

FISHER INVESTMENTS EUROPE™

HOW CLOUD COMPUTING SUPPORTS
ESG INVESTORS' GLOBAL CLIMATE
GOALS

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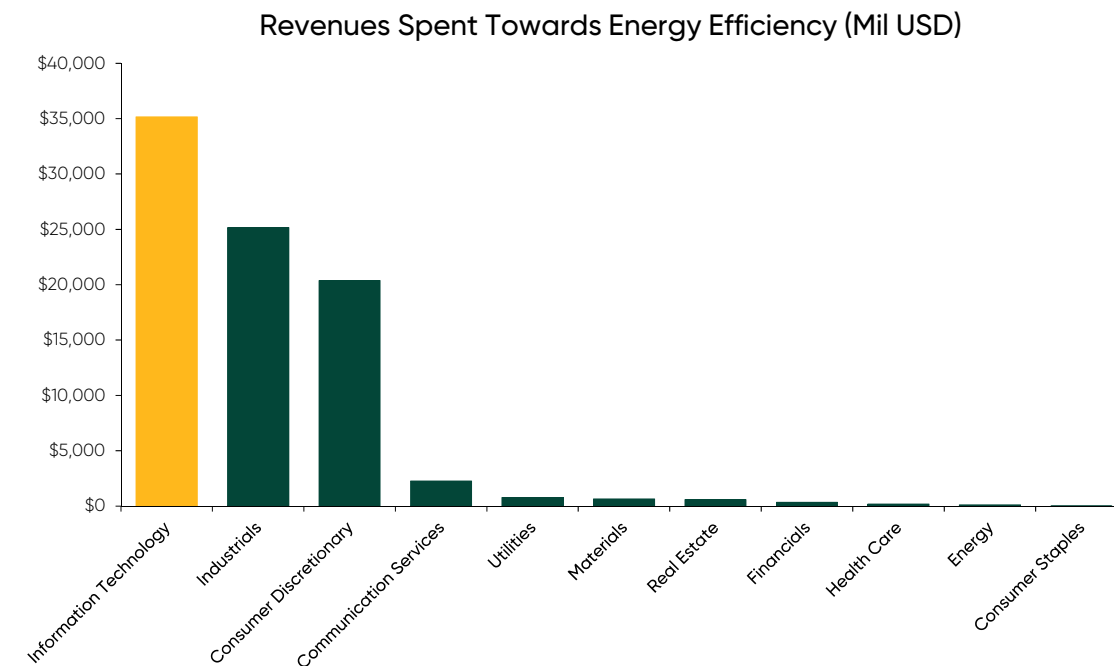
The Information Technology sector isn't the only beneficiary of cloud computing's rapid and widespread adoption. Cloud service providers also aid ESG investors' climate goals by helping support energy efficiency and renewable energy use.

Cloud computing has expanded throughout the global economy as companies strive to more efficiently store and access their data. Storing and analysing larger and more complicated datasets require resources. Whereas firms used to store their data on-site, more are now outsourcing their storage needs to companies such as Amazon Web Services and Microsoft Azure for the specialisation and scale they provide.

Our research shows widespread adoption of cloud-based services has a beneficial impact on energy consumption. This wasn't always obvious. While server farms provide secure, scalable and cost-efficient computing, they also require a tremendous amount of energy to operate and cool the hardware. As cloud computing gained prominence, some investors worried data centres' carbon emissions would rise alongside their energy use. However, recent studies show strides in these clusters' operational efficiency allowed a 550% leap in computational power between 2010 and 2018 with only a 6% bump in energy consumption.¹

Reducing energy consumption isn't out of line with companies' profit motive. Reducing major input costs such as energy overhead can improve profitability. This aligns cloud giants' incentives with ESG investors'. From a top-down view, MSCI's Impact Revenue data show how the Tech sector outpaces others on money spent towards energy efficiency (Exhibit 1).

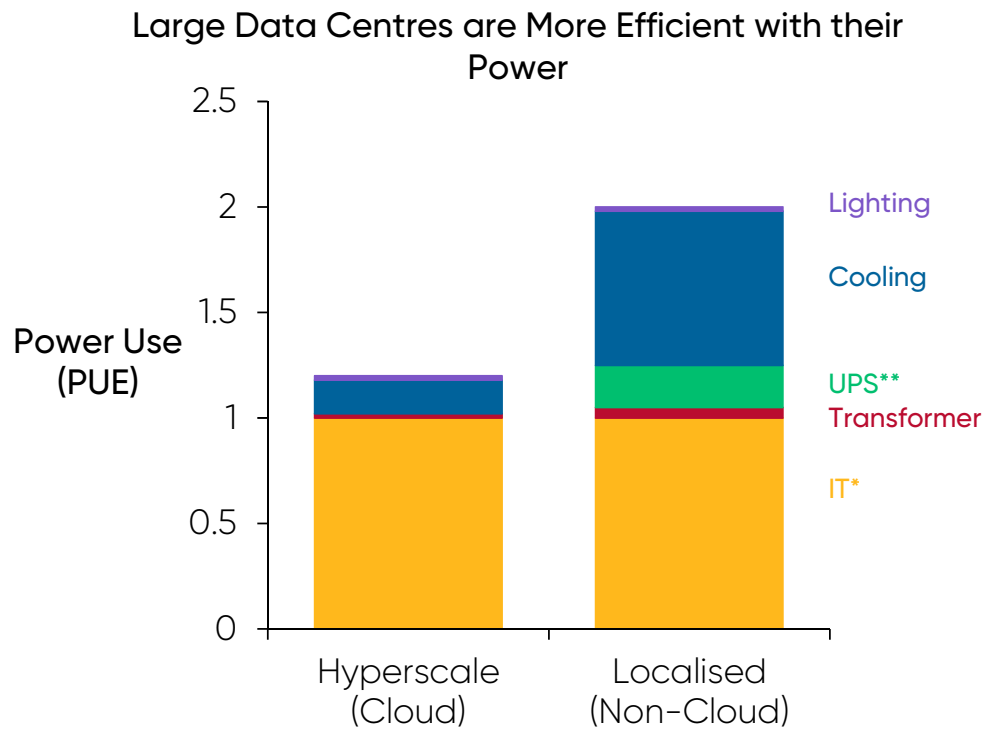
Exhibit 1: Energy Efficiency Expenditures by Sector



Source: MSCI ESG Manager as of 30/06/2020.

Moreover, these energy efficiency investments extend cloud computing’s inherent advantages. Due to economies of scale, cloud computing is much more efficient than localised computing. Cloud firms fully utilise their servers for several clients’ data, whereas on-site servers typically use only part of their capacity. One way to show this is by examining the power usage effectiveness (PUE) of “hyperscale” (very large) data centres compared to localised ones. PUE measures efficiency by dividing the total energy companies consume by the energy they use to operate their information technology (IT) infrastructure, such as data servers, networking and storage. Exhibit 2 shows that hyperscale data centres are almost twice as energy efficient as localised data centres.²

Exhibit 2: Power Use of Hyperscale vs. Localised Data Centres



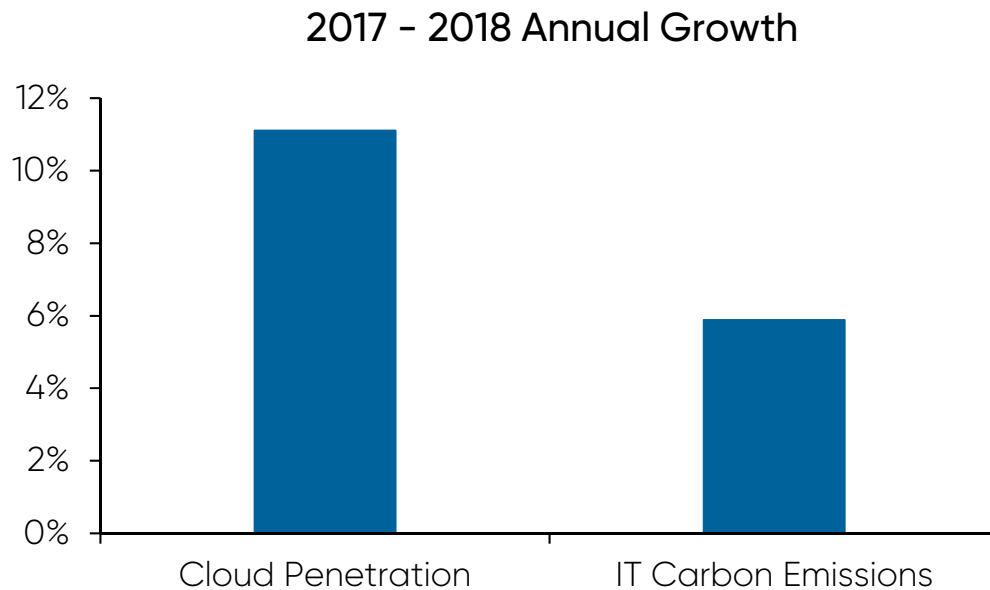
*Servers, Networking and Storage

** Uninterruptible Power Supply

Source: Lawrence Berkeley National Laboratory, June 2016.

Another way to examine cloud firms' impact on global climate change goals is to compare the growth of cloud use relative to growth in carbon emissions. Reducing carbon emissions is a big goal for many ESG investors. Cloud use growth can be measured by looking at how much cloud services have grown relative to the other data services such as infrastructure software, hardware and non-cloud support services. Cloud use growth is nearly double that of the IT sector's carbon emissions growth (Exhibit 3). While enough companies haven't yet been reported to examine 2019 data, we expect this trend to continue.

Exhibit 3: Growth Rate Comparison – Cloud Penetration vs. IT Carbon Emissions

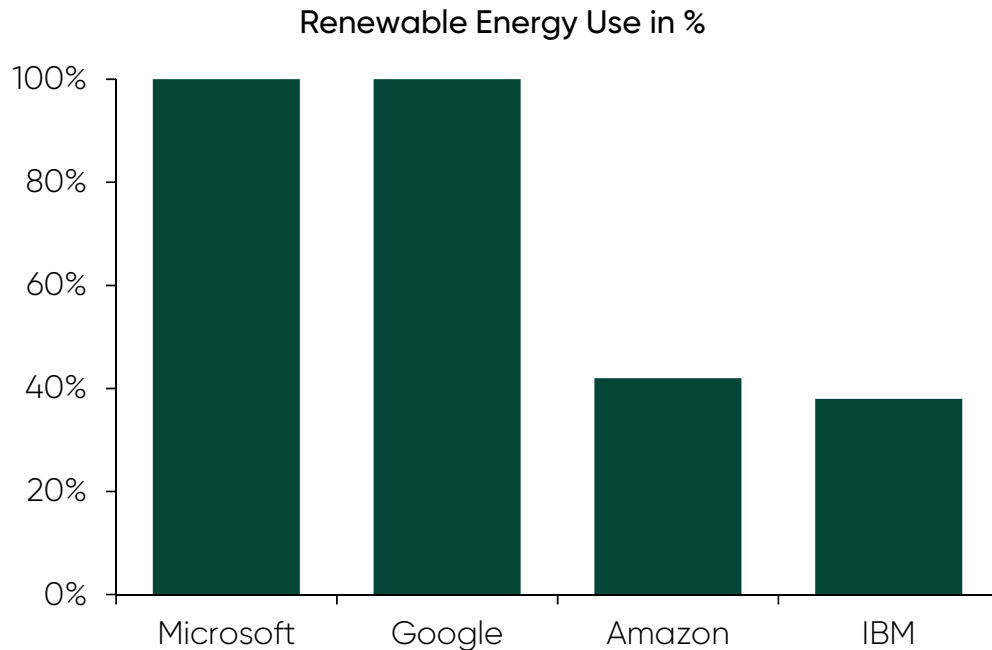


Source: Gartner as of Q1 2020, MSCI ESG Manager as of 30/06/2020.

Finally, there is cloud firms' growing renewable energy use. One of the biggest issues facing widespread renewable energy adoption is startup costs. Enormous fixed costs inhibit large scale and cost effective renewable energy deployment. Further, directly using renewable energy is currently not straightforward with multiple energy sources feeding into the power grid. It is difficult to know just how much of cloud firms' energy use comes from renewables, but some of the largest are utilizing Power Purchase Agreements and Renewable Energy Credits. These allow firms to either directly contract the use of renewable energy or purchase credits representing renewable energy generation. The impact of both methods is that renewable energy creators receive more funding, which helps build the infrastructure for more environmentally friendly energy use.

To examine this, Exhibit 4 looks at the four largest cloud service providers: Microsoft, Amazon, Google and IBM. Each of these industry giants leads in renewable energy consumption. Microsoft and Google currently purchase enough renewable energy to match all of their electricity consumption, Amazon has committed to 100% renewable use by 2025, and IBM is aiming for 55% renewable use by 2025. While these are only a few names, they each use a tremendous amount of energy, making their renewable contributions all the more impactful. There are certainly more Information Technology firms committed to renewables, but these four leaders help set the pace for the rest of the industry.

Exhibit 4: Renewable Energy Use of Major Cloud Service Providers



Source: Company Filings as of 30/06/2020.

Energy efficiency and renewable use may not be the largest performance drivers, but for ESG investors, cloud service providers serve a clear function in addressing long term climate goals. Fisher Investments' proprietary top-down materiality system helps make these insights visible. We can then use this to craft responsible investment themes with clarity on how trends impact a given market segment and then honing in on those drivers. Continued use and development of our materiality system also reveals other trends, supporting our goal of continued leadership in responsible money management.

¹ "Study: Data Centers Use Less Energy Than Expected," Bryan Walsh, Axios, 29/02/2020. <https://www.axios.com/study-data-centers-energy-52d13839-d697-4b55-b02b-65e9b332c3e2.html>

² "United States Data Center Energy Usage Report," Staff, Lawrence Berkeley National Laboratory, June 2016. https://eta-publications.lbl.gov/sites/default/files/lbnl-1005775_v2.pdf

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