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Cross-Sector - Renewable Energy

Going green: Renewable energy projects are a growing asset class for European banks

Renewable energy projects are playing an increasing role on the balance sheets of European banks. In Europe, banks have syndicated more than €100 billion of loans for renewable energy projects since 2013. Given the EU's commitment under the Paris climate accord and projected investment needs of €180 billion each year, renewable energy projects will remain at the top of the political agenda for the foreseeable future.

Banks are increasingly active in financing renewable energy transactions. Large European banks such as BNP Paribas and UniCredit SpA report exposures between €8 billion and €12 billion, representing more than 16% of their Common Equity Tier 1 (CET1) capital. On a relative scale, renewable energies are an even more important asset class for some smaller or specialised German banks such as KfW IPEX, NORD/LB,[1] and Hamburg Commercial Bank (HCOB, formerly HSH), accounting for between 1.1x and 1.7x their CET1 capital, and DKB and SaarLB at more than 3.5x their CET1 capital. The German government's energy transition (*Energiewende*) has led some German banks to become particularly involved in financing domestic renewable projects, which are often smaller-scale.

Technological progress has shifted the dynamics of the sector. Technology advances mean that renewable energy is now cost-competitive with fossil fuels in many countries. Many governments now provide little or no subsidy for newly installed projects in established technologies like solar photovoltaic (PV) and onshore wind.

Renewable energy projects as an asset class have specific risks. Key characteristics include the variable nature of the energy source and the feed-in tariff, which may no longer include subsidies as a result of the shift in the regulatory regime. Renewable energy projects typically limit the liability of the project sponsor to the initial equity injection (non-recourse). In Moody's-rated precedents, renewable energy project financings have typically achieved low investment grade ratings, although the sponsors' approach to risk mitigation can yield a range of risk profiles. In assessing a bank's asset risk we also consider sector concentration risks. Diversification and granularity, as well as strict underwriting standards in renewable energy projects may mitigate these risks to some extent.

Recent developments bode well for renewable energy projects. Technological advances and declining capital equipment costs have been key in advancing renewable energy projects. Additional factors include moves by Big Tech companies to procure up to 100% renewable energy; innovation in financial markets, including weather hedging products; favourable market conditions due to higher prices for electricity; and access to new, cheaper sources of funding.

The EU is committed to increasing the share of renewable energy consumption

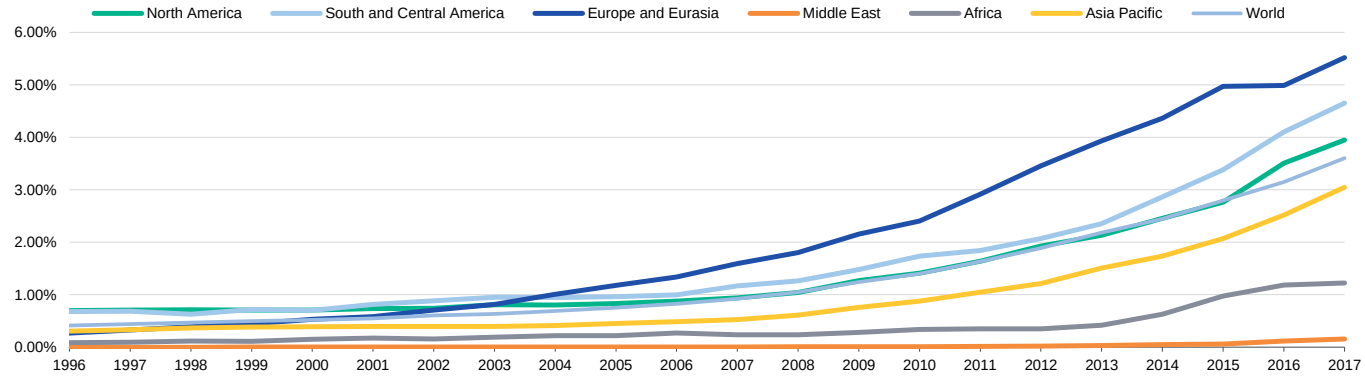
The European Union (EU) has committed to increasing the share of energy from renewable sources to at least 32% by 2030, from 17.5% in 2017. The EU estimates an additional need to invest around €180 billion each year to meet its climate change goals.[2]

Renewable energy plays a more prominent role in the energy mix in Europe than in any other part of the world (Exhibit 1).

Exhibit 1

Renewable energy consumption has risen in almost all regions but is highest in Europe

Renewable energy share of total primary energy consumption



Source: BP Statistical Review of World Energy 2018

Latest available data from Eurostat shows that the European Union (EU, Aaa stable) is on track to meet its 2020 interim target of 20% final energy consumption from renewable sources.[3] In 2017, the share of energy from renewable sources reached 17.5% of the energy mix, from 17.0% in 2016 and 8.5% in 2004, the first year for which data are available.

Renewable energy generation remains high on the EU agenda. Key targets in the EU's 2030 climate and energy framework are: (1) to cut greenhouse gas emissions by at least 40% by 2030 (from 1990 levels), (2) take the share of renewable energy in the energy mix to at least 32%, and (3) improve energy efficiency by at least 32.5%. As a result of its recent legislative package Clean Energy for all Europeans[4] the European Commission expects an even steeper emission reduction of 45% by 2030. In its 2050 decarbonisation strategy, the EU is pursuing the longer-term goal of climate neutrality by 2050. One building block of the strategy is to maximize the deployment of renewables and the use of electricity, with the expectation that by 2050 about 80% of electricity will be coming from renewable energy sources.

Non-renewable energy generation capacity added in Europe since 2010 has been minimal and limited to a few gas plants. In the Netherlands, some new gas plants even had to be mothballed because they were no longer economical to run given the pressure on energy prices. In many European countries, the traditional base load role of coal plants has been displaced and renewables have been given grid priority. These dynamics are driving significant investment in electricity networks, reinforcing their importance in the energy supply chain.[5]

Significant further investment is needed to reach EU climate change goals

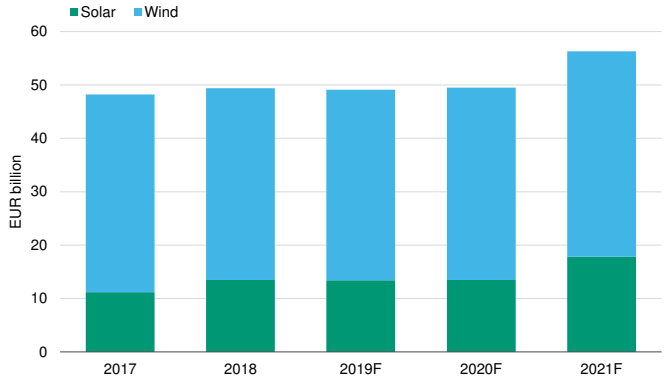
The Action Plan for Sustainable Finance published by the European Commission in March 2018, focuses on re-orienting capital flows towards a more sustainable economy. The Commission, the EU's executive arm, estimates that around €180 billion of additional investments in priorities like renewable energy projects and efficient buildings are needed in the region each year to meet its pledge to reduce CO2 emissions by 40% in all sectors of the EU economy by 2030. The European Investment Bank (EIB, Aaa stable), in a broader assessment of measures required for the European economy to regain competitiveness, estimates the investment gap in transport, energy and resource management to be as high as €270 billion a year.

Exhibits 2 and 3 below show expected investments in solar and wind energy generation over the coming three years as well as the expected revenues for those energy classes. Solar energy generation in particular is benefiting from declining costs of installation and increased efficiency of solar power generation.

Exhibit 2

Wind investments still dominant, though uptick in investments mainly driven by solar energy

Investment forecasts for solar and wind energy in Europe

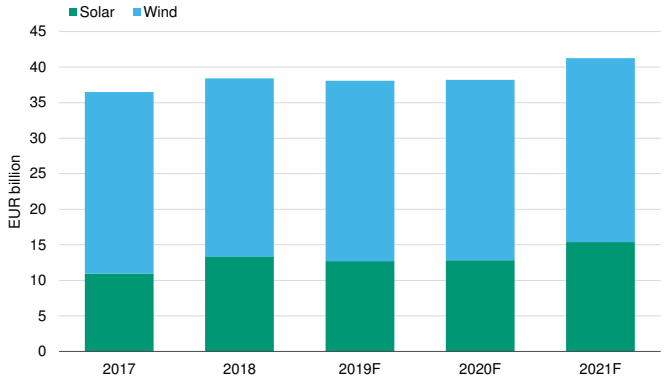


Source: Frost & Sullivan

Exhibit 3

Similarly, solar is also expected to drive increase in revenues

Expected revenues in Europe from solar and wind power



Source: Frost & Sullivan

Renewable energy generation will continue to grow in Europe

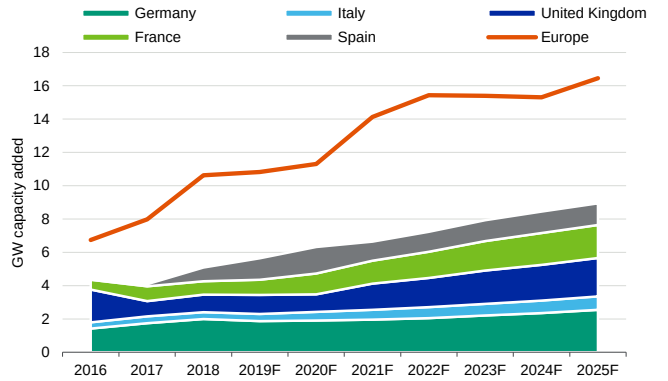
We expect solar and wind energy generation to continue to grow rapidly in Europe over the next five to six years (Exhibits 4 and 5). Europe accounted for 29% of the capacity of the global solar PV market in 2017 with Germany and the United Kingdom (UK) contributing more than 40%. Despite the closure of subsidy programs, newly installed annual production capacity of solar energy is forecast to increase every year by an average of almost 10% until 2025 from its 2017 levels.

Expected capacity increases in wind power generation are more modest at just 2% annually over the same period. Reasons for the slower growth in wind energy are falling energy prices and the life-time extension and potential expansion of nuclear plants in the EU.[6] Growth in wind energy generation mainly hinges on off-shore wind parks which benefit from larger turbines.

Exhibit 4

Solar energy generation capacity will increase significantly across Europe...

Annual installed capacity forecasts in GW (gigawatt)



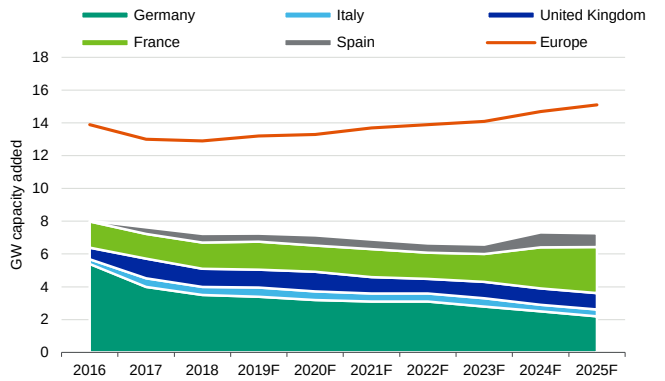
Note: Europe also includes countries outside the European Union like Norway, Switzerland and Turkey.

Source: Frost & Sullivan

Exhibit 5

...while growth in wind energy generation capacity is slowing, led by Germany

Annual installed capacity forecasts in GW (gigawatt)



Note: Europe also includes countries outside the European Union like Norway, Switzerland and Turkey.

Source: Frost & Sullivan

Banks are increasingly active in financing renewable transactions

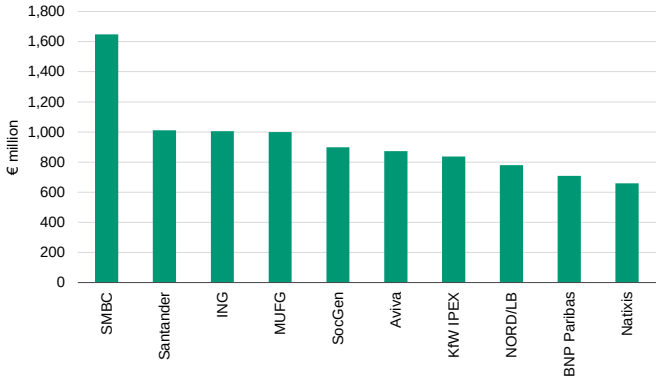
According to data provided by Dealogic, more than €100 billion of loans for renewable energy projects have been syndicated in Europe since 2013. However, this only covers part of the market which continues to be very fragmented. For example, for onshore wind energy, transactions for production volumes of 50 MW or less tend to be done on a bilateral basis; volumes between 50 – 200 MW as club deals; and larger transactions as syndicated loans. The Dealogic data misses out in particular on bilateral loans which are often very granular, but may in sum represent the major part of a bank's exposure. In addition, banks face competition from institutional investors, such as pension funds and insurance companies, which have developed the skills to lend directly to the sector.

According to data on syndicated loans reported by Inspiratia, the top 10 lenders 2018 took total exposures between €660 million and €1,650 million for wind projects and between €180 million and €420 million for solar projects (Exhibits 6 and 7).

Exhibit 6

Top 10 lenders in syndicated loans in European wind energy

Allocated values as of 2018, total of €9.4 bn

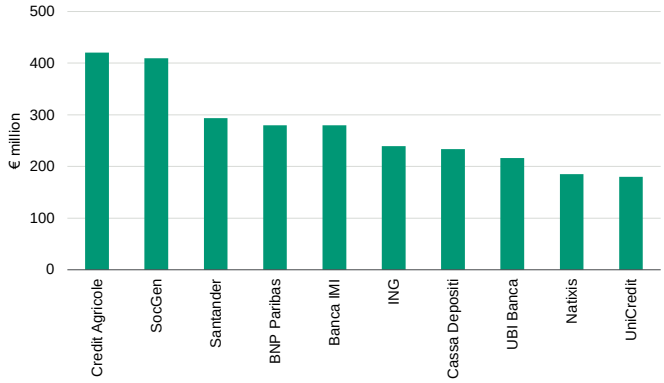


Note: Allocated values include final allocations from loans that were syndicated in 2018
Source: Inspiratia

Exhibit 7

Top 10 lenders in syndicated loans in European solar energy

Allocated values as of 2018, total of €2.7 billion



Note: Allocated values include final allocations from loans that were syndicated in 2018
Source: Inspiratia

Banks participating in the overall market fall broadly into three categories:

» (1) large European banks like **BNP Paribas** (Aa3 / Aa3 stable, baa1), **ING Bank NV** (Aa3 / Aa3 stable, baa1), **Rabobank** (Aa3 / Aa3 stable, a3) and **UniCredit SpA** (Baa1 / Baa1 stable, ba1);[7]

» (2) large international banks, in particular **Sumitomo Mitsui Financial Group Inc.** (SMFG) (A1 stable) and **Mitsubishi UFJ Financial Group Inc.** (MUFG) (A1 stable), both from Japan, and to some extent US banks such as **Goldman Sachs Group, Inc** (GS, A3 stable) and **Citigroup** (Citi, A3 stable);[8] and

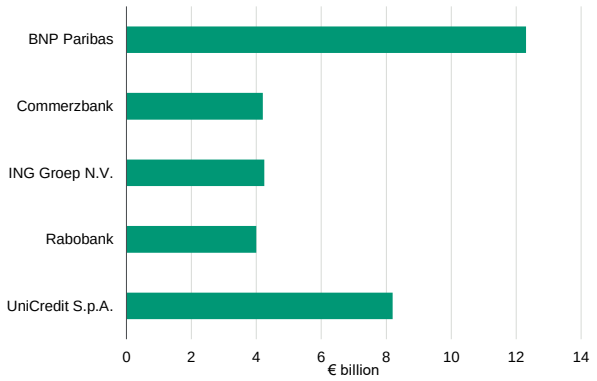
» (3) smaller regional or specialised banks in particular from Germany, where the government made an early switch to renewables from nuclear power after the 2011 Fukushima nuclear disaster. These include **KfW IPEX** (Aa2 stable, a3), **Norddeutsche Landesbank GZ** (NORD/LB, Baa2 / Baa2 review for upgrade, b2 review for upgrade) and **Hamburg Commercial Bank** (HCOB, formerly HSH, Baa2 / Baa2 stable, ba2).

League tables as provided by Dealogic and Inspiratia only report exposures to the extent that they have been allocated in a particular year. The data misses out on smaller bilateral loans, and moreover we lack consistent public disclosure on aggregate balance sheet exposures which have been accumulated over several years.

Exhibits 8 and 9 show exposures for selected European banks for which public data is available. As of year-end 2017, BNP Paribas had €12.3 billion of loans to renewable projects (equivalent to 16.5% of CET 1 capital), UniCredit SpA €8.2 billion (equivalent to 16.8% of CET1 capital) and Commerzbank (A1 / A1 stable, baa2) €4.2 billion (equivalent to 16.2% of CET1 capital).

Exhibit 8

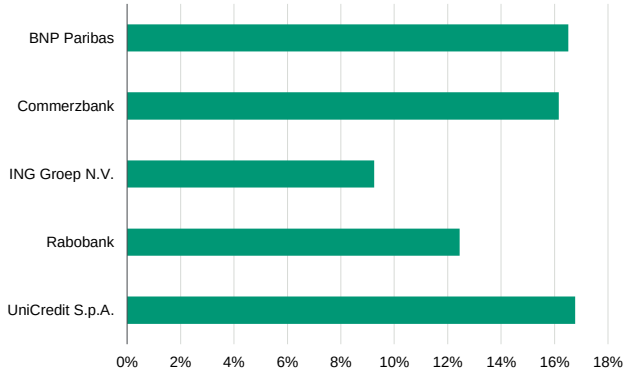
Exposure to renewable energy projects of selected European banks



Note: We only provide evidence for a small sample of banks for which data is available, as so far we lack consistent disclosure for renewable energy exposure across the broader European banking universe.
Source: Company reports, Moody's Investors Service

Exhibit 9

Exposure to renewable energy projects as percentage of CET1 capital of selected European banks

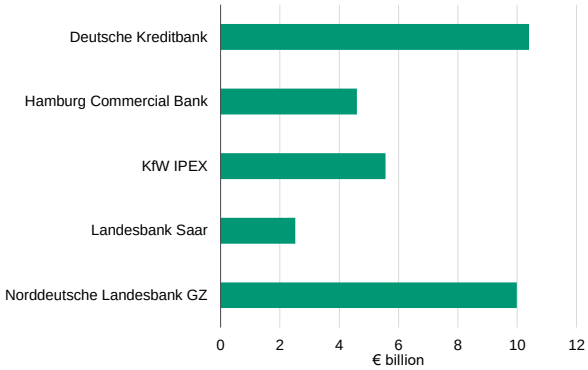


Note: We only provide evidence for a small sample of banks for which data is available, as so far we lack consistent disclosure for renewable energy exposure across the broader European banking universe.
Source: Company reports, Moody's Investors Service

Renewable energies are an even more important asset class for some smaller or specialised German banks such as KfW IPEX, NORD/LB,[9] and Hamburg Commercial Bank (HCOB, formerly HSH), accounting for between 1.1x and 1.7x their CET1 capital (Exhibit 10 and 11). KfW IPEX' portfolio is globally diversified with a market leading position for offshore wind projects. Also NORD/LB and HCOB have internationally diversified portfolios. Particularly exposed are DKB and SaarLB at more than 3.5x their CET1 capital.

Exhibit 10

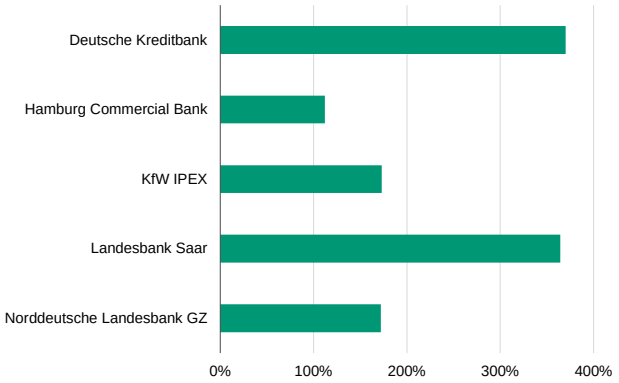
Exposure to renewable energy projects of selected German banks



Note: Data has been compiled for each bank according to its disclosure on energy / renewable energy exposures, which may not be fully consistent across banks[10]
Sources: Company reports, Moody's Investors Service

Exhibit 11

Exposure to renewable energy projects as percentage of CET1 capital of selected German banks



Note: Data has been compiled for each bank according to its disclosure on energy / renewable energy exposures, which may not be fully consistent across bank. Data for Norddeutsche Landesbank is on a pro-forma basis accounting for the €2.8 billion capital injection committed by its owners and to be completed by Q3 2019
Sources: Company reports, Moody's Investors Service

Landesbank Saar (SaarLB, A1 stable, baa1) is a mid-sized player in terms of lending volume with exposure of €2.5 billion, focusing on onshore wind energy in Germany and France. **Deutsche Kreditbank** (DKB, A1 stable, baa2) had mainly domestic loans outstanding of €10.4 billion at the end of 2017 (including about €1 billion in bioenergy projects). This exposure is a concentration risk even at the level

of its owner **Bayerische Landesbank** (BayernLB, Aa3 / Aa3 stable, baa3). DKB's renewables portfolio accounted for more than 100% of BayernLB's CET1 at the end of 2017.

The German government's energy transition (*Energiewende*) fostered a lot of domestic renewable projects, which are often smaller-scale. Together with the vintage of these exposures with a significant part of the stock of loans still relying on subsidies, granularity is a key mitigating factor. Nevertheless, the sector concentration risk for the most exposed banks may not be fully offset.

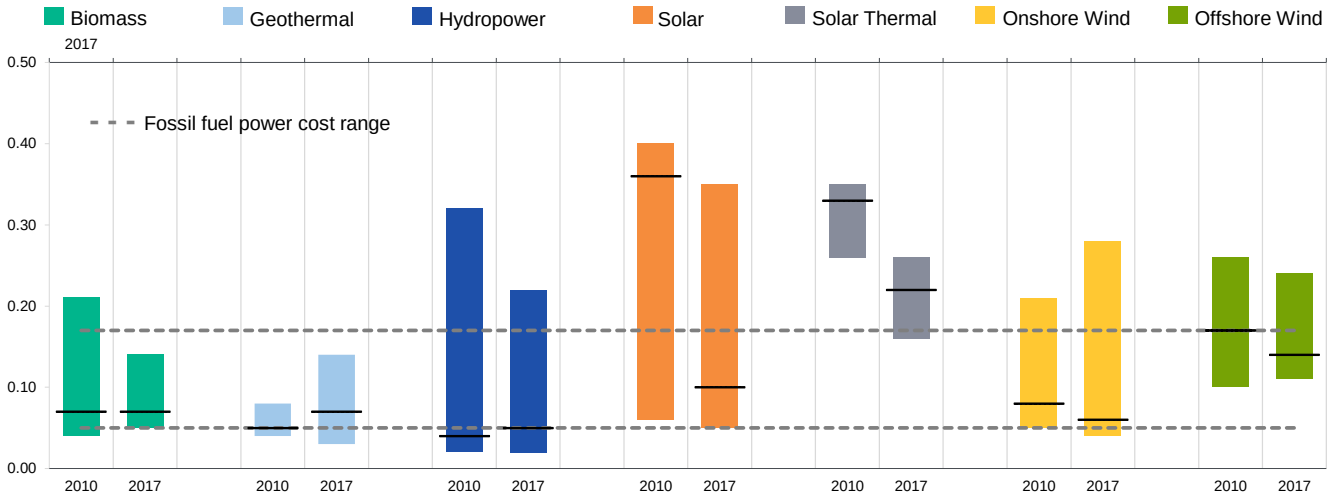
Technological progress has shifted the dynamics of the sector

Renewable energy generation has benefitted from considerable technological advances and is now largely cost-competitive with fossil fuels in many countries (Exhibit 12). EU governments provide little or no subsidy and renewable energy producers bid against each other at auctions to put a certain capacity of renewable energy-based electricity on the national grid.

Exhibit 12

The cost of renewable energy technology has become competitive with fossil fuels

Levelised cost of electricity from renewable energy, 2010 vs 2017, USD per kWh



Note: The levelised cost of electricity (LCOE) represents the unit-cost of electricity over the lifetime of a generating asset. It is often taken as a proxy for the average price that the generating asset must receive in a market to break even over its lifetime. The bars represent the min-max range in LCOE, and the black lines are the average. All costs are in 2017 USD. The costs have been calculated using a weighted-average cost of capital of 7.5% for OECD and China, and 10% for the rest of the world.
Source: IRENA's renewable cost database

Evidence from the International Renewables Energy Agency (IRENA) suggests that by 2020 all renewable energy technologies will be price-competitive with fossil fuels. In its global survey, the agency expects that all renewable power generation technologies will by then be able to produce energy at a cost of between 3 and 10 US cents/kWh[11], compared with between 5 and 17 cents/kWh currently for fossil fuel power generation. In 2017, onshore wind and solar photovoltaic[12] projects already produced energy at a global-weighted average cost of 6 cents and 10 cents respectively. Recent auction results indicate that offshore wind and concentrating solar power (CSP) projects[13] commissioned between 2020-22 will cost in the range of 6 to 10 cents per kWh, supporting the accelerated deployment of these relatively new technologies globally.

This has shifted the dynamics of the sector. With renewable energies being fully competitive, the scope for new projects has shifted upwards with major parts of the European energy market now being available, a credit positive for renewable energy projects. At the same time, competitive auctions may risk an overheating of the market, a credit negative.

Recent auctions have produced record low prices with some generators requiring no subsidy above the market price of power. Bids reflect declining equipment costs and economies of scale. At the same time, the competitive pricing constrains profits, thereby reducing the margin of error on assumptions made for the project, including capital costs, project delays, equipment quality, payment delays and curtailment. For part of their tenure, projects may no longer rely on pre-agreed prices, but incur the risk of market fluctuations.

Renewable energy project finance has specific risks and is typically structured around the low investment grade risk profile

Renewable energy projects have gained increasing importance as the world transitions to a less carbon-intensive energy mix. Energy generation from renewable energy sources includes energy from solar panels and wind turbines as well as biomass and hydro energy. In this report, we focus on solar and wind energy as they have developed into a new asset class with specific risk characteristics, while biomass and hydro energy have been part of the energy mix for a long time. Energy generation from biomass is typically part of SME lending, whereas the huge infrastructure investments needed for hydro energy generation is funded by the large national electric utility companies or the government itself.

Technological risks differ depending on the technology used. Some technologies like solar photovoltaic and onshore wind rely on well established technology and have a solid operating track record. Others, such as offshore wind and concentrated solar power (CSP) energy continue to benefit from significant technological progress, implying some additional risk to the extent that they still have to establish an operational track record over the full lifetime of a project.

In addition to these technology-related risks, portfolios of renewable energy projects have four key characteristics:[14]

(1) Renewable energy projects are non-recourse

Renewable energy project finance as a form of project finance is cash-flow based lending. Unlike corporate exposures, it will typically be non-recourse, meaning that the liability of a project sponsor is limited to the initial equity injection. Projects are financed on the basis of their projected cash-flows. If future cash flows are unlikely to be sufficient to pay both future debt service and distributions to sponsors, the sponsor will have little economic incentive to provide additional equity injections. This is similar to loans in commercial real estate (CRE) and private equity-sponsored leveraged finance transactions. In contrast, for a corporate loan a bank is able to rely on more diversified cash flows and the entire equity of the business provides a buffer against default. In the case of a retail loan, the bank will often have access to the private wealth of a client in the event of default.

Once the renewable energy project is installed, the volume of energy produced and its price are the two key components driving a project's cash flows. The available cash flows drive the project's debt servicing ability.

(2) Variability of the natural resource

The volume of energy produced is stochastic and dependent on the availability of wind or solar irradiance. To safeguard against downside operating scenarios as a result of a shortfall in wind or solar irradiance, each renewable energy finance agreement is based upon a statistical production distribution forecast. Independent experts establish these probability scenarios which the banks then consider in their underwriting procedures.

The forecast measures the probability that the actual energy generation of the wind or solar project will exceed a predefined level. These confidence levels are generally referred to as P-levels associated with certain percentiles of the probability distribution. For example "P90" means there is a 90% probability that the actual wind or solar irradiance will exceed this level; and a 10% probability that the actual resource will be lower than this level. Standard levels are P75, P90 or P99.[15]

With the lower probability of a short fall, a P99 base case will in general be lower than a P90 base case. For the underwriter of a project there is a trade-off between the P-level and the required cash flow target to cover interest and principal payment of a loan as measured by the debt service coverage ratio.[16] The higher P90 base case will typically require a higher debt service coverage ratio (DSCR). In order to assess the risk of a financial shortfall the P-level and the DSCR have to be viewed together.

(3) Feed-in tariff, which may no longer include subsidies as a result of the shift in the regulatory regime

When renewable energies were first introduced, governments in Europe used subsidised feed-in tariffs, based on costs rather than competitive pricing, to foster their implementation. This regime has shifted. Technological progress has now made most forms of renewable energy competitive on the open market. Wind and solar energy costs have declined by between 60% and 80% since 2010, with both technologies benefitting from economies of scale and improving efficiency.

Recent auctions with record-setting pricing include offshore wind in Denmark, Germany and the Netherlands. With more intense competition, there is an increased risk that construction of these projects is mispriced and they become loss-making. Project finance lenders to non-recourse special purpose vehicles are exposed to the risk that auction competition creates incentives for aggressive operating budgets.

(4) In assessing a bank's exposure, portfolio effects and underwriting standards matter

Project portfolios held by individual banks need to be assessed on their own merit. In assessing a bank's exposure we also consider sector concentration risks, which may be mitigated by granularity, regional diversification and vintage of these exposures, as well as underwriting standards.

» **Granularity.** A diverse portfolio helps to spread risk to the extent that idiosyncratic risks of the individual projects are uncorrelated. We expect more granular portfolios to show better predictability and lower downside risk.

» **Regional diversification.** Regional diversification allows the bank to diversify the underlying risk of the natural resource being available. The more global a portfolio is, the less likely deviations from the predicted availability of the natural resource will be correlated.

» **Vintage.** With the shift in the regulatory regime from subsidies to competitive auctions, the vintage of the portfolio will be important, too. To promote renewable energy projects under the subsidy regime, fixed feed-in prices were calculated to cover for assumed costs at a given point in time, thereby allowing cash flows to rely on a minimum margin from the initiation of the project. With competitive auctions, this is less clear, as competitive bidding may have already incorporated expected efficiency gains, thereby adding an additional layer of risk.

» **Underwriting standards.** Liquidity reserves and the level of cushion in the debt service coverage ratios (DSCR) can serve as additional buffer. Banks may require additional sources of protection as part of their underwriting standards including: (1) first ranking security in the borrower's assets and shares in the event of default; (2) trustee administered cash flow hierarchies; (3) covenant packages designed to place restrictions on what the project company can do; and (4) historical and forward-looking debt service coverage ratio tests for distributions. In addition, banks may choose to work with established financial sponsors.

In many cases the credit profiles of renewable energy projects have been structured around low investment grade

Renewable energy projects limit the liability of the project sponsor to the initial equity injection. Lenders are therefore reliant on the cash flows of the asset, primarily a function of the resource, regulatory regime, technology and cost profile. Risks can be mitigated both through operational contracts and on the financial side. Where the technology is untested, the support provided by the original equipment manufacturer or vendor, warranty periods and the structure and duration of long-term service agreements can mitigate operational risks. On the financial side, liquidity reserves and the level of cushion in the debt service coverage ratios can serve as an additional buffer. Typically, renewable energy projects have been structured around low investment grade, but risk profiles vary depending on the risk mitigation approach taken.

In line with this assessment, we found the 10-year cumulative default rate to be 5.7% for green use-of-proceeds projects across a broad sample of project finance bank loans in a recent study of default rates. We borrowed the concept of proceeds being used for "Green Projects" from the Green Bond Principles issued by ICMA.[17] Non-green use-of-proceeds projects had a 10-year cumulative default rate of 8.5%, although the empirical evidence suggests that this difference may be driven by subsample characteristics other than greenness. For comparison, corresponding default rates for Baa3-rated and Ba1-rated corporates are 5.4% and 10.4% respectively.

Technology, sponsors and the operational set-up drive the risk profile of a project

Auction bids for renewable energy generation reflect declining equipment costs and economies of scale. While the auction result will set the frame for the economics of a specific project, the risk and potential rewards of financing a renewable project will then depend on the specifics of the project, including the technology it uses, the sponsor behind it, and its operational set-up.

The role of technology. Technological progress has made renewable energy increasingly competitive. Some renewable energy technologies – particularly solar photovoltaic and onshore wind – are now well established and have long operational track records. For solar thermal (heating water or air) and offshore wind, the technology is still evolving and we expect additional efficiency gains over the coming years.

Technological progress may threaten existing projects or projects may get mispriced if the anticipated technological progress does not materialise. To the extent projects do not fully amortise during their initial admission period and the license to operate the project expires, the bank faces a refinancing risk. New technology may have become available in the meantime, offering better efficiency or enhanced operations, such as noise reduction. In such a case, the risk is that it may no longer be efficient to run the project or the regulator may not renew the license of the project in which case the project becomes a stranded asset.

The role of the project sponsor. The project may benefit from having an experienced sponsor with a track record in selecting viable projects and in running them successfully. Experienced project sponsors may also face reputational risks if they walk away from a failed project and may therefore be more inclined to inject additional equity if needed.

Operational set-up will drive risk and potential reward of renewable project. Factors to be considered include (Exhibit 13): (1) the tariff structure, including its duration, potential inflation adjustment, and exposure to price variability. In general, renewable energy projects benefit from the negligible cost of producing the energy; (2) the possibility that a project may be postponed to allow the use of a more efficient technology on the horizon; (3) the risk that renewable energy generators may face curtailment due to grid stability considerations or lack of grid capacity; (4) the counterparty credit quality of the energy purchaser with a new trend started by Big Tech companies in the US to procure renewable energy long-term to meet their sustainability goals; (5) capital spending synergies which may favour larger asset owners and operators, who benefit from pricing power when negotiating with equipment manufacturers and from economies of scale in maintaining their assets; (6) the cost of financing which may benefit from low-cost loans from national development banks (concessionary lending).

Exhibit 13

Key considerations in assessing risk and potential reward of renewable energy projects: the perspective of the project sponsor

Source: Moody's Investors Service

Recent developments bode well for renewable energy projects

Key in advancing renewable energy projects has been technological progress, allowing most of the available technologies to compete with fossil fuels on price. But there are a number of additional factors benefitting renewable energy projects.

» **Big tech companies procuring renewable energy.** Corporate Power Purchase Agreements (CPPAs) have emerged as an additional driver of renewable demand. Large corporates, such as Google parent Alphabet Inc. (Aa2 stable) and Microsoft Corporation (Aaa stable), that consume huge amounts of energy, are contracting renewable energy to meet their sustainability goals. Auctions will typically result in contracted prices below market rates. However, CPPAs offer renewable energy projects a long horizon of predictable prices and committed levels of minimum demand. For a CPPA the key risk of the credit quality of a counterparty will in many cases be low, given the sound risk profile of many of the big tech companies seeking to procure 100% renewable energy. This is one of the reasons why green power projects will often have a lower default rate than their fossil fuel equivalents.

» **Further innovation in financial markets.** New weather hedging products have been introduced to cover variability in weather conditions for wind and solar. Proxy Revenue Swaps are one of the most recent innovations, covering both revenue and price risk. These new financial instruments allow participants to trade the key risks of a renewable energy project. As a result, the sponsor and the bank can choose to what extent they want to hedge their risks.

» **Favourable market conditions.** Higher prices for carbon allowances in Europe last year served to raise electricity prices. Renewable energy producers saw the gross benefit from this development as they did not have to bear the carbon cost.

» **Access to additional sources of funding: Concessionary lending, green bonds and covered bonds backed by renewable energy projects** In some countries in the EU (e.g. Germany), renewable energy projects benefit from promotional loans from government-owned development banks (concessionary lending). These subsidised loans help the economic viability of renewable finance projects.

» For banks involved in renewable project finance, Green Bonds offer an opportunity to access an additional funding source with a dedicated investor base. Evidence, however, that investors would be willing to trade return for greener credentials is limited.[18] Luxembourg (Aaa stable) was the first country to introduce a law allowing banks to issue covered bonds backed by renewable energy infrastructure financings (REIFs) in June 2018. This allows banks to tap into new and potentially cheaper funding sources.

In the EU, we expect renewable energy projects to remain at the top of the political agenda given the EU's commitment to fulfill the commitments of the Paris climate accord. In addition, in March 2018 the European Commission agreed on a broader Action Plan on Sustainable Finance. This broad set of proposals is designed to channel capital flows towards sustainable investment, manage financial risks stemming from sustainability issues, and foster transparency and long-term decision-making in financial and economic activity.

In February 2019, the Action Plan led to a political agreement to amend the EU Banking Package to incorporate Environmental, Social and Governance (ESG) risks. The amendment of the EU's CRR/CRD banking regulation may lead (1) to a potential inclusion of ESG risks in the supervisory review and evaluation process (SREP), including among other things stress-testing processes and scenario analyses to assess the impact of ESG risks; and (2) a change in capital requirements based on a dedicated prudential treatment of exposures related to assets or activities with a positive environmental and / or social impact.

The implications of these measures are foremost long-term and partly indirect. Nevertheless, they reflect increasing pressure on banks to engage with the EU agenda of greening the economy. An important part of that will be fostering renewable energy lending.

Moody's related publications

Methodology

» Power Generation Projects, June 2018

» General Principles for Assessing Environmental, Social and Governance Risks, January 2019

Electricity Markets and Renewable Energy

» Renewable Energy - Global: Renewables sector risks shift as competition reduces reliance on government subsidy, September 2017

» US Power & Utilities: Economics, End-User Sustainability Policies Drive Renewables in a post-CPP World, March 2017

Electricity Markets, Regulated Electric & Gas Networks

» Europe's electricity markets: In Europe, higher carbon price would benefit generators, July 2018

» Europe's electricity markets: In Germany, national policies will continue to challenge conventional generators, July 2018

» Regulated Electric & Gas Networks - EMEA: Energy transition presents long-term risks for European regulated energy networks, June 2017

» Regulated electric & gas networks - EMEA: 2019 outlook stable reflecting predictable regulation, but low allowed returns persist, November 2018

Default Risk

» Default research - Global: Default and recovery rates for project finance bank loans, 1983-2016: Green projects demonstrate lower default risk, September 2018

Green Bonds

» Green Bonds – Global: Repeat issuers drive volume as green bond market matures, November 2018

» Green Bonds – Global: Green bond issuance to hit $200 billion in 2019, January 2019

Covered Bonds - Luxembourg

» Covered bonds – Luxembourg: New legal framework offers dual recourse credit strength for renewable energy funding, March 2018

» Covered Bonds: Luxembourg allows covered bonds backed by renewable energy financings, diversifying banks' funding, June 2018

Sustainable Finance

» Financial Institutions - European Union: European Commission's sustainable finance action plan to stimulate lending and investment, March 2018

» Banking - European Union: EU bank legislation is overall positive for senior creditors, but reforms not yet complete, March 2019

To access any of these reports, click on the entry above. Note that these references are current as of the date of publication of this report and that more recent reports may be available. All research may not be available to all clients.

Endnotes

1 On a pro-forma basis taking into account the €2.8 billion capital injection committed by its owners and to be completed by Q3 2019

2 According to the European Commission's March 2018 Action Plan for Sustainable Finance

3 Note that the values in Exhibit 1 present renewables as a share of primary energy consumption, which is different from final energy consumption used to measure compliance with the European Union's Renewable Energy Directive. The EU has a binding target of 20% final energy consumption from renewable sources by 2020. Final energy consumption is the total energy consumed by end users, such as households, industry and agriculture. It is the energy which reaches the final consumer's door and excludes that which is used by the energy sector itself.

4 Proposed by the European Commission in November 2018 and adopted by the European Parliament in March 2019

5 Moody's: Regulated Electric & Gas Networks - EMEA: Energy transition presents long-term risks for European regulated energy networks, June 2017, Regulated electric & gas networks - EMEA: 2019 outlook stable reflecting predictable regulation, but low allowed returns persist, November 2018

6 Belgium extended the lifetime of its nuclear fleet until 2025. France, producing 50% of the EU's nuclear electricity, started a public consultation in Q1 2019 on the lifetime extension of France's fleet of 900 MW reactors. In the coming years, each of these reactors will reach the age of 40 years. According to the International Atomic Energy Agency (IAEA) nuclear plants are under construction in Finland, France, Slovakia, and the UK with additional nuclear plants being planned in Romania, the Czech Republic, Hungary, and the UK.

7 The ratings shown in the report are the banks' deposit rating / senior unsecured debt ratings and outlook and Baseline Credit Assessment, for some banks like KfW IPEX, DKB, or SaarLB we only assign deposit ratings and no senior unsecured ratings.

8 For the large Japanese financial conglomerates and the US bank holding companies we only assign senior unsecured ratings.

9 On a pro-forma basis taking into account the €2.8 billion capital injection committed by its owners and to be completed by Q3 2019

10 Exposures comprise the following categories: Deutsche Kreditbank = Wind + Photovoltaic + Biogas exposures; Hamburg Commercial Bank = Project financing Energy & Utilities; KfW IPEX = Energie und Umwelt; Landesbank Saar = Erneuerbare Energien; Norddeutsche Landesbank = Wind (onshore + offshore) + Solar energy + Gas/biogas

11 These are global figures. Costs for each technology will vary across and within regions - hence the range.

12 Solar photovoltaic panels contain semiconductors such as silicon, which convert solar radiation into electricity

13 Concentrating solar power systems use mirrors or lenses to concentrate a large area of sunlight onto a small area. Electricity is generated when the concentrated light is converted to heat, which drives a steam turbine connected to an electrical power generator.

14 Moody's rating methodology for renewable energy projects is set out in its Power Generation Projects methodology.

15 E.g. for wind projects P99 will typically be used with a one year horizon, whereas P90 and P75 values will be used longer term.

16 The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment.

17 See ICMA: Green Bond Principles Voluntary Process Guidelines for Issuing Green Bonds, July 2018, p. 3:"The Green Bond Principles explicitly recognise several broad categories of eligibility for Green Projects, which contribute to environmental objectives such as: climate change mitigation, climate change adaptation, natural resource conservation, biodiversity conservation, and pollution prevention and control."

18 Moody's: Green Bonds – Global: Green bond issuance to hit $200 billion in 2019, January 2019, p. 3

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