not competing against gas and coal. In fact, they're cheaper, but the prices keep going down. Why? Because there's a competitive pressure amongst the OEMs themselves*
>
> *I think there's a lot of aggressive assumptions taken in the last four or five years by all the OEMs in the space about their ability to get cost out, about their ability to improve the technology. They were forward-selling technology improvements, let's call it that way. They were baking it in.*
>
> — Expert Transcript | Executive Director, GE (Prior)

Developers, accustomed to declining costs for offshore wind projects, had assumed that these would continue, or at least not increase. The former GE Renewables executive director notes that turbines need more differentiation in order to gain better pricing. He asserts:

> *My view on what's happening in the market actually is the wind and renewable segment is hyper-competitive, and because it's very capital-intensive and it's very competitive on the upfront wind turbine sale, the OEMs have been in a technology race in order to beat the competition, because in many aspects, the wind turbines are very, very similar. If you have*

> *a look at the underlying technology, it's three blades and a gearbox and a generator. Really, where you start to differentiate is on incremental improvements, whether you've got better aerodynamics, maybe a better, more efficient generator technology. What happens is you can differentiate by having a larger product. You'll see this race every year, the OEMs launch bigger and bigger turbines, bigger blades.*
>
> — Expert Transcript | Executive Director, GE (Prior)

These unwelcome headwinds in the wind turbine market have prompted developers to halt development and pay contract termination fees for early exits. Wood Mackenzie, the energy consultancy, says that in the US:

> *Rising collateral requirements in some Independent System Operators (ISOs) have discouraged smaller wind farm developers from expanding. Some ISOs have participation requirements that require a surety bond or letter of credit of at least $5 million. In Europe, a lack of available land suitable for new installations in many European nations and slow project permitting timelines. These unfavorable conditions for developers have slowed the achievement of long-term renewables targets in some large markets like Germany and the Netherlands.*
>
> — Report | Wood Mackenzie

Wood Mackenzie also notes that industry participants need to pay increased attention to the softer aspects of renewables procurement because "the important non-financial risk factors include: availability, viability, safety, reputation, and partnership."

Hydrogen

In hydrogen powered equipment, issues with reliability and maintenance expenses lowered Plug Power's profit potential. While some of Plug Power's hydrogen powered forklifts operate with impressive consistency, others demand considerable attention. A former Plug Power assistant controller disclosed:

> *Plug Power launch customers like Amazon and Walmart struggled with Plug Power's forklifts during peak times like Amazon Prime Day and Christmas. Core fuel cell components and the auxiliary system elements such as pump sensors and electronics are the culprits for reliability. These issues are surmountable; however, the resolution's scope, potential size, and associated initial implementation costs remain uncertain.*
>
> — Expert Transcript | Assistant Controller, Plug Power (Prior)

The former Plug Power assistant controller noted that changing membrane materials improved reliability.

> *We discovered that using different materials for stacks significantly increased the lifespan of the stacks. It was a better invention, so to speak, by our engineers to make sure that*

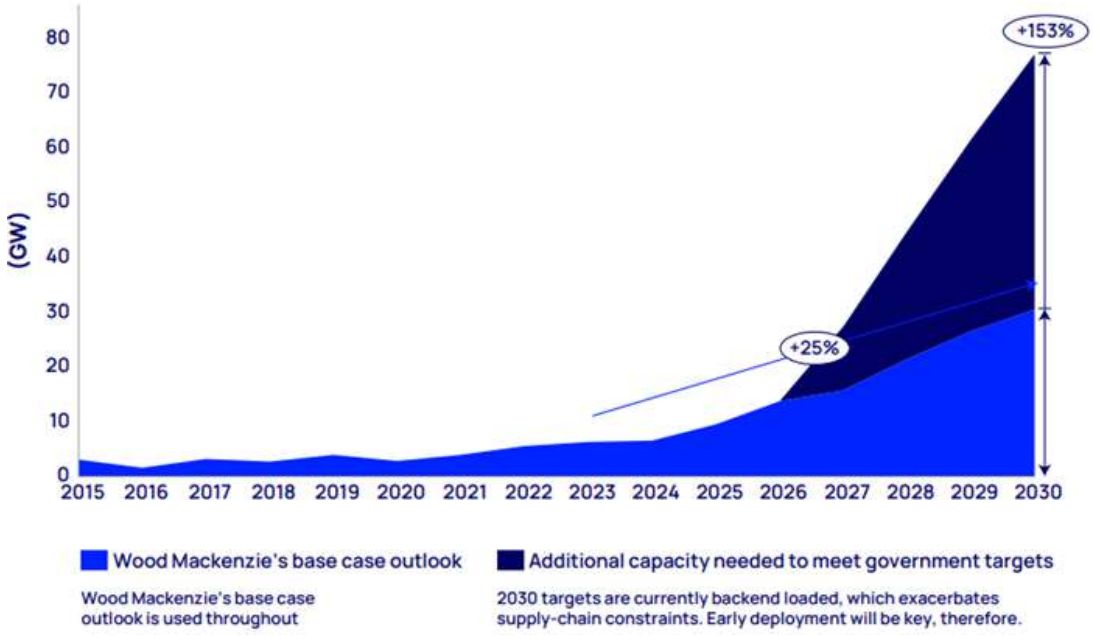
> *these stacks last and they needed less service. Membrane contamination caused diminishing stack performance, air filter efficiency, and coolant-related matters tied to maintaining dielectric properties.*
>
> — Expert Transcript | Assistant Controller, Plug Power (Prior)

Implications

While governments have articulated their commitment for higher renewables penetration, the profitability issue will constrain renewables availability. This will lead to governments missing their renewables targets. Chris Seiple, Vice Chair, Power and Renewables at Wood Mackenzie notes:

> *If change does not happen, nearly 80 GW of annual installations to meet government targets is not realistic, even achieving our forecasted 30 GW in additions will prove unrealistic if there isn't immediate investment in the supply chain. While some 24 GW of projects scheduled to come online between 2025 and 2027 have secured a route to market, they have not reached the stage where developers order equipment from suppliers. Additionally, developers have delayed multiple global projects as they look to renegotiate offtake contracts given increased supply costs and inflation.*
>
> — Report | Wood Mackenzie

Offshore Wind Supply Needed To Meet Government Targets



Source: Wood Mackenzie, "Charting A Sustainable Course For Offshore Wind"

Looking Ahead

Industry participants should expect new pricing strategies from renewables firms as they attempt to raise profitability. Stream experts suggest that wind turbine firms should enhance their innovation efforts to earn more favorable pricing. On the innovation front, the former GE Renewables executive director states:

> *I would say there is no low-hanging fruit. There's a lot of OEMs that deploy hundreds of millions of dollars a year into R&D and technology and new products. I don't believe there is a low-hanging fruit available that's immediately apparent, but there's going to need to be some fundamental technology shifts.*
>
> — Expert Transcript | Executive Director, GE (Prior)

He further notes that the innovation could come from manufacturing improvements or change in components.

> *If there's a breakthrough on additive manufacturing or new manufacturing methods, particularly for these large components like blades and others, that could drive a step change. The other part is in new materials. There have been discussions about superconducting generators, for example, that could be a step change in technology. It would require something*

> *quite new rather than this iterative process, which is how the industry has moved over the past 20 years.*
>
> — Expert Transcript | Executive Director, GE (Prior)

The former GE Renewables executive director argues that renewables firms are using a pricing strategy more suited for fossil fuels than renewables. He implies that wind turbine firms need to raise the upfront price rather than relying on future maintenance revenues.

> *In a thermal asset, you could make nearly all of your profit in the services side. Because the capex is so high in renewables, you don't make the majority of your profit. You need to make profit both in the capex and in the opex for renewable projects. You can't just rely on opex margins, which is what they do sometimes with thermal contracts.*
>
> — Expert Transcript | Executive Director, GE (Prior)

Wood Mackenzie notes that:

> *Several investors raised that the target equity IRR must be much higher for US offshore wind assets to be reconsidered as a commercially viable option, and a lot more downside protection via higher levels of inflation adjustment and longer PPA duration is needed. Investors stress higher IRR and stronger safeguards for US offshore wind viability, with potential recovery through credits and tax incentives.*
>
> — Report | Wood Mackenzie

Industry participants should also expect increased nearshoring in renewables manufacturing as this could raise profitability through tax credit harvesting. A former GE director notes:

> *I know the IRA has created an eight year incentive, an incentive through 2030. That was enough of a long-term incentive for a few of the manufacturers that I know of that were making big decisions on supply chain changes, onshoring things, changing from China sources. In the absence of IRA incentives they would not happen. They would be small changes.*
>
> — Expert Transcript | Director, GE (Prior)

Wood Mackenzie also notes that:

> *Over 60+ reshoring-related solar partnership announcements across the entire PV value chain have occurred between August 2022 and July 2023. Most investors agreed that the focus has been harvesting tax credits and securing supply over the next few years. None of the partnerships have focused on reshoring the highest-value add segment of the solar supply chain - polysilicon ("poly") manufacturing.*
>
> — Report | Wood Mackenzie

Finally industry participants should expect lower renewables project IRRs if the profitability issues are not solved. Wood Mackenzie notes in an energy report:

> *Several renewable project investors with a high-risk, high-return strategy are targeting 15-20% IRR. However many project investors think getting double-digit returns in energy storage isn't possible. The consensus for now is that the median IRR for proposed storage assets in Texas is about 9-13%.*
>
> — Report | Wood Mackenzie