MSCI ESG Research LLC

Industry Insight: Utilities

Biden's Quest to Decarbonize U.S. Power Generation

Velina Karadzhova, Umar Ashfaq I December 2020

U.S. President Elect Joe Biden has announced the target of achieving net-zero carbon emissions in the United States by 2050. The target year for the electricity sector is even stricter: 2035[1]. We examined which U.S. utility companies may benefit the most from this expected change in climate agenda course. Our findings suggest that climate policy clarity could minimize asset stranding risks and optimize investment decisions for almost all companies:

- **Change in course is timely** – Coal-fired power plants operational as of 2020 in the US are aged, around 35 years old as of November 2020,[2] and could be, therefore, retired at minimum cost. Existing stock of gas-fired power plants would be of similar age by 2035. With minimum lifespan of such assets of around 30 years[3], any new investments could face asset stranding risks, should the US target full decarbonization of power generation by 2035. So, companies with modest decarbonization efforts such as **Allete, Otter Tail, PPL, Black Hills** would likely be nudged to re-think their strategies just in time.
- **Utilities' transition plans need a step up in ambition** - despite widespread adoption of decarbonization targets by U.S. utilities, only a handful plan to reach a near zero carbon intensity for their electricity generation by 2035 (**CMS Energy, Nextera, Edison International, Exelon and Clearway Energy).**
- **Utilities appear to leave growth potential on the table** - Data from available investment plans[4] showed that new renewables generation capacity was still the smallest investment category – only around 10% (Exhibit 4). Leaving a market with high growth potential underinvested could open the door for more non-utility players, and ultimately increase the competition for projects for utilities.

[1] "The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future." November 24, 2020
[2] U.S. operating power plants data retrieved via S&P Market Intelligence
[3] Jean J., Borelli, D. and Wu, T., 2016, "Mapping the Economics of U.S. Coal Power and the Rise of Renewables" MIT Energy Initiative
[4] US-based companies that are constituents of the MSCI ACWI Investable Market Index (MSCI ACWI IMI) as of July 2020 classified in the Utilities sector, excluding those exclusively engaged in water supply and sewage. Industry classification follows the Global Industry Classification System (GICS®)

Putting Biden's Target Year of 2035 into Context

Decarbonizing the U.S. power generation sector by 2035 would be a difficult task, as coal and gas are still major fuels for electricity production. Fossil fuels contributed around 63% of US total electricity generation in 2019, which was just over 4,000TWh or around 16% of global electricity generation in 2019.[5] Replacing coal and gas generation output with renewables **could require onboarding an additional generation capacity of around 700-800GW in the next 15 years** (excluding potential demand growth due to electrification and assuming an average load factor of 30% for renewables). This amount is broadly equal to the current stock of 250GW coal-fired and 540GW of gas-fired capacity in the U.S. – capacity which has been built over the past 50 years (Exhibit 1).

Given the size of the challenge and the potentially short timeline for decarbonization, U.S. utilities might face the imposition of aggressive decarbonization policies under a Biden administration. But Biden is likely to face push-back from elected Republicans that are reticent to pass sweeping climate legislation[6]. Regardless, we can look at what the European Union (EU) has done to decarbonize to understand what might be possible under a new Biden administration.

The EU has had air pollution and decarbonization policies in place since the late 1980s. The earliest Large Combustion Plant Directive (LCP), tackling power plant air pollutants, was introduced in 1988, and tightened most recently in 2010 and 2020. The White paper on Renewable energy sources of 1997 laid the foundations of targets and subsidies for new zero-carbon technologies (solar, wind, biomass, etc) and the EU Emissions Trading Scheme started in January 2005. Yet, the share of fossil fuels in EU's electricity generation has **only decreased by 15%**, from 53% in 2000 to 38% in 2019[7]. Coal-fired power generation was reduced more substantially in the interim, from 31% in 2000 to 15% in 2019[8].

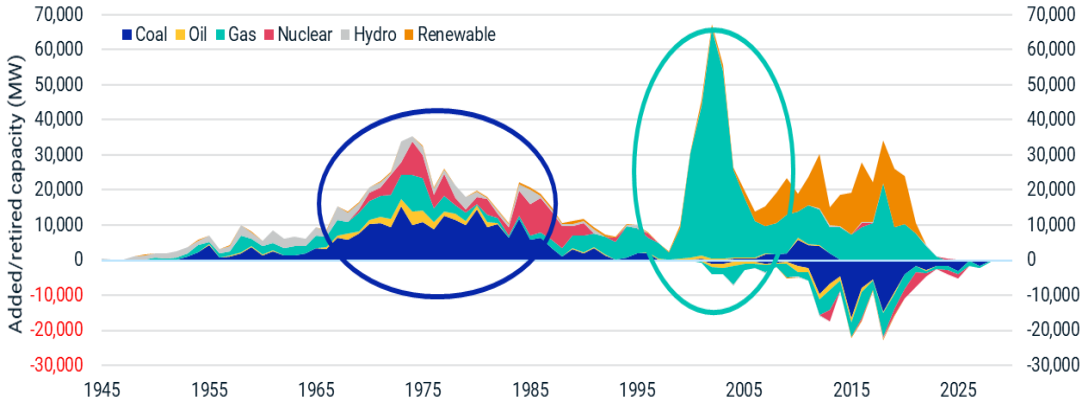
EU member states are now under pressure to act faster, so some governments have implemented **mandatory deadlines for the phase out** of coal/fossil fuel use in power generation. Mandatory phase outs and the latest tightening of the emissions regulations (LCP) could prove to be the most powerful policy tool for EU member states so far. The approved coal phase out plans in Spain (2025-2030), Italy (2025), Netherland (2030) and Germany (by 2038) could remove around 230TWh from the remaining 490TWh of coal power generation in Europe[9].

[5] Statistical Review of World Energy 2020, BP
[6] L. Friedman "The Republican Climate Agenda." Feb. 19, 2020
[7] Statistical Review of World Energy 2020, BP
[8] Statistical Review of World Energy 2020, BP
[9] Europe Beyond Coal and Statistical Review of World Energy 2020, BP

Utilities can Retire Existing Fossil-fuel Generation Assets at Limited Cost

The challenge for U.S. power generators is primarily on the execution side, i.e. seizing the investment opportunity, rather than a stranded assets risk. Most coal-fired power plants currently in operation are almost 40 years old (Exhibit 1). Hence, investments have been largely recovered. Gas-fired power plants are newer, most were built in the early 2000s and are expected to reach the lower end of their technical useful lives during the 2030s (Exhibit 1).

Exhibit 1: U.S. Power Plants by Fuel and by Year of Addition/Retirement



Source: MSCI ESG Research LLC, U.S. Energy Information Agency Form 860 2018a, as of July 2019

Planning for future investments so that zero-carbon additions support retirement of fossil fuel capacity would not only limit asset stranding costs but also replace aged infrastructure. Still, U.S. utilities' carbon reduction commitments and near-term investment plans do not yet indicate full decarbonization by 2035.

Only a Handful of U.S. Utilities Plan to Decarbonize their Power Generation by 2035

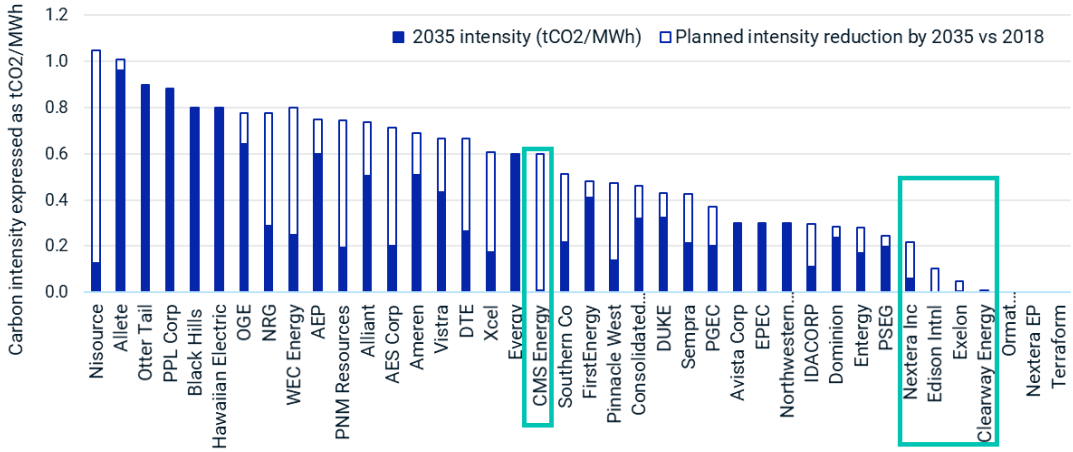
We identified 42 companies that are constituents of the MSCI ACWI Investable Market Index (MSCI ACWI IMI) as of July 2020 classified in the U.S. utilities sector[10] that have power generation activities. Based on the companies' disclosed decarbonization targets (or lack thereof), we estimate that only five U.S. utilities (12% of power generators) plan to reach a near zero carbon intensity for their electricity generation by 2035 – **CMS Energy, Nextera, Edison International, Exelon, and Clearway Energy** (Exhibit 2). The latter three of those companies already have very low-carbon fuel mix and hence carbon reduction does not present a significant challenge.

Further seven companies have net zero commitments, albeit targeting 2050 rather than 2035 - **Xcel Energy, Dominion Energy, Southern Company, Entergy, Duke Energy, Public Service Enterprise Group (PSEG) and Pinnacle West.** Of those, **Xcel** and **Southern** have

[10] Industry classification follows GICS

the highest carbon intensity at present and we estimate that their interim targets could deliver substantial emissions reductions by 2035 (Exhibit 2). In addition, **Nisource, NRG Energy, PNM Resources, AES** and **DTE Energy** also plan substantial carbon emissions reductions across their fuel mix. Despite those commitments, all those companies would need to accelerate their plans if carbon neutrality is to be achieved by 2035.

Exhibit 2: Estimated Carbon Intensity of Power Generation in 2035 for Selected U.S. Utilities

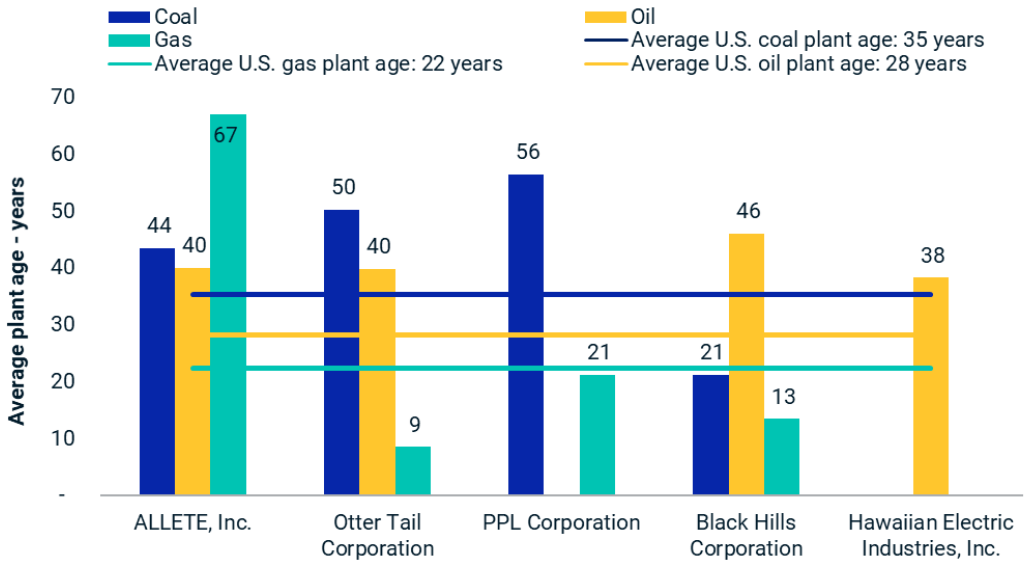


Source: MSCI ESG Research, data as of May 2020, except for WEC Energy and Pinnacle West's data updated as of November 2020

Notes: 1) Carbon intensity of power generation is calculated as annual carbon emissions (in CO2 tonnes) divided by annual power generation (in MWh). It is expressed as tonnes CO2 per MWh (tCO2/MWh). 2) Company target intensities for 2035 were approximated based on disclosed company targets; where decarbonization targets fall prior to or after 2035, the target is equally prorated over the period; 3) Company target intensities are estimated assuming generation output in 2035 in MWh remains at 2018 level; 4) Where companies do not appear to plan to make any reductions in carbon intensity (no empty blue bar), companies either have no decarbonization target or they have already overachieved their initially planned targets and the solid blue bars represent their 2018 carbon intensity; Company abbreviations: AEP = American Electric Power Company; PSEG = Public Service Enterprise Group Incorporated; PGEC = Portland general Electric Company; EPEC = El Paso Electric Company

Conversely, **Allete, Otter Tail, PPL, Black Hills** and **Hawaiian Electric Industries** were among the U.S. utilities that had the highest carbon intensities of electricity generation (as of FY2018) - yet appear to plan no or limited emissions reductions. Moreover, the average age of the carbon-intensive power generation assets for all the aforementioned companies was much higher than the U.S. average (Exhibit 3), which is likely to facilitate the transition to a low-carbon generation fleet via lower asset retirement costs. If companies continue to invest capital in fossil fuel power generation assets, guided by such limited decarbonization ambitions, they could face increased asset stranding risk and limited opportunities to expand in zero carbon technologies.

Exhibit 3: Utilities with the Highest Carbon Intensity Have Ageing Power Generation Plants



Source: MSCI ESG Research, as of November 2020, S&P Market Intelligence

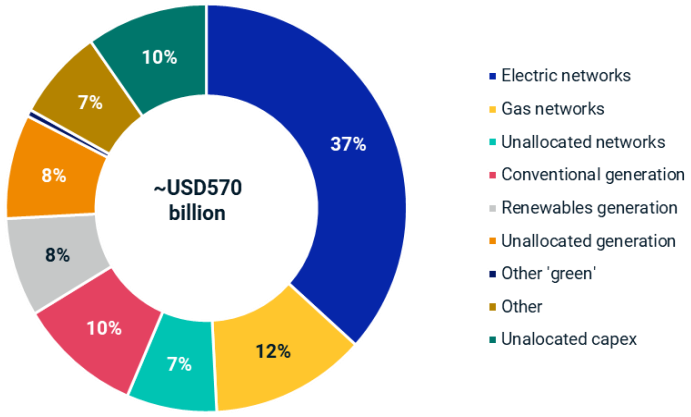
Investments in Renewables Remain Low for most Utilities

While we identified a wide adoption of decarbonization targets among U.S. utilities with varied ambition levels, near-term investment plans still lack a strong focus on renewables. Our review of companies' investment plans[11], indicates that planned investments in new renewables capacity accounted for under 10% of total capital expenditure planned. (Exhibit 4). This share is lower than the investments planned in conventional generation, which also includes nuclear – at 10% and lower than investments in gas transportation networks - 12% - which could also face asset stranding risk as the use of gas declines (subject to regulatory provisions).

We found that a disproportionally large amount of investments was allocated toward electric networks, (37% of total planned investments, Exhibit 4). Investment allocation decisions are influenced by the business mix of the companies in the peer set, nonetheless earnings visibility and the essential role in enabling the energy transition could contribute to the investment attractiveness of regulated electric networks. Similarly, a clear policy direction for electricity generation could enable utilities to optimize capital allocation towards zero-carbon generation. Electric infrastructure is a key enabler of the energy transition, along with the replacement of power generation capacity.

[11] US-based companies, constituents of the MSCI ACWI IMI Index and classified in the Utilities sector as of July 2020, excluding those exclusively engaged in water supply and sewage. Industry classification follows the Global Industry Classification System. Companies investment plans broadly cover the period of 2020-2025, but exact periods vary.

Exhibit 4: Renewables Account for Under 10% of Total Planned Investments by U.S. Utilities

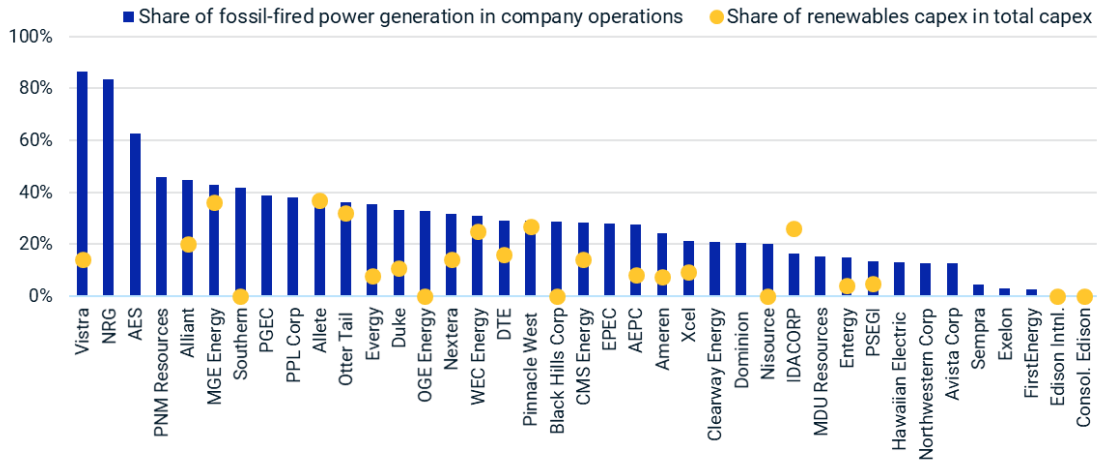


Source: MSCI ESG Research as of October 2020, company disclosures

Notes: 1) Unallocated networks = unclear if it relates to electric or gas networks; Conventional generation = coal and gas-fired, oil-fired, nuclear; Renewables generation = wind, solar, hydro and other or any capex classified as renewables by the reviewed companies; Unallocated generation = identified as allocated to generation assets, but unclear generation fuel; Other green = electric vehicles charging, batteries, hydrogen; 2) U.S.-based companies, constituents of the MSCI ACWI IMI Index and classified in the utilities sector as of July 2020, excluding those exclusively engaged in water supply and sewage. Industry classification follows the Global Industry Classification System. Companies investment plans broadly cover the period of 2020-2025, but exact periods vary

At company level, the picture is mixed. Again, only a handful of U.S. utilities - **Pinnacle West, MGE Energy, Allete, Otter Tail, WEC Energy, IDACORP.** - stood out with investment plans that envisage investments in renewables that hold an equivalent share as their present carbon-intensive generation assets (Exhibit 5). Companies investment plans generally cover three to five years, so visibility until 2035 is not available and plans can be adjusted. Still, a sluggish start to build-up zero-carbon capacity could be concerning for investors, as companies may not be able to replace decreasing fossil fuel earnings immediately or face financial penalties for carbon abatement in line with regulatory limits on carbon.

Exhibit 5: Share of Renewables in Capex Plans Remains Below the Contribution of Fossil-fuel Power Generation to Company Operations



Source: MSCI ESG Research as of October 2020, company disclosures

Notes: Share of fossil-fired power generation to company operations is estimated on the basis of fixed assets and following MSCI's revenue estimation model (MSCI ESG Climate Change Metrics Methodology, May 2019); Company capex plan analysis is limited due to availability of company disclosures; Company abbreviations: PGEC = Portland general Electric Company; EPEC = El Paso Electric Company; AEPC = American Electric Power Company; PSEG = Public Service Enterprise Group Incorporated;

Two of the largest U.S. utilities, **Southern Company** and **Duke Energy**, seemed to have modest investments in renewables compared to their large fossil fuel generation base (Exhibit 5). Both companies combined generate around 300TWh annually from fossil fuels, which represented almost 8% of total annual U.S. power generation (around 4,000TWh in 2019). Generators of such scale may need to bet on an early transition due to the added complexity from the sheer scale of their operations.

Overall, most U.S. utilities would need to re-think their longer-term strategies and targets if they were to achieve full decarbonization by 2035. Nonetheless, changing course is still possible now. Companies could optimize their investment decisions and minimize asset stranding risk if they were to set more ambitious decarbonization targets. Given the long asset lives, any delay could make the transition of U.S. utilities more challenging.

Contact us

clientservice@msci.com

AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

* = toll free

ABOUT MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 45 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

About MSCI ESG Research Products and Services

MSCI ESG Research products and services are provided by MSCI ESG Research LLC, and are designed to provide in-depth research, ratings and analysis of environmental, social and governance-related business practices to companies worldwide. ESG ratings, data and analysis from MSCI ESG Research LLC. are also used in the construction of the MSCI ESG Indexes. MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc.

To learn more, please visit www.msci.com.

Notice and disclaimer

- This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI. All rights in the Information are reserved by MSCI and/or its Information Providers.
- The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.
- The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.
- Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.
- Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.
- The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.
- None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.
- It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.
- Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.
- The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.
- Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.
- Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.
- MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of www.msci.com.
- MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI