Peter Cody, CFA

Principal,
U.S. Investment Grade Credit Research

Tatiana Spineanu, CFA

Principal,
European Investment Grade Credit Research

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The Potential Implications of Investing in Coal-Heavy Utilities

The intensifying debate about the continued need for coal-fueled electrical generation and its role in climate change has highlighted the potential implications of investing in coal-intensive utilities. As a historically significant fuel source, thermal coal continues to have a sizable presence in the U.S. and European utility sectors, despite significant declines in recent use.

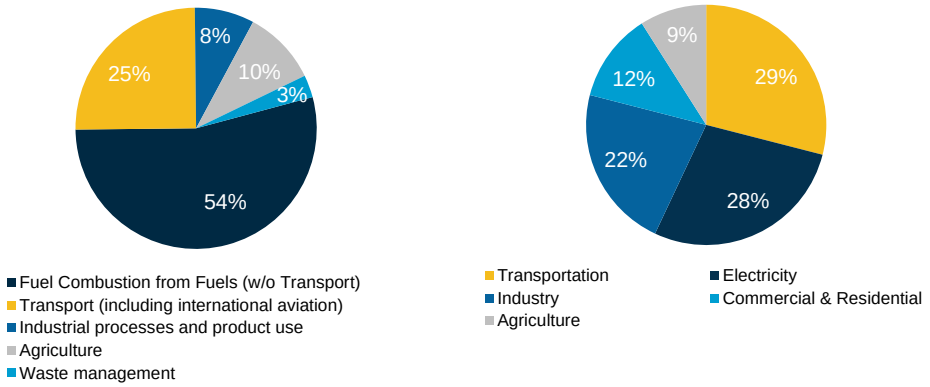
Several factors—including evolving regulations, shifting dynamics across commodity markets, declining costs of renewable electrical generation, and mounting environmental concerns—continue to affect the economics of coal-fueled electrical generation.

With these factors in mind, this paper addresses a primary investment-related question: Do (or will) utility bonds issued by more coal-heavy or carbon-intensive utilities trade at a discount? Or stated differently, what are the implications from the relationship between bonds issued by coal-heavy utilities and those issued by utilities with less reliance on coal?

Fuel for the Debate

Despite recent improvements in utility greenhouse gas (GHG) emissions amid coal-plant retirements, new regulatory targets, adoption of renewable sources, and improved efficiencies, the electric utility sector remains the largest industry contributor to GHGs in the European Union and the second largest industry contributor in the U.S. (see Figure 1). **Therefore, the focus on reducing the industry's GHG emissions often centers on coal use given that its carbon intensity is about double that of natural gas.**[1]

FIGURE 1: EU and U.S. Greenhouse Gas Emissions (2017 % of MMT CO2 Equivalents)[2]



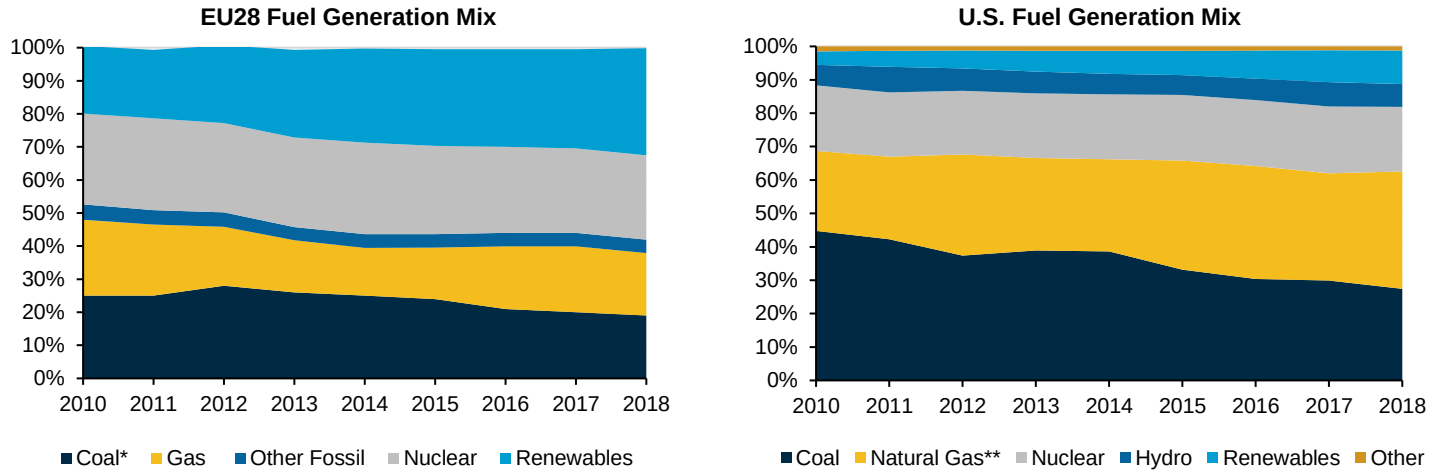
Sources: Eurostat and the U.S. Environmental Protection Agency. MMT is million metric tons.

[1] *The carbon intensity of coal can be measured at about 100 kg CO2 per million BTUs (depending on the coal type), and the carbon intensity of natural gas is measured at 53 kg of CO2 per million BTUs, according to the U.S. Energy Information Administration (EIA).*

[2] *When comparing industries, the amount of GHGs produced by weight is a reasonable measure. When comparing individual utilities, carbon intensity is preferable. Carbon intensity is a measure of how much CO2 is produced per unit of electricity generated, and as such, normalizes for the size of a utility and its generation fuel mix.*

In a historically slow-moving industry, utilities' fuel mix continues to change rapidly. While the largest gainers differ—renewables in Europe rose from 20% in 2010 to nearly 33% by the end of 2018 and natural gas in the U.S. rose from 24% in 2010 to 35% by the end of 2018—the decline in coal use is common across the regions. **Yet, it still comprised 27% of the generation mix in the U.S. and 19% of the generation mix in the EU at the end of 2018 (see Figure 2).** Pockets of concentrated use also remain. For example, Poland has the highest installed coal capacity of any country in the EU at more than 70%, followed by the Czech Republic at nearly 50%. However, Germany is first in absolute terms (gigawatts (GW) of coal installed capacity), accounting for over 30% of the EU28 coal.[3] In the U.S., coal-fueled generation was the most common form of electricity in 18 states in 2017, still exceeding the 16 states where natural gas generation was the most common form of electricity.[4]

Figure 2: EU and U.S. Electricity Generation by Major Energy Source (2010-2018)



*Source: The European Power Sector in 2018, Agora Energiewende, and the U.S. EIA. *Consists of hard coal and lignite. **Consists of dry and liquid natural gas.*

Economics of Coal Generation

Regulatory Push

Given coal's continued significance in the utility sector, the numerous headwinds against its use as a major fuel source will likely mount with the potential to affect the credit market's perception of coal-heavy utilities. One source of these headwinds is the regulatory climate that continues to affect the economics of coal-fueled generation. At the EU level, the main climate policy instrument has been the Emissions Trading Scheme (ETS), which was launched in 2005, with power generation accounting for more than 60% of the covered CO2 emissions. Since early 2018, the carbon credit price has rebounded—from below €10/ton of CO2 from 2012 through 2017 to about €25/ton of CO2 currently—with support from the Market Stability Reserve and its removal of excess allowances from 2019 through 2023. The recovery in the price of carbon credits has rendered coal plants, particularly the less efficient ones, more expensive to run and frequently incentivizes utilities to switch to natural gas as a fuel source. **In addition to the ETS, we expect the EU's climate and energy framework for 2030 and 2050 to continue accelerating the energy transition in Europe (see Figure 3).**

Figure 3: An Accelerating EU Climate and Energy Framework for 2020, 2030, and Beyond

Year	GHG Emissions (Relative to 1990)	Share of Renewable Energy in Gross Final Consumption	Improvements in Energy Efficiency (Relative to 2007 Projections)
EU 2020 Targets	Reduction of 20%	20%	20%
EU 2030 Targets	Reduction of 40%	32%*	32.5%*
EU 2050 Roadmap	Reduction of 80-95%	80%	~50%

Source: European Commission and PGIM Fixed Income. The EU directive includes an upward revision clause in 2023.*

[3] *According to The European Network of Transmission System Operators for Electricity. Just two countries, Germany and Poland, are jointly responsible for around half of the EU's installed coal capacity.*

[4] *According to the U.S. EIA.*

With the EU planning to nearly eliminate CO2 emissions by 2050, most member countries have announced plans to phase out coal generation, with some large countries (France, the UK, Italy, and Sweden) anticipating a phase out as early as 2025. However, in many cases, implementation details (e.g. plant level closure dates) remain missing. Germany, Poland, and the Czech Republic—where most of EU's coal capacity and CO2 intensity is located—are still expected to clarify their policies. Germany has recently announced a 2035-2038 closure horizon (with compensation likely to be paid to utilities), while Poland lacks any phase-out plans and expects coal to account for 60% of its generation by 2030 (see Figure 4).

A similar, fractured approach exists in the U.S. where most utilities are governed by state, not federal, regulations. States with an environmental agenda have been able to push for progressively higher renewable generation targets in spite of recent federal attempts to preserve coal-fired generation. The most aggressive states—including California, Nevada, New Mexico, Washington, and Hawaii—have set renewable portfolio standards (RPS) of 100% renewable energy by 2050.[5] However, the state-by-state approach segments the country into 30 jurisdictions with RPS (generally less aggressive than California and Hawaii, for example), nine jurisdictions with voluntary goals, and 14 jurisdictions with no standards or targets (see Figure 5).[6]

Although some states without RPS have significant coal mining operations, coal extraction has been relegated to a minor role in the U.S. economy. State efforts and political rhetoric aimed at continued or increased coal generation are likely to be dwarfed by states with aggressive environmental targets as well as prevailing market forces throughout the utility industry.

Figure 4: National Coal Phase-Out Plans in Europe

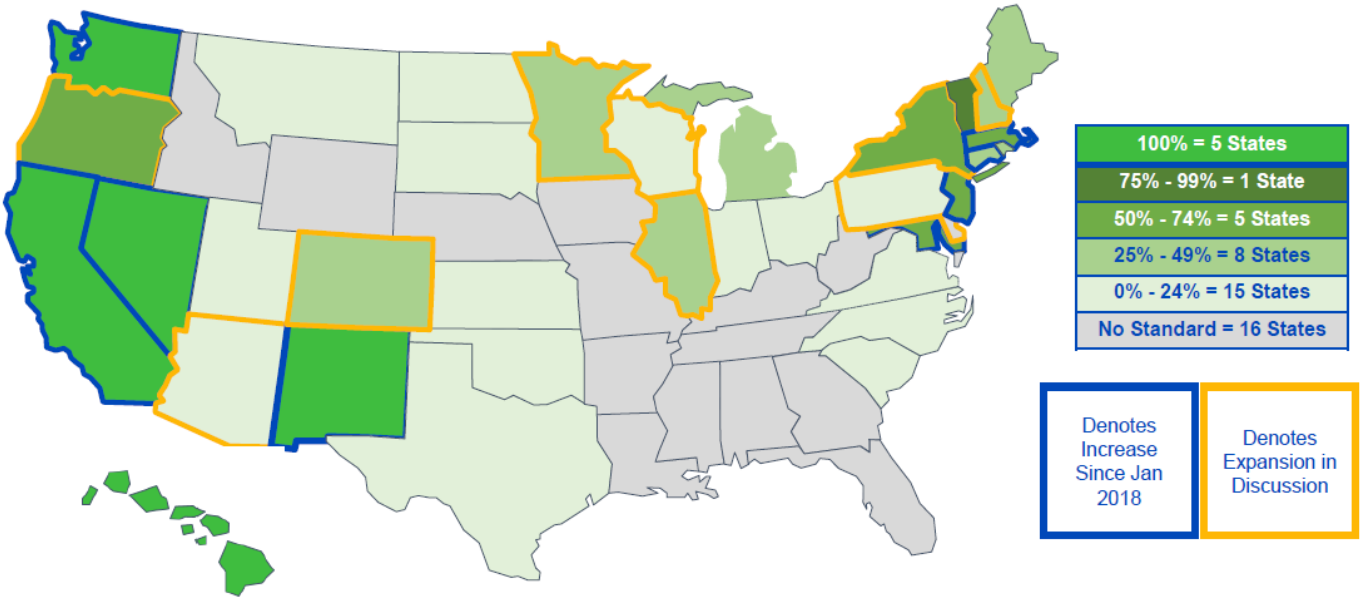
Country	Phase-Out	Deadline	Comments
Belgium	Coal free		The first and only EU country to become coal free (March 2016). Closures driven by EU pollution control regulations.
Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta	Coal free		No coal plants, although some have other CO2-generating technologies.
Austria	Announced	2020	The two remaining coal plants to close in 2019 and 2020, respectively.
Sweden	Announced	2022	Goal to be one of the first fossil fuel free developed countries in the world.
France	Announced	2023	President Macron brought this forward to 2021, although policy measures still pending.
UK	Announced	2025	The first country in the world to announce a coal phase-out and to set into law a zero CO2 target for 2050. Coal now supplies less than 5% of the electricity generated in the UK, down from 40% as recently as 2012.
Slovakia	Announced	2023	Target released in June by the new President and PM.
Ireland	Announced	2025	
Italy	Announced	2025	Plan is non-binding, with executive measures still pending.
Netherlands	Announced	2029	Legal ban on coal power production from January 1, 2030. Compliance with 2020 GHG reduction targets may lead to some early closures.
Finland	Announced	2029	Coal ban after May 2029, with incentives for companies that close plants before 2025.
Spain	Announced	2030	Draft national plan includes retirement of 5GW of coal by 2025 and all by 2030; target of 74% renewable generation share by 2030.
Portugal	Announced	2030	Coal closures expected before 2030. Roadmap to CO2 neutrality by 2050.
Denmark	Announced	2030	Orsted to close coal by 2023 with only a few small coal-based combined heat and power plants remaining.
Germany	Under discussion	2038	Option for 2035. 12.5GW coal closing over 2018-22. Draft bill on closures and compensation for utilities expected by the fall. Targeting 65% renewable generation by 2030.
Hungary	Under discussion		Good chance of phase out by 2030 at the latest.
Poland	No plans		Government supports coal. Five new units under construction.
Czech Rep., Bulgaria, Croatia, Greece, Romania, Slovenia	No plans		Governments support status quo with new units being planned/recently launched in some countries.

Source: Europe Beyond Coal, PGIM Fixed Income as of August 2019

[5] *California, Nevada, New Mexico, and Washington have adopted 100% "carbon free," which typically includes hydro and nuclear generation in addition to traditional renewables.*

[6] *According to the National Conference of State Legislatures. The jurisdiction counts include Washington D.C. and territories.*

Figure 5: The State Approach to Renewable Generation in the U.S. (2050 Renewables Portfolios Standards)

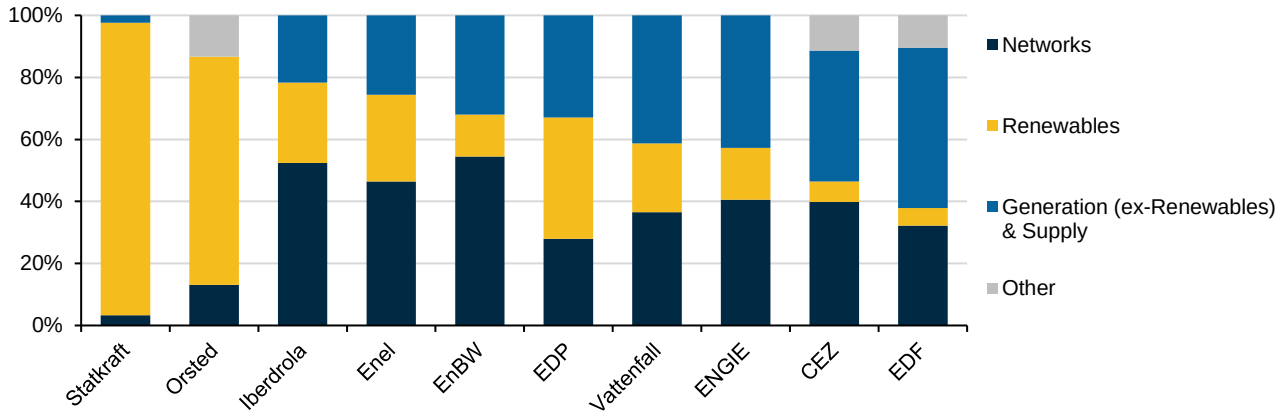


Source: NextEra Energy Resources June 20, 2019 Investor Presentation.

Corporate Steps

Individual utilities reflect the industry's tangible steps towards decarbonization and reduced coal use. **In Europe, most companies have refocused their businesses on higher-quality regulated networks, subsidized renewable generation, and contracted services, while reducing exposure to commodity-driven activities. As recently as 2012, the European integrated utility sector derived around half of its EBITDA from merchant activities (including thermal generation, oil and gas exploration and production, mining, etc.)—and we estimate that this share averaged a quarter in 2018 (see Figure 6).**

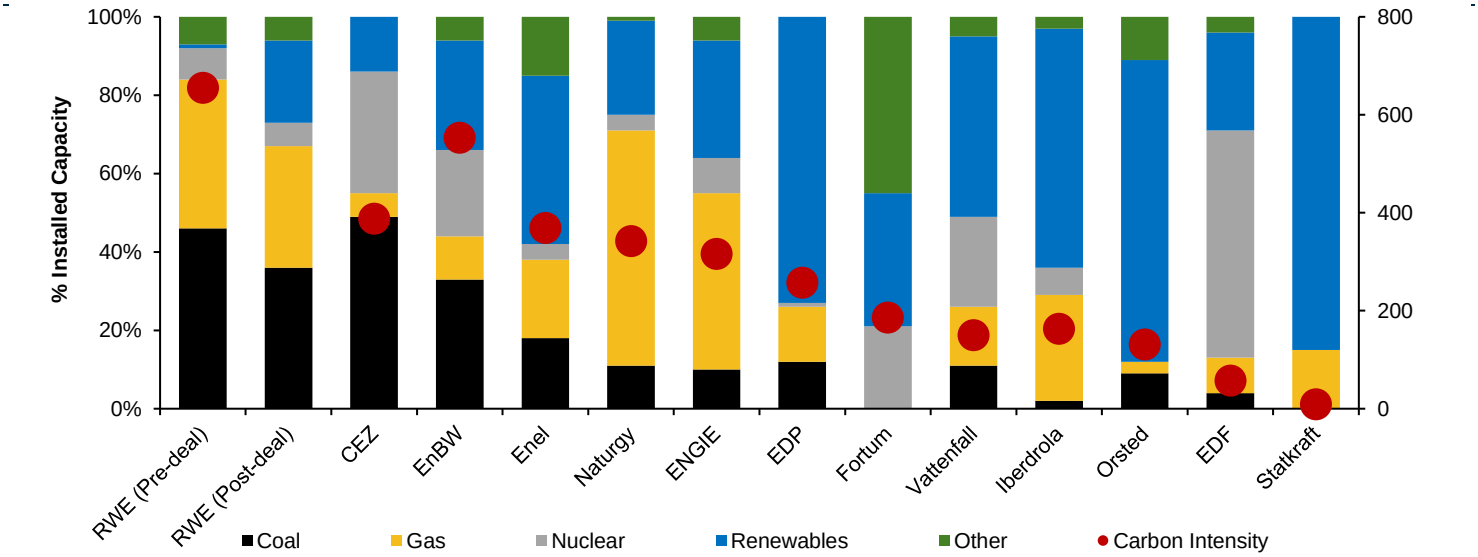
Figure 6: European Integrated Utilities EBITDA Mix in 2018



Source: Company reports and PGIM Fixed income. Note: For Orsted, Vattenfall, and Statkraft "Networks" include Heat. Statkraft mix is estimated. "Other" includes mining, construction, other energy-related services, etc.

Although falling profits in the merchant businesses have also played a role, the change in EBITDA mix primarily reflects management action (e.g. asset sales/demergers, "green" acquisitions, organic investment, plant mothballing/closures, etc.). For example, RWE, a pure power generator with one of the highest CO2 intensities in the European sector (see Figure 7), is set to lower its intensity through an asset swap deal with E.ON where they exchange their stake in Innogy for the renewable power portfolios of both E.ON and Innogy.

Figure 7: European Integrated Utilities Installed Capacity Mix and CO2 Intensity in 2018 (gCO2/kWh)



Source: Company reports and PGIM Fixed Income. Note: "Other" includes pumped storage, other thermal plants, fuel oil, other non-renewable power, combined heat & power (CHP), and/or biomass. For Fortum, "Other" refers mostly to CHP plants (41% of the mix). RWE's CO2 intensity following the transaction with E.ON is unknown, but should be significantly lower vs. 2018.

The change in business mix is also evident in corporate results. In a recent investor presentation, Enel emphasized that "decarbonisation improves margins," showing that the levelized cost of electricity in its solar portfolio provides about 20% extra margin over thermal generation. For further context, Enel's Italian Thermal Generation & Trading operation has posted extremely low EBITDA margins (in the low single digits) relative to the healthier margins in its renewable operations.

While virtually all European companies are implementing energy transition strategies, the pace of change varies widely. For example, Iberdrola and Orsted have significantly improved their generation mix and lowered their CO2 intensity, while RWE, CEZ or ENBW retain higher CO2 generation portfolios (again, see Figure 7).[7] Nordic utilities have historically benefited from greener generation given the region's prevalence of hydro-power. Interestingly, a number of European utilities—including Centrica, EDF, Enel, Iberdrola, Naturgy, and Vattenfall—have targeted carbon neutral generation by 2050, in line with EU targets.

While U.S. utilities generally lag their European counterparts in terms of carbon-neutral generation, several market factors, such as cheaper natural gas and subsidized renewable costs (wind and solar generation), continue to make coal generation increasingly uneconomic and incentivize companies to adjust their generation sources. One notable difference between the U.S. and European markets is the availability of inexpensive natural gas in the U.S., largely due to fracking, making it a cheaper fuel source than coal in many regions of the country. **While natural gas-fired generation also emits GHGs, its lower-carbon intensity means that if a U.S. carbon tax were to ever materialize, a natural gas-fired generation plant would be less affected than a coal-fired plant.**

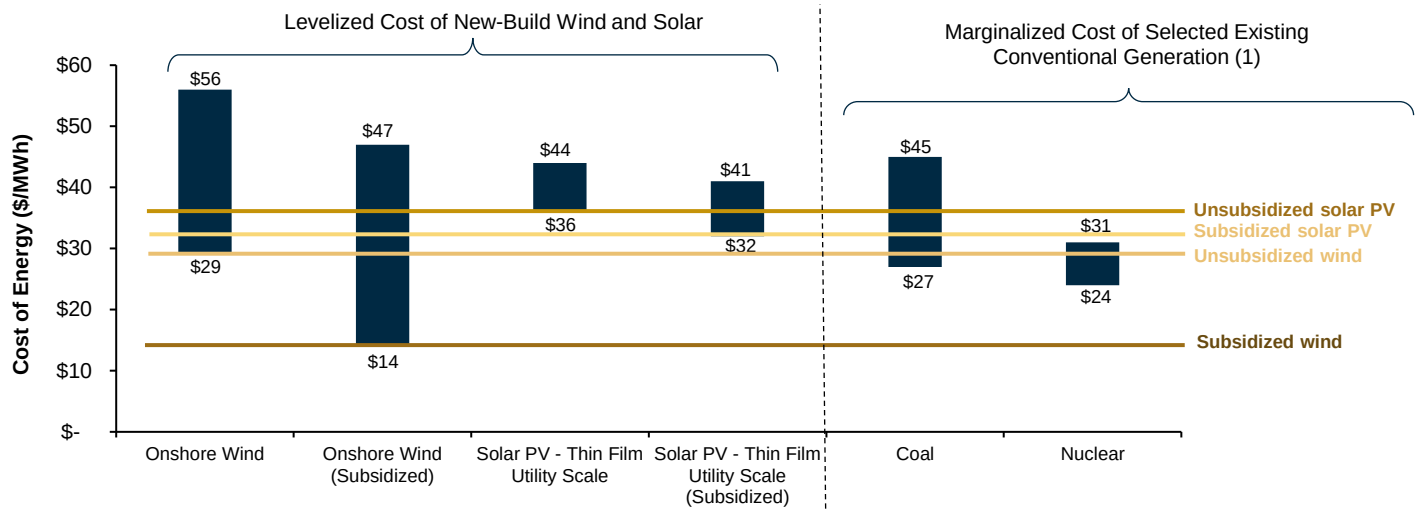
The falling cost of renewables also contributes to reduced coal generation globally. When coupled with subsidies, the all-in cost of renewables (including financing) is frequently cheaper than the marginal fuel costs for existing fossil-fired generation. For example, Figure 8 shows that the levelized, subsidized cost of newly built onshore wind in the U.S. (midpoint range of $30.50/MWh) is well below the marginal cost (fuel expense) of existing coal generation (midpoint of range $36/MWh).[8] **With that backdrop, certain U.S. utilities, such as Xcel Energy and WEC Energy Group, have stated goals to dramatically reduce or even eliminate carbon emissions within 30 years.[9]**

[7] *Enel, one of the largest renewable power companies in the world, retains material CO2 intensity (only half of its power output in fiscal year 2018 was emissions-free, although this share is expected to grow to around 60% by fiscal year 2021. We believe that part of Enel's high CO2 intensity is attributable to restrictions on closing coal capacity due to reserve requirements.*

[8] *MWh is megawatt hour. The U.S. EIA defines levelized cost of electricity as the average revenue per unit of electricity generated that would be required to recover the costs of building and operating a generating plant during an assumed financial life and duty cycle.*

[9] *The Xcel Energy information is from pg. 14 of its August 2019 investor presentation. The WEC Energy information is from pg. 17 of its August 2019 investor presentation.*

Figure 8: Renewables: Becoming a Cheaper Generation Source in the U.S.



Source: Lazard

While renewable generation continues to cheapen, it still suffers from intermittency, i.e. it does not produce electricity without sun or wind. Therefore, electrical grids continue to require significant conventional generation—fueled by coal, gas, or nuclear—to provide support when renewable output drops, therefore limiting the total amount of renewables currently being deployed. **However, if batteries can become cheap enough to provide large-scale, cost-effective power storage from renewables, the amount of conventional generation required for electrical grid support would drop significantly. This would also facilitate further declines in utility carbon emissions.**

Furthermore, some U.S industry participants, such as NextEra, believe that even without subsidies, the renewables/batteries combination will be competitive in the U.S. within about five years. "With continued cost and efficiency improvements, we expect new firm wind and solar to be cheaper than the operating cost of coal, nuclear, and less efficient, oil and gas-fired generation units, even after the tax credits phase down early in the next decade," said NextEra's Chief Financial Officer Rebecca Kujawa, during its second quarter 2019 earnings call.[10]

Investors' ESG concerns pose another consideration regarding investments in coal-heavy utilities. If this investor base were to reach critical mass, it could conceivably affect the cost of capital for a utility with significant coal use. **In Europe, the focus on carbon intensity/coal exposure continues to mount, particularly among Nordic investors, and we cannot rule out a scenario where the European investing community places restrictions on coal assets, similar to its treatment of the tobacco sector.**

Do Investors Differentiate by Carbon Intensity?

With a backdrop of continued, sizable coal use that is countered by mounting headwinds, one might expect that investor sentiment toward utility companies' carbon emissions could impact bond prices.

Therefore, we analyzed new issue credit spreads for a group of large U.S. and European utilities over the last two years in an effort to identify a correlation between spread level and carbon intensity. **After adjusting for credit quality, duration, liquidity, etc., we were unable to find a clear, statistical link between the two factors in the U.S. and European utility sectors.**[11, 12]

One possible reason for the lack of spread differentiation is that investors, including those sensitive to ESG, may believe that the utility-GHG issue will diminish in importance relatively quickly given the ongoing reduction in coal-fired generation. **While it's possible that investor sentiment regarding carbon-heavy utilities has yet to materially shift amid a perception that the carbon issue may**

[10] Call held on July 24, 2019. Transcript retrieved from Bloomberg. In this usage, "firm" pertains to base load, or full-time availability of an electrical generating asset.

[11] Nor did we identify a general relationship between utilities that have reduced their carbon footprint more aggressively relative to those that have decarbonized less aggressively. Our findings are supported by the fact that U.S. green bonds do not appear to trade at a premium to traditional utility bonds. Even in Europe, which leads the charge in green bond issuance (five out of world's ten largest corporate green bond issuers are European utilities), we struggled to find any green bond spread premium over similar maturity bonds of the same issuer. The comparison between green bonds and traditional bonds comprised an evaluation of issues from ENEL SpA, EDP (Energias de Portugal) Finance B.V., Engie SA, and Iberdrola International B.V.

[12] Though with Utilities and Energy accounting for about half of all corporate green bonds outstanding, there is some diversification value for investors in owning green bonds in other European sectors, such as Transportation or Construction, which could trade at a small premium (2-3 bps) to Utilities' green bonds.

expeditiously self-correct, the timing of any rectification remains difficult to pinpoint.[13] Another potential reason is that ESG-focused investors in the U.S. have not yet reached a scale where their security selection influences credit spreads.

However, there are some important insights to be gleaned from the lack of a general relationship across the sectors. There are signs of market responses to meaningful shifts to renewable generation sources. For example, in Europe, Orsted benefited from its repositioning in offshore wind power and the disposal of its oil and gas business, which contributed to a positive equity repricing. While it's uncertain whether the factors that influence the differences in equity valuations could eventually affect credit spread relationships, it indicates that markets may be starting to differentiate utilities by their coal and carbon footprints.

For fixed income investors focused on GHG emissions, perhaps the most important aspect is not whether coal-intensive utilities currently trade at a discount to less-coal intensive peers, but whether they might trade at a discount in the future. With that scenario in mind, the lack of general differentiation between the credit spreads for coal-intensive utilities and those with less coal-intensity could be considered inexpensive—or even free—insurance against a future scenario where the market starts to demand wider spreads on coal-intensive utilities, particularly given the numerous factors set to weigh on coal usage going forward.

PGIM Fixed Income's Approach

PGIM Fixed Income believes that integration of ESG criteria into the investment process allows us to identify companies with sustainable competitive advantages that will ultimately maximize clients' investment returns.[14]

In terms of investing in the utility sector, the key ESG focus generally centers on environmental issues. **Despite the broader lack of correlation between coal intensity and credit spreads across the sector to this point, if our bottom-up security selection process identifies a utility with a smaller environmental footprint or the prospects for a meaningfully reduced footprint in the foreseeable future—without giving up any yield—we select that security (all else being equal). That rationale aligns with the concept of identifying utilities with less-carbon intensity, but with similar yields as those with greater carbon intensity, as a form of insurance if the market starts to demand wider spreads for relatively large carbon footprints.**

For utilities with bigger environmental footprints, we require a credit spread premium to compensate for the risk that it might have to bear the costs of a carbon tax or stranded costs in the future (due to potential regulatory action, for example). We evaluate the magnitude of a required spread premium based on a utility's current business model, the effectiveness and feasibility of its future operational goals, and management's commitment to those goals.

CONCLUSION

The decarbonization of the U.S. and European utility industry will likely continue into the foreseeable future, yet it remains very difficult to say whether the pace will be fast enough to quell public concern regarding utilities' carbon emissions.

Although the credit markets have yet to distinguish between utilities' current or future coal use, focusing exposure on those with less coal and carbon intensity can be thought of as cheap (or even free) insurance against the possibility that investors begin to demand a higher premium for the more carbon intensive utilities in the future.

Therefore, it makes sense for investors in utilities to consider tactically allocating away from more carbon-intensive issuers (and those with slower carbon reduction plans) in favor of those with similar yields and lower-carbon footprints or with only transmission and distribution businesses.

[13] *From an anecdotal perspective, we've observed that European investors tend to prefer utilities with more advanced and clear strategies regarding the changing market and regulatory environment with the caveat that there are many other factors that could, and do, impact trading levels and spread performance over time. These can include sovereign concerns, including state ownership and support track record, operating environment and competition, company specific financial policies, including M&A or deleveraging strategies.*

[14] *The utility sector highlights the differences between Socially Responsible Investing (SRI) and ESG investing. We view SRI as an investment approach that explicitly seeks to achieve non-investment goals (e.g. positive environmental impact) in addition to more traditional investment objectives. We view ESG as an investment approach that first seeks to achieve more traditional investment objectives (e.g. maximizing risk-adjusted returns), while incorporating ESG factors into the investment process. ESG investing doesn't necessarily mandate a social or environmental goal, but rather seeks improvement in these areas by formally elevating these considerations into the investment process.*

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as of September 2019.

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