

Global Renewables Performance Review

Solar Continues to Surpass Wind

“Comparing actual production data from Fitch-rated renewable projects going back to 2010, we found 86% of annual observations across solar projects were within 5% or better of the original P50 levels. Wind, by contrast, does not measure up. Around 89% of wind project observations were below the P50 level and over half were significantly below.”

Andrew Joynt, Fitch Ratings

Solar Outperforms Wind

Fitch Ratings' portfolio of wind and solar project finance ratings spans countries, regions and continents. Key rating drivers and credit metrics are applied consistently to assign and monitor ratings, despite geographic disparities. With more than a decade of experience, Fitch's portfolio indicates solar projects consistently outperform wind on a global scale.

Resource Stability Enhances Solar

The stability and predictability of solar resources relative to wind are the salient factor differentiating these asset types. Renewable revenues are inherently volatile as the resource is outside of the project's control. But rated solar projects consistently outperformed wind projects, as reflected in volume risk assessments and generally higher solar ratings.

Counterparties Can Drive Ratings

Utility ratings often cap U.S. and Mexican project ratings. In Peru, Chile and Brazil, the structure of the power purchase agreements (PPAs) signed in the regulated market suggests counterparty risk as systemic, not individual. Rated Canadian projects are dependent on the overall system operator's creditworthiness. Across Europe, regulatory provisions and market structure ease constraints from payment counterparties.

Merchant Exposure Common in Wind

In about half of all rated wind projects, Fitch's analysis of revenues contemplates some form of exposure to prevailing market prices. This is consistent across regions. Only a few rated solar projects retain such exposure, mostly in EMEA.

Coverage – Differentiating Metric

Most rated project debt is senior ranking and fully amortizes before maturity of the revenue contracts. The debt service coverage ratio (DSCR) is the key metric for renewables. Indicative metrics to achieve a rating level vary by asset type and the degree of merchant exposure. With no merchant risk, the investment-grade DSCR threshold is 1.3x for wind and 1.2x for solar photovoltaic (PV).

More Upgrades in Solar

Through 2019, upgrades represented 13% of solar rating actions, but similar to 2018, upgrades are rare for wind (3%). Downgrades occurred in 13% of wind rating actions, due to underperformance, while only 1% of solar rating actions were performance-related downgrades. Unlike past years, solar downgrades were more prevalent than upgrades due to weakened revenue counterparties.

Related Research

[Fitch Ratings 2020 Outlook: EMEA Renewable Energy \(December 2019\)](#)

[Fitch Ratings 2020 Outlook: North American Energy Infrastructure \(Evolution in Financing Within a Stable Sector\) \(December 2019\)](#)

[Latin America Renewables Revenue Risk \(Renewable Energy Project Revenue Risks Vary Across Region\) \(November 2019\)](#)

[Fitch Ratings: Brazil Wind Energy: Notable Output but Inaccurate Forecasts \(August 2019\)](#)

[Power and Renewables – 10 Years in Infrastructure \(October 2017\)](#)

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Criteria Application

Fitch's *Renewable Energy Project Rating Criteria* outlines the approach to rating new and existing debt instruments where repayment depends on cash flow from the operation of renewable energy projects. These criteria primarily cover onshore and offshore wind projects, PV projects and concentrated solar power plants, but may also be applied to hydropower plants and geothermal power projects.

Fitch identifies four key rating drivers for debt financing for renewable energy projects: Revenue risk – volume (volume risk), revenue risk – price (price risk), operation risk and debt structure. As a general rule, volume risk and price risk have the most direct influence on renewable energy project ratings, but the weakest driver may attract greater analytical weighting. Fitch assesses the risk factors as “stronger,” “midrange” or “weaker” for solar and wind projects.

Fitch derives its rating by considering these assessments, along with the financial profile under the Fitch rating case (described in the *Coverage and Ratings* section) and a comparison of peer projects.

Fitch's Rated Portfolio

Fitch rates the debt instruments of 69 issuers with repayment dependent on the operation of wind or solar projects. Within this portfolio, about two-thirds are wind projects and one-third are solar projects (with the bulk of these being PV projects). Nearly half of these projects are in the LatAm region (including Mexico), 40% are located in the U.S. or Canada, 12% are in EMEA (all within Europe), and two new rated solar deals in APAC. Fitch rates wind and solar projects in 12 countries— U.S., Canada, Mexico, Peru, Brazil, Chile, Europe, India, Chile, Brazil, Spain, Germany, France, UK, Italy and India.

Chile, Brazil, Spain, Germany, France, UK, Italy and India.

The typical wind project in the portfolio experienced six full years of operation (though Fitch has rated onshore wind transactions from the mid-2000s). Single-site wind projects (51% of the total) have an average capacity of 193MW. Projects encompassing wind farms on multiple sites have an average total capacity of 402MW.

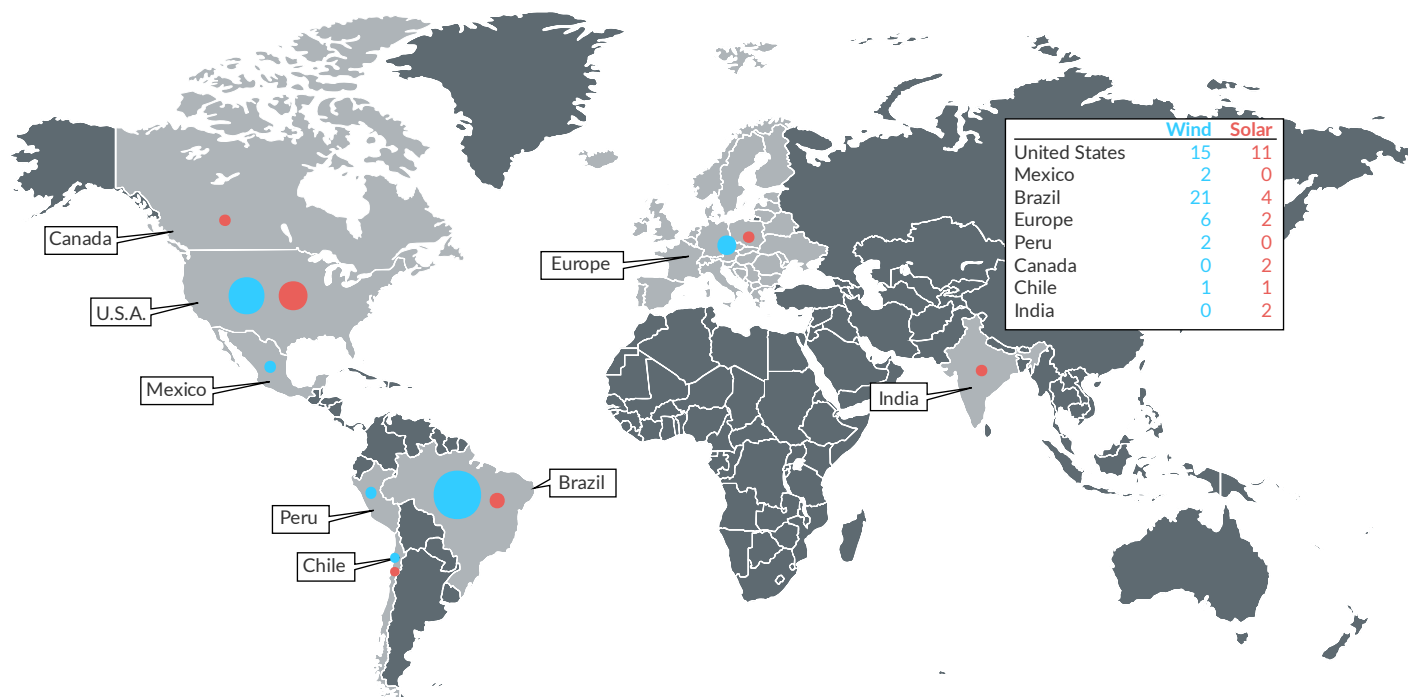
The offshore wind sector is relatively new and the rated transactions are very early into their operational life. These are big projects with an average capacity of 430MW.

The typical solar project in the portfolio experienced four full years of operation. Fitch rated its first solar PV transaction in 2011. Single-site solar projects (36% of the total) have an average capacity of 241MW. Projects encompassing multiple sites have a slightly larger average capacity of 308MW. Compared with 2018, the proportion of single-site projects declined. Newly rated solar transactions largely have been multiple-site portfolio financings.

Limitations

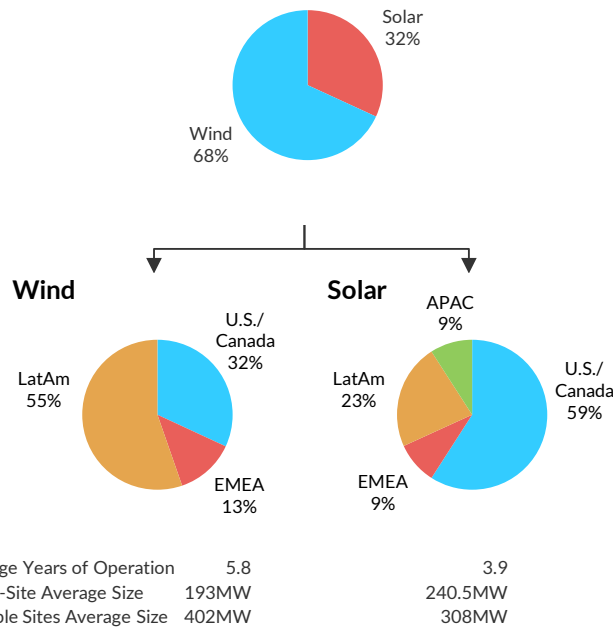
There are inherent limitations when examining a portfolio of projects that represents just a sample of the world's installed base of renewable generation. Moreover, while Fitch has rated renewable projects for more than a decade, the bulk of the portfolio is early in its operational life. There are limitations in the ability to extrapolate the trends observed in Fitch's portfolio to the larger sector. As such, the report does not suggest any conclusions about the relative capability of wind and solar equipment manufacturers, operators or resource consultants.

Number of Fitch Rated Projects



Source: Fitch Ratings.

Fitch's Rated Portfolio

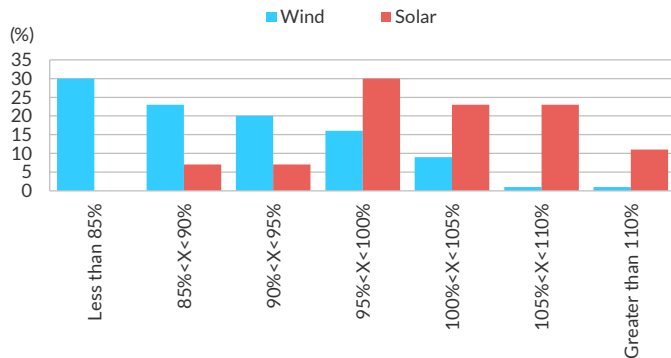


Source: Fitch Ratings.

Resource Stability Enhances Solar

Fitch's analysis of renewable energy projects across EMEA, the U.S. and LatAm shows electricity production from solar projects tended to meet or exceed initial independent estimates, while wind projects more often underperformed against expectations. This underperformance is the leading cause of ratings volatility among wind projects. For solar projects, volume risk had no negative impact on ratings.

Annual Production as % of P50



Note: This chart is based on 182 annual observations from 58 wind and solar projects. Source: Fitch Ratings.

We compared actual production data from Fitch-rated renewable projects against the initial P50 forecasts (the annual production level the project is expected to exceed 50% of the time). The analysis takes into account data gathered since 2010 for wind and since 2011 for solar, and excludes ramp-up phases. We found 86% of annual observations across solar projects were within 5% or better of the original P50 levels, and only 7% were significantly (i.e.

more than 10%) below the initial forecasts, which are provided by independent resource consultants.

Wind, by contrast, does not measure up. Around 89% of wind project observations were below P50 level and 53% were more than 10% below. These figures exclude the onshore wind Breeze transactions (Breeze Finance S.A. and CRC Breeze Finance S.A., located in Germany and France), significant underperformers which are not considered representative of the broader wind portfolio.

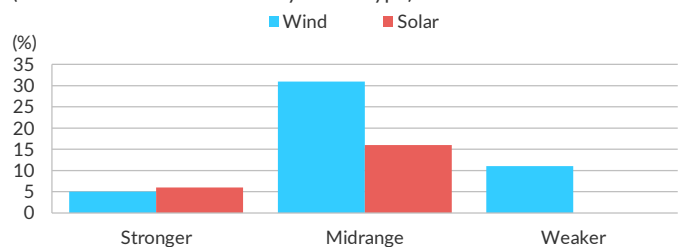
Wind project underperformance is often attributed to overestimation of power production due to the greater technical challenge in forecasting relative to solar projects. For some projects, equipment issues reduced availability and production. It is also conceivable that Fitch's dataset coincides with a period of lower natural resource that will revert over time. It can be difficult to isolate a precise cause for one particular wind project's underperformance, so extrapolating to the larger portfolio is equally challenging.

The chart below reflects the breakdown of volume risk assessments across Fitch's wind portfolio. Those projects with a weaker score demonstrated poor historical performance or have wind resource forecasts that reflect a higher degree of uncertainty or volatility.

In contrast, solar projects benefited from better than expected solar irradiance and plant availability. The track record of solar projects is shorter, but they clearly demonstrate lower operational risk, better generation performance and lower volatility than wind projects. A much larger proportion of solar projects earned a stronger assessment for volume risk. None are assessed at weaker.

Resource Stability Enhances Solar

(Share of Assessment Score by Asset Type)



Note: The chart is based on 47 rated wind projects and 22 solar projects. Source: Fitch Ratings.

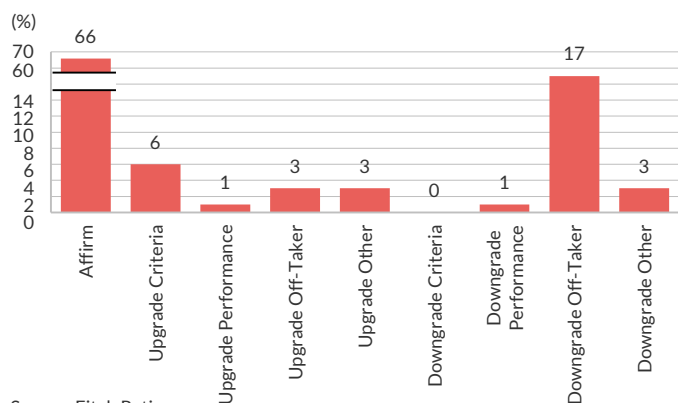
Counterparties May Drive Rating Actions

Counterparty credit quality is the largest driver of volatility in solar project ratings. This phenomenon emerged most prominently in the U.S. due to the erosion of credit quality of California's largest utilities.

All rated renewable projects depend on some form of incentive structure underpinning revenue generation, providing stability and predictability. These mechanisms vary by country and will continue to evolve over time. But the contractual/market structure alone does not ensure revenue stability. The relative strength of a projects' revenue counterparty can bolster or erode credit quality.

Utility ratings are often a cap on U.S. project ratings since PPAs are bilateral contracts where revenue is fully dependent on the creditworthiness of those off-takers. This contractual structure is present in Mexican projects as well. The dependence on a single off-taker indicates that the project's revenue stream can be no stronger than the off-taker's credit quality.

Counterparties Drive Most Solar Downgrades



Source: Fitch Ratings.

In the U.S., solar projects performed so well operationally that some ratings are equivalent to those of the off-taker, which pays a fixed price for every megawatt-hour generated. In the wake of massive liabilities associated with California wildfires over the past few years, the state's three largest investor-owned utilities have come under pressure. In particular, Pacific Gas & Electric Co. (PG&E) filed voluntary petitions for reorganization under Chapter 11 Bankruptcy in January 2019 and is still working toward a restructuring through the legal proceeding. The weakening creditworthiness of these entities resulted in downgrades on numerous solar projects.

We have not seen this same exposure outside of the U.S. In Peru, Chile and Brazil, for example, the PPAs signed in the regulated market and the power sector framework of those countries support the characterization of counterparty risk as a systemic one.

Canadian projects are similarly dependent on the overall system operator's creditworthiness. Across Europe, revenue counterparties include government-related entities, transmission operators and market traders. However the ratings are not constrained by the counterparties as the regulatory provisions and/or market structure envisage that the obligation to pay the incentives will apply to replacement counterparties or that the projects should be able to find alternative counterparties on similar terms.

The stability and sustainability of regulatory frameworks are important considerations. Changes in law and regulations can alter market structures and introduce unforeseen risks to revenue generation. In general, Fitch does not rate to the risk of change in law unless there is an explicit forthcoming change.

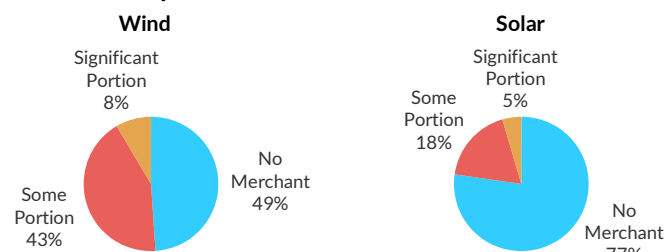
Merchant Exposure Expanding

In about half of all rated wind projects, Fitch's analysis of revenues contemplates some form of exposure to prevailing market prices,

although rarely a significant portion. This is consistent across regions. Only a few solar projects retain such exposure, mostly in EMEA.

Exposure to market price risk reduces remuneration predictability depending on the level of exposure. Indexation of contractual prices may also result in lower stability depending on the complexity and transparency of indexation formulas. We evaluate exposure to merchant market power prices based on the ratio of merchant to total revenues that the project is forecast to receive under the Fitch rating case.

Merchant Exposure More Common for Wind



Source: Fitch Ratings.

In the U.S., the projects held within wind portfolio financings are typically all contracted with PPAs. But the contract termination dates are often staggered, resulting in a handful of projects that flip to merchant while the debt is still outstanding. Thus, merchant risk is more pronounced in the outer years, when there is the least certainty regarding market prices. Just two rated U.S. solar portfolios have such exposure. With PPA terms generally shrinking, we expect to see more projects financed with debt repayment beyond the contracted period, introducing potentially substantial merchant risk.

Merchant exposure is present in several projects throughout EMEA. Some earn a small portion of revenue through electricity sales at market prices on top of more secure revenue earned under a feed-in-tariff (FIT) framework. Others encounter merchant risk as projects roll off of the FIT toward the end of the debt term.

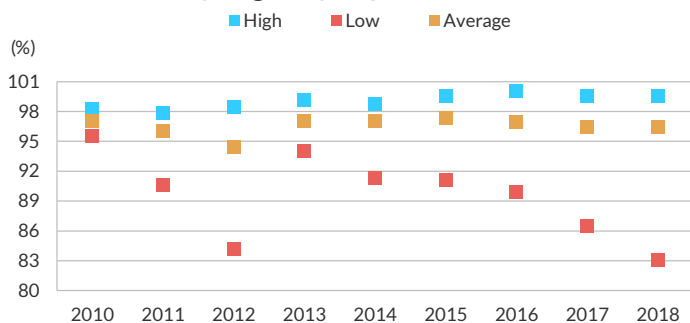
In Brazil, wind projects under the LEN (new energy auctions) or LER (reserve action) frameworks signed before December 2017 are subject to energy settlements if actual production yields a deficit to contractual commitments, considering the annual and quadrennial settlement mechanisms inherent to each respective PPA. In LEN PPAs, the penalties are settled at spot prices, thereby introducing market risk to project cash flow. For LER contracts, penalties are settled at a factor of the PPA price.

In the December 2017 auction, the Brazilian regulator (Agência Nacional de Energia Elétrica, ANEEL) changed the PPAs' clauses, and they no longer include the quadrennial mechanism. Taking a step further, in the August of 2018 auction, ANEEL subsequently changed the PPA for wind source that now have the obligation to deliver a fixed energy output on a monthly basis. These changes brought the PPAs closer in line with agreements in more mature international markets, and the projects will be exposed to spot prices when monthly energy production falls below commitment.

Strong Operational Track Record for Renewables

Aside from some ramp-up issues during the first years, few of Fitch's rated wind and solar projects were negatively affected by operational underperformance not related to renewable resource levels. Most projects employ proven technologies and there now exists a pool of well-known operators with established track records. The average project in Fitch's wind portfolio achieved availability of at least 96% for five straight years. Solar projects regularly top 98%.

Wind Availability Regularly Tops 96%



Note: This chart is based on 167 observations from 47 wind projects.
Source: Fitch Ratings.

The typical arrangement includes an operating agreement with a third-party service provider to perform regular maintenance at cost plus a service fee. There is often a reserve mechanism in place to cover the incurrence of larger maintenance costs. Unless there are particular technological or geographical concerns, the risk that an operator will need to be replaced is unlikely to constrain the rating. As such, operation risk scores are heavily clustered in the midrange assessment.

Due to their heightened complexity, offshore wind projects must withstand harsher operational stresses in Fitch's financial analysis. The offshore wind sector is relatively new and the rated transactions are in their early years of operations. These projects have more complex operations than onshore peers due to the more challenging operating environment offshore and face the risk of outages of the offshore transformers or transmission cables that connect wind farms to the onshore grids.

Portfolio financings generally benefit from a lower risk of operating volatility in terms of costs and availability, and display a tighter P50-P90 spread. Diversity among equipment manufacturers spread across a variety of geographic sites suggests that pervasive issues are less likely. However, Fitch's data set is not yet robust enough to support this conclusion. It is also possible that the management oversight required of portfolio financings offsets the benefit of diversified operating risk. As the historical record lengthens, we expect to be able to compare cost volatility of portfolio financings relative to single-site financings.

Few Deviations in Debt Structure

Within the wind and solar portfolio, debt structure is not often a driver that differentiates ratings. This is because the majority of financings in both asset classes contain a common set of structural

elements. The typical financing is senior ranking and fully amortizing with interest accruing at a fixed rate (or fully hedged). There is typically a six-month debt service reserve, distribution lock-up (based on 1.2x DSCR trigger) and some restrictions on permitted additional indebtedness.

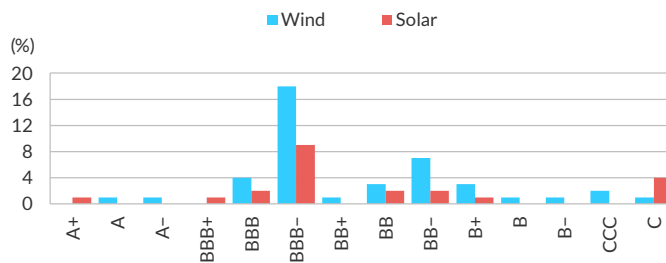
But there are differences. In many Brazilian deals, there is some exposure to floating-interest rates and inflation, though this is considered sufficiently hedged through inflation adjustments in the PPAs and debt instruments. For the WindMW GmbH (Meerwind) transaction in Germany, a series of long notes will mature with a balloon (and some merchant exposure). This refinance risk is considered manageable, as there is partial amortization and a cash sweep mechanism, but the long notes are rated one notch lower than the fully amortizing short notes.

Portfolio financings are typically issued at a holding company level with cash flow structurally subordinated to the operating companies (opco) and, in some cases in the U.S., to a tax equity investor. Yet the risk of subordination is often mitigated by limitations on debt at the opco level, flexible amortization combined with cash sweeps or strong resilience to various stress scenarios.

Coverage and Ratings

The more predictable nature of solar power is reflected in our ratings through the lower DSCR a solar project generally needs to achieve investment-grade status compared with a wind project. For fully contracted projects with no merchant risk, the investment-grade DSCR threshold in Fitch's rating case is 1.3x for wind and 1.2x for solar PV.

International Scale Ratings Clustered at 'BBB-'



Note: The Pirapora Solar Holding S.A. project rated 'A+' benefits from a guarantee from the Inter-American Development Bank.
Source: Fitch Ratings.

The Fitch rating case evaluates the resilience of the projected cash flows to a combination of stresses that together simulate a scenario of material underperformance. Typically, Fitch's rating case is based on a project's one-year P90, adjusted further downward based on the volume risk assessment to reflect the uncertainty in production assessments. Stresses that increase operating costs (ranging from 0%-20%) in the rating case are influenced by the operation risk assessment. Further stresses on production, curtailment, availability and degradation rate (for solar projects) may be included in the rating case as well.

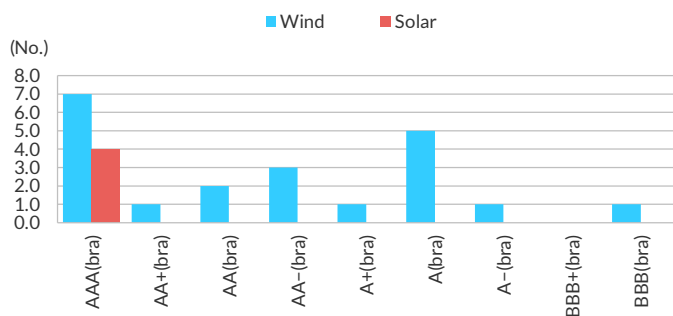
The structure of Brazilian wind contracts awarded in the regulated market prior to December 2017 allows for generation deficits to be offset by previous or future surpluses (over defined four-year

periods), which improves revenue predictability. Fitch uses the 10-year average P90 assessment in the rating cases for such projects.

Wind and solar projects rated on the international scale are clustered around 'BBB-'. Wind projects sustained more downgrades to sub-investment grade due to underperformance, while Solar projects were due to weakness in counterparty credit quality. Those that achieved 'A' category ratings have strong counterparties rated at least as highly, and typically display strong DSCRs in line with indicative thresholds, with little expected volatility in cash flow.

Most Brazilian projects only have national scale monitored ratings, as these debt instruments are issued in Brazilian real. National scale ratings are an opinion of creditworthiness, relative to the universe of issuers and issues within a single country. National scale ratings are most commonly used in emerging market countries with sovereign ratings of 'BBB' and below on the international scale.

Brazilian Project Ratings



Source: Fitch Ratings.

What Is to Come

Future iterations of this report will benefit from the lengthening historical record and a growing portfolio of rated projects. Newer technologies, such as battery storage, are also gaining investor confidence and will increasingly be paired with solar generation in future projects.

Over the coming year, Fitch expects to see further rapid expansion of its ratings in LatAm (in particular in Brazil, Chile and Colombia) and in the Middle East and Asia. In Europe, the ongoing retirement of thermal generation will lead to new capacity additions. New renewable projects are increasingly financed on a fully merchant basis, and we also expect European capacity auctions to continue.

In the U.S., the outcome of PG&E's bankruptcy filing could provide a signal for new projects to move further away from the traditional utility PPA model.

Overall, we are seeing a shift in the typical energy project finance paradigms as new off-taker types are becoming commonplace and merchant exposure is being incorporated into portfolio financings.

Appendix

Rated Portfolio – Wind

Project	Country	Site(s)	Size (MW)	Volume Risk	Price Risk	Operation Risk	Debt Structure	Current Rating
Alta Wind 2010 Pass-Through Trust	USA	Single	300+	Weaker	Stronger	Midrange	Midrange	BBB-
Caithness Shepherds Flat, LLC	USA	Multiple	300+	Weaker	Stronger	Midrange	Midrange	BBB-
Continental Wind, LLC (Exelon)	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BBB-
Private Wind Project 1	USA	Multiple	300+	Stronger	Midrange	Midrange	Midrange	BB
Private Wind Project 2	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BBB-
Private Wind Project 3	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BBB
Private Wind Project 4	USA	Single	201-300	Stronger	Stronger	Midrange	Midrange	BBB-
Private Wind Project 5	USA	Multiple	201-300	Midrange	Stronger	Midrange	Stronger	BBB-
Private Wind Project 6	USA	Multiple	101-200	Midrange	Midrange	Midrange	Midrange	BBB-
Private Wind Project 7	USA	Multiple	101-200	Midrange	Midrange	Midrange	Midrange	BB-
Private Wind Project 8	USA	Single	101-200	Midrange	Weaker	Midrange	Midrange	C
Private Wind Project 9	USA	Single	101-200	Midrange	Stronger	Midrange	Stronger	BBB-
Private Wind Project 10	USA	Single	101-200	Midrange	Stronger	Midrange	Midrange	BBB-
Private Wind Project 11	USA	Single	0-100	Stronger	Midrange	Midrange	Midrange	BBB
Private Wind Project 12	USA	Single	0-100	Midrange	Midrange	Midrange	Stronger	BBB-
AES Tietê Eólica Participacoes S.A.	Brazil	Single	300+	Midrange	Midrange	Midrange	Midrange	AA+(bra)
Ventos de Santo Estevao Holding S.A.	Brazil	Single	300+	Weaker	Midrange	Stronger	Midrange	AA-(bra)
Copacabana Geração de Energia e Participações S.A.	Brazil	Single	201-300	Midrange	Stronger	Midrange	Midrange	AAA(bra)
Itarema Geracao de Energia S.A.	Brazil	Single	201-300	Weaker	Midrange	Midrange	Midrange	A-(bra)
Omega Energia e Implantacao 2 S.A.	Brazil	Multiple	201-300	Midrange	Midrange	Midrange	Midrange	AAA(bra)
Santa Vitoria do Palmar Energias Renovaveis S.A.	Brazil	Single	201-300	Midrange	Midrange	Midrange	Stronger	AAA(bra)
Ventos de Sao Clemente Holding S.A.	Brazil	Single	201-300	Midrange	Midrange	Midrange	Midrange	AA-(bra)
Ventos de Sao Tito Holding S.A.	Brazil	Single	201-300	Midrange	Stronger	Midrange	Midrange	A(bra)
Complexo Morrinhos Energias Renovaveis S.A.	Brazil	Multiple	101-200	Midrange	Midrange	Midrange	Midrange	AAA(bra)
VDB F2 Geração de Energia S.A.	Brazil	Multiple	101-200	Weaker	Stronger	Midrange	Weaker	AAA(bra)
Ventos de Sao Jorge Holding S.A.	Brazil	Single	101-200	Midrange	Stronger	Midrange	Midrange	A(bra)
Ventos de Sao Tome Holding S.A.	Brazil	Single	101-200	Midrange	Stronger	Midrange	Midrange	BBB(bra)
Ventos do Sul Energia S.A.	Brazil	Multiple	101-200	Midrange	Stronger	Stronger	Weaker	AAA(bra)
Voltaia São Miguel do Gostoso S.A.	Brazil	Multiple	101-200	Midrange	Stronger	Midrange	Midrange	A+(bra)
Private Wind Project 13	Brazil	Single	101-200	Midrange	Stronger	Midrange	Midrange	AAA(bra)
Centrais Eolicas de Caetite Participacoes S.A.	Brazil	Single	0-100	Weaker	Stronger	Midrange	Midrange	A(bra)
Enel Green Power Damascena Eolica S.A.	Brazil	Single	0-100	Midrange	Stronger	Midrange	Midrange	A(bra)
Enel Green Power Manicoba Eolica S.A.	Brazil	Single	0-100	Weaker	Stronger	Midrange	Midrange	A(bra)
Eolica Serra das Vacas Holding II S.A.	Brazil	Multiple	0-100	Weaker	Stronger	Midrange	Midrange	AA(bra)
Eolica Serra das Vacas Holding S.A.	Brazil	Multiple	0-100	Midrange	Midrange	Midrange	Midrange	AA-(bra)
Potami Energia S.A.	Brazil	Multiple	0-100	Midrange	Midrange	Midrange	Midrange	AA(bra)
Private Wind Project 14	Chile	Multiple	101-200	Weaker	Weaker	Weaker	Weaker	A+(cl)
CE Oaxaca Cuatro, S. de R.L. de C.V.	Mexico	Single	101-200	Midrange	Midrange	Midrange	Midrange	BBB-
CE Oaxaca Dos, S. de R.L. de C.V.	Mexico	Single	101-200	Midrange	Midrange	Midrange	Midrange	BBB-
Energia Eolica, S.A.	Peru	Multiple	101-200	Midrange	Midrange	Midrange	Midrange	BBB-
Parque Eólico Marcona S.A.C., Parque Eólico Tres Hermanas S.A.C.	Peru	Multiple	101-200	Midrange	Midrange	Midrange	Midrange	BBB-
Breeze Finance S.A., (Breeze III)	Germany	Multiple	300+	Weaker	Stronger	Weaker	Midrange	CCC
CRC Breeze Finance S.A., (Breeze II)	Germany	Multiple	300+	Weaker	Midrange	Weaker	Midrange	CCC

Rated Portfolio – Wind (Continued)

Project	Country	Site(s)	Size (MW)	Volume Risk	Price Risk	Operation Risk	Debt Structure	Current Rating
WindMW GmbH	Germany	Single	201-300	Midrange	Stronger	Midrange	Stronger	BBB
Private Wind Project 15	Spain	Multiple	300+	Stronger	Weaker	Midrange	Weaker	B-
Dudgeon Offshore Wind Limited	United Kingdom	Single	300+	Midrange	Stronger	Midrange	Stronger	A-
Private Wind Project 16	Western Europe	Multiple	300+	Stronger	Midrange	Midrange	Midrange	BBB-

Source: Fitch Ratings.

Rated Portfolio – Solar

Project	Country	Site(s)	Size (MW)	Volume Risk	Price Risk	Operation Risk	Debt Structure	Current Rating
Axium Infinity Solar LP	Canada	Multiple	0-100	Stronger	Stronger	Midrange	Midrange	BBB
Ontario Solar Holdings LP	Canada	Multiple	0-100	Midrange	Stronger	Midrange	Midrange	BBB-
Solar Star Funding, LLC	USA	Single	300+	Stronger	Midrange	Midrange	Stronger	BBB-
Topaz Solar Farms LLC	USA	Single	300+	Midrange	Midrange	Midrange	Stronger	C
Private Solar Project 1	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BBB-
Private Solar Project 2	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	C
Private Solar Project 3	USA	Multiple	300+	Stronger	Midrange	Midrange	Midrange	BBB-
Private Solar Project 4	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BB-
Private Solar Project 5	USA	Multiple	300+	Midrange	Midrange	Midrange	Midrange	BB-
Private Solar Project 6	USA	Multiple	101-200	Midrange	Midrange	Midrange	Stronger	C
Private Solar Project 7	USA	Single	101-200	Stronger	Stronger	Midrange	Midrange	BBB+
Private Solar Project 8	USA	Multiple	101-200	Midrange	Stronger	Midrange	Midrange	BBB-
Pirapora Solar Holding S.A.	Brazil	Single	101-200	Midrange	Stronger	Midrange	Stronger	AAA(bra)
Pirapora II Solar Holding S.A.	Brazil	Single	0-100	Midrange	Stronger	Midrange	Midrange	AAA(bra)
Sertão I Solar Energia SPE S.A.	Brazil	Single	0-100	Midrange	Stronger	Midrange	Midrange	AAA(bra)
Sobral I Solar Energia SPE S.A.	Brazil	Single	0-100	Midrange	Stronger	Midrange	Midrange	AAA(bra)
Private Solar Project 9	Chile	Multiple	0-100	Midrange	Midrange	Midrange	Weaker	B+
Andromeda	Italy	Multiple	0-100	Stronger	Midrange	Stronger	Midrange	BB
Private Solar Project 10	Spain	Multiple	0-100	Stronger	Midrange	Midrange	Midrange	BBB
Adani Renewable Energy (RJ) Limited, Kodangal Solar Parks Private Limited, Wardha Solar (Maharashtra) Private Limited	India	Multiple	300+	Midrange	Stronger	Midrange	Stronger	BBB-
Azure Power Solar Energy Private Limited	India	Multiple	300+	Midrange	Stronger	Midrange	Midrange	BB

Source: Fitch Ratings.

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