Index Insights

Sustainable Investment | Green Economy

Investing in the green economy 2022

Tracking growth and performance in green equities

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An LSEG Business

Overview

Channeling more capital towards the low carbon transition, meeting new regulatory requirements of green taxonomies and capturing green thematic investment opportunities requires better and more granular data on the green economy. This report discusses key trends and insights in the global green economy based on the FTSE Russell Green Revenue data – a unique source providing granular, bottom-up information on corporate revenues from green products and services. We find that the global green economy remains large, diversified and is expanding rapidly. It saw strong equity market performance over the longer term and particularly in 2020 and 2021. In 2022 its performance to date has lagged global equity markets. We attribute this to extended valuation premiums and weakness in certain green subsectors, such as renewable energy. However, the long-term growth drivers of the green economy remain intact – in particular the need for delivering solutions to global challenges, none less significant than climate change.

Contents

Executive summary

Addressing climate change and environmental issues requires significant investment; estimates suggest that between USD125 to USD 275 trillion is needed to reach net zero greenhouse gas emissions by 2050.[1] As governments and investors seek new ways to deploy ever greater capital towards this and other global environmental challenges, there is a need to create a common language on sustainable activities through which to define, measure and invest in the green economy.

One of the main challenges to developing and implementing such a common language is the lack of in-depth data on the green economy and limited corporate reporting on green products and services. Despite the proliferation of green taxonomies globally, improvements in disclosures are likely to be gradual, and measuring the green exposure of large and diverse global investment portfolios will, for the time being, remain challenging for investors.

FTSE Russell's Green Revenues dataset uses disclosed information as the starting point for measuring green revenues for over 16,000 equities, of which c.3,000 are found to have green products and services. In cases where detailed disclosures are lacking, it leverages additional data (such as product volumes) to produce robust, bottom-up estimates of revenues from each green activity for each company. The data captures 133 types of green products and services, in alignment with the EU Taxonomy but also going beyond to cover areas such as waste management and pollution control.

Building on this dataset, this report – our latest annual update on the green economy[2] - aims to plug the information deficit created by low levels of disclosure and provide a holistic picture of green trends in the global equity market. As the green economy gathers pace, sustainability-themed investment has become a dominant trend within the financial industry – now too significant for investors to ignore.

The key findings of this report are as follows:

**Figure 1. Size of the green economy by Market Capitalization, 2009 – 2021**
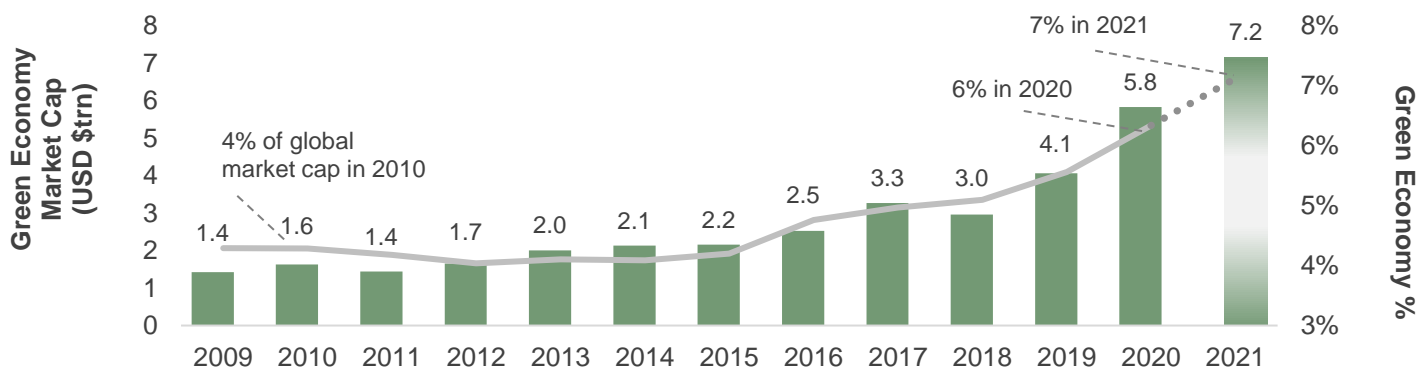
Notes: GR-weighted investable market cap. GR2.0 data, including disclosed information and estimates, for 2016 to 2020; Faded 2021 bar represents linear interpolation of 2020 GR data; Data for 2009 to 2015 is extrapolated using disclosed GR percentages and disclosed maximum and minimum ranges. Source: FTSE Russell, May 2022.

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[1] McKinsey & Company (2022), *The net zero transition: what it would cost, what it could bring;* Glasgow Financial Alliance for Net Zero (GFANZ) (2021), *We need to reach net zero emissions by 2050*; GFANZ, launched in April 2021 and co-chaired by Mark Carney and Mike Bloomberg, is a group made up more than 450 banks, insurers and asset managers - including the London Stock Exchange Group - dedicated to helping raise ambitions across the financial system to meet Net Zero by 2050.

[2] FTSE Russell (2020), *Investing in the green economy – sizing the opportunity*.

- **The green economy demonstrates a rapidly growing and sizeable investment opportunity (**Figure 1**)**. In response to global environmental challenges, including climate change, the green economy recorded a compound annual growth rate of c.14% over the last 12 years. With a market capitalization of over USD7 trillion and a weight of 7.1% of global equity markets, the green economy by itself would be the fifth largest industry, comparable in size to the fossil fuel sector.

- **The green economy is diversified with a growing range of technologies.** Some are growing fast – such as energy management and efficiency and transport equipment – while other are growing more modestly, such as renewable energy equipment.

- **Some industries are rapidly greening,** with 42% of the Automobiles and Parts sector's market capitalization is focused on lower-carbon solutions, mainly driven by growth in the electric vehicles (EVs) market and Tesla. Utilities is the second greenest sector, with 27% of its market capitalization being focused on low-carbon solutions such as renewable power generation.

- **FTSE Green Revenues data captures green exposure across the whole value chain,** in which each link can offer unique investment characteristics. For instance, EVs are not only about auto manufacturers, encompassing activities from lithium mining and charging infrastructure.

- **The green economy is both a developed and emerging markets story.** The green economy is globally diverse, albeit with concentration in certain countries such as the United States (54%), followed by China (12%). However, while smaller in total size, Japan and European countries such as France and Germany have a higher exposure to the green economy.

- **The long-term performance of the green economy is strong (**Figure 2**).** The FTSE Environmental Opportunities All Share (EOAS) Index[3] outperformed the FTSE Global All Cap by 5.9% over the last five years.[4] EOAS is even further ahead next to fossil fuels, where its returns were 19.8% larger than the oil and gas sector over the same period.[5]

Figure 2. Performance of FTSE Environmental Opportunities All Share vs Global All Cap and Oil & Gas (TR, USD)
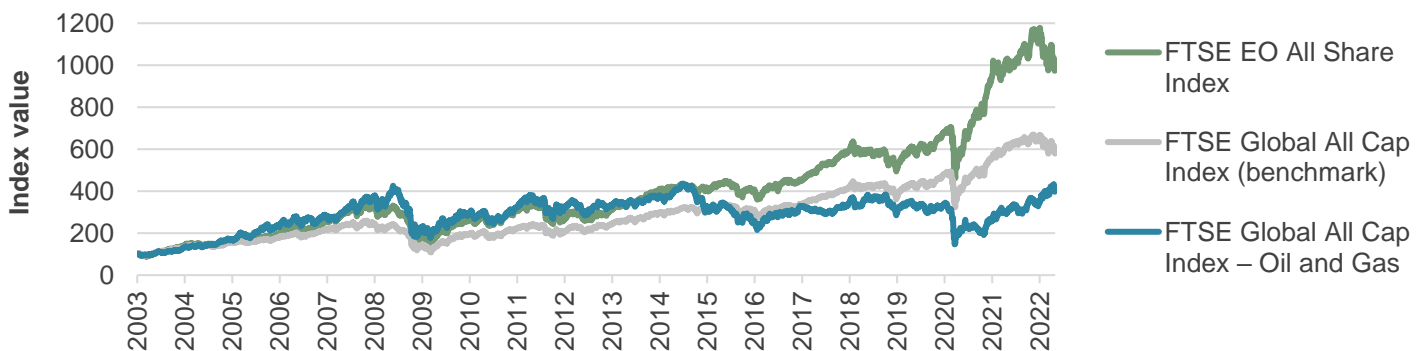
Notes: Index represents Total USD return, based to 31/12/2003, running until 29/04/2022; Companies included in the Environmental Opportunities All Share Index have at least 20% green revenue. Past performance is not a guarantee of future performance. Source: FTSE Russell, May 2022.

[3] Companies must have at least 20% of green revenues derived from environmental products and services to be eligible for the FTSE Environmental Opportunities Index Series. https://www.ftserussell.com/products/indices/env-markets

[4] Difference between compound annual returns on five-year basis (December 2016 to December 2021). For more details, see FTSE Russell (2022), *FTSE Environmental Opportunities Index Series: Factsheet*.

[5] Difference between compound annual returns on a five-year basis (December 2016 to December 2021); Oil and gas sector represented by the FTSE Global All Cap Index - Oil and Gas

- So far in 2022 its performance to date has lagged global equity markets. We attribute this to extended valuation premiums and weakness in certain green subsectors, such as renewable energy. However, the long-term drivers remain intact for this fast-developing market, such as an increasing focus on climate finance, investors' growing interest in sustainable investment and green taxonomies coming into force.[6]

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[6] FTSE Russell (2021), *Global asset owner sustainability survey sheds light on regional differences*.

Introduction

Investors are increasingly interested in the green economy – for example, inflows into European sustainability funds almost doubled in 2020 to USD364 billion[7] − not only for sustainability benefits, but also for thematic investment opportunities and ways to mitigate material climate and environmental risks. This growing wave of sustainability-focused investment channels capital towards the green economy and low-carbon transition, is helping to develop and scale emerging green products and services.

However, despite its increasingly green tinge, the level of investment in the green economy remains far from what is necessary to address global climate change and depletion of environmental resources. Capital investment required to effect these changes are substantial: for instance, the Glasgow Financial Alliance for Net Zero (GFANZ) estimate that USD125 trillion is needed by 2050[8], while McKinsey put the same figure closer to USD275 trillion.[9]

Given the potential scale of the green investment opportunity, there are clear benefits to establishing a common language, or classification system, to define the green economy. Financial markets rely on such a common classification to identify investment opportunities and measure their associated growth and performance. Crucially, common languages on sustainable activities also facilitate the creation of thematic indices and other financial products, through which capital can be channeled towards the low-carbon transition at scale.

As policymakers seek ways to address these challenges, developing 'Green Taxonomies' (classification systems that identify business activities with genuine environmental benefits) is becoming a greater priority (see Appendix 1). As taxonomies develop and mature, and more rules, metrics and thresholds are created to gauge the environmental credentials of companies, broader and more granular data will be required − both to meet the increasing disclosure requirements from taxonomy regulations and to help investors identify green investment opportunities.[10]

FTSE Russell's Green Revenues dataset uses disclosed information as the starting point for measuring green revenues for over 16,000 equities, of which c.3,000 are found to have green products and services. Where detailed disclosures are lacking, it leverages additional, non-revenue data (such as product volumes) to produce robust, bottom-up estimates of each green activity for each company. The data captures 133 types of green products and services (green micro sectors) − in alignment with the EU Taxonomy but also going beyond this to cover areas such as waste management or pollution control (see Appendix 2 for more information on the GRCS, the Green Revenues dataset and its methodology).

Using the latest FTSE Russell Green Revenue data, the remainder of this report outlines the latest trends shaping the global green economy: Section 2 outlines its composition; Section 3 looks at its growth; and Section 4 analyzes its long- and short-term performance.

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[7] Refinitiv Lipper data on net ESG fund flows, as of 31/03/2022; Increase from EUR 229bn in 2019 to EUR 402bn in 2020, converted from EUR to USD at a rate of 0.905 EUR:USD (rate as of 01/04/2022); Figures cover multiple asset classes.

[8] Glasgow Financial Alliance for Net Zero (GFANZ) (2021), *We need to reach net zero emissions by 2050;* GFANZ, launched in April 2021 and co-chaired by Mark Carney and Mike Bloomberg, is a group made up more than 450 banks, insurers and asset managers - including the London Stock Exchange Group - dedicated to helping raise ambitions across the financial system to meet Net Zero by 2050.

[9] McKinsey & Company (2022), *The net zero transition: what it would cost, what it could bring*

[10] FTSE Russell (2021), *"Do No Significant Harm" and "Minimum Safeguards" in Practice: Navigating the EU Taxonomy Regulation in practice*

Composition of the green economy

As this section will outline, the green economy is mature enough to be considered a standalone economic sector. Like the technology sector, it is **multi-faceted** in how it horizontally pervades other sectors, while being **large** enough to be considered a sector in its own right − underpinned by a **diverse** set of green technologies, corporate players and countries.

Green economy by industry

The green economy, if seen as an industry, would be the *fifth* largest industrial Supersector by market capitalization, as shown in Figure 3. It remains materially bigger than the oil and gas sector today, and it recently overtook the retail sector. Future growth estimates imply the green economy could become the first or second largest industry.

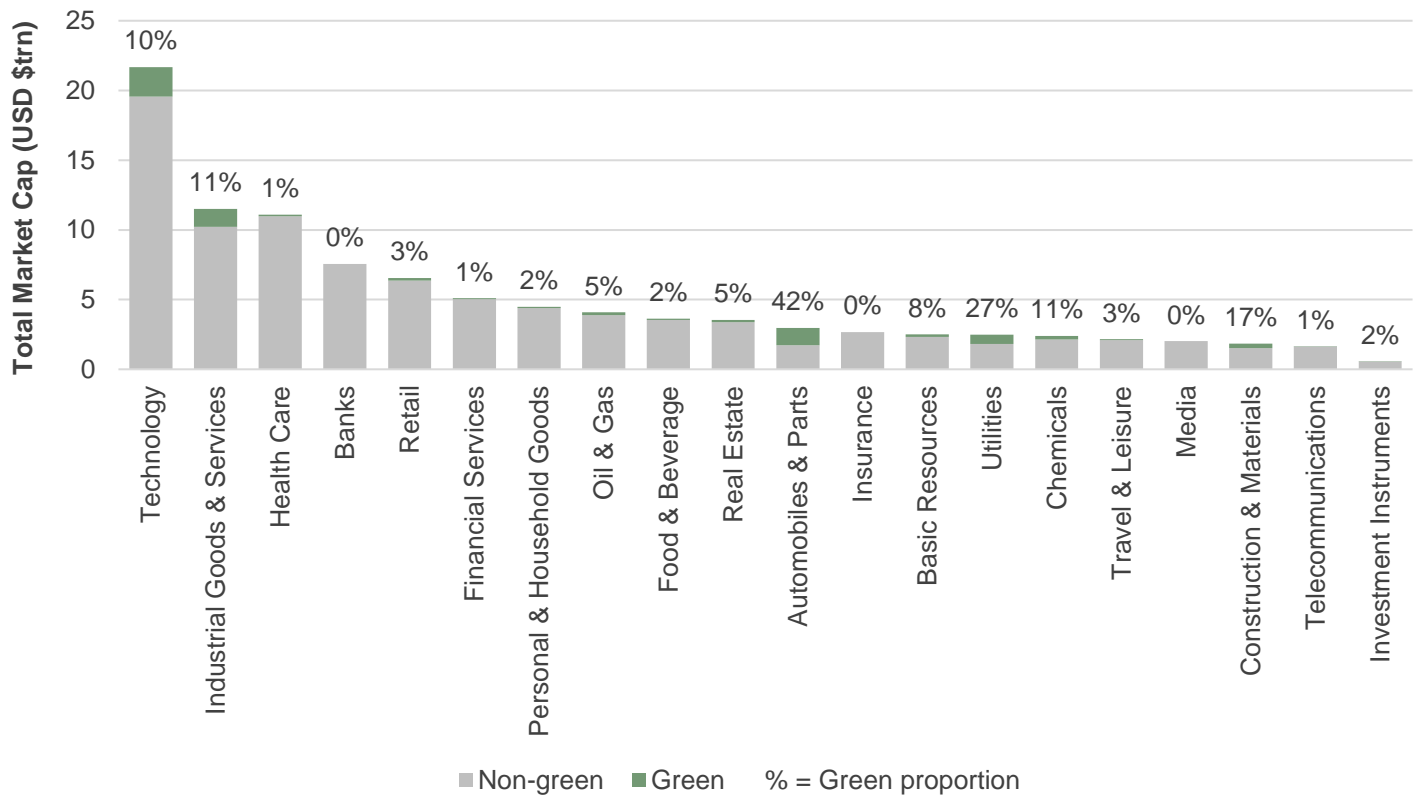**Figure 3. Size of the Green Economy by ICB Supersector**
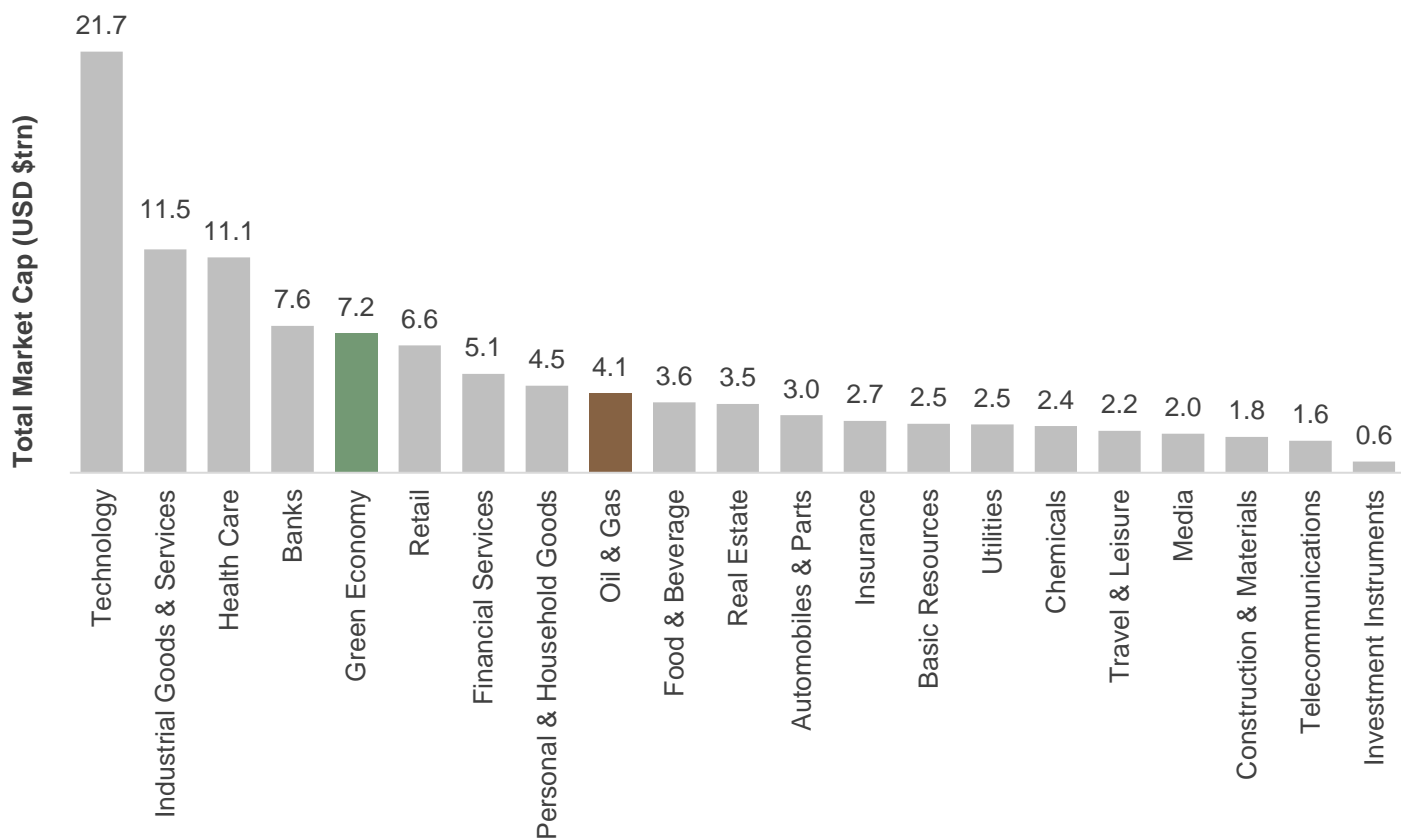
Notes: GR-weighted investable market cap.

Source: FTSE Russell, May 2022.

The picture changes when looking at a sector's exposure to the green economy (Figure 4). For example, although the technology sector constitutes over a quarter of the green economy by size, it sits outside the top five by green exposure. In contrast, while the Automobiles & Parts sector accounts for under one tenth of the green economy by size, 42% of its market cap is exposed to the green economy − a trend driven by recent market tilts towards electric vehicles (EVs).

Figure 4. Green Exposure of ICB Supersectors

Notes: Sum of GR-weighted investable market cap over the sum of total market cap of all green revenues by ICB sector.
Source: FTSE Russell, May 2022.

The green economy is diverse across industries, although it is largely concentrated in several ICB Supersectors. For instance, over 75% of its market capitalization comes from the Technology, Industrial Goods and Services, Automobiles & Parts, Utilities and Construction & Materials sectors (Figure 5).

Figure 5. Green Economy by ICB Supersector
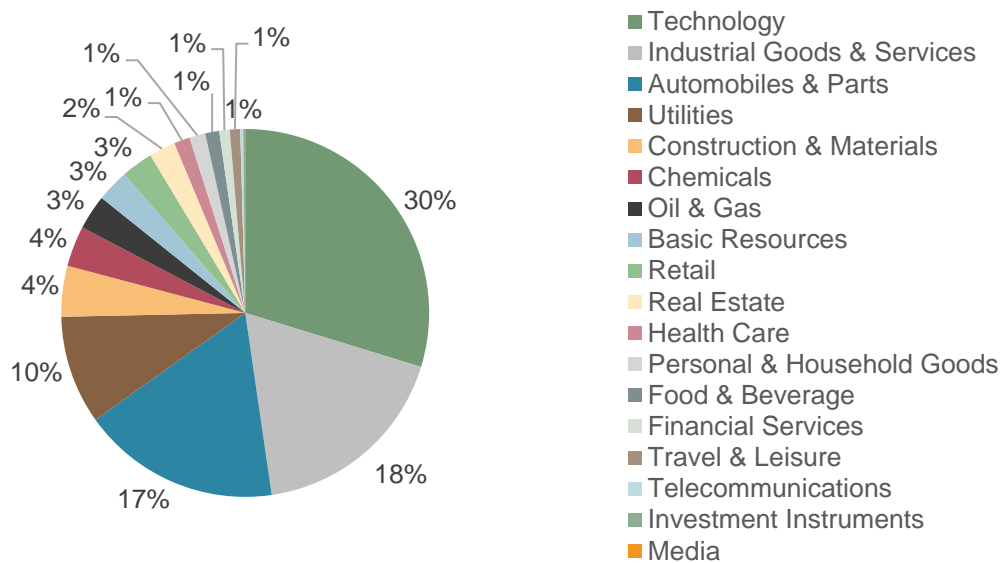
Notes: GR-weighted investable market cap. Source: FTSE Russell, May 2022.

Green economy by product and services

While commonly thought of as solely focused on renewable energy and climate change, in reality the green economy represents a diverse set of activities spanning multiple points up and down the value chains, providing solutions across several environmental objectives (Figure 6). Energy management and efficiency represents 39% of the green economy, reflecting the importance of energy efficiency as an environmental solution (such as reducing carbon intensity, pollution control and resource efficiency) throughout a range of markets, particularly buildings, industry, and IT. Transport equipment − the second largest green sector − is one fifth of the green economy by size, having recently grown with the shift towards electric vehicles (see more analysis in Section 3).

Figure 6. Global Green Economy by green sector[11]
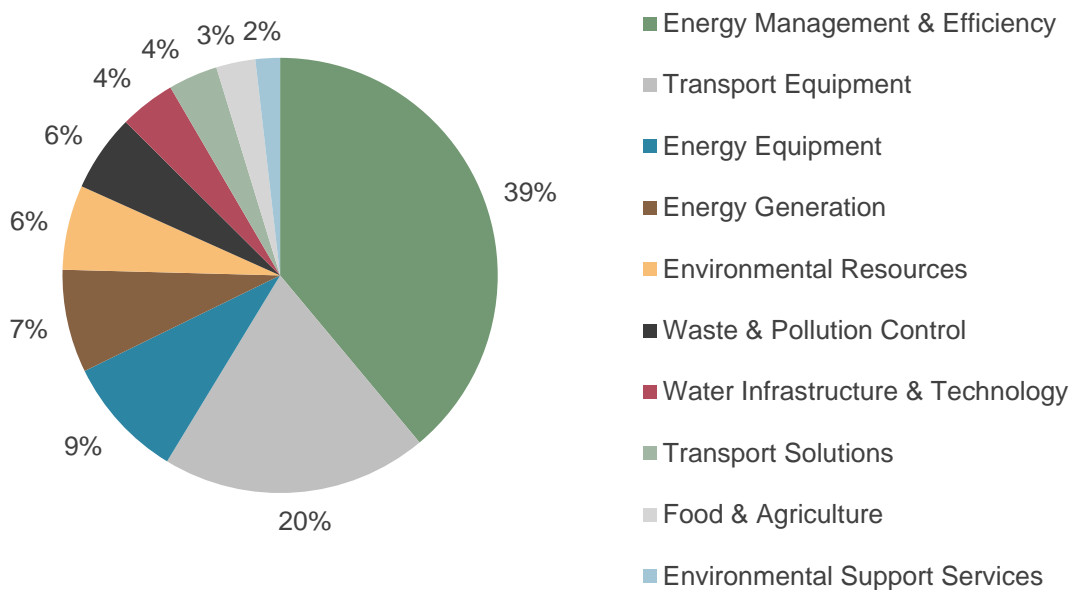
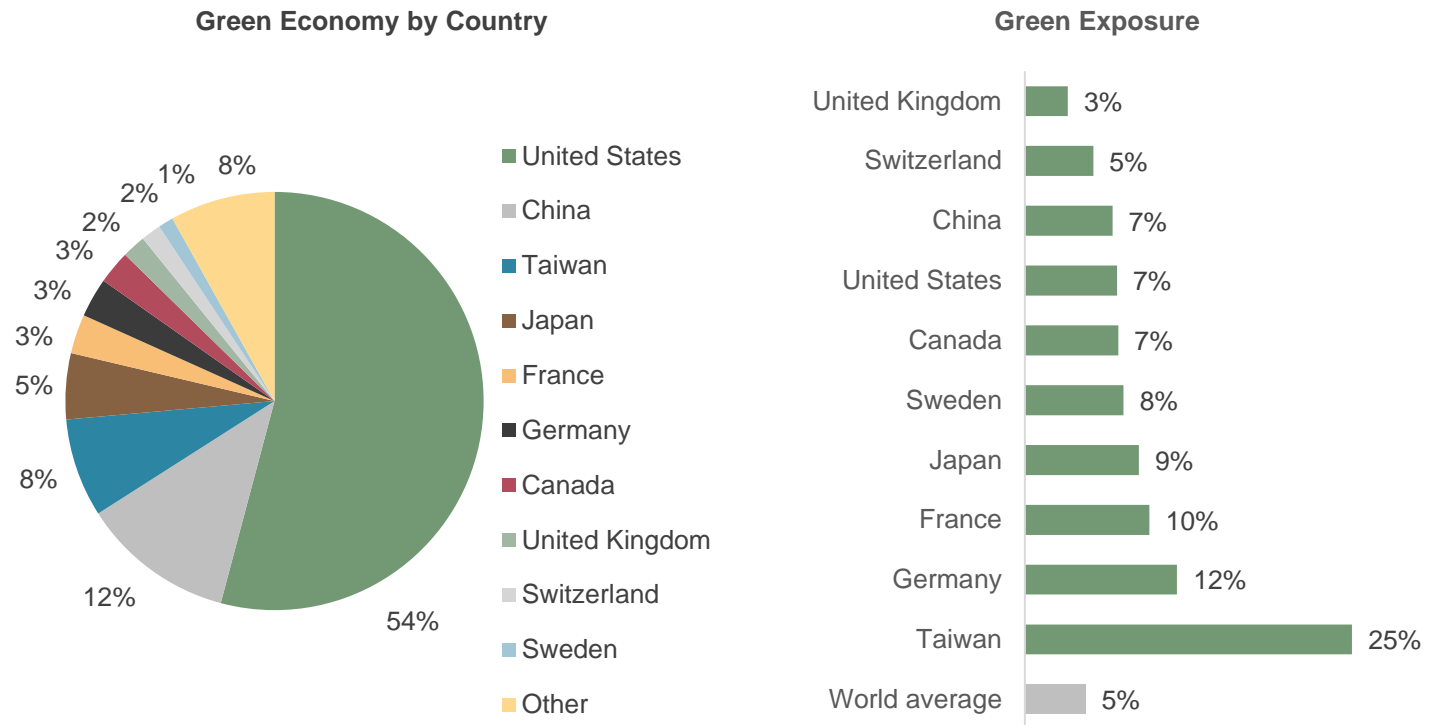Notes: GR-weighted investable market cap.

Source: FTSE Russell, May 2022.

Other sectors are smaller, but no less significant in the functioning of the green value chains. For instance, renewable energy generation and equipment, which make up 18% of the green economy, remains large; the sector plays a critical role in decarbonizing the power sector. Other areas of the green economy such as, the role of environmental resources in producing critical metals for a range of green end uses, are similarly important for producing green goods and services, but tend to be overlooked.

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[11] Green sectors as defined within the FTSE Russell Green Revenue Classification System.

Green economy by country

Looking at the green economy by country (Figure 7), it is globally diverse, although it is dominated by the US and China, in keeping with the global equity market. While Europe has a smaller share of the global green economy by size, its exposure is significantly higher compared to the rest of the world (Figure 8). Differences in the green economy by country are partly affected by national circumstances, such as if one large company dominates (as is the case of Taiwan with its semiconductor industry), or if some other sectors are particularly large (as is the case in the UK, with its financial services industry).
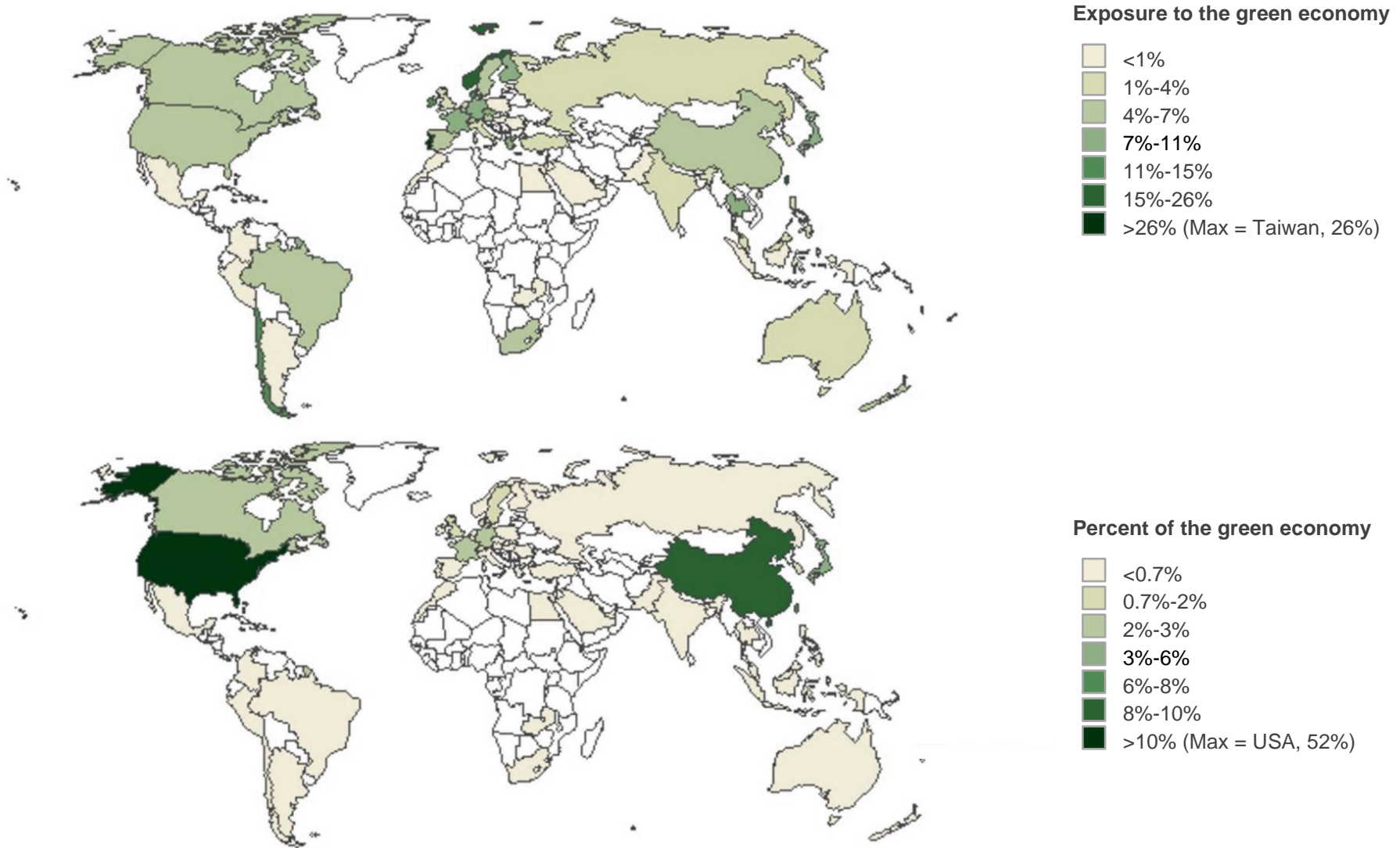
Figure 7. The Green Economy by Country

Notes: GR-weighted investable market cap by country of domicile of listed company; green exposure is calculated as the sum of GR-weighted investable market cap over the sum of all listed companies by country of domicile.

Source: FTSE Russell, May 2022.

Figure 8. Green Economy by country

Exposure to the green economy

- <1%
- 1%-4%
- 4%-7%
- **7%-11%**
- 11%-15%
- 15%-26%
- >26% (Max = Taiwan, 26%)

Percent of the green economy

- <0.7%
- 0.7%-2%
- 2%-3%
- **3%-6%**
- 6%-8%
- 8%-10%
- >10% (Max = USA, 52%)

Notes: Percent of the global economy calculated as the sum of GR-weighted investable market cap by country of domicile of listed companies; Green exposure calculated as the sum of GR-weighted investable market cap divided by the sum of the total market cap of all listed companies by country of domicile included in the FTSE All World Index; Color bands are based on Jenks natural breaks classification.
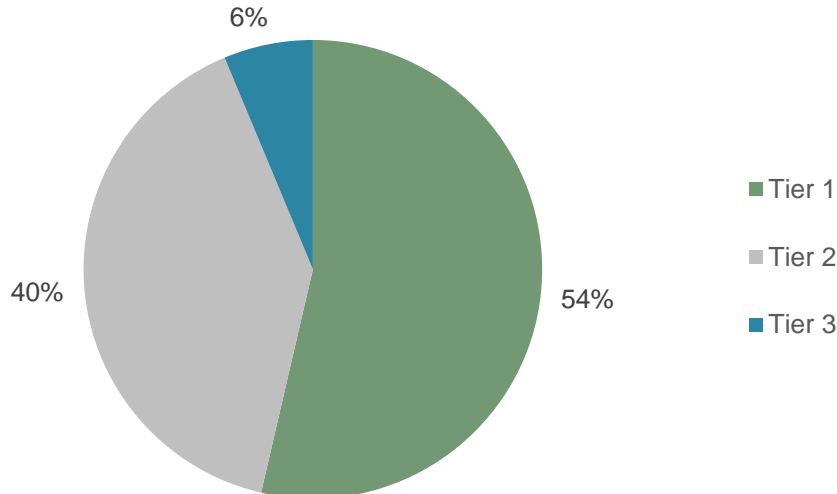
Source: FTSE Russell, May 2022

Green economy by 'Tiers'

When evaluating the greenness of activities across value chains, current taxonomies tend to use a binary system, categorizing them as either green or not green. However, in practice this can prove to be a tricky exercise, particularly when thinking across diverse value chains, juggling relatively incomparable environmental objectives, evaluating activities with both positive and negative environmental impacts, and negotiating stakeholders' different views on what is green. For instance, nuclear is a low-carbon energy source, however it does have other environmental issues, in particular radioactive waste, which can be long-lasting.

To recognize activities with both positive and negative environmental impacts, the Green Revenue Classification System (GRCS) adopts a tiering approach: Tier 1 covers activities with significant and clear environmental benefits (for example, solar energy generation); Tier 2 covers activities with more limited but net positive environmental benefits (for example, water utilities); Tier 3 covers activities which have some environmental benefits but are overall net neutral or negative. Within this schema, nuclear is classed as a Tier 3 activity.

While 'Tier 3' activities represent only 6% of the market (Figure 9), the ability to differentiate activities with different tiers is important. It helps investors to understand their exposure to products and services with various levels of greenness, which is increasingly more useful as green taxonomies take contrasting positions on what activities count as green − such as nuclear and gas[12] − requiring datasets that can be flexibly deployed to meet the needs of divergent taxonomies and diverse sustainable investment strategies.

Figure 9. The global green economy by Tier
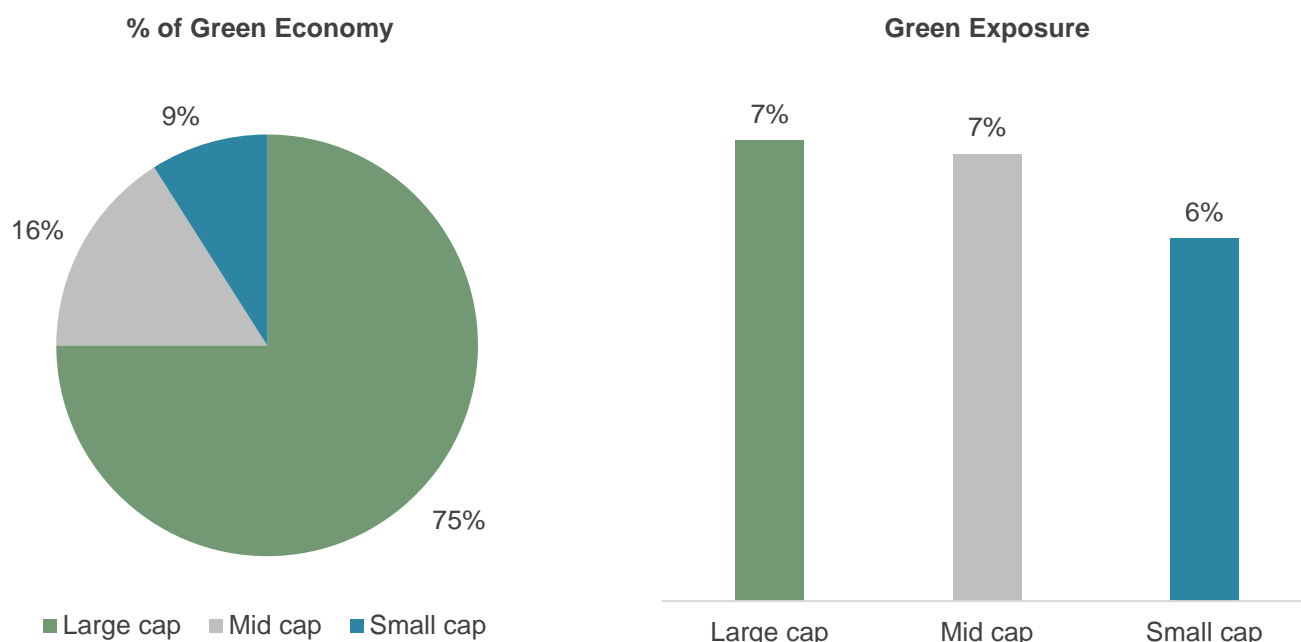

Notes: GR-weighted investable market cap.

Source: FTSE Russell, May 2022.

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[12] For instance, this can be seen in the differing position of natural gas and nuclear power generation across different Taxonomies; see PowerMag (2022), _Nuclear and Natural Gas Taxonomy Battles Brewing in Europe and S. Korea._

The green economy by company size

Large cap companies constitute most of the green economy, making up 75% of its market capitalization (Figure 10). While this shows that large-cap companies account for a higher share of the total *value* of green goods and services, the green economy still has a diverse set of players: in terms of the number of companies, 79% of green companies are medium and small.[13] In addition, the 'green exposure' of companies − the proportion of a company's value linked to green activities and products − differs less across company sizes, a fact which can be missed when focusing only on the large green players.

Figure 10. The green economy by company size

% of Green Economy

Green Exposure

Notes: Right: GR-weighted investable market cap. Left: Green exposure calculated as the average sum of GR-weighted market cap over total market cap of Large, Mid and Small cap companies; Company size is defined based on the FTSE Global Equity Index Series on a regional basis, which excludes some companies based on the rules of the index, such as minimum investability rules, resulting in the green exposure of large/mid/small-cap firms being lower than the global average for countries; for more information, see *FTSE Russell (2022), Ground Rules: FTSE Global Equity Index Series.*

Source: FTSE Russell, May 2022.

Growth of the green economy

The overall growth of the green economy

Over the last decade the green economy's market capitalization grew from USD2 trillion in 2009 to over USD7 trillion in 2021, underlying a strong capacity for year-on-year growth (Figure 11). It also grew on a relative basis, almost doubling its share of the global investable market, from 4% to over 7%, between 2009 and 2021.

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[13] Of the c.3000 companies identified by FTSE Russell as generating revenue from green products and services, 21% are large-cap, 28% are mid-cap, and 51% are small-cap.

Figure 11. The size of the green economy by market capitalization, 2009-2021
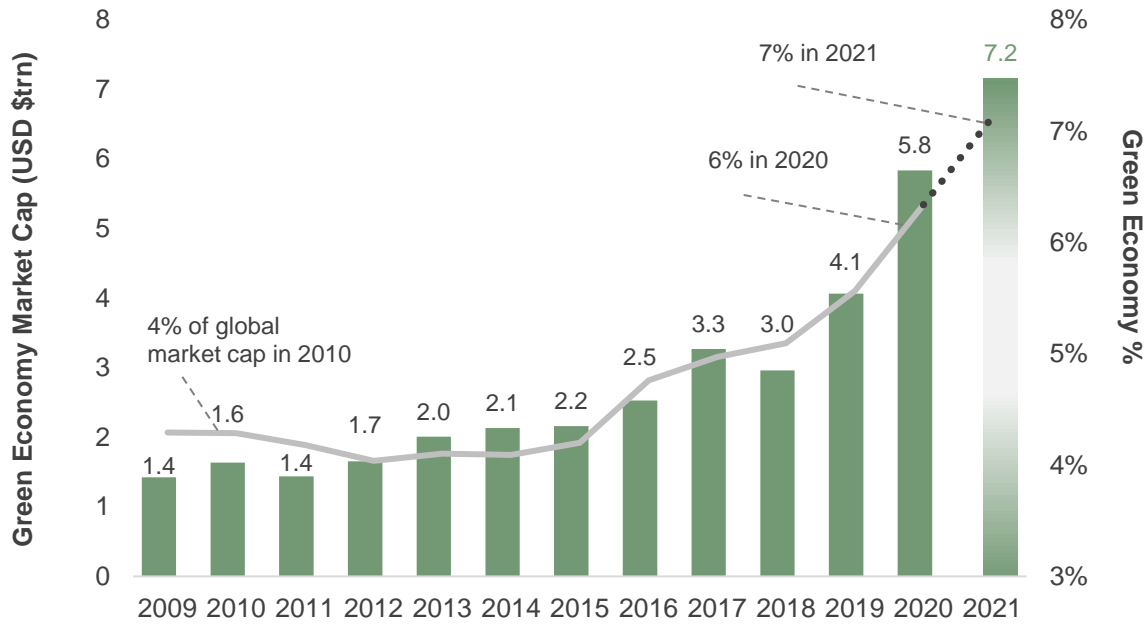
Notes: GR-weighted investable market cap. GR2.0 data, including disclosed information and estimates, for 2016 to 2020; Faded 2021 bar represents linear interpolation of 2020 GR data; Data for 2009 to 2015 is extrapolated using disclosed GR percentages and disclosed maximum and minimum ranges. Source: FTSE Russell, May 2022.

Revenue provides a complementary view of growth by helping to dilute the 'value impact' of market capitalization as a metric, which is influenced by trends in the wider equity market (Figure 12). While the growth rate is more gradual, using revenue as a lens, both measures show that over the long term, the green economy is growing on both an absolute and relative basis.

**Figure 12. The size of the green economy by Revenue (2009-2021)**
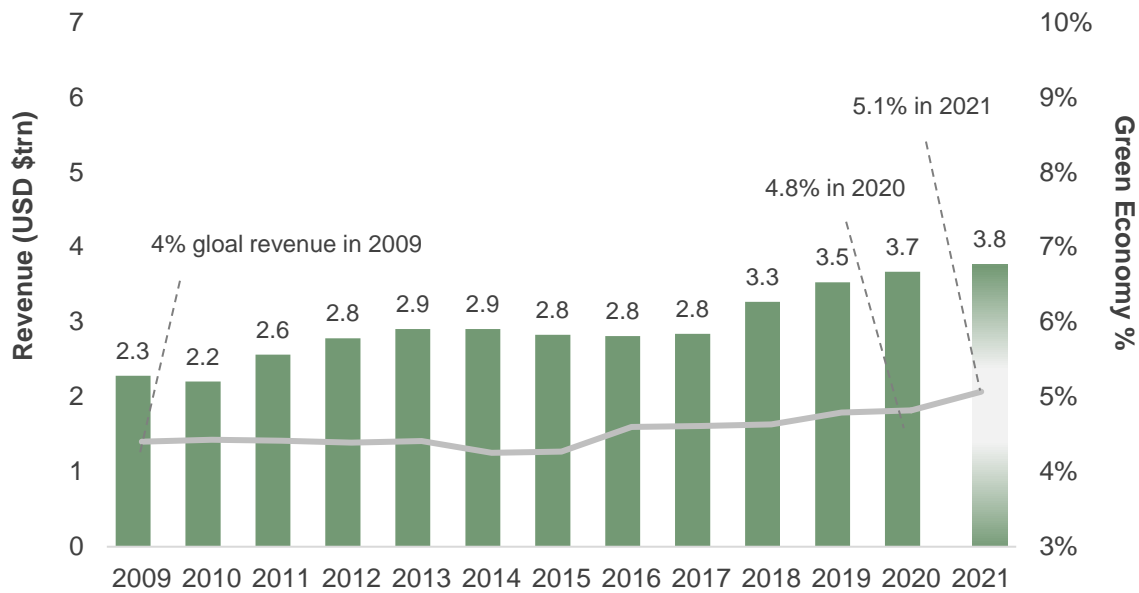
Notes: GR-weighted revenue. GR2.0 data, including disclosed information and estimates, for 2016 to 2021. Data for 2009 to 2015 is extrapolated using disclosed GR percentages and disclosed maximum and minimum ranges. 2021 uses the latest available full year revenue figures for each GR company. Source: FTSE Russell, May 2022.

Despite this recent growth, various forecasts imply that investment in the green economy needs to grow faster to meet global climate and environmental goals. Comparing with climate investment required by 2050, Figure 13 shows that the green economy needs to become substantially larger to achieve a Net Zero climate target, growing from around 7% of the global economy today, to between 16-25% by 2050. The green economy remains far from even the lower bound of the investment need, even though the investment gap appears to narrow.[14]

While these estimates are uncertain over how the green economy will grow in the future, resulting in a wide range of potential growth trajectories, they agree that meeting Net Zero by 2050 requires it to grow substantially over the next three decades. Much of the capital driving this growth will be channeled toward sectors conventionally thought of green, such as renewable energy and energy management and efficiency, but other sectors will also have a significant role to play, such as food and agriculture, which itself is a large source and potential sink of greenhouse gas emissions.[15]

Figure 13. Potential Future Growth Trajectory of the Green Economy.[16]
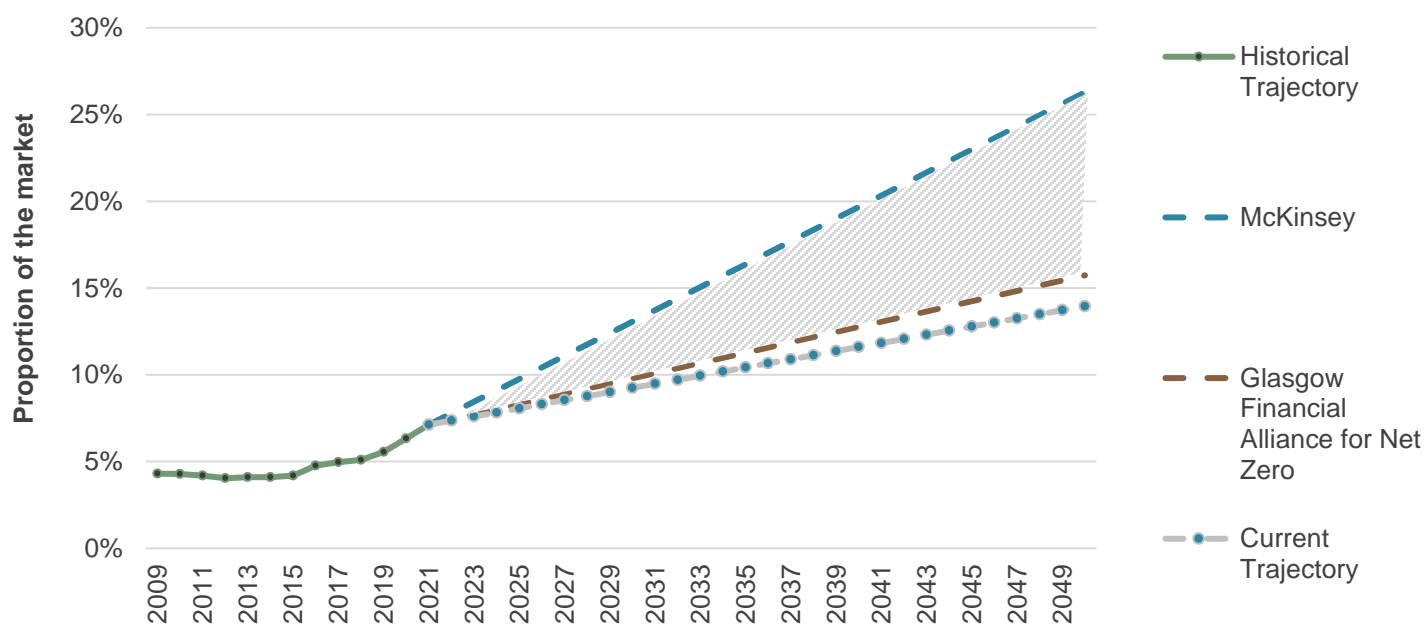
Notes: Current trajectory estimate based on extrapolation of average growth rate from 2009 to 2021; McKinsey and GFANZ trajectories based on hitting respectively USD275trn and USD125trn of total green investment by 2050, with an 'additional investment' factor of 0.09 (25 / 275) applied based on McKinsey's 2022 report; assumed price to sales ratio of 1.9 for the green economy and 1.3 for the rest of the market; Rest of market assumed to grow at 3% (World Bank); Multiplier of 1.48 applied to green economy (IMF).

Sources: FTSE Russell, May 2022; McKinsey, January 2022; GFANZ, November 2021; IMF, March 2021; World Bank, June 2021.

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[14] The 'Current Trajectory' is based on extrapolating the compound annual growth rate of green revenue companies to 2050 based on the sum of green revenue-weighted investable market capitalization of all green revenue companies in each calendar year between 2009-2021.

[15] For more information, see FTSE Russell (2021), *The COP26 Net Zero Atlas*

[16] McKinsey & Company (2022), *The net zero transition: what it would cost, what it could bring;*

Glasgow Financial Alliance for Net Zero (November 2021), *Net Zero Financing Roadmaps*; International Monetary Fund (March 2021), *Building back better: How big are green spending multipliers?;* World Bank (June 2021), *Slowing growth, Rising risks*.

Growth of industries' green exposure

The green exposure of most industries is growing, in particular Automobile & Parts, Technology and Utilities (Figure 14). For example, between 2016 and 2021, green revenues of the Utilities sector increased from 19% to 32%, driven by growth in the market value of renewable energy generation and technologies. In other sectors such as Chemicals, Construction & Materials and Industrial Goods & Services, the green exposure is plateauing, having fluctuated around 10% over the last five years. The green share of some sectors remains marginal − under 1% of sector market cap, as is the case in the Media and Telecommunications sectors.

Figure 14. Green exposure of selected ICB Supersectors, 2016-2021
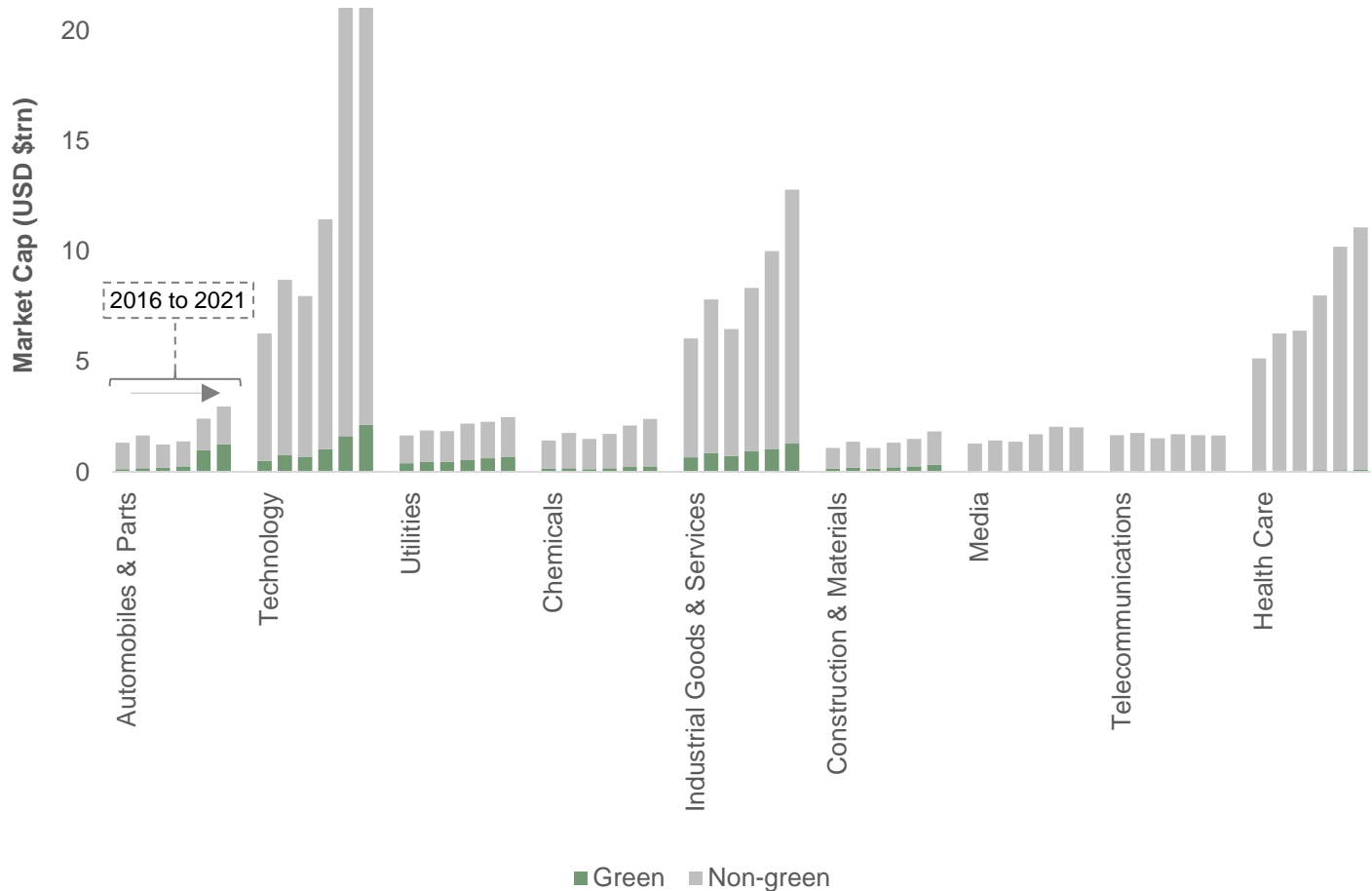
Notes: sum of GR-weighted investable market cap over the sum of total market cap of all green revenues by ICB sector.

Source: FTSE Russell, May 2022.

Growth of green sectors

From the perspective of green technologies, most are seeing a rapid growth, owing to the development of new activities such as energy efficiency, efficient IT and electric vehicles (Figure 15). Transport equipment, which includes green solutions across road, rail, shipping and aviation, more than quadrupled in value between 2018 and 2021. Similarly, energy management and efficiency more than tripled in size between 2016 and 2021, driven by recent growth in cloud computing, which alone accounted for 61% of the sector's growth between 2016 and 2021.

Figure 15. Growth of selected green sectors
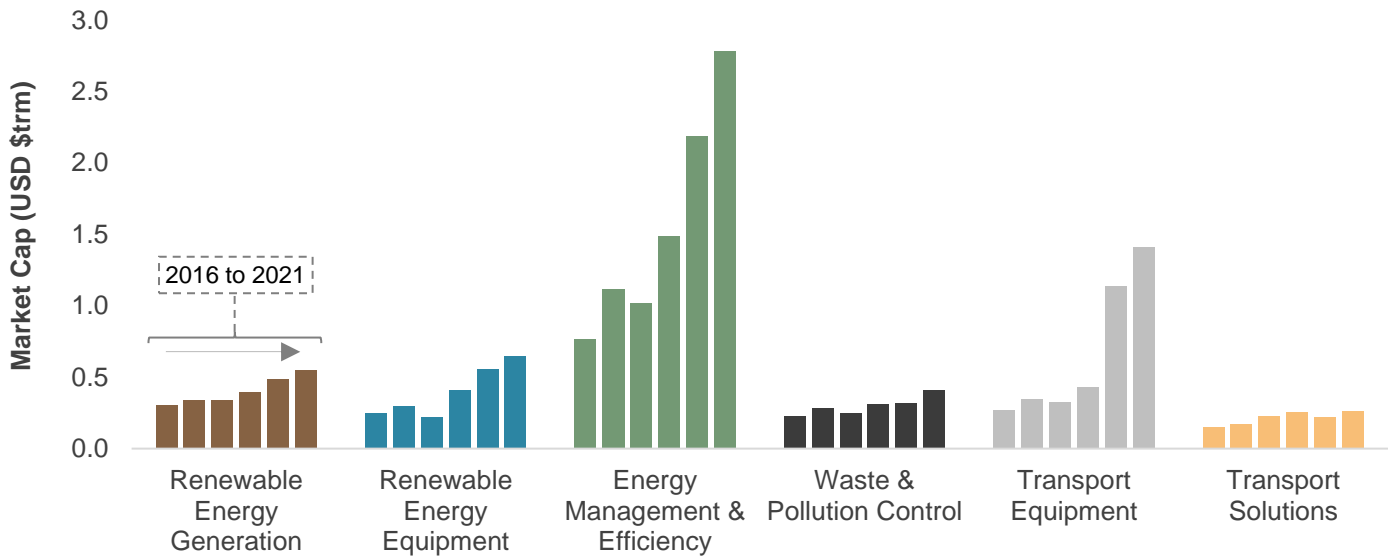
Notes: GR-weighted investable market cap. Source: FTSE Russell, May 2022.

Examining trends at the micro sector or green technology level can help investors build effective and diversified green portfolios in the same way as investing across traditional industry sectors, since these varied parts of the market can have unique investment characteristics. For instance, the renewable energy equipment market is comprised of many different technologies, with solar being the largest (over 50% of the market capitalization), having gained an additional 20% share since 2018 (Figure 16) – mainly driven by growth in the market capitalization of solar companies, such as LONGi Green Energy Technology and Enphase energy.

**Figure 16. Sub-sector breakdown of Renewable Energy Equipment**
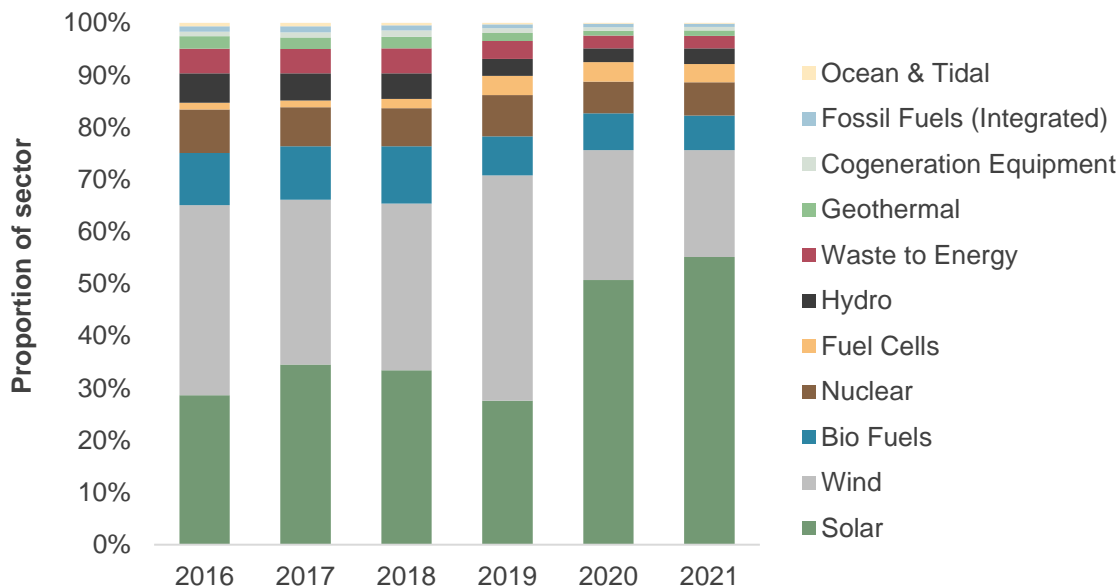
Notes: GR-weighted investable market cap. Source: FTSE Russell, May 2022.

A deep dive into the Automotive & Parts

The green exposure of the Automotive & Parts sector is increasing particularly fast, tripling between 2018 and 2021 from 15% to 42%. This substantial increase is mostly driven by one company, Tesla, due to a combination of significant growth of its market capitalization (increasing by over 500% over the same time period) and the fact that 100% of its revenue is green. That is, every additional unit of Tesla's value proportionally increases the sector's exposure to the green economy (Figure 17). By December 2021, Tesla alone made up over two thirds (68%) of the green exposure of the whole Automobiles & Parts sector.

Figure 17. Green exposure of the Automobiles & Parts sector
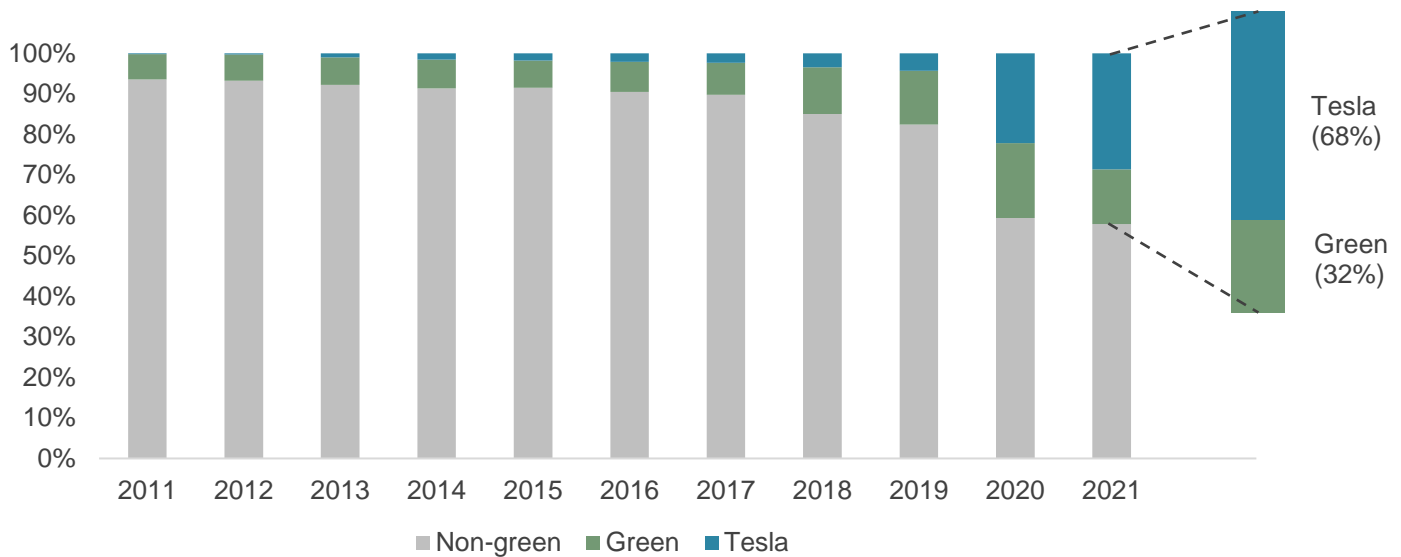
Notes: 'Green' uses the GR-weighted investable market cap of companies in the Automobile & Parts sector, minus the market cap of Tesla; Tesla uses GR-weighted investable market cap; 'Non-green' uses investable market cap.

Source: FTSE Russell, May 2022.

To fully capture green investment opportunities, it is important to consider green exposures across the whole value chain. Figure 18 provides a stylized example of how the Green Revenues data captures value chain green exposures by measuring micro sector-level green revenues, using Tesla as an example. The dataset touches multiple points in the value chain, from the extraction and processing of important metals to the manufacturing of other key components − including batteries, power semiconductors and control systems − to the assembling of electric vehicles themselves. The chain continues downstream of these activities, with battery-recycling companies recovering valuable metals, which can again be used in the manufacturing of entirely new components.

Figure 18. How does GR2.0 reflect the burgeoning EV supply chain?

Key raw materials

Glencore
Cobalt   GR = 2.9%
Environmental Resources: Cobalt

Albemarle
Lithium   GR = 52.1%
Environmental resources: Lithium

Galaxy Resource
Lithium   GR = 95.5%
Environmental Resources: Lithium

Cobalt and Lithium

Auto parts, materials & recycling

Sebang Global Battery
Lithium-ion batteries   GR = 27.1%
Transport Equipment: Advanced Vehicle Batteries

Umicore
Specialist materials   GR = 77.0%
Transport Equipment: Advanced Vehicle Batteries
Waste & Pollution Control: Transport Pollution Reduction

Contemporary Amperex Technology (CATL)
Battery recycling & production   GR = 89.0%
Environmental Resources: Recyclable Materials
Transport Equipment: Advanced Vehicle Batteries

- Advanced Vehicle Batteries
- Recyclable Materials

Electronics

Delta Electronics
Power components   GR = 33.2%
Transport Equipment: Electrified Road Vehicles & Devices (inc. hydrogen)
Transport Equipment: Energy Use Reduction Devices

Infineon Technologies
Control systems   GR = 44.3%
Transport Equipment: Electrified Road Vehicles & Devices (inc. hydrogen)
Transport Equipment: Energy Use Reduction Devices

Energy Use Reduction Devices

Advanced auto parts

SGL Carbon
Lightweight composites   GR = 51.6%
Environmental Resources: Advanced & Lightweight Materials

Advanced & Light Materials

Supporting services & infrastructure

Flex
Charging software & hardware   GR = 17.5%
Transport Equipment: Electrified Road Vehicles & Devices (inc. hydrogen)

Blink Charging
Dedicated EV charging infrastructure   GR = 91.5%
Transport Equipment: Electrified Road Vehicles & Devices (inc. hydrogen)

Tesla | GR = 100%

Tesla's green revenue

- Carbon credit trading (5.0%)
- Energy projects (6.3%)
- EV services (e.g. repair plans) (7.3%)
- EV sales (84.1%)

Electrified Road Vehicles & Devices

Notes: The relationships shown here reflect a hypothetical EV supply chain and should therefore be considered highly stylized; the Green Revenue Classification System micro sectors included here are those relevant to Electric Vehicles, and in most cases each company generates additional green revenues in other areas too; data for charts shows total green revenue weighted investable market caps for the relevant micro sectors.

Source: FTSE Russell, May 2022.

Regional growth rates reveal further dynamics about the green economy (Figure 19). North America is both the largest and fastest growing region, home to over half of the global green economy by market capitalization, having doubled in size between 2018 to 2021. In other major regions, the green economy segment is also growing, albeit at a slower pace than in North America. Between 2009 and 2022, the United Kingdom's green economy − as measured by the FTSE Environmental Opportunities Index, which includes companies with green revenue of at least 20% − grew roughly five times in size, beating Europe and Asia (both of which grew by a factor of around three).

Figure 19. Regional growth in the green economy, 2009-2021
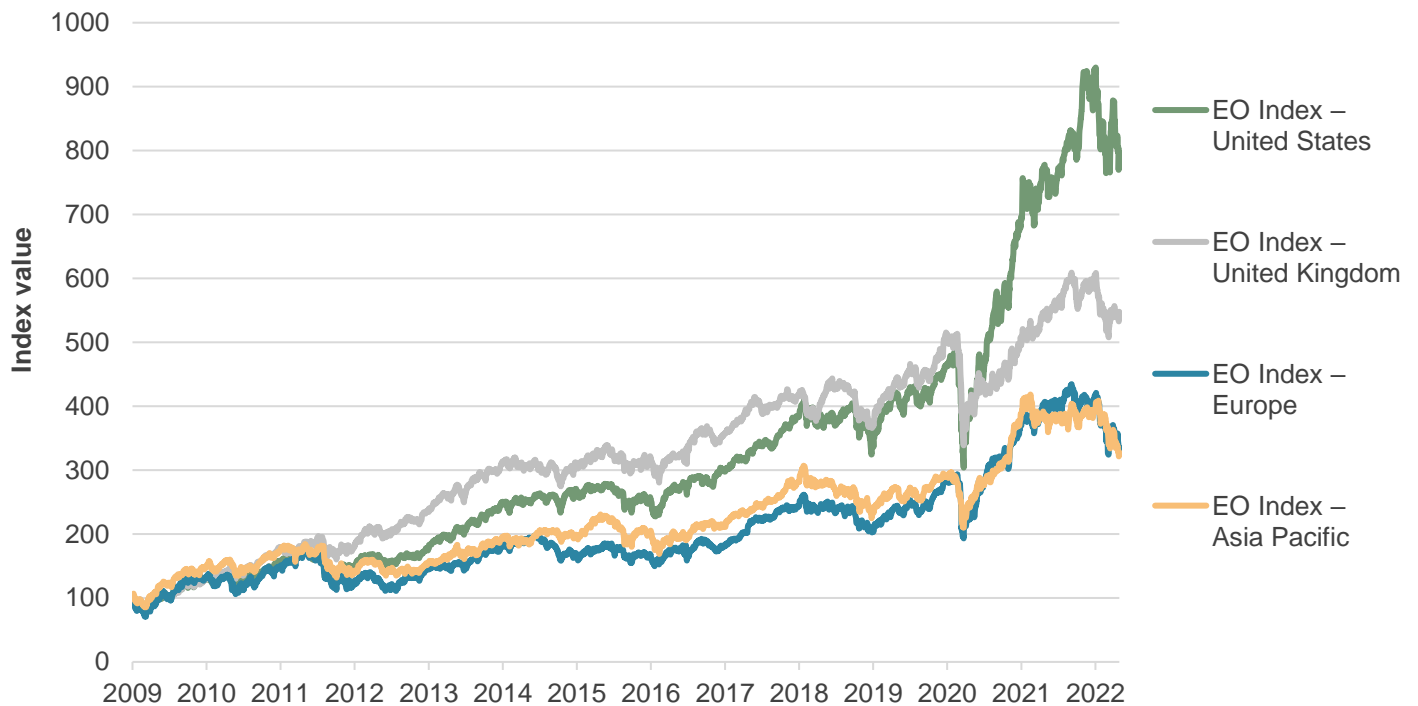
Notes: Index represents Total USD Return, based to 31/12/2008 and running until 29/04/2022; Companies included in the FTSE Environmental Opportunities Index have at least 20% green revenue; Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

Performance of the green economy

The green economy's long-term performance has been strong, outperforming the wider market and the oil and gas sector by some margin. As shown in Figure 20, the FTSE Environmental Opportunities All Share (EOAS) Index, which measures the performance of companies with at least 20% of their revenues derived from environmental products and services, outperformed the FTSE Global All Cap, by 9.7% over the last three years, and 5.9% over the last five years.[17] When compared to oil and gas, the green economy's outperformance is even more significant, generating returns that were 26.3% and 19.8% larger than those of the FTSE Global All Cap Index (Oil and Gas) over the last three and five years respectively.[18]

Figure 20. Performance of FTSE Environmental Opportunities All Share vs Global All Cap and Oil & Gas (TR, USD)

Notes: Index represents Total USD return, based to 31/12/2003, running until 29/04/2022; Companies included in the Environmental Opportunities All Share Index have at least 20% green revenue. Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

However, digging beneath the surface shows that this strong performance is not universal across the whole of the green economy. As outlined in Section 3, the green economy pervades across a wide range of sectors, each of which offers unique investment characteristics (Figure 21). For instance, while the Renewable & Alternative Energy sector is typically assumed to dominate the green economy, its performance since 2008 is muted compared to other green sectors, particularly energy efficiency and water technologies, which saw consistently stronger growth from 2008 to 2022. While the whole green economy has outperformed the market over the last two decades, some green sectors are outperforming others, particularly over the long run and since 2019.

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[17] Based on the Compound Annual Returns calculated on a three-year (2018 to 2021) and five-year basis (2016 to 2021); for more details, see FTSE Russell (2021), *FTSE Environmental Opportunities Index Series: Factsheet*

[18] Based on the difference between compound annual returns, calculated on a three-year (December 2018 to December 2021) and five-year basis (December 2016 to December 2021).

Given these sectoral dynamics, it is important for sustainability-focused investors to understand the diverse investment characteristics of different green sectors, subsectors and activities. As outlined throughout this report, tools such as the FTSE Green Revenues dataset and Environmental Markets indices can help investors to do this, in turn allowing them to build diversified green portfolios − much in the same way as they can by investing across traditional industry sectors.

**Figure 21. Performance of the FTSE Environmental Opportunities family of indices, 2002-2022**
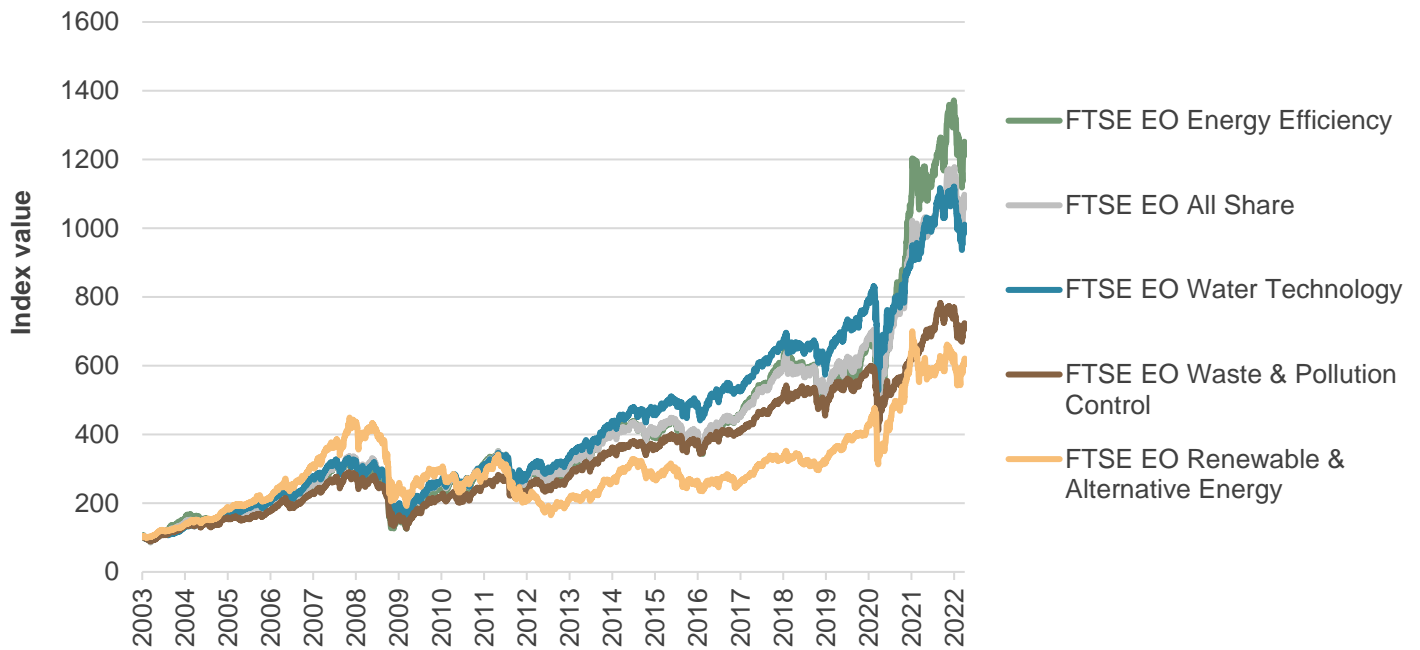
Notes: Index represents Total USD return, based to 31/12/2003, running until 29/04/2022; Companies included in the Environmental Opportunities All Share Index have at least 20% green revenue; Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

Based on this long-term growth and the increasing scale of sustainable investment flows, the green economy tends to trade at a premium compared to the rest of the market. For instance, the green economy has a higher market capitalization to net profit ratio than the wider market (Figure 22) − a metric that reflects the aggregate value investors place on equities relative to their profits. The same can be said for its market cap to revenue ratio (Figure 23), reflecting how the value of green equities tends to be higher than the wider market. This was particularly the case in 2020 and 2021, where the gap between the market cap and profit/revenue of the green economy was at its widest.
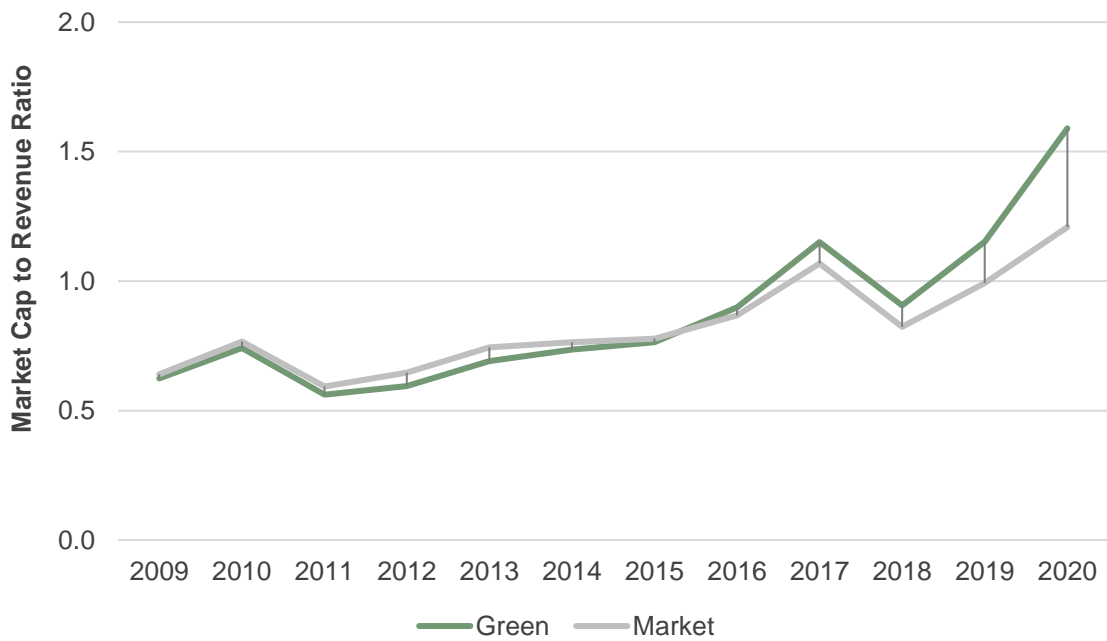
Figure 22. Market capitalization to net profit ratio
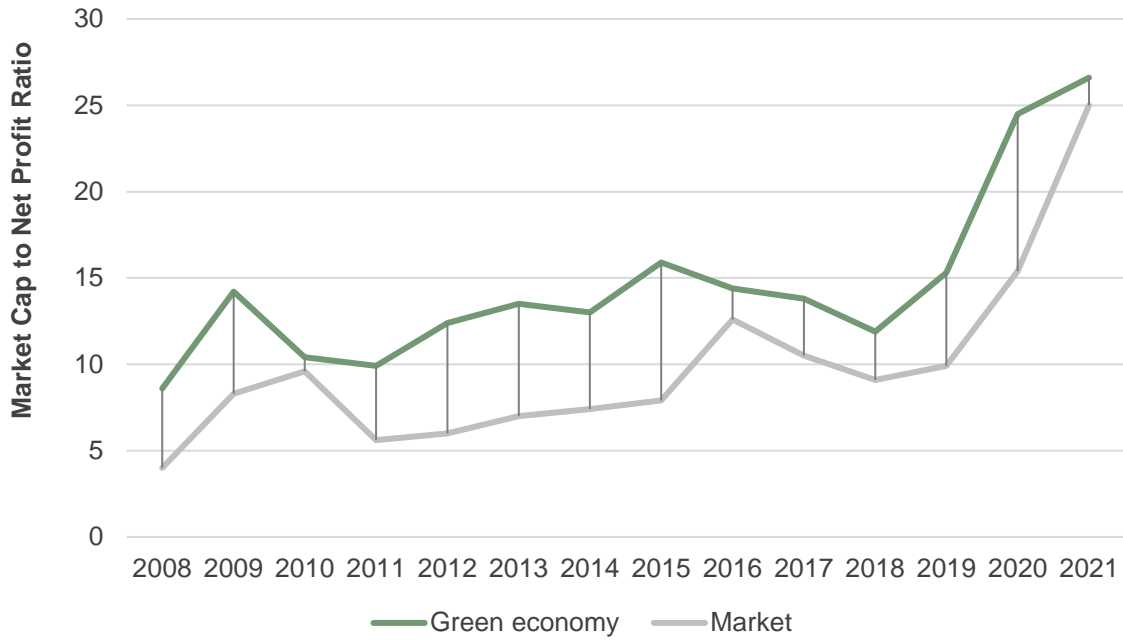
Notes: End-of-year Investable market capitalization divided by the relevant financial year's net profit; for the green economy, market capitalization and net profit are weighted by the green revenue percentage of constituents; Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

**Figure 23. Market capitalization to revenue ratio**

Notes: End-of-year Investable market capitalization divided by the relevant financial year's revenue; for the green economy, market capitalization and revenue are weighted by the green revenue percentage of constituents; Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

Coming out of 2021, these trends more or less reversed (Figure 24). Having fallen in value the most following the 2020 downturn, the oil and gas sector saw a better performance than the market over 2021, and particularly into 2022 on the back of high oil and gas prices − the price of US crude, for instance, rose some 40% between December 2021 and February 2022.[19] In contrast, over 2021 the performance of the green economy was more muted than in 2019-2020. So far in 2022, 'greener' equities, such as those in the Environmental Technologies 100 index, and the Renewable and Alternative Energy sector have sold off faster than the market.

This relatively faster drop in the value of the greenest equities partly continues the trend in their longer-term volatility, and it is not mirrored in the broader environmental markets, with the recent performance of EOAS being closer to that of the FTSE Global All Cap.

Figure 24. Recent performance of selected indices, 2020-2022
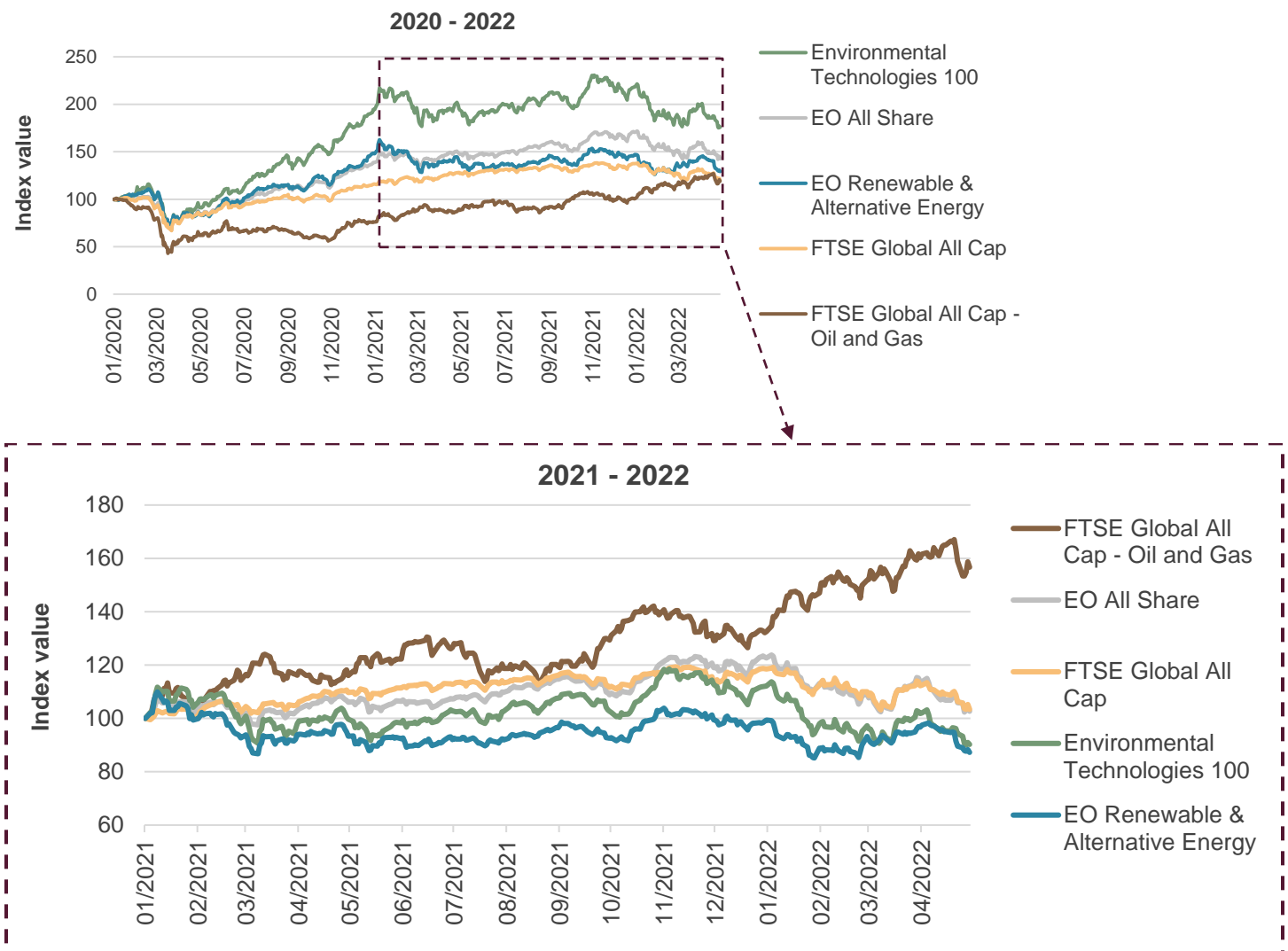
Notes: Index represents Total USD Return, based to 01/01/2020 and running until 29/04/2022 for the top chart, and based to 01/01/2021 and running to 29/04/2022 for the bottom; Companies included in the FTSE Environmental Opportunities (EO) Index have at least 20% green revenue; Companies included in the FTSE Environmental Technologies (ET) Index have at least 50% green revenue; Past performance is not a guarantee of future performance.

Source: FTSE Russell, May 2022.

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[19] Reuters (2022), *Wall St Week Ahead: Surging oil prices add another worry for frazzled investors*.

Although the short-term performance of the environmental markets is currently challenging, it is unclear whether this weak performance will unfold into a longer-term trend, largely because the drivers of the green economy's strong long-term performance remain: an increasing focus on climate finance, investors becoming increasingly interested in sustainable investment[20], green taxonomies coming into force and more have not weakened, and they are likely to continue channeling capital towards the low-carbon transition over time.

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[20] FTSE Russell (2021), *Global asset owner sustainability survey sheds light on regional differences*.

Appendix 1. Taxomania

As policymakers seek ways to address these challenges, developing 'Green Taxonomies' (classification systems that identify business activities with genuine environmental benefits) is becoming a greater priority. Such frameworks could prove effective at channeling capital towards the most sustainable activities by defining what can be labelled as green − minimizing the perceived risk of greenwashing, while providing a yardstick by which to judge the effectiveness of a wider suite of green policies.

The ensuing 'Taxomania' (Figure 25) is creating an international patchwork of taxonomies, with more than 20 developed or in development as of September 2021. The European Commission's 'Taxonomy for Sustainable Activities' is possibly the most advanced, although other jurisdictions have also introduced their own systems, such as China's Green Bond Endorsed Project Catalogue, initially launched in 2015 and focused on the burgeoning green bond market, and Russia's recently published 'Criteria for Sustainable Development Projects'.

Despite the range of taxonomies being created, defining sustainable activities is by no means an easy task; the range of products and services which could count as green makes it difficult to carve out a defined set, and different taxonomies can interpret the same activity through dissimilar lenses, resulting in an activity being green in one jurisdiction but not in another − an issue more common among risky or controversial activities, such as nuclear or natural gas. [21]

Given that green taxonomies ultimately share the same goal − of mobilizing capital for climate and environmental solutions − work is underway to create a 'Common Ground Taxonomy' (CGT) to map common agendas and promote consistency between the emerging national taxonomies.[22] While these initiatives will help taxonomies to better align against each other, one of their main challenges is overcoming the general lack of granular data on the green economy, and in particular limited and inconsistent corporate reporting on their provision of green goods and services.

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[21] As evidence by the reaction to the recent consultation on including natural gas and nuclear in the EU Taxonomy; see Environmental Finance (2022), *Nuclear, gas in taxonomy is 'biggest greenwash ever'*. Nuclear, gas in taxonomy is 'biggest greenwash ever' - Environmental Finance (environmental-finance.com)

[22] International Platform on Sustainable Finance (2021), *Common Ground Taxonomy － Climate Change Mitigation: Instruction report*

Figure 25. Taxomania: An International Overview.[23]
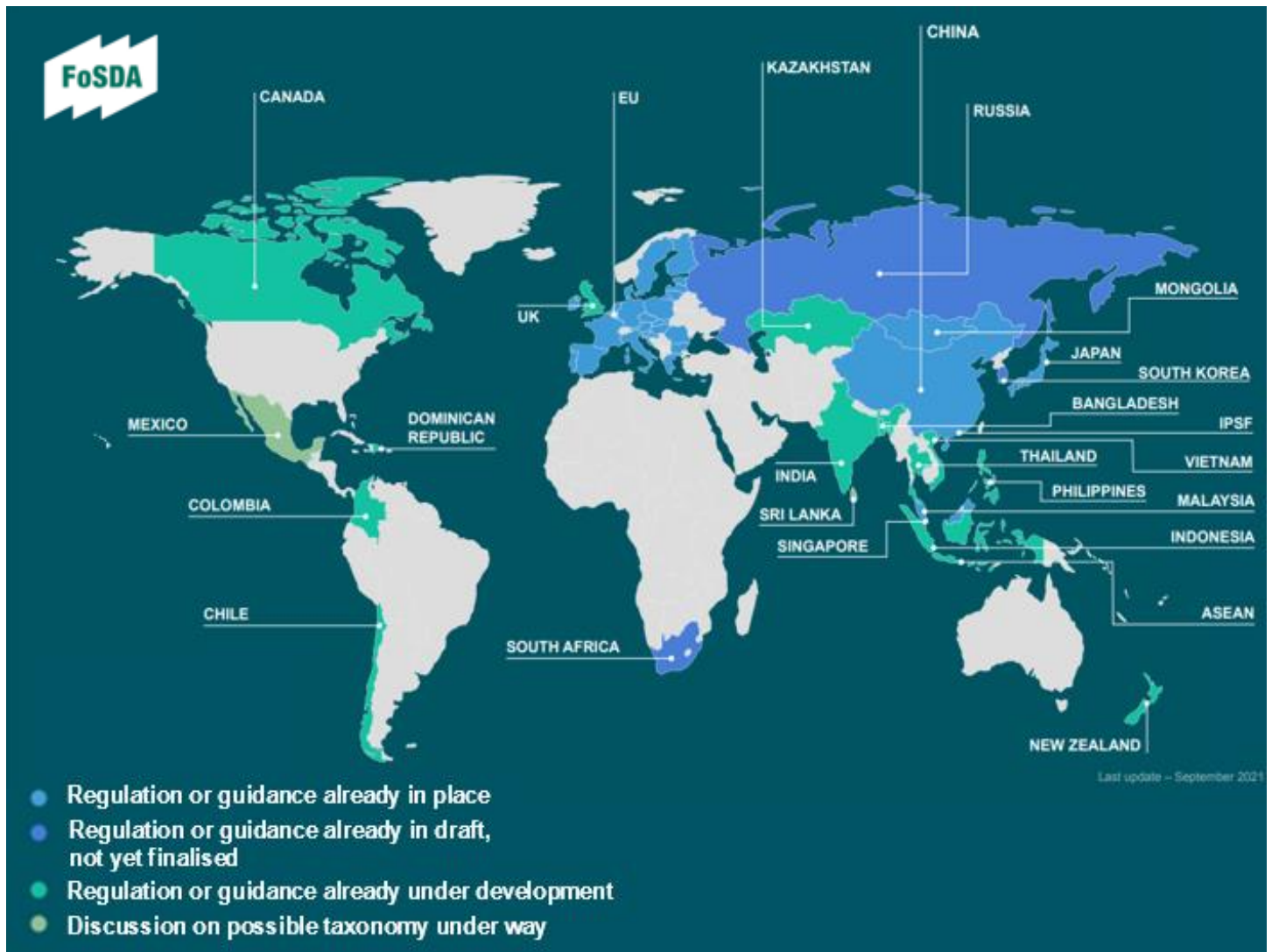
[23] Future of Sustainable Data Alliance (FOSDA) (2021), *Taxomania! An International Overview*

Appendix 2. The Green Revenue Classification System

FTSE Russell's Green Revenues data model measures the green revenue exposure of more than 16,000 securities across 48 developed and emerging markets based on FTSE Russell's Green Revenues Classification System (GRCS) − a comprehensive taxonomy for green products and services covering 10 subsectors, 64 subsectors and 133 micro sectors. When a company's activity is identified to have any green revenues, it is mapped to one or more micro sectors and then aggregated at the company level. The dataset is compiled through a thorough research process, including semantic screening, business segment identification and green micro sector breakdown.[24]

Sector and subsectors

ENERGY GENERATION [EG] 19	**ENERGY MANAGEMENT & EFFICIENCY [EM]** 13	**ENERGY EQUIPMENT [EQ]** 22	**ENVIRONMENTAL RESOURCES [ER]** 11
Biofuels Cogeneration Clean Fossil Fuels Geothermal Hydro Nuclear Ocean & Tidal Solar Waste to Energy Wind	Buildings & Property (Integrated) Controls Energy Management Logistics & Support Industrial Processes It Processes Lighting Power Storage Smart & Efficient Grids Sustainable Property Operator	Biofuels Cogeneration Equipment Clean Fossil Fuels Fuel Cells Geothermal Hydro Nuclear Ocean & Tidal Solar Waste To Energy Wind	Advanced & Light Materials Key Raw Minerals & Metals Recyclable Products & Materials
ENVIRONMENTAL SUPPORT SERVICES [ES] 5	**FOOD & AGRICULTURE [FA]** 17	**TRANSPORT EQUIPMENT [TE]** 12	**TRANSPORT SOLUTIONS [TS]** 9
Environmental Consultancies Finance & Investment Smart City Design & Engineering	Agriculture Aquaculture Land Erosion Logistics Food Safety – Efficient Processing & Sustainable Packaging Sustainable Plantations	Aviation Railways Road Vehicles Shipping	Railways Operator Road Vehicles Video Conferencing
WATER INFRASTRUCTURE & TECHNOLOGY [WI] 10	**WASTE & POLLUTION CONTROL [WP]** 15		
Advanced Irrigation Systems & Devices Desalination Flood Control Meteorological Solutions Natural Disaster Response Water Infrastructure Water Treatment Water Utilities	Cleaner Power Decontamination Services & Devices Environmental Testing & Gas Sensing Particles & Emission Reduction Devices Recycling Equipment Recycling Services Waste Management	**10** SECTORS **64** SUBSECTORS **133** MICRO SECTORS	

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[24] For more information, please see FTSE Russell (2020), *Meeting the EU Taxonomy reporting requirements: Green Revenues 2.0 data model*

The GRCS forms was created in 2013 (Box 1) to help investors and financial markets better identify companies with products and services contributing to the transition to a green economy, track their performance and facilitate the construction of financial products that seek exposure to such companies. The latest iteration of the classification system, GRCS 2.0 was launched in 2020. It takes a broad, bottom-up view of the green economy, capturing products and services across the whole value chain. These products and services are analyzed based on their impact on climate change mitigation and adaptation, water, resource use, pollution, and agricultural efficiency, which are well aligned with the EU's environmental objective.

In addition to identifying green activities, the GRCS also shines a light on the 'greenness', or net environmental impact, of a company's activities. The GRCS assesses each micro sector against seven environmental objectives[25] and allocates it to a tier based on its overall environmental impacts: Tier 1 micro sectors have significant and clear environmental benefits (for example, solar energy generation); Tier 2 micro sectors have more limited but net positive environmental benefits (for example, water utilities); Tier 3 micro sectors have some environmental benefits but are overall net neutral or negative through, for example, carrying potentially significant environmental risks (one example being nuclear power generation).

Box 1. Green Revenue Classification System: A decade of evolution

The roots of the GRCS stretch as far as 2008 when FTSE Russell and the Impax Asset Management launched the Environmental Markets Index Series. The collaboration between FTSE Russell and Impax continues today. The initial Environmental Markets Classification System had a thematic focus on sectors including clean energy, energy efficiency, water and waste management and were included in the index family based on revenue thresholds.

On this basis, **FTSE Russell created the GRCS in 2013,** offering wider scope and improved granularity. It provided a broader view of the green economy and therefore catered to a wider range of use cases, including portfolio monitoring, reporting, construction, and benchmarks.

The latest iteration of the classification system, GRCS 2.0, was launched in September 2020.[26] It takes a broad, bottom-up view of the green economy, capturing products and services across the whole value chain. These products and services are analyzed based on their impact on climate change mitigation and adaptation, water, resource use, pollution, and agricultural efficiency, which are well aligned with the EU's environmental objectives.

As taxonomies develop and mature, and more rules, metrics and thresholds are created to judge the environmental credentials of companies against, broader and more in-depth data sets will be required − both to meet the increasing demands of Taxonomies and help investors identify green investment opportunities.[27]

However, a range of challenges exist to creating datasets that can meet the growing demands of taxonomies, none more significant than the current low levels of corporate disclosure of revenues related to green products and services. As Figure 26 shows, in 2021, only 24% of the green economy is derived from green revenue data directly disclosed by companies who provide disclosures that are granular enough to identify their green revenues from each green product or service.

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[25] Climate change mitigation, climate change adaptation, pollution prevention and control, protection of healthy ecosystems, sustainable use and protection of water and marine resources, transition to a circular economy, waste prevention and recycling, and sustainable and efficient agriculture. Of which, six environmental objectives are set by the European Commission and aligned with the EU Taxonomy.

[26] For more information, please see FTSE Russell (2020), Green Revenue Classification System

[27] FTSE Russell (2021), "Do No Significant Harm" and "Minimum Safeguards" in Practice: Navigating the EU Taxonomy Regulation in practice

Figure 26. Trends in granular disclosures among companies with green revenue
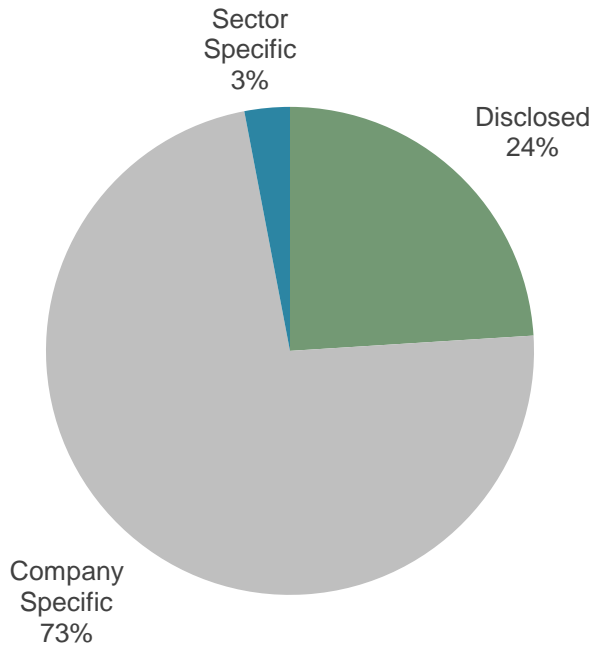
Notes: Proportion of GR-weighted investable market cap that is disclosed vs. estimated by FTSE Russell.

Source: FTSE Russell, May 2022.

Green taxonomies and disclosure regulations will encourage companies to provide transparency on taxonomy-aligned activities. However, full implementation of taxonomy regulations globally and improvements in disclosure levels will take time, and in the interim, estimation will play a critical role in measuring the green exposure of large and diverse global investment portfolios.

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