Transition to Net Zero with the S&P PACT™ Indices
(S&P Paris-Aligned & Climate Transition Indices)

Backed by evidence from the UN Intergovernmental Panel on Climate Change (IPCC), ambition has grown¹ to limit global temperature rise to 1.5°C since pre-industrial levels, reaching net zero by 2050. Currently, 70% of global CO₂ emissions are covered by net zero targets (IEA, 2021).

To date, climate-conscious investors have largely focused on reducing relative portfolio carbon exposure; however, a combination of new forward-looking datasets and index innovation is emerging. Investors now have the choice to align with a scenario that may mitigate the most catastrophic impacts. The European Union (EU) has defined minimum standards for the EU Climate-Transition Benchmarks (CTB) and EU Paris-aligned Benchmarks (PAB), both of which are absolutely 1.5°C and 2050 net zero compatible.² Our S&P PACT Indices offer a sophisticated, but accessible, solution for investment product providers to incorporate these standards and further climate objectives, which will support investors to:

1. Implement the objectives of the Paris Agreement and align investments with a 1.5°C trajectory toward achieving net zero emissions by 2050;
2. Adopt a strategy intended to meet the minimum standards for EU CTBs and EU PABs and recommendations from the Task Force on Climate-related Financial Disclosures (TCFD)—accounting for the physical risks, transition risks, and opportunities arising from climate change; and
3. Address other climate objectives in an efficient manner, while staying as close to the underlying index as possible with broad, diversified exposure.

This paper underscores how the S&P PACT Indices could help investment product providers transition to a 1.5°C world and achieve other climate objectives, utilizing an accessible index construction.

¹ The Paris Agreement is an international treaty, sponsored by the UN Framework Convention on Climate Change (UNFCCC), to keep the increase in global average temperature rise to “well below 2°C above pre-industrial levels” that went into effect in November 2016.
THE IMPORTANCE OF CLIMATE TRANSITION

Latest scientific research shows unequivocally that observed global warming of the Earth’s climate is human driven, with potential catastrophic and irreversible impacts.³ Many are therefore committed to reducing greenhouse gas (GHG) emissions—the goal is now not only the well below 2°C target of the Paris Agreement, but less than 1.5°C of warming since pre-industrial levels.⁴ Research reveals a non-linear GHG emissions and several climate tipping point relationship, which could set off dramatic and irreversible effects. For example, 1-3°C of warming could melt the entire Greenland ice sheet, reversing Atlantic Ocean currents, amounting to sea-level rise and Southern Ocean heat accumulation, facilitating further ice loss from the East Antarctic ice sheet.⁵ Higher temperatures may cause even more severe consequences.⁶

With a rise of 2°C, we would likely see crop yield reduction, coastal flooding, and many more extensive impacts, relative to 1.5°C of warming (see Exhibit 1). An additional 0.5°C of warming between these two scenarios could have exponentially more devastating human consequences, let alone at higher warming levels. With each increment in global warming, the frequency and intensity of extreme weather events, such as heatwaves, heavy precipitation, and droughts, will only get larger.

⁴ Since the IPCC released its special report, Global Warming of 1.5°C (Masson-Delmotte et al., 2018), there has been growing interest in meeting the more ambitious 1.5°C target than the commitments of the Paris Agreement, focused on well below 2°C.
⁶ Steffen et al. 2018.
Just an additional 0.5°C of warming between the 1.5°C and 2°C scenarios could have exponentially more devastating human consequences.

In 2020, global land and ocean surface temperature was recorded at its second highest level in 140 years, at 0.98°C above the 20th century average...

...which begs the question: what trajectory are we on and is it aligned with a 1.5°C scenario?­

In 2020, the average global land and ocean surface temperature was recorded at its second highest level in 140 years, at 0.98°C above the 20th-century average. 7 However, snap assessments like these do not paint a complete picture. It begs the question: what trajectory are we on and is it aligned with a 1.5°C scenario and net zero by 2050?

In the absence of corrective action, global warming is expected to reach 2.5°C-2.9°C above pre-industrial levels by the end of this century under current policies (see Exhibit 2). Even under current Nationally Determined Contributions (NDCs), 2.1°C of warming is expected by 2100 and the most optimistic scenario represents 1.8°C of warming. 8 The behavior of governments, policymakers, and market participants alike are required to transform the status quo and radically transition to a lower-carbon economy. For investors, this includes capital allocation decisions and the selection of benchmarks used to evaluate their investment performance.

In the absence of corrective action, global warming is expected to reach 2.7°C-3.1°C above pre-industrial levels by the end of this century under current policies.

The IPCC report, Global Warming of 1.5°C, shows how if net zero 2050 is desired, aligning with a 1.5°C scenario presents a reasonable chance of achieving that goal.

The Necessity of 1.5°C Compatibility to Achieve Net Zero by 2050

As net-zero commitments become increasingly of focus, how do they relate to different climate scenario alignments? Exhibit 3 uses data from the IPCC report, Global Warming of 1.5°C, to show how if net zero by 2050 is desired, aligning with a 1.5°C scenario presents a reasonable chance of achieving that goal. Aligning with a 2°C scenario implies a delay in reaching the net-zero target year, pushing it from 2050 to 2070-2080, and simply being better than the benchmark is reliant on the decarbonization of the wider economy rather than absolutely controlling climate exposure.9

Aligning with a 2°C scenario would imply a delay in reaching the net-zero target year, pushing it from 2050 to 2070-2080.

Exhibit 3: 1.5°C Scenario Implies Net Zero by 2050; 2°C Scenario Implies Net Zero by 2070-2080

Source: S&P Dow Jones Indices LLC, IIASA. Data as of Aug. 8, 2019. Charts are provided for illustrative purposes.

Climate Scenario Alignment, Net-Zero, and Uncertainty

INDEX EDUCATION | ESG

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Rationale for the S&P PACT Indices Construction

EU Paris-Aligned and Climate Transition Benchmarks

In March 2018, the European Commission published its action plan to reorient capital flows toward investment for “sustainable and inclusive growth”, with private sector investment being key. To this end, the EU has introduced minimum standards (summarized in Exhibit 4) for two new classifications of climate benchmarks, in order to align investments with a 1.5°C trajectory and prevent greenwashing. These are the EU Climate Transition Benchmarks (CTBs) and EU Paris-Aligned Benchmarks (PABs); both are absolutely 1.5°C compatible rather than relatively better than an underlying index.

Exhibit 4: Overview of EU Minimum Standards for Climate Benchmarks


TCFD: Transition Risk, Physical Risk, and Climate Opportunities

The TCFD has also sought to enhance market transparency on climate risks and opportunities to support sustainable investment.

Physical climate risks include more frequent and severe extreme weather events such as storms, hurricanes, and floods (acute impacts), as well as shifts in long-term weather patterns and sea-level rise (chronic impacts). Physical risk thereby threatens companies potentially facing asset write-


The TCFD also gave recommendations for climate disclosure, underscoring the importance of reporting on the financial impacts of transition and physical climate risks.

Physical climate risks include more frequent extreme weather events, as well as shifts in long-term weather patterns and sea-level rise.

Transition risk refers to the costs associated with policy, legal, technological, and reputation from adapting to climate change.

downs, disruptions in supply chains, and costly insurance premiums for high-risk locations. Even under a 1.5°C scenario, physical climate risks will likely occur more frequently and cause more damage than they do now.\(^\text{12}\)

Transition risk, on the other hand, refers to the costs associated with the policy, legal, technological, and reputational risks from adapting to climate change. For example, carbon pricing may cause companies higher operating costs that they are unable to pass on, directly affecting companies’ profitability.

A successful transition is expected to require about USD 1 trillion of investment each year in gainful areas such as low-carbon energy, resource efficiency, and sustainable products.\(^\text{13}\)

Exhibit 5: TCFD Approach to Climate-Related Risks and Opportunities

Transition and physical climate risks are not theoretically connected, and S&P Dow Jones Indices’ research shows a weak positive correlation.\(^\text{14}\) If the world accomplishes the transition to a lower-carbon economy, we would expect to mitigate some physical risk compared with a business-as-usual scenario, whereas we would expect to take on significant transition risk. Therefore, we might anticipate high transition risk and low physical risk in a low-carbon scenario. The opposite is true of a high-carbon scenario. Neglecting either transition risk or physical risk could result in less climate risk mitigation than a standard market-cap-weighted index. A holistic, climate-aligned strategy that incorporates TCFD recommendations must therefore address types of climate risk, as well as the opportunities arising from climate change.

\(^{12}\) According to the contribution from Working Group I on the IPCC AR6 Report, *Climate Change 2021: The Physical Science Basis*, hot temperature extremes over land are still likely to occur 4.1 times more relative to 1850-1900 in a 1.5°C scenario.


THE S&P PACT INDICES

To meet the EU’s minimum standards for CTBs and PABs, we offer two index series: the S&P Paris-Aligned Climate (PA) Indices and S&P Climate Transition (CT) Indices, respectively, collectively referred to as the S&P PACT Indices. Both methodologies are intended to meet the respective EU requirements\(^{15}\) and other climate objectives to become compatible with a 1.5°C scenario and the TCFD recommendations, while improving (PA) or controlling (CT) the overall ESG footprint.

**Index Exclusions**

The indices exclude undesirable exposures beyond the minimum required by the EU, with the S&P PA Indices being more stringent than their CT counterparts (see Exhibit 6).

<table>
<thead>
<tr>
<th>EXCLUSION</th>
<th>S&amp;P PACT INDICES</th>
<th>EU MINIMUM REQUIREMENTS</th>
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<td>United Nations Global Compact Violators</td>
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<td>X</td>
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<tr>
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</table>

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

**Reweighting**

The S&P PACT Indices’ Methodology is rooted in transition risks, physical risks, and the opportunities from climate change, as recommended by the TCFD, while improving the broad ESG footprint. This, in addition to the

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\(^{15}\) Regulation (EU) 2019/2089 and Commission Delegated Regulation (EU) 2020/1818

\(^{16}\) Controversies monitoring is a proxy used to incorporate the “do no significant harm” principle: 1) climate change mitigation; 2) climate change adaptation; 3) sustainable use and protection of water and marine resources; 4) transition to a circular economy, waste prevention and recycling; 5) pollution prevention and control; and 6) protection of healthy ecosystems.
inclusion of several other climate objectives, means the methodology goes beyond the EU’s minimum standards for CTBs and PABs to provide a holistic index solution for transitioning to a 1.5°C world and reducing potential climate risk (see Exhibit 7). It achieves all of these objectives simultaneously, through an optimization that minimizes deviations from the underlying index, which has historically resulted in a broad and diversified index with similar performance to the benchmark.

Exhibit 7: The S&P PACT Index Methodology Reweighting Factors

![Exhibit 7](image)

Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

Transition Risk Reweighting

The EU’s minimum standards for CTBs and PABs allow a four-year period for phasing in Scope 3 emissions. However, the S&P PACT Indices’ Methodology includes Scopes 1, 2, and 3 from the start.\(^{17}\) Both up- and downstream Scope 3 emissions are key to a complete understanding of company emissions throughout the value chain, made especially true as the ratio of Scopes 1 and 2 emissions with Scope 3 emissions is inconsistent across sectors. For example, approximately 90% of emissions associated with the Energy are Scope 3. As such, incorporating Scope 3 emissions helps to ensure a more holistic assessment of a company’s overall transition risk.

\(^{17}\) The GHG Protocol classifies a company’s GHG emissions into three scopes. Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the company, including both upstream and downstream emissions. (Greenhouse Gas Protocol: [https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf](https://ghgprotocol.org/sites/default/files/standards_supporting/FAQ.pdf)).
While the EU CTBs and PABs allow for a four-year period for phasing in Scope 3 emissions, the S&P PACT Indices include all three scopes from the start...

Exhibit 8: Sector Breakdown of Scopes 1 and 2 and Scope 3 Emissions

Source: S&P Dow Jones Indices LLC. Data as of December 2019. Chart is provided for illustrative purposes.

7% Year-on-Year Emissions Reduction

One of the climate objectives required by the EU’s proposed minimum standards is to reduce the GHG emissions intensity of the index by 7% year-on-year, to align with carbon neutrality by 2050, using Scopes 1, 2, and 3 emissions for each company from inception. As the 7% year-on-year emissions reduction target must be met using average weights over the period, this introduces two risks intra-rebalance, which can change the index level weighted average GHG intensity: weight drift and new carbon information. With these risks in mind, the S&P PACT Indices rebalance quarterly—to reduce the weight drift compared with an annual rebalance and ensure we receive less new emissions data—and to give ourselves a 5% buffer below the required trajectories. Together, these approaches make meeting the 7% year-on-year alignment more obtainable.

Exhibit 9: 7% Year-on-Year Rebalance

Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

...helping to ensure a more holistic assessment of a company’s overall transition risk.
The future GHG emissions intensity trajectory of the underlying benchmark is unknown. As such, the 7% year-on-year decarbonization target required by the EU’s minimum standards for CTBs and PABs means the future required decarbonization relative to the underlying benchmark is unknown, since we do not know how quickly the benchmark will decarbonize (if at all). If the underlying benchmark decarbonizes at a rate of less than 7% year-on-year, then the implied decarbonization relative to the underlying index (bottom panel) will grow. The efficiency of the index design will be key for these more extreme decarbonization requirements.
**Stress Test**

To understand the potential impact of requiring decarbonization at greater levels than currently required, we have stress tested the S&P Eurozone LargeMidCap Net Zero 2050 Paris-Aligned ESG Index. Here, we change the decarbonization requirement to be between 50%-90% (representing any possible future requirements of a S&P Paris-Aligned Index) and can observe the effects on the stock count and effective number of stocks. We see little difference between a 50%-70% decarbonization trajectory, with slightly larger jumps as we head toward 90%. This indicates that the efficiency of our index design would likely allow for the index objectives to be met, even if the underlying index were to keep carbonizing for many years to come.

**Exhibit 11: Decarbonization Stress Test**

Source: S&P Dow Jones Indices LLC. Data as of October 2019. Chart is provided for illustrative purposes.

**A Transition Pathway Approach**

The S&P PACT Indices use forward-looking data and models from S&P Global Trucost to assess the GHG emissions of each constituent and their GHG emissions compared with a 1.5°C scenario compatible budget. These budgets may be set in two ways—both of which were developed by leading academics and are supported by the SBTi.

The budgets reflect a company’s share of the required decarbonization rate for the world to transition to a 1.5°C scenario.

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18 This represents the full S&P PACT Index methodology before a market consultation, for which results were announced May 18, 2021.
20 As referenced in footnotes 16 and 18.
in certain high-emitting activities, sector-specific budgets are defined in terms of a given unit of output (for example, tons of carbon and carbon equivalents (tCO₂e) per ton of crude steel produced). This method, known as the Sectoral Decarbonization Approach (SDA), permits sectors to decarbonize at varying speeds, depending on the opportunities available given the current technologies within each sector.

For companies not covered by the SDA model, we use the GEVA model, which assigns budgets based on the required level of decarbonization for the whole economy.

Together, these budgets assign each company a maximum amount of emissions each year. Trucost compares these budgets with forward-looking estimates and realized GHG emissions for companies, using company emissions reduction targets and asset-level data. Where neither is available or usable, Trucost relies on either a company-specific or sub-industry-specific historical trend to measure the likely forward-looking pathway. Exhibit 12 illustrates what the individual company emission trajectories might look like. In this way, Trucost models company emissions toward a trajectory consistent with a 1.5°C scenario in their transition pathway models. This enables the S&P PACT Indices to reweight companies, so the index as a whole is 1.5°C compatible, on a forward-looking basis.

The Trucost transition pathway models enable S&P PACT Indices to reweight companies, so the index is 1.5°C compatible, on a forward-looking basis.

Together, the GEVA and SDA approaches assign each company a maximum amount of GHG emissions each year.

The S&P PACT Indices overweight companies with publicly disclosed science-based targets that adhere to the EU’s proposed minimum standards.

Exhibit 12: Illustrative Company GHG Emission Trajectories

Source: S&P Global Trucost. The GHG emissions intensity is based on Scopes 1 and 2 emissions to avoid double counting when setting individual company budgets. Chart is provided for illustrative purposes.

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21 These include power (GWh), cement (tons), steel (tons), aluminum (tons), and air transport (passenger miles).

22 Krabbe et al., 2015.
Rewarding Companies with Robust Science-Based Targets

To enhance exposure of companies aligned with a 1.5°C scenario, the S&P PACT Indices overweight companies with publicly disclosed science-based targets (SBTs) that adhere to the following criteria, as per the EU’s minimum standards for CTBs and PABs, to prevent climate index greenwashing. Companies must publicly disclose a 1.5°C target, which incorporates all Scopes 1, 2, and 3 emissions, disclose their Scope 1, 2, and 3 emissions, have evidence of a 7% year-on-year decarbonization over the past three years, and the target must represent a 7% year-on-year decarbonization.

Mitigating Stranded Asset Risk

To mitigate the possibility of exposure to costly asset write-downs, the S&P PACT Indices reduce the fossil fuel reserve exposure by a minimum of 80%, while the S&P CT Indices maintain exposure so that it does not exceed that of the underlying index. To the extent that carbon-limiting efforts are successful in achieving the goals of the Paris Agreement, fossil fuel reserves may become “stranded,” meaning their value would not be realized. To limit global warming to 1.5°C with a 50% probability implies that 60% of oil and gas reserves, as well as 90% of coal, must remain on the ground by 2050. These unextractable assets could thus be rendered operationally unviable and potentially worthless from a financial perspective.

Physical Risk Reweighting

Climate modeling datasets and hazard models are overlaid on geolocation-specific, asset-level data. Trucost’s climate change physical risk dataset assesses the impact of wildfires, cold waves, heatwaves, water stress, sea-level rise, floods, and hurricanes.

Exhibit 13 summarizes Trucost’s physical risk methodology and Exhibit 14 visualizes how a global energy company’s assets are exposed to hurricane risk. In addition to assessing a company’s exposure to physical climate risks, Trucost also determines a company’s sensitivity to these risks, based on the types of asset and business operations affected. For example, an IT firm’s corporate offices are generally less sensitive to water stress than a food and beverage company’s manufacturing plants, as the former is much less water intensive. However, the IT firm’s office might be more sensitive to heatwaves due to falling worker productivity and overheating equipment.

Trucost’s dataset allows the S&P PACT Index Series to go beyond the EU’s minimum standards for CTBs and PABs, capping individual company exposure to physical risk and reducing the physical climate risk exposure of the index overall.

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exposure to physical risk and reducing the physical climate risk exposure of the index overall. The former helps to mitigate tail risk from acute climate hazards, such as hurricanes and wildfires, while the latter aims to mitigate the long-term effects of chronic physical risks like rising sea levels.

**Exhibit 13: Trucost Physical Risk Methodology**

- **Climate Modeling Datasets and Hazard Models**
  - Map Climate Change Hazards

- **Asset Location Dataset Overlaid with Hazard Maps**
  - Quantify Exposure

- **Sensitivity of Business Models to Different Forms of Physical Risk**
  - Adjust for Risk Sensitivity/Materiality

**Corporate Physical Risk Profile and Score**

Source: S&P Global Trucost. Chart is provided for illustrative purposes.

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**Climate Opportunities**

From an investor’s perspective, the consequences of climate action (or lack thereof) can lead to both gains and losses. Ignoring the opportunities does not allow investors to benefit from a low-carbon transition. For example, while a 1.5°C scenario implies fossil fuels would need to fall from 83% of primary energy in 2020 to about 33% in 2050, the slack would likely be picked up by renewables, expected to grow from 15% to about 60% over the same period.\(^{24}\) To account for this, the S&P PA Indices make adjustments to companies’ weights that are involved in power generation, improving the green-to-brown ratio by overweighting companies with more

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\(^{24}\) Rogelj, 2018.

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The S&P DJI ESG Scores are based on the renowned S&P Global CSA, which ranks as the highest quality among ESG rating providers, according to leading sustainability professionals.

These scores provide insights into the financially material ESG aspects of a company’s strategy.

S&P DJI classifies sectoral allocations at the revenue level rather than at the company level to minimize any unintentional greenwashing.

revenues from green power generation activities relative to brown. The weights are accounted for so that the green-to-brown\textsuperscript{25} ratio of the index is either maintained in the S&P CT Indices or improved by at least a factor of four for the S&P PA Indices, relative to the underlying benchmark.

S&P DJI ESG Scores

While the S&P PACT Indices have a strong climate component, they do not ignore broader ESG risks, opportunities, and values. For this reason, the S&P PA Indices seek to improve, and the S&P CT Indices seek to maintain, ESG exposure, as measured by the S&P DJI ESG Scores. These scores provide insights into the financially material ESG aspects of a company’s strategy. The S&P DJI ESG Scores\textsuperscript{26} are based on the renowned S&P Global Corporate Sustainability Assessment (CSA), which ranks as the highest quality among ESG rating providers, according to leading sustainability professionals.\textsuperscript{27}

High Climate Impact Approach to Minimize Greenwashing

S&P DJI classifies sectoral allocations at the revenue level rather than at the company level to minimize any unintentional greenwashing.\textsuperscript{28} We can see in Exhibit 15 that most companies have a mix of high and low impact revenue streams. The S&P PACT Indices must have at least the same revenues coming from high climate impact sectors, per dollar invested, as the underlying index. The index-level carbon intensity reductions required by the EU’s minimum standards for the CTBs and PABs would be simple to achieve if the indices underweighted the most carbon-intensive sectors. However, the minimum standards mandate that the benchmarks not underweight equity securities in high climate impact sectors.

Exhibit 15: Classification of Companies’ Revenues into Low and High Climate Impact

Source: S&P Dow Jones Indices LLC. Data as of March 2020. Chart is provided for illustrative purposes.

\textsuperscript{25} Green power generation is defined as coming from biomass, geothermal, hydroelectric, solar, wave and tidal, wind, and nuclear electric. Brown power generation is defined as coming from coal, petroleum, and natural gas.

\textsuperscript{26} To learn more about the S&P DJI Environmental and S&P DJI ESG Scores, visit https://www.spglobal.com/spdji/en/landing/investment-themes/esg-scores/.

\textsuperscript{27} Rate the Raters Survey, SustainAbility, 2019. Approximately 70\% of respondents to this annual survey of sustainability professionals had more than 10 years of experience. Visit https://sustainability.com/our-work/reports/rate-raters-2019/ to learn more.

\textsuperscript{28} Leale-Green, 2020.
MAINTAINING BROAD, DIVERSIFIED EXPOSURE

Theoretically, the S&P PACT Indices aim to make minimal modifications to the underlying index, while simultaneously meeting the climate and ESG objectives laid out in previous sections. This is based on a constrained optimization to minimize active share, while controlling for climate and ESG exposures (see Appendix 1).

The 7% year-on-year decarbonization target means we are dependent on the underlying index’s level of GHG intensity to calculate the required reduction, which is unknown for the future. Using an optimization to minimize active share helps reduce the possibility of high tracking error between the index and its underlying benchmark and may be particularly useful if the overall market fails to decarbonize at a sufficient rate over time.

The efficiency provided by active share minimization aims to facilitate meeting multiple index objectives.

Active share minimization also has the benefit over tracking error minimization with regards to transparency. In combination with our weight attribution methodology, this can allow for the meeting of sophisticated, competing objectives, within an accessible “glass-box” framework, rather than the “black-box” framework of a risk-based optimization, while indirectly minimizing tracking error.

EXPOSURES AND PERFORMANCE

Risk and Return

The S&P PACT Indices are designed to track the underlying benchmark as closely as possible, while simultaneously meeting the constraints outlined in Appendix 1. With an active share of about 20%-40% depending on the index, these are still well within the bounds of “closet indexers,”30 with tracking errors below 2% for most S&P PA Indices and below 1.5% for most S&P CT Indices, with the European region being the exception to the rule since inception. The S&P PACT Indices have all shown excess return since inception (see Exhibits 16 and 17).

30 Cremers & Petajisto (2009) categorizes strategies with between 20%-60% active share as “closet indexers.”
Transition to Net Zero with the S&P PACT Indices

Exhibit 1: Historical Total Returns

Source: S&P Dow Jones Indices LLC. Data as of July 2021. Index performance based on total return in USD for U.S. and Developed and EUR for Eurozone and Europe. Charts are provided for illustrative purposes and reflect hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 17: Risk and Return Statistics of the S&P PACT Indices

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<tr>
<th>INDEX</th>
<th>RETURN (%)</th>
<th>EXCESS RETURN (%)</th>
<th>VOLATILITY (%)</th>
<th>TRACKING ERROR (%)</th>
<th>RETURN / VOLATILITY (%)</th>
<th>INFORMATION RATIO (%)</th>
<th>ACTIVE SHARE (%)</th>
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<td>Climate Transition</td>
<td>9.84</td>
<td>0.77</td>
<td>15.71</td>
<td>1.42</td>
<td>0.63</td>
<td>0.54</td>
<td>21.03</td>
<td>186</td>
</tr>
<tr>
<td>Paris-Aligned</td>
<td>10.14</td>
<td>1.07</td>
<td>15.95</td>
<td>1.63</td>
<td>0.64</td>
<td>0.65</td>
<td>41.78</td>
<td>148</td>
</tr>
<tr>
<td>EUROPE Benchmark</td>
<td>8.66</td>
<td>-</td>
<td>14.25</td>
<td>0.61</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>466</td>
</tr>
<tr>
<td>Climate Transition</td>
<td>9.87</td>
<td>1.2</td>
<td>13.24</td>
<td>1.88</td>
<td>0.75</td>
<td>0.64</td>
<td>24.97</td>
<td>350</td>
</tr>
<tr>
<td>Paris-Aligned</td>
<td>10.17</td>
<td>1.51</td>
<td>13.11</td>
<td>2.24</td>
<td>0.78</td>
<td>0.67</td>
<td>41.51</td>
<td>269</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Data from Dec. 30, 2016, to July 30, 2021. Index performance based on total return in USD for U.S. and Developed and EUR for Eurozone and Europe. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

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ESG Exposures

The index-level ESG exposures across the board showed significant improvements, reflecting the multifaceted range of ESG and climate improvements the S&P PACT Indices are intended to meet (see Exhibit 18).

**Exhibit 18: ESG Exposures**

- **1.5°C Compatibility**
- **Weight of 1.5°C Compatible Stocks**
- **Physical Risk**
- **Weight in Mid/High Physical Risk Stocks**
- **GHG Intensity**
- **High Climate Impact**
- **Fossil Fuel Reserves**
- **Green-to-Brown Share**
- **S&P DJI ESG Score**
- **Social Score**
- **Governance Score**

Source: S&P Dow Jones Indices LLC. Data as of Sept. 30, 2021. Charts are provided for illustrative purposes.
The S&P PA Indices Methodology satisfied the criteria of a 50% lower GHG emissions intensity than the underlying index and a 7% year-over-year self-decarbonization trajectory.

**GHG Emissions Intensity**

Exhibit 19 illustrates the GHG emissions intensity of the [S&P Eurozone LargeMidCap](#) and the S&P Eurozone LargeMidCap PA Index against the decarbonization trajectory as proposed by the EU’s minimum standards for PABs.

**Exhibit 19: GHG Emissions Intensity over Time versus the Proposed Decarbonization Trajectory**

Source: S&P Dow Jones Indices LLC. Data as of March 2020. Weighted average carbon intensity (WACI) is inflation adjusted using quarterly average weights and measured as tCO2e divided by enterprise value including cash (EVIC), based on S&P Global Trucost emissions data that account for all Scopes 1, 2, and 3 emissions from inception. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Q1 2020 saw high levels of market volatility, causing the denominator used for calculating the GHG emissions intensity, the EVIC, to fall.

As Exhibit 19 shows, the S&P PA Indices Methodology satisfied both criteria of: a 50% lower GHG emissions intensity than the underlying benchmark and a 7% year-on-year self-decarbonization trajectory.

The first quarter of 2020 proved a stern test for the S&P PACT Indices Methodology, due to high levels of market volatility, causing the EVIC, the denominator used for calculating the GHG emissions intensity, to fall. Over this period, the EVIC fell by 14%. Controlling for the fluctuating EVIC minimizes market impact on the 7% year-on-year self-decarbonization, allowing company emissions to drive the decarbonization, rather than the EVIC itself. Thus, despite the volatility over this period, this approach enabled the S&P Eurozone LargeMidCap PA Index to meet both criteria.
**Sector Exposures**

Over time, sector weights tend to be similar between the S&P PACT Indices and the underlying index (see Exhibit 20). The Energy sector, the exception to the rule, was excluded from the S&P PACT Indices as a consequence of the EU’s minimum standards for PABs (fossil fuel-based exclusions)—this remains fairly consistent in other regions, with only a handful of Energy companies being eligible globally (in the regions currently covered by an S&P PACT Index).

**Exhibit 20: Sector Weights Are Broadly Aligned with the Underlying Index**

Source: S&P Dow Jones Indices LLC. Data as of July 2021. Charts are provided for illustrative purposes.
Factor Exposures

When looking at factor exposures, we see a persistently sizable, statistically significant (p < 0.01 over the whole period) active large-cap tilt within the S&P 500® Net Zero 2050 Paris-Aligned ESG Index, which aims to improve the weighted average S&P DJI ESG Score, but not for the S&P 500 Net Zero 2050 Climate Transition ESG Index (see Exhibit 21). The large-cap exposure is unsurprising given that the S&P DJI ESG Scores have a large-cap tilt. Other factor exposures are either statistically insignificant or economically small for both indices over the period.

Exhibit 21: The S&P 500 Net Zero 2050 Paris-Aligned ESG Index Has an Active Large-Cap Exposure

Weight Attribution

The S&P PACT Indices Methodology first excludes ineligible constituents from the underlying benchmark universe (see Exhibit 22). Then, based on the eligible constituents that remain, the methodology allocates weights to companies.

31 Before the consultation, the environmental pillar of the S&P DJI ESG Score was included in the S&P PA Indices.
Following the market consultation, the S&P PA Indices have become more exclusive, while the S&P CT Indices have remained largely the same.

What drives the active weights? Within the S&P PA Indices, we see more active share coming from exclusions compared with the S&P CT Indices across regions. Exhibit 23 shows an example from the S&P 500 region.

The S&P PA Indices take on more active reweighting from the underlying index than their climate transition counterparts.
To what can we attribute the active share from reweighting? The transition pathway requires the most reweighting of all climate factors in order for the index to be 1.5°C compatible on a forward-looking basis. Physical risk and high impact revenues are also impactful, while the S&P DJI ESG Scores are relevant particularly for the S&P PA Indices, which seek an ESG improvement.

**Exhibit 24: Reweighting Drivers**

Source: S&P Dow Jones Indices LLC. Data as of June 30, 2021. Chart is provided for illustrative purposes.

**CONCLUSION**

The potentially disastrous impacts associated with rising global temperatures underscore the importance of climate action. Investors and other market participants therefore have a critical role to play when it comes to financing a low-carbon transition. Regardless, the perils of climate change represent financially material risks for investor portfolios that need to be managed. To that end, the S&P PACT Indices supply the market with sustainable versions of S&P DJI benchmarks that are designed to align select constituents with a 1.5°C scenario and achieve net-zero emissions by 2050. The indices draw upon S&P Global’s market-leading environmental data and models to not only meet but exceed the EU’s minimum standards for the Paris-aligned and Climate-Transition Benchmarks, as well as TCFD recommendations—by accounting for the physical risks, transition risks, and financial opportunities arising from climate change. Multiple climate and ESG objectives are simultaneously incorporated while minimizing deviations from the underlying benchmark, resulting in broad, diversified exposure. The S&P PACT Indices provide a toolkit for adhering to our collective “pact” of transitioning to a 1.5°C world and net-zero 2050.
WORKS CITED


## APPENDIX

### Appendix 1: S&P PACT Index Constraints Relative to the Underlying Benchmark

<table>
<thead>
<tr>
<th>CONSTRAINT</th>
<th>PAB</th>
<th>CTB</th>
<th>DATA SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRANSITION RISK-RELATED CONSTRAINTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average GHG Emissions per U.S. Dollar Invested</td>
<td>≤ 0</td>
<td>≤ 0</td>
<td>Trucost</td>
</tr>
<tr>
<td>GHG Emissions Intensity[^32]</td>
<td>50% lower</td>
<td>30% lower</td>
<td>Trucost</td>
</tr>
<tr>
<td>Decarbonization Trajectory (adjusted for enterprise value growth)</td>
<td>WACI must stay below the 7% year-on-year trajectory</td>
<td>WACI must stay below the 7% year-on-year trajectory</td>
<td>Trucost</td>
</tr>
<tr>
<td>Exposure to Companies with Science-Based Targets (based on 1.5°C scenario and 7% decarbonization)</td>
<td>Increase collective index weight of all companies with SBTs by 20% overall</td>
<td>Increase collective index weight of all companies with SBTs by 20% overall</td>
<td>Trucost/ SBTi</td>
</tr>
<tr>
<td>Fossil Fuel Reserve Exposure</td>
<td>80% lower</td>
<td>No higher</td>
<td>Trucost</td>
</tr>
<tr>
<td>Environmental Score</td>
<td>20% higher</td>
<td>No lower</td>
<td>S&amp;P DJI ESG Scores</td>
</tr>
<tr>
<td>Revenue from High Climate Impact Sectors[^33]</td>
<td>Maintain at least same proportion</td>
<td>Maintain at least same proportion</td>
<td>Trucost</td>
</tr>
<tr>
<td>Weight of Non-Disclosing Companies</td>
<td>Capped at x 1.1</td>
<td>Capped at x 1.1</td>
<td>Trucost</td>
</tr>
<tr>
<td><strong>PHYSICAL RISK-RELATED CONSTRAINTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Risk Exposure</td>
<td>10% lower</td>
<td>No higher</td>
<td>Trucost</td>
</tr>
<tr>
<td>Physical Risk Cap</td>
<td>Dynamic cap based on the level of physical risk of each stock</td>
<td>Dynamic cap based on the level of physical risk of each stock</td>
<td>Trucost</td>
</tr>
<tr>
<td><strong>OPPORTUNITY-RELATED CONSTRAINTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green-to-Brown Revenue Share from Power Generation</td>
<td>4x higher</td>
<td>No lower</td>
<td>Trucost</td>
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<tr>
<td><strong>INDEX CONSTRUCTION RULES</strong></td>
<td></td>
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<tr>
<td>Constituent Weights</td>
<td>±2%</td>
<td>±2%</td>
<td>-</td>
</tr>
<tr>
<td>Minimum Weight</td>
<td>0.01%</td>
<td>0.01%</td>
<td>-</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Company weight capped based on an investment of EUR 1 billion and the length of time it would take to trade, based on the company’s three-month median daily value traded</td>
<td>Company weight capped based on an investment of EUR 1 billion and the length of time it would take to trade, based on the company’s three-month median daily value traded</td>
<td>-</td>
</tr>
<tr>
<td>Diversification</td>
<td>Individual stock weights capped at 5%</td>
<td>Individual stock weights capped at 5%</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

[^32]: Calculated using weighted average carbon intensity (WACI), which is measured as tCO₂e divided by enterprise value including cash (EVIC), based on Trucost emissions data that account for all Scopes 1, 2, and 3 emissions from inception.

[^33]: High climate impact sectors are defined by The EU Technical Expert Group on Sustainable Finance (2019).
PERFORMANCE DISCLOSURE/BACK-TESTED DATA

The S&P 500 Net Zero 2050 Paris-Aligned ESG Index, S&P 500 Net Zero 2050 Climate Transition ESG Index, S&P Developed Ex-Korea LargeMidCap Net Zero 2050 Paris-Aligned ESG Index, and S&P Developed Ex-Korea LargeMidCap Net Zero 2050 Climate Transition ESG Index were launched June 1, 2020. The S&P Europe LargeMidCap Net Zero 2050 Paris-Aligned ESG Index and S&P Europe LargeMidCap Net Zero 2050 Climate Transition ESG Index were launched May 4, 2020. The S&P Eurozone LargeMidCap Net Zero 2050 Paris-Aligned ESG Index and S&P Eurozone LargeMidCap Net Zero 2050 Climate Transition ESG Index were launched April 20, 2020. All information presented prior to an index’s Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be relaxed. Complete index methodology details are available at www.spglobal.com/spdji. Past performance of the Index is not an indication of future results. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results. Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations. Back-tested performance is for use with institutions only; not for use with retail investors.

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