Life Is On | Schneider Electric

Renewable Energy 2024

Global Trends & Regional Market Overview

This brief explores topics in renewable energy across the globe and complements our recurring regional market reports.

Explore >

Executive Summary

With 2030 just over the horizon, 2024 must be the year that sees organizations accelerate their decarbonization strategies. In a recent interview, U.N. Secretary-General Antonio Guterres noted very matter-of-factly the central, shared challenge global organizations face: “Today’s emissions gap is more like an emissions canyon.” Indeed, the primary decarbonization question is no longer, “Why?” as the real-time disruption caused by the effects of climate change is no longer theoretical.

The question now is *how*. Schneider Electric’s Sustainability Business exists to answer that foundational question.

The welcome news for company leaders is that the renewable energy options available to them are expanding to meet this urgency. The reality, however, is that trial and error as an adoption method is a bygone luxury. That’s why Schneider Electric partners with clients to first set their decarbonization destination, then we guide their journey.

Our **Renewable Energy 2024: Global Trends & Regional Market Overview** is a succinct analysis of several of the most significant opportunities on the renewable energy landscape. This report explores international, regional and local topics, including trends in supply chain decarbonization, environmental commodities, voluntary carbon markets and tax credit investment to name only a few. While these capture what we know *today*, there are ample opportunities for readers to engage our team to carry those conversations forward *tomorrow*.

More than two dozen subject matter experts collaborated on this document, most from within Schneider Electric’s Renewable Energy & Carbon Advisory. Additional contributions came from recent additions that include Zeigo and EcoAct. These teams joined Schneider Electric in 2022 and 2023, respectively. With those acquisitions, our team has grown to represent nearly 3,500 experts in more than 30 countries around the globe.

Schneider Electric’s Sustainability Business is proud to support small, medium and large organizations with a wide variety of sustainability challenges. We believe we are uniquely capable of driving momentum toward significant strides toward decarbonization in 2024. We hope you’ll join us.

Contents

Supply Chain Decarbonization

More organizations are setting science-based targets and beginning the process to better understand their emissions in total. Scope 3 emissions from within their supply chains often stands out as a significant area of opportunity. Traditionally, reducing supply chain emissions has been very challenging: in many cases it is difficult to even *measure* these emissions. To drive the greatest impact, companies are increasingly encouraging their suppliers to adopt renewable energy solutions. Options often include aggregated purchasing of EACs, as well as aggregated Power Purchase Agreements (PPAs). Schneider Electric has successfully collaborated with entire industry segments to cooperatively educate their suppliers on renewables and decarbonization.

A Collaborative Approach to Renewable Energy Procurement >

A Collaborative Approach to Renewable Energy Procurement

Schneider Electric is actively working toward supply chain decarbonization with innovative solutions that not only benefit the environment, but also provide numerous advantages for organizations and their respective supply chains. Through its buyers' cohorts in large-scale industries, such as pharmaceutical, retail and the semi-conductor space, among others, Schneider Electric provides international organizations with unique solutions to reduce their carbon footprint and transition to renewable energy sources.

Catalyze Overview

As the global demand for semiconductors in consumer and commercial products increases, the sector's carbon footprint continues to grow. It is imperative the industry collaborates to achieve a more sustainable future. To that end, Schneider Electric introduced the Catalyze program, which brings together corporate sponsors and encourages their suppliers throughout the semiconductor ecosystem to transition to renewable energy and a low-carbon future together. The four founding sponsors include:

Applied Materials, ASM, intel, Google

Through industry-wide collaboration, Catalyze addresses one of the most notoriously challenging aspects of decarbonization: **Scope 3 emissions**.

The core elements of the Catalyze program include:

- Combining energy purchasing power across the semiconductor value chain to accelerate the deployment of renewable energy projects
- Providing suppliers who may not have the capability on their own the opportunity to participate in the market for utility-scale PPAs
- Increasing awareness of the availability of renewable energy in specific global regions where the semiconductor value chain is operational
- Assisting suppliers who have made commitments to reduce their carbon emissions
- Educating companies in the semiconductor value chain on the importance of developing operational models to use in their supply chain programs

Progress

HP recently joined as a Catalyze program sponsor, bringing the total to five corporate sponsors. In parallel, sponsors are now reaching out beyond their semiconductor suppliers to invite their entire value chain to join the Catalyze program.

A Collaborative Approach to Renewable Energy Procurement

Energize Overview

Accessing the market for renewable electricity procurement is a critical step towards decarbonization. However, companies of all sizes not only encounter barriers to access, but also these common challenges to renewable electricity procurement:

- Limited knowledge of renewable electricity transactions
- Constraints based on load size
- Credit challenges
- The need for guidance throughout complex contracting processes

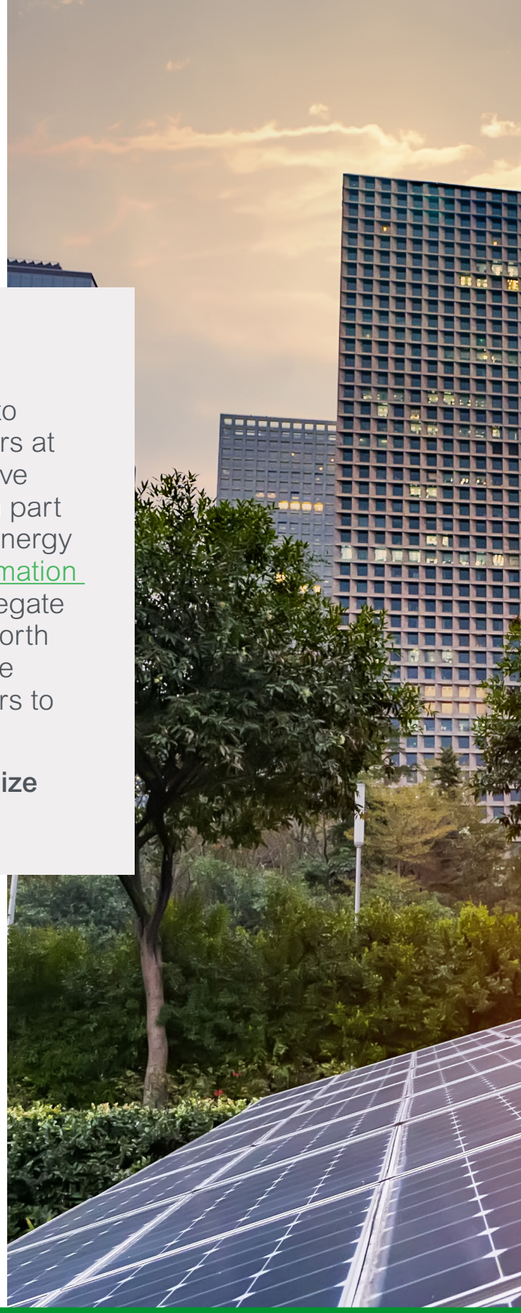
With support from the Pharmaceutical Supply Chain Initiative (PSCI) and 10 global pharmaceutical companies, Schneider Electric launched Energize to increase access to renewable electricity for the pharmaceutical industry supply chain. The first-of-its-kind program initially launched with a focus on Europe and North America and includes these sponsors:

AstraZeneca, GSK, Novartis, Pfizer, Merck, Sanofi, Amgen, Bristol Myers Squibb, Chiesi, Biogen, Boehringer Ingelheim, Roche, UCB, Johnson&Johnson, Novo Nordisk, Takeda, Haleon, Teva, Charles River, Merck

Progress

The program has made considerable progress, growing to 20 sponsor companies from its initial 10 founding sponsors at COP26 in 2021.Today, 500+ pharmaceutical suppliers have registered for the program and more than 200 have taken part in Schneider Electric's educational series on renewable energy procurement.) In December, Energize announced the formation of five PPA buyer's cohorts representing a potential aggregate of 2 terawatt-hours (TWh) of electricity demand across North America, the UK and the EU. PPA buying cohorts leverage group purchasing power to enable sponsors and suppliers to access to large-scale renewable energy projects.

Visit Hub.zeigo.com/energize to learn more about Energize and how companies can get involved with our network.



The Evolution of the Voluntary Carbon Market

2024 must be a year of action. The urgency to address climate change is reaching new heights, with 2023 the warmest on record and the effects of climate change already being felt across the world. EcoAct CEO Stuart Lemmon's recent blog, New Year outlook: Five key climate and biodiversity trends to watch in 2024, explores critical trends businesses need to urgently address to adapt to climate change impacts.

The evolution in the Voluntary Carbon Market (VCM) is one of those critical trends.

Read the Trend

The Need for Quality & Transparency in the VCM

“Last year was a transitional year for the Voluntary Carbon Market (VCM), with the nuts and bolts of Article 6 still being worked out and several media-related shocks on demand leading to a slight plateauing of price. Despite challenges, there is lots of optimism within the VCM for a rebound of the market into 2024 with a renewed focus on quality.

The spotlight on quality of projects has driven key standards (covering nearly 90% of the VCM volume) to issue a joint statement at COP28 to improve alignment of accounting, transparency and capacity building. Several standards are now investing heavily into improving methodologies (eg., Verra’s revised REDD methodologies) to ensure that offsetting activity improves in quality throughout the coming years. (Catch up on EcoAct’s recap of COP28 and the future of the VCM.)

I’m hugely encouraged to see leading organizations not backing down from their climate commitments. Instead, many are re-evaluating how they can maximize quality and transparency to achieve them. There is also the continuing trend towards companies investing in their own projects to secure credit supply for their long-term net-zero targets. As the demand for high-quality carbon credits and a shift towards transparent and verifiable offsetting mechanisms grows, EcoAct is supporting more and more clients with project development opportunities and maximizing positive impact of investment.”

Join Our Webinar:

Why a Robust Offsetting Strategy is Essential to Your Net-zero Transition

Presented by EcoAct, this webinar will explore the voluntary carbon market, nature-based solutions, and how to mobilize climate finance to support your organization’s net-zero transition.

Register

North American Market Overview: Power Purchase Agreements

The North American PPA market is experiencing a dynamic period of change influenced by various regional and policy factors. As we look ahead to 2024, two initial trends stand out:

1. Project availability has increased, largely because of investments in development pipelines due to the tax policy established by the Inflation Reduction Act of 2022.
2. PPA pricing remains high, though pricing leveled off in the second half of 2023.

This section explores the unique factors driving both higher PPA prices and, in many cases, longer delays in project deployment.

Market Insights >

Trends & Challenges for 2024 (and Beyond)

PPA Prices Remain Up

High interest rates are heavily contributing to continued high PPA prices. Renewable energy projects require large capital expenditure, much of which is debt-financed. Project developers are passing through the additional costs of borrowing money to offtakers, which results in higher PPA prices. It is a sellers' market, with corporate demand for renewable energy at an all-time high and growing.

Projects Slow Down

Additionally, project delays and timelines have increased in 2023 due to continued supply chain issues, regulatory hurdles and changes in interconnection queue methodology at ISOs. Some developers are asking for damages-free forgiveness for delays related to equipment procurement and/or interconnection to address these risks. While this adds to the complexities in contracting, it has not served as a major roadblock to corporates seeking renewable energy.

As a result of changes in cost and timing, quotes from Engineering, Procurement, and Construction (EPC), equipment providers and other parties involved in development now have a shorter shelf life. This means prices quoted for contracts are valid for a shorter period adding to the uncertainty and volatility in the market and increasing complexities in contracting with corporates.

Policy Impacts

The US Department of Commerce's tariffs imposed on foreign-made solar panels have increased the cost of solar projects and slowed down the pace of development. The policy was established to support domestic manufacturing of solar panels in hopes of long-term benefits for the U.S. industry, but significantly stymied near-term development. Additionally, the Uyghur Forced Labor Protection Act, which bans imports from China's Xinjang region where forced labor is suspected, has also added to supply chain disruptions and contributed to increased costs for panels and longer procurement timelines.

Developers Adapt

Many developers are now strategically marketing projects much later in the development cycle. This approach helps to lock down input costs and reduce the likelihood of contractual price re-openers with PPA offtakers. Schneider Electric has observed enhanced efficiency in the PPA negotiation process with developers able to provide concrete input costs. The increase in mature projects in the market reflects a favorable shift for corporate offtakers who favor projects that offer greater price certainty.

Conclusion

The North American PPA market evolved significantly across 2023 with various factors influencing what we will see in 2024. Despite the increase in project availability and the strategic shift towards marketing mature projects, challenges persist. High interest rates, supply chain issues and regulatory hurdles have contributed to high PPA prices and project delays.

These challenges have not deterred corporate demand for renewable energy, however. Demand remains at an all-time high. The market's evolution reflects the industry's resilience and adaptability. The focus remains on reducing reliability on fossil energy and moving to a much greener grid as developers and corporate offtakers navigate these changes.

PPA Analysis by Region

Alberta, Canada

The government has put a hold on approving renewable projects permits until February 29, 2024. Project developers pending approval and potential corporate offtakers have largely paused conversations while the government examines the implications of renewable energy projects in the region. Schneider Electric expects increased contracting in 2024 if project approvals resume.

CAISO

New state legislation has the potential to reshape the PPA market. The Climate Disclosure Act and the Climate-Related Financial Risk Act are now in effect. These acts apply to any public and private companies doing business in the state. This legislation drives increased transparency in the market and could positively influence companies' decisions to invest in renewable energy projects in CAISO.

PJM

The system operator has reformed its interconnection queue approval methodology. The shift from 'first-come, first-served' to a 'first-ready, first-served' approach is expected to deter speculative practices and prioritize projects ready to proceed. This should give developers of mature projects better visibility on timing and reduce uncertainty in contracting with corporates for offtake.

ERCOT

The ISO remains a top market despite numerous anti-renewable bills introduced in Texas. Some regulatory uncertainty from the passed bills will play out in this market over the next few years. Throughout the year, Texas saw a resurgence in competitive wind projects and continued growth in an already robust solar development queue. Load growth from increased industrial demand continues to be the story influencing increased investment from renewable developers into the ERCOT market. Increased extreme weather in winter and summer is driving wholesale pricing volatility and may provide upside for renewable projects online to capture price spikes.

Innovations in Renewable Energy: Tax Credit Transferability

An exciting new opportunity has emerged via the Inflation Reduction Act of 2022 to unlock additional corporate liquidity: tax credit investing via transferability. This clause in the IRA allows for the one-time transfer of a tax credit from a seller to a buyer in the form of a purchase rather than an investment. By purchasing a tax credit, organizations not only acquire tax credits at a discount — thereby reducing tax liability — but also actively support sustainable growth and development by pouring capital into a renewable energy project.

More Tax Credit Insights

Tax Credit Transferability

Traditionally, supporting the development of renewable energy through tax credit monetization required equity investments. These transactions are complex investment structures rarely suited for one-off corporate participation. Tax credit transfers, meanwhile, are much more straightforward and much more accessible to a larger pool of organizations looking to simultaneously reduce their tax liability and support their sustainability goals.

The Advantages

Tax credit transfers are a blend of smart economics and conscientious decision-making, and the benefits are numerous:

- Less complexity and risk
- A faster diligence process
- Reduced legal fees
- Promising returns
- The option to finance sustainability goals

These benefits make tax credit transfers a unique opportunity that's beginning to intrigue more and more corporate investors. The first tranche of transfer deals have already closed, and corporates continue to rush into this market to source the most attractive projects.

The Challenges

While transferability creates a more straightforward path to tax credits than tax equity investing, there are still considerations and risks to analyze before selecting a project. Tax credit investment requires a sharp strategic vision and a keen ability to manage risk. As an investor, staying attuned to the shifting legislative landscape is crucial, as is ensuring your investments respond to market evolutions and your sustainability goals.

Maximizing the potential of a tax credit transfer, mitigating as much risk as possible, keeping a finger on the pulse of industry trends and filtering out the best projects among a web of developers is no small feat. Savvy corporate investors rely on Schneider Electric and other experienced advisors to help guide them to their strategic tax credit and renewable goals.

Learn More

Schneider Electric recently announced an innovative tax credit transfer agreement with ENGIE to accelerate its progress toward its 100% renewable energy goal in North America. For more information on that agreement or to explore ways to maximize the benefits of tax credit investment for your organization, join our upcoming webinar:

Tax Credit Transferability & Corporate Buyers

Thursday, May 2 • 11 a.m. EST

Register

European PPA Market Snapshot

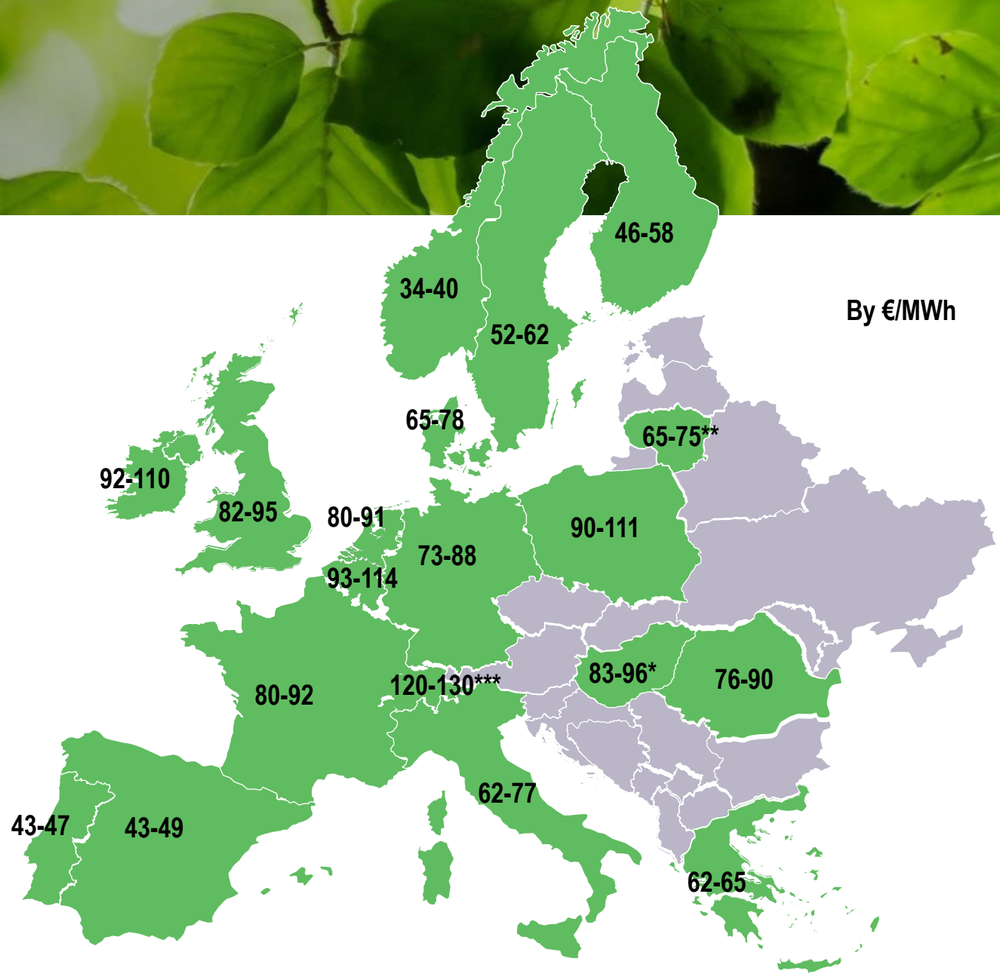
In recent years, the European energy market has seen a growing interest in Virtual Power Purchase Agreements (VPPAs) as a means to secure renewable energy and promote sustainability. Indicative VPPA pricing in Europe varies across regions and is influenced by factors such as market dynamics, regulatory frameworks and renewable energy resource availability.

Update & Observations

Indicative Pricing & Observations in Europe

Observations

- **Rising Demand for Various PPA Types:** Demand continues to rise, showing strong interest from corporates and their supply chains. There is robust demand for VPPA, DPPA (direct power purchase agreements), both in-country and Pan-European, with a preference for a mixed approach.
- **Declining Price:** A decreasing pricing trend has been noted in the majority of the markets.
- **Growing Interest in New Emerging Markets:** There is a high demand for country diversification leading to increased consideration of new emerging countries, especially Greece, Romania and Hungary.
- **Spanish Market:** Despite permitting challenges, Spain remains highly competitive for corporates seeking pan-European PPAs, with many projects reaching RTB (ready-to-build) status, necessitating rapid financing.
- **UK Market:** The rising demand for corporate PPAs delivered through UK projects is driven by the alignment of CDP and RE-100 market boundaries, with high REGO prices making the local PPA business case more appealing.
- **German and French Markets:** While the business case remains less compelling compared to other countries, the financials of German and French projects are improving. There is a high level of corporate interest in in-country PPAs driven by environmental and/or hedging reasons.
- **Portuguese Market:** Portugal is seeing a rise in the availability of projects for corporate offtake, primarily in solar energy. However, the number of executed PPAs remains low compared to Spain.



Notes

- *The H2 2023 data set that informs this report considers corporate request for proposal (RFP) responses across VPPA gathered between June and December 2023, representing over 2,000 offers across 17 countries.*
- *Price ranges displayed represent the 25th to 75th percentile of offers received in H2 2023.*
- *Prices displayed have been rounded to the nearest whole number.*
- *Both wind and solar technologies are considered.*
- *Past performance is not suggestive of future results.*
- *Prices should be considered within the context of the local market.*

Past performance is not indicative of future results. Hypothetical performance results have many inherent limitations. No representation is being made that any program will or is likely to achieve profits or losses similar to those shown. Swaps, futures, and options trading involve significant risk of loss and may not be suitable for everyone. Therefore, carefully consider whether such trading is suitable for you in light of your financial condition

** Price range observed is from the H1 2023 data set*

*** Price range observed is from the H1 2022 data set*

**** Price range observed is from the H2 2022 data set*

European Environmental Commodities: 2023 GO & REGO Market Activity

The year 2023 saw a period of significant upheaval for guarantees of origin (GOs). GO and Renewable Energy Guarantees of Origin (REGO) markets were marked by volatile price swings and unpredictable market dynamics. These changes were driven by a complex interplay of factors, including the involvement of major players, evolving market conditions and regulatory shifts.

2023 Market Review & 2024 Trends >

2023 Market Review & 2024 Trends

2023 GO Market Trends

The GO market fluctuated dramatically throughout 2023 with prices surging and then retreating. At the beginning of the year, a surge in buying activity from significant market participants resulted in price increases.

- This momentum stalled in March: the market saw a 9% decline in trading activity and a corresponding decline in 2022 GO prices. This shift signaled a move towards shorter-term trading strategies as traders focused on future years.
- In April, the European Parliament approved the new Carbon Border Adjustment Mechanism (CBAM). This mechanism is expected to incentivize the use of low-carbon electricity and cover emissions of imported commodities. This is supposed to boost PPA markets and increase demand for renewable energy.
- In May, there was an increase in registered volumes focused on short-term vintages (2022-24) despite a decrease in trading activity.
- June brought further volatility as low reservoir levels in the Nordic region dampened market sentiment. This led to cautious trading behavior and an increased sense of uncertainty.
- By the start of Q3, trading activity had slowed significantly. Prices across various categories and vintages rose as 2023 GO prices exhibited a notable V-shaped change in August.
- September marked another dip in activity as traders began to show increasing interest in 2026 production trades.
- High reservoir levels in key regions caused this volatility, which created uncertainty and fluctuations in market prices. The substantial increase in the hydro reservoir levels in the Nordics during mid-October applied downward pressure on the 2023 GOs prices.
- In November, markets saw a significant uptick in activity, with a continued emphasis on the 2023 and 2024 vintages.
- Finally, it is worth noting that in December 2023, the Association of Issuing Bodies (AIB) has approved Bulgaria's Sustainable Energy Development Agency's (SEDA) application for membership in the European GO hub.

REGO Market Transformation

The REGO market underwent a significant transformation following Brexit. In Q3, REGO prices soared to a record high of 25-30 EUR/MWh. Several factors pushed REGO prices to exceptional levels, including:

- The UK's stoppage of GO imports following Brexit
- Lower-than-expected wind output
- Generators' unwillingness to sell along with aggressive buying strategies

While the initial surge has stabilized at ~18-20 EUR/MWh, the market remains highly volatile. Stakeholders need to prioritize procurement activities before the end of the current reporting period, particularly for CP22 (April 23 - March 24), to mitigate potential price hikes as available volumes decrease.

Renewable Energy 2024: Europe Edition

Our team of renewable energy and carbon experts is developing the latest report focused on trends and markets across Europe. To receive a notification when the report is ready, please complete the form below:

Request Report

What to Expect in 2024

While REGO prices have shown signs of stabilizing, the market's inherent volatility remains a concern. Proactive procurement strategies are essential to navigate potential price increases, especially as volumes decrease. The GO market dynamics suggest a continued focus on short-term strategies, emphasizing future years over long-term planning.

Market analysis points to a promising outlook for the 2024 and 2025 GO contracts. These are expected to regain strength, surpassing the 5.5 EUR/MWh level. There is a bearish pull from 2023 price levels due to 23/24 swapping possibilities and the energy stored in reservoir levels.

Given the decline in REGO prices at the end of 2023, we anticipate fluctuations influenced by the GO imports restriction and auctions will persist — particularly in the first quarter of 2024.

Legislative & Framework Updates

A quick look at two new variables coming into play in 2024:

1

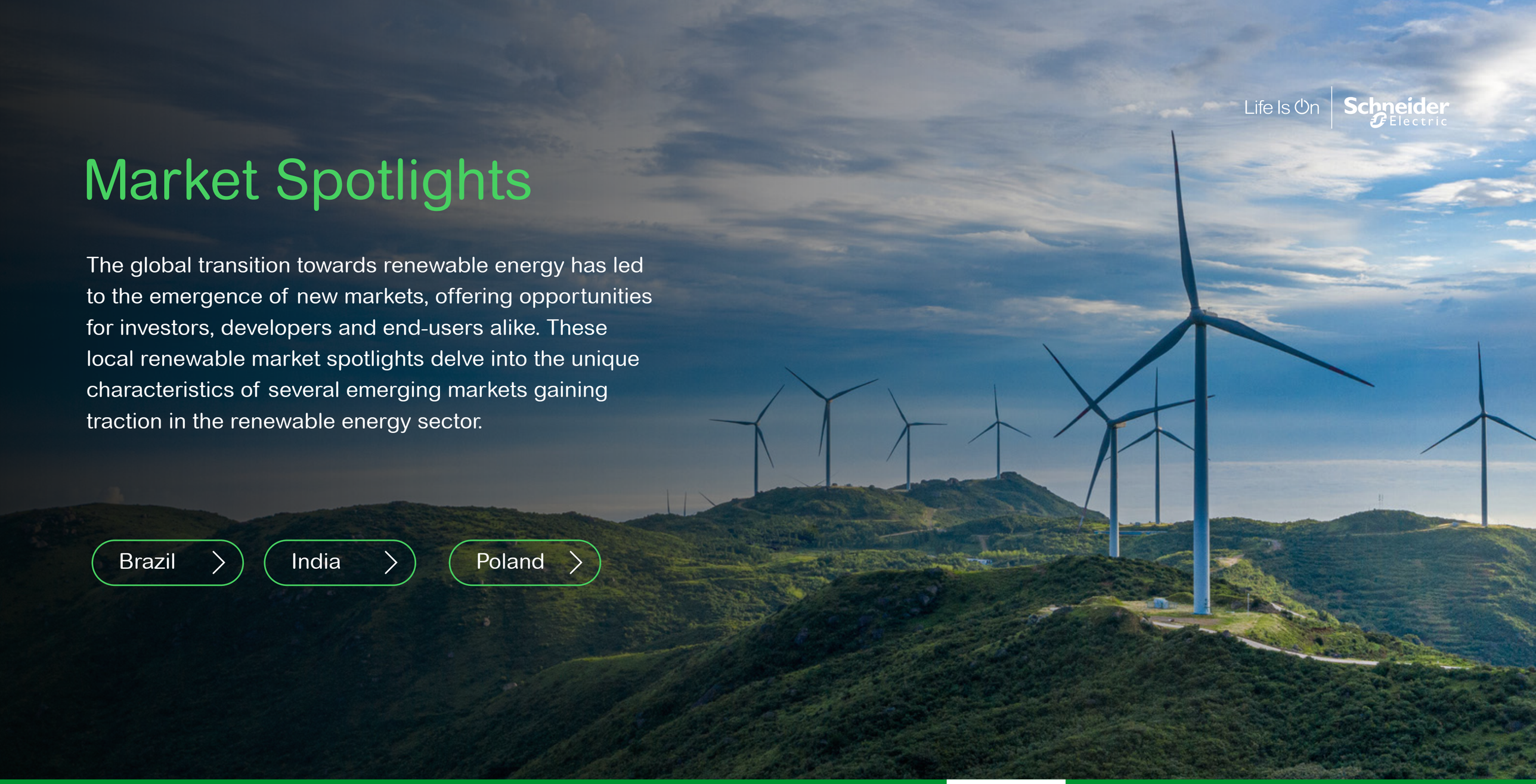
New RE100 Guidelines

These have been under enforcement since January 1, 2024, with a new definition of single market and technical criteria. In particular, the RE100 technical criteria requires the purchase of renewable electricity to observe a 15-year commissioning or re-powering date limit. This means bundled and unbundled GOs procured for the reporting period 2024 (and all forthcoming years) must be generated by facilities fewer than 15 years old. RE100 made this change to directly increase its members' demand for new renewable electricity capacity and to signal to companies using the RE100 technical criteria that supporting new projects is central to the energy transition.

2

European Sustainability Reporting Standard (ESRS)

ESRS is another bullish factor that could affect more than 50,000 companies in the EU. The directive mandates the use of dual reporting and strengthens the case for GOs and PPAs for market reporting. The wave of ESRS-spurred demand for GOs is expected to hit the market first in 2024 (large-listed companies) with additional demand coming in 2026 (large companies) and with comparably lower demand entering the market in 2029 (listed SMEs).



Market Spotlights

The global transition towards renewable energy has led to the emergence of new markets, offering opportunities for investors, developers and end-users alike. These local renewable market spotlights delve into the unique characteristics of several emerging markets gaining traction in the renewable energy sector.

Brazil >

India >

Poland >

Brazil

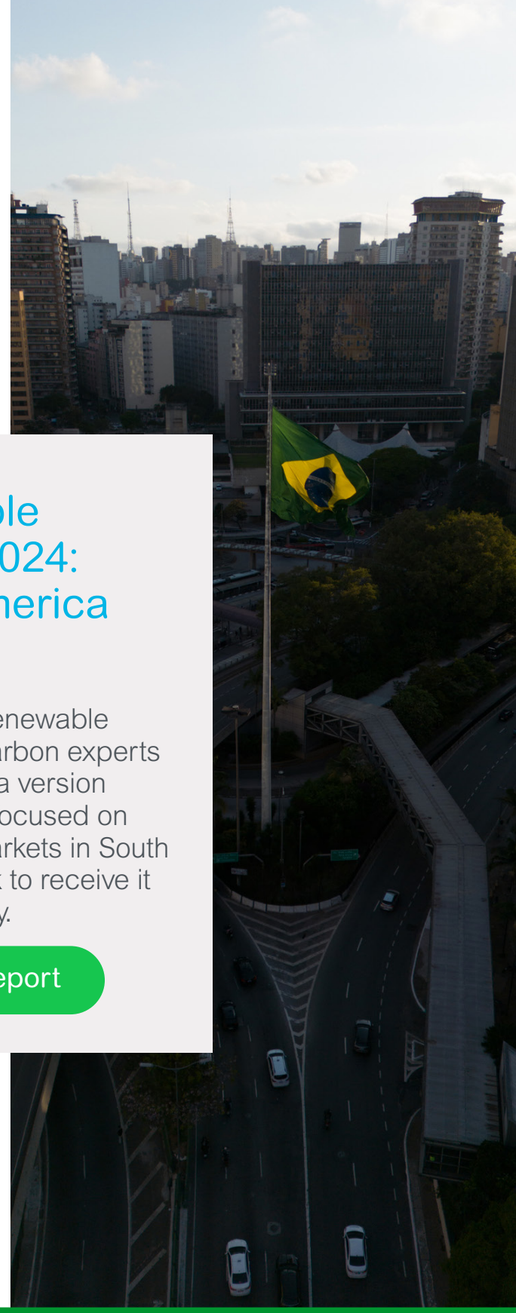
Introduction

PPAs are a key mechanism for the growth of renewable energy in Brazil, both in the regulated and deregulated energy markets. In the regulated market, PPAs are long-term contracts awarded through government-organized public auctions. In the deregulated market, direct PPAs are negotiated between energy generators and consumers.

The Market

Between 2022 and 2023, the search for corporate renewable PPAs increased, especially as a risk management mechanism against energy price volatility. Corporate PPA volumes, specifically, rose from 1.5 MW in 2022, to 2.1 MW in 2023. Volatility is natural in a market with an energy generation matrix ~60% dependent on hydropower. The increase in access is also true for new projects with a significant number coming online since the start of 2023.

Buying energy from renewable power plants or self-generating power are additional alternatives that make PPAs attractive in Brazil. In addition to the 50% reduction on demand charges, self-generators can also significantly reduce utility costs related to either sectorial charges or transmission. Although this structure may require capex and legal counsel during negotiations, our clients in Brazil are still interested as the payback is estimated between three and five years.



Renewable Energy 2024: South America Edition

Our team of renewable energy and carbon experts is developing a version of this report focused on trends and markets in South America. Click to receive it when it's ready.

Request Report

Legislative & Market Challenges

Although spot prices were generally favorable during most of 2023, two factors influenced renewable energy prices:

1. Increased power demand on the national interconnected system caused by extreme heat
2. Limited operations by large hydroelectric powerplants caused by planned maintenance or drought

Renewable PPA opportunities were also affected by the combination of project risks and forward prices, while conventional power remained almost unchanged.

Another challenge for corporates seeking PPAs with additionality is the availability of new projects after 2026. When the main incentive for renewables shut down in March 2022, developers rushed to obtain connection licenses. According to local regulation, developers would have at least 48 months to begin operations from the date of issuance. However, in October 2023, the Brazilian Electricity Regulatory Agency (Aneel) formally accepted resigned licenses from 246 power plants with no arbitrary sanctions on “Forgiveness Day”. Those powerplants could have added up to 9.9 GW renewable electricity capacity to the electricity market.

Regarding the self-generation structure, Bill Project PL 414 aims to modernize Brazil’s regulatory model for its electricity sector. That bill is still awaiting a vote. If it passes, PL 414 will mostly affect the minimum capacity and increase the percentage of equity to invest from a minimum of 10% to 15%. As the equity is related to project size, this change will impact a project’s ROI and limit the pool of eligible clients.

The tax reform approved in November 2023 is also creating uncertainty in the electricity market. The new taxation will unify federal and state taxes to simplify economic transactions and Union duties. However, it does not specify what will happen to the special treatment applied to sales taxes that benefit renewables in some Brazilian states.

Conclusion

Despite these challenges, renewables in Brazil still have a bright future as the country strives to become a global leader in the energy transition. The Chinese company State Grid recently won the largest transmission auction in Brazil’s history, which is expected to reduce issues with congestion and improve the grid’s ability to dispatch renewables. In parallel, the Ministry of Mines and Energy is launching Brazil’s most significant decarbonization program, which will interconnect 300,000 consumers in the country’s northern region that currently consume thermal power.

India

Introduction

India is the second largest market in Asia Pacific for annual energy demand and peak demand. India's renewable energy landscape has been steadily evolving with ambitious targets as substantial investments drive its growth. The country has made significant strides in expanding its renewable energy capacity, particularly in wind and solar power. With favorable government policies, declining costs of renewable technologies and increasing private sector participation, India is poised to further accelerate its transition towards clean energy.

The future of India's renewable energy sector looks promising. There's a coordinated focus on enhancing energy storage capabilities, promoting grid modernization and fostering innovation in renewable technologies. This trajectory not only contributes to reducing carbon emissions and addressing environmental concerns, but also presents substantial economic opportunities and energy security for the nation.

Stats on Energy Demand & Mix

As of mid-2023, India had a total renewable energy capacity of >173 GW, with plans to achieve 500 GW from non-fossil fuel sources by 2030 as part of its National Action Plan on Climate Change. Growth continues its impressive trajectory as renewable energy capacity has increased significantly year over year. Wind and solar — starting at 12% in 2023 — are expected to nearly double their share in generation to 21% by 2030. A study says wind and solar will combine to supply 55% of the generation by 2050 as coal's share falls to 24%. Increased demand is projected from charging electric vehicles that will escalate from <1 TWh (2022) to 9 TWh by 2030 to **an astonishing 563 TWh by 2050**. This alone would account for more than 12% of the total power demand by that time.

The Market

India features a partly liberalized electricity market with significant private investment in generation assets that all operate within a singular synchronous grid. However, activity within both wholesale and retail electricity markets remains relatively limited. Notably, short-term transactions represent merely 12% of the total power generation. These transactions are primarily conducted through three active power exchanges, power traders or utilities. Furthermore, distribution licensees in India (predominantly state-owned entities) largely procure power via long-term PPAs.

From 2023 to 2032, India offers a substantial opportunity for a total investment of $165 billion US in the deployment of solar, wind and battery storage. Projections indicate the combined cost of solar and storage is anticipated to be lower than coal by 2030. Moreover, the generation expenses related to renewables and storage are predicted to decrease by 30 to 40% in the next 10 years, consequently driving up the market demand for green power.

Policies

India has a partially deregulated electricity market with both the federal and state governments responsible for making power related policies. The Renewable Purchase Obligation (RPO) rules were updated by the Ministry of Power in October 2023 and mandate entities attain 43.3% of their total consumption from renewable sources by 2030. Additionally, recent green energy open access policies enable consumers to procure electricity directly from renewable energy generators. Other notable policies include incentives for rooftop solar installations and various financial mechanisms to promote renewable energy projects. A major push on VPPAs and other derivatives is also anticipated.

Conclusion

India has been at the forefront of implementing ambitious power policies aimed at boosting the percentage of renewable energy in its overall energy mix. With a strong emphasis on sustainability and reducing dependence on fossil fuels, India has set aggressive targets for renewable energy capacity addition. The country's leading power policies have focused on incentivizing investment in solar, wind and other forms of renewable energy through various mechanisms, such as feed-in tariffs, tax incentives and renewable purchase obligations.

Moreover, India's leadership in establishing the International Solar Alliance (ISA) has been a significant step toward global cooperation in promoting solar energy. The ISA, co-founded by India and France, aims to address key challenges to solar energy adoption and facilitate the deployment of solar projects across the world, particularly in sun-rich countries. By spearheading this alliance, India has positioned itself as a key advocate for solar energy, as well as the growth potential and market demand for renewable power.

Poland

Solar & PPAs

Poland aims to generate 32% of its electricity from renewable sources by 2030. Having added ~4.6 GW of new PV installations in 2023, Poland's solar industry is set to continue its remarkable growth trajectory this year and is forecast to approach 27 GW of cumulative capacity by the end of 2025. PPAs are becoming increasingly popular in the country, driven by high energy prices and waning interest in renewable energy auctions. As a result, Poland has emerged as a major European solar energy market, with investors developing large-scale projects well beyond the 100 MW benchmark.

Several international industries have relocated to Poland in recent years, bringing with them commitments to electrification and emissions reduction. This has led to a high demand for renewable energy projects in the country.

Poland's non-AIB membership makes in-country corporate power purchase agreements (CPPAs) attractive to CDP/RE100 reporting companies. The absence of Association of Issuing Bodies (AIB) membership has also led to intense competition for local projects, despite high price levels, particularly among companies with ambitious decarbonization targets. However, Poland is paving the way to join the AIB GO hub, with the necessary legislation due to come into force in 2024.

Poland has the most coal-dependent power generation mix in the EU, making PPAs in the country more environmentally sensitive than deals in other markets. Growing industrial interest in power purchases is being driven by the achievement of grid parity.

There has been an increase in the number of tenders announced by companies transitioning from a B2B approach to more structured processes. However, there is still insufficient knowledge about contracting CPPA structures. In the coming months, new regulations are expected in the Polish PPA space, potentially including permits for constructing direct lines in connection with energy supply under PPAs.

Legislative & Market Challenges

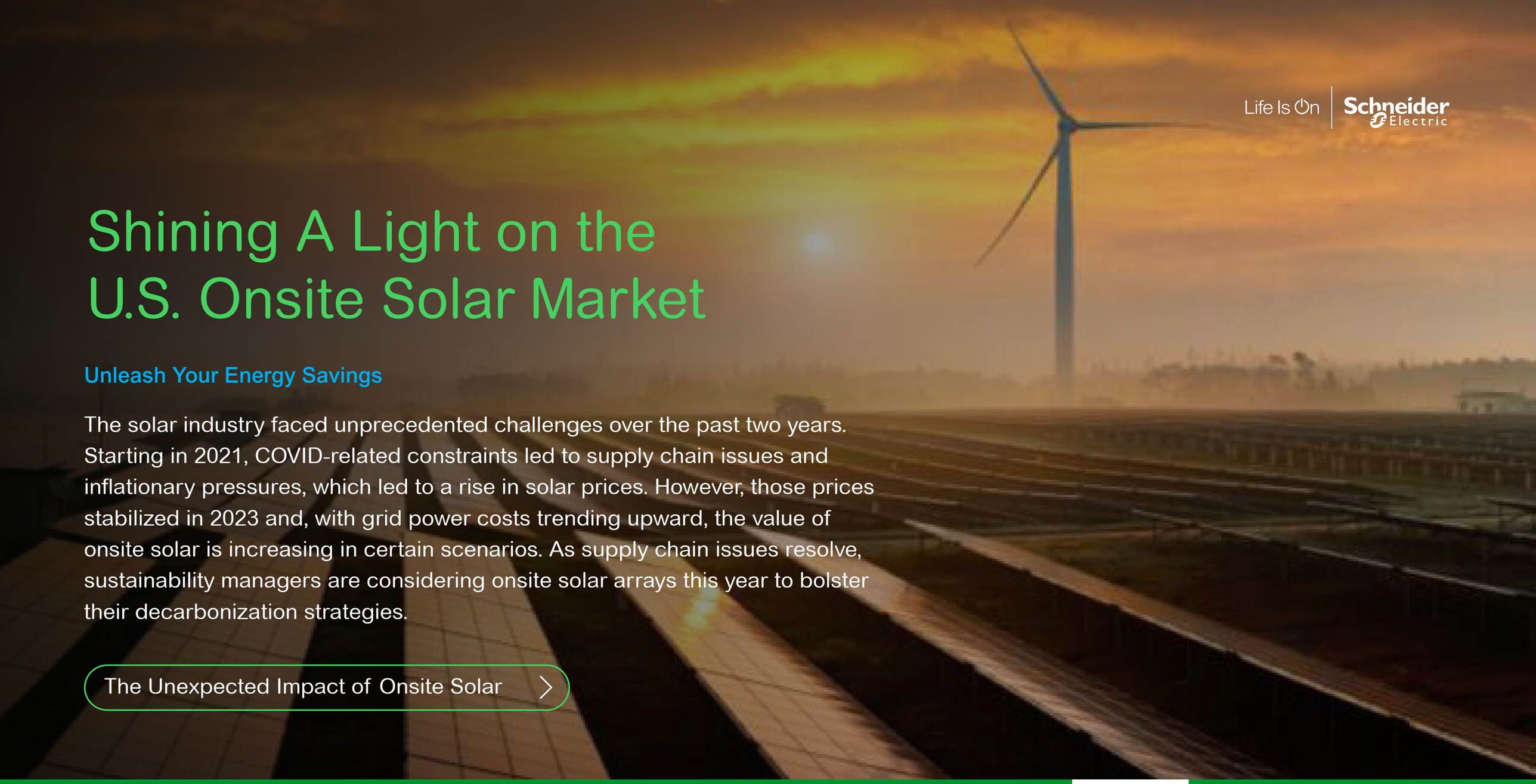
The difficult and unpredictable legislative environment in Poland restricts the growth of new renewable energy projects. The "10H rule" implemented in 2016 stalled onshore wind farm development, but a 2023 amendment allowing local municipalities to determine minimum distances in their Local Zoning Plan (with a 700-meter absolute minimum) increased land availability for wind investment by 4 to 5%.

Despite Polish environmental policy generally supporting solar energy, proposed regulations on Class IV land usage may decrease available land for off-site solar projects.

Additionally, the Polish market faces grid connection challenges for renewable projects, including limited access, distribution grid expansion and direct line regulations. In H2 2023, Poland established a cap on electricity market revenues for infra-marginal technologies affecting electricity producers or traders in PPAs and 97% tax on the revenues of the sale of GOs to generators. These measures created an increased risk for market participants and lower liquidity due to the disincentive they represent.

Market dynamics are creating obstacles for renewable energy projects, including increased financing costs and large fluctuations in energy prices. Regulatory changes have created uncertainty and reduced attractiveness. Poland's parliament has approved to extend the energy price freeze in the first half of 2024 and is currently working to loosen rules to build wind farms.

It is important to note that participation in the markets can also expose corporates to risk. Interested in exploring eastern countries' PPA market? **Contact our local market experts**.
Past performance is not indicative of future results. Hypothetical performance results have many inherent limitations. No representation is being made that any program will or is likely to achieve profits or losses similar to those shown. Swaps, futures, and options trading involve significant risk of loss and may not be suitable for se everyone. Therefore, carefully consider whether such trading is suitable for you in light of your financial condition.



Shining A Light on the U.S. Onsite Solar Market

Unleash Your Energy Savings

The solar industry faced unprecedented challenges over the past two years. Starting in 2021, COVID-related constraints led to supply chain issues and inflationary pressures, which led to a rise in solar prices. However, those prices stabilized in 2023 and, with grid power costs trending upward, the value of onsite solar is increasing in certain scenarios. As supply chain issues resolve, sustainability managers are considering onsite solar arrays this year to bolster their decarbonization strategies.

The Unexpected Impact of Onsite Solar

The Unexpected Impact of Onsite Solar

Based on our data, companies that invest in onsite solar can expect immediate savings, partly due to enhanced tax incentives in the Inflation Reduction Act (IRA). Recent policy changes and ongoing tax credit guidance from the IRS will improve corporate adoption of solar arrays at their facilities. That adoption will also reduce Scope 2 emissions.

With 2025 deadlines for sustainability goals just around the corner (and with 2030 goals on the horizon), onsite solar can help your organization achieve its targets.

Innovation & Regulation: Two Reasons To Act Now

1. **The IRA created more favorable economics for onsite renewables.** The IRA, passed near the end of 2022, reinstated solar tax credits to their full 30% value for projects installed by 2032 provided they meet wage and apprenticeship guidelines. The IRA also includes incentives that can increase the ITC value to as much as 60% of the total cost of an onsite solar project. These enhanced tax credits can significantly improve the feasibility of many solar projects.

2. **With US energy prices increasing, onsite solar can decrease companies' grid reliance.** Climate change has led to more severe and more frequent extreme weather events. In response, the IRA aims to reduce carbon emissions by promoting renewably generated electric power to the automotive, appliance and heating sectors. This shift towards electrification should raise electricity demand — and, in turn, electricity prices.

   Commercial facilities can mitigate these rising costs without increasing their Scope 2 carbon emissions by installing onsite solar systems. Typically, companies enter into a fixed-term power purchase agreement (PPA) with a developer. The PPA fixes the energy price for some (or all) of their facility's energy consumption over 15 to 20 years, depending on the length of the contract.

Onsite Solar Hot Spots in the U.S.

Business leaders often assume the sunniest states provide the best financial value proposition for solar. However, the cost of power and state-based incentives or regulations often have a greater impact on onsite solar viability and those factors can be difficult to uncover.

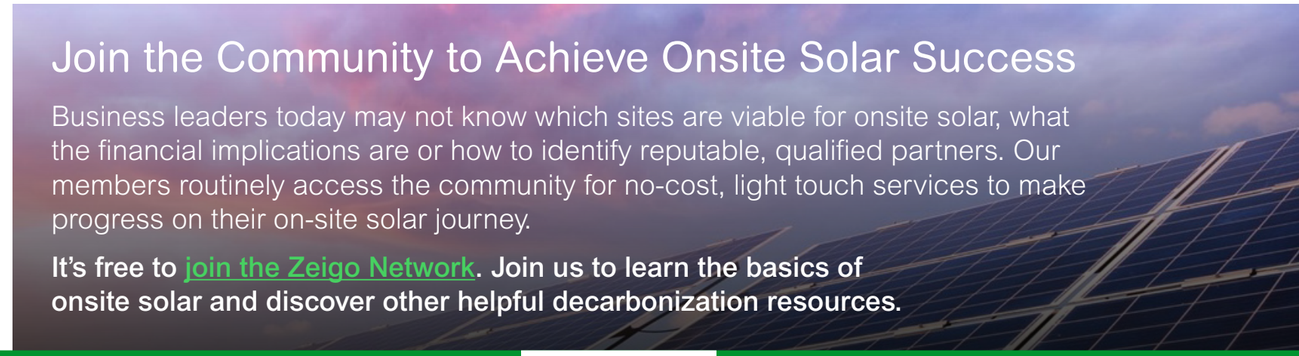
The Zeigo Network partners with several of the nation's largest onsite solar companies. We asked our developers for the top three states for onsite solar based on their experience. Here are the results:

1. **California:** California's energy costs are among the highest in the US, which is a huge factor in solar economics. The recently passed NEM 3.0 encourages the addition of storage to any onsite solar array, which can be beneficial for decreasing high-demand charges.

2. **Illinois:** Illinois' Adjustable Block Program provides significant incentives to install onsite solar at facilities around the state.

3. **New Jersey:** New Jersey's renewable energy certificate (REC) market is lucrative, so companies can get a reduced PPA rate by selling off the RECs produced by their onsite solar arrays.

The Zeigo Network offers tools to help your organization evaluate solar in other states and regions, such as Pennsylvania, Colorado and New England.



Join the Community to Achieve Onsite Solar Success

Business leaders today may not know which sites are viable for onsite solar, what the financial implications are or how to identify reputable, qualified partners. Our members routinely access the community for no-cost, light touch services to make progress on their on-site solar journey.

It's free to join the Zeigo Network. Join us to learn the basics of onsite solar and discover other helpful decarbonization resources.

The Global Leader in Renewable Energy Procurement

Schneider Electric Sustainability Business is a global pioneer in renewable energy and clean technology. We serve more than 40% of the ***Fortune 500*** and our clients include organizations across the commercial, industrial and institutional sectors.

Schneider Electric Sustainability Business currently manages more than $30B in energy spend on behalf of its clients annually and tracks nearly 130 million metric tons of corporate carbon emissions. Our team includes 3,000+ global experts across 31 countries who collaborate to manage, lead and advise:

- 440,000+ sites around the world
- 383,000,000 metric tons of CO_2
- 19 GW in PPAs (since 2014)
- 115,000,000 MWh of EACs (since 2001)

With experts on the ground in dozens of international markets, Schneider Electric's Renewable Energy & Carbon Advisory continues to help companies around the globe identify and adopt optimal solutions in renewable electricity.

Links Library

01 Supply Chain Decarbonization

- Decarbonizing Supply Chains through Aggregated PPAs
- Pharmaceutical Supply Chain Initiative
- Energize Cohort Growth
- Zeigo Hub Supply Chain Renewables Initiative

02 Voluntary Carbon Markets

- New Year outlook: Five key climate and biodiversity trends to watch in 2024
- Verra's Revised REDD Methodologies
- EcoAct's COP 28 Recap and the Future of VCM
- EcoAct Webinar: Harnessing the Power of Biodiversity and Nature within Your Transformation Journey
- EcoAct Webinar: Why a Robust Offsetting Strategy is Essential to Your Net-zero Transition

06 Tax Credit Transferability

- Tax Credit Transferability & Corporate Buyers Webinar

08 Onsite Solar

- Join the Zeigo Network

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Connect with Our Tax Credit Team

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Join the community to discover helpful decarbonization resources.

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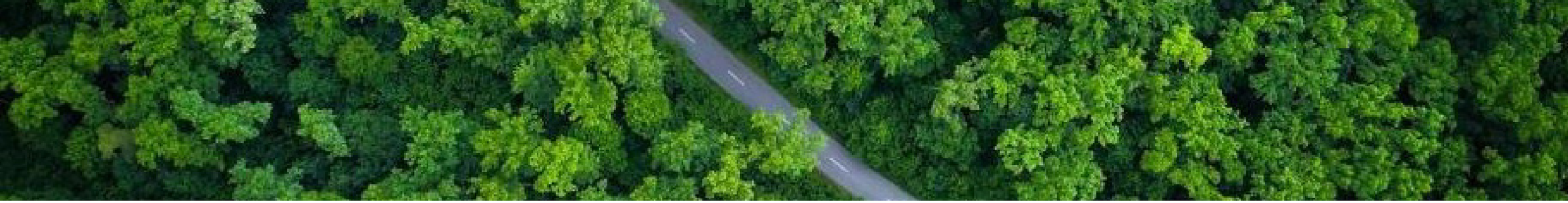

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One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results.

There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results. Past performance is not indicative of future results. No representation is being made that scenario planning, strategy, consistency or discipline will guarantee success or profits. You should not rely on any of the information as a substitute for the exercise of your own skill and judgment in making such a decision on the appropriateness of any particular transaction.

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