



## Greenhouse Gas Emissions Trends

# Most Global Industries Haven't Reduced Emissions, Only Their Intensity

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**S&P Global**  
Ratings

Cristina Polizu

Areeb Khan

Peter Kernan

Terry Ellis

Pierre Georges

Nov. 21, 2024

*This report does not constitute a rating action*

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# Key Takeaways: Emissions Trends Signal Continued Industry Concentrations

## What data from 2016 to 2022 shows

- S&P Global Ratings finds that total absolute scopes 1 and 2 greenhouse gas emissions (hereafter also "emissions") did not reduce between 2016 and 2022, based on the analysis of S&P Global Sustainable1 data (see Appendix).
- However, the intensity of scope 1 greenhouse gas emissions declined over that period for the majority of industry groups in the dataset, though absolute emission levels decreased for less than half of those groups.
- The utilities, materials, energy, and transportation industries exhibit distinctly higher scope 1 emissions and emissions intensity than other industries and remain most exposed to climate transition risks; scope 2 emissions are more evenly distributed across industry groups.

## Looking ahead

- Within the industry groups we analyzed, scope 1 and 2 emissions are concentrated in a few industries, where we believe decarbonization efforts are most often the focus of various stakeholders, including policymakers, investors, and the companies in those industries.
- If historical trends remain, data suggests a continuing relatively high correlation between growth and emissions.
- Reduced emissions intensity does not necessarily translate into reduced absolute emissions, notably because increasing economic activity can offset emissions intensity improvements.

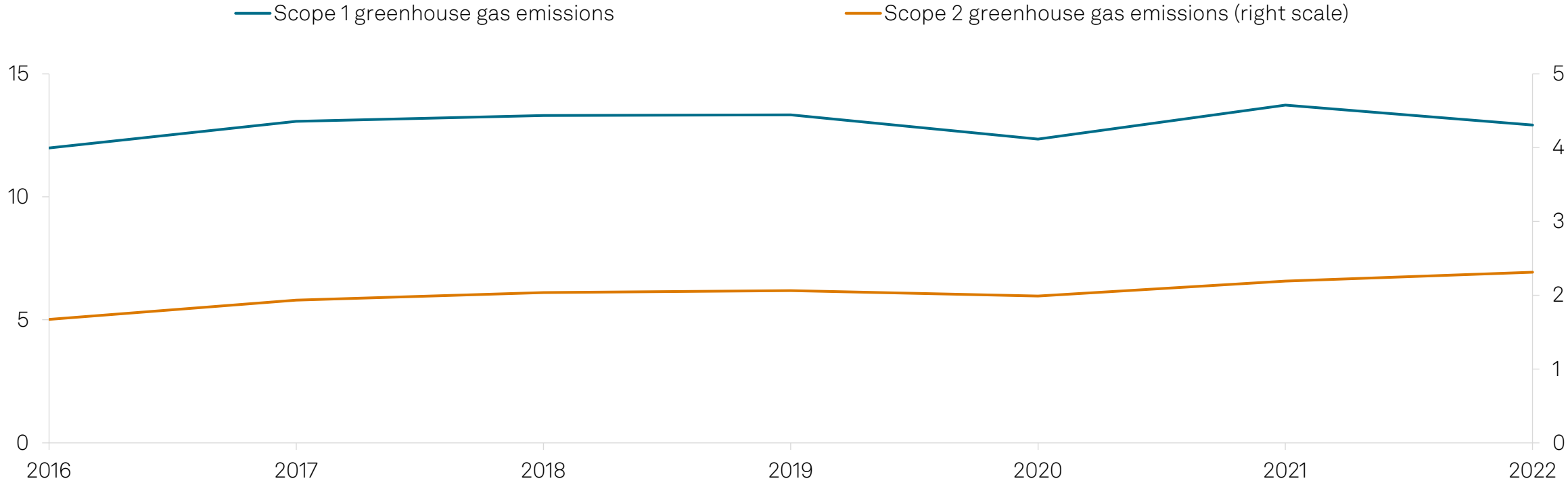
*The dataset used for this report draws upon S&P Global Sustainable1's historical annual data for scope 1 and 2 absolute emissions and emissions intensity. The data coverage increased to more than 18,000 companies in 2022 from more than 13,000 companies in 2016. See the [Appendix](#) for details of the scope and analysis.*

Did the volume and intensity  
of greenhouse gas emissions  
change in 2016–2022?

# Total absolute scopes 1 and 2 greenhouse gas emissions have risen since 2016

Scope 1 and scope 2 greenhouse gas emissions did not decrease from 2016

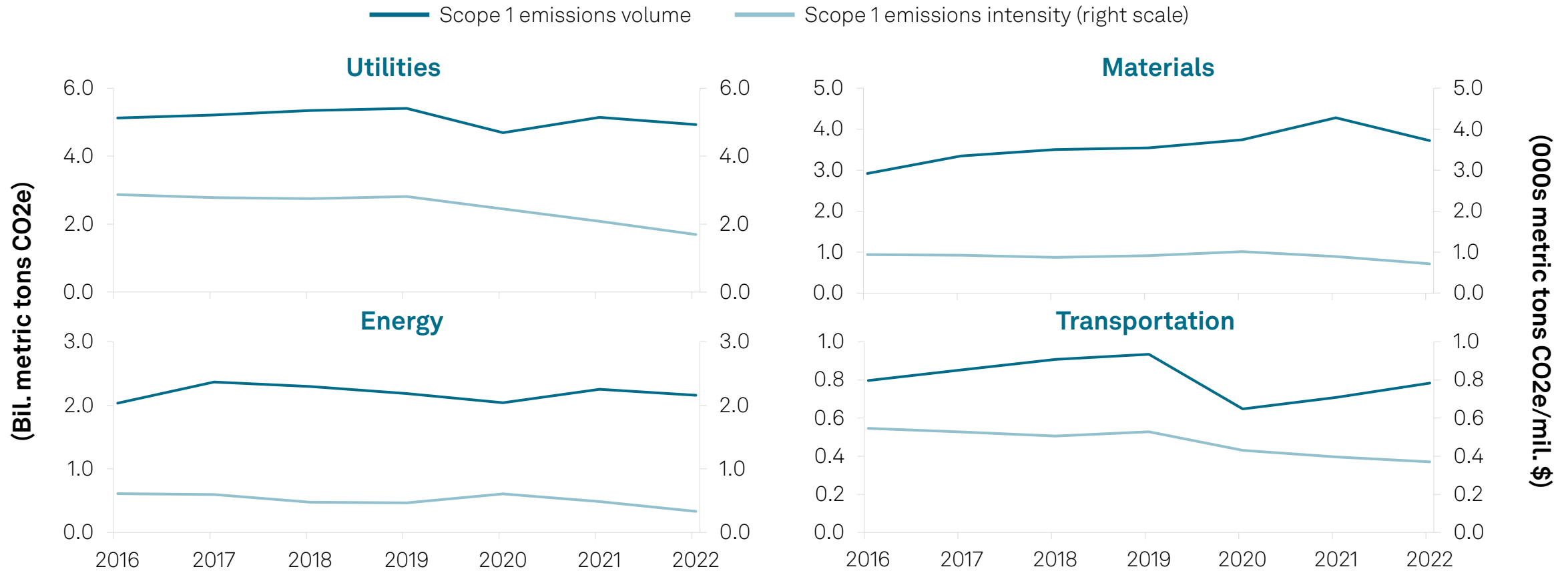
Bil. metric tons of carbon dioxide equivalent (CO2e)



As of June 15, 2024. Source: S&P Global Sustainable1.

# The top four industries show a decline in scope 1 intensity but not total emissions

Scope 1 greenhouse gas emissions (total) and emissions intensity (weighted average by revenue)

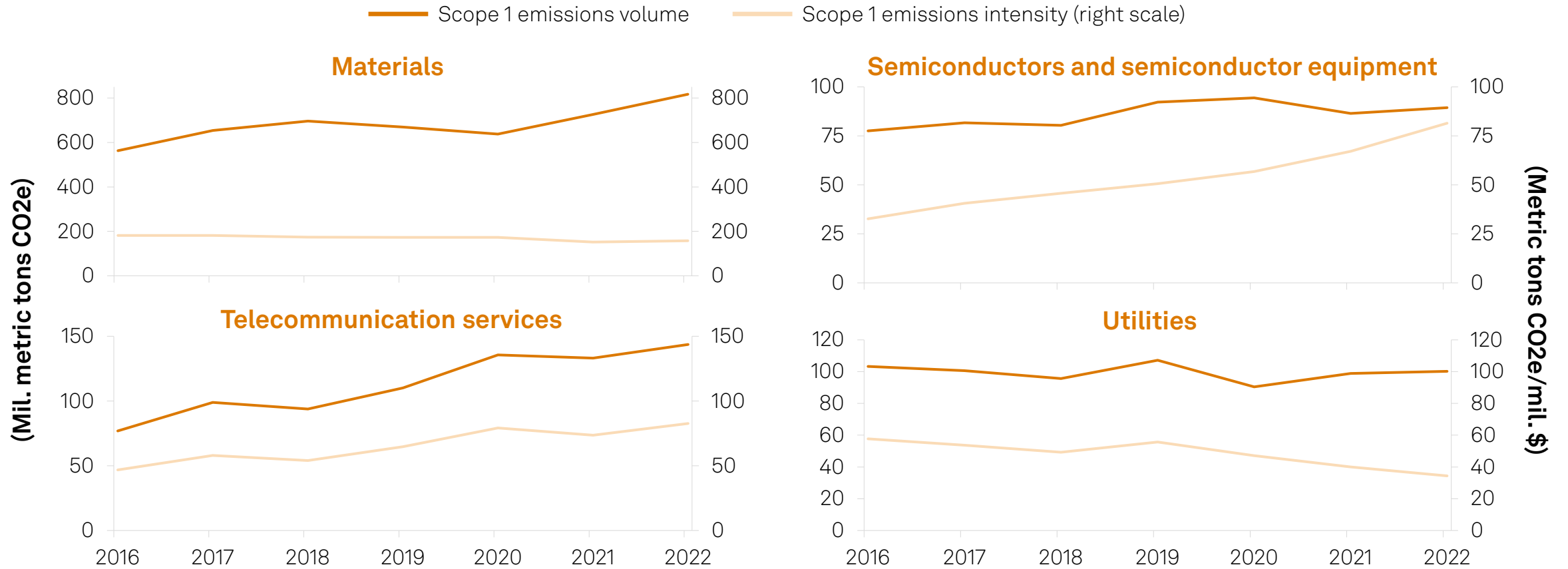


As of June 15, 2024. Source: S&P Global Sustainable1.

Note: These four industry groups exhibit the highest emissions as well as the highest emission intensities. See [3] in the endnotes table for more details.

# Two of the top four show a rise in total scope 2 emissions and emissions intensity

Scope 2 greenhouse gas emissions (total) and emissions intensity (weighted average by revenue)

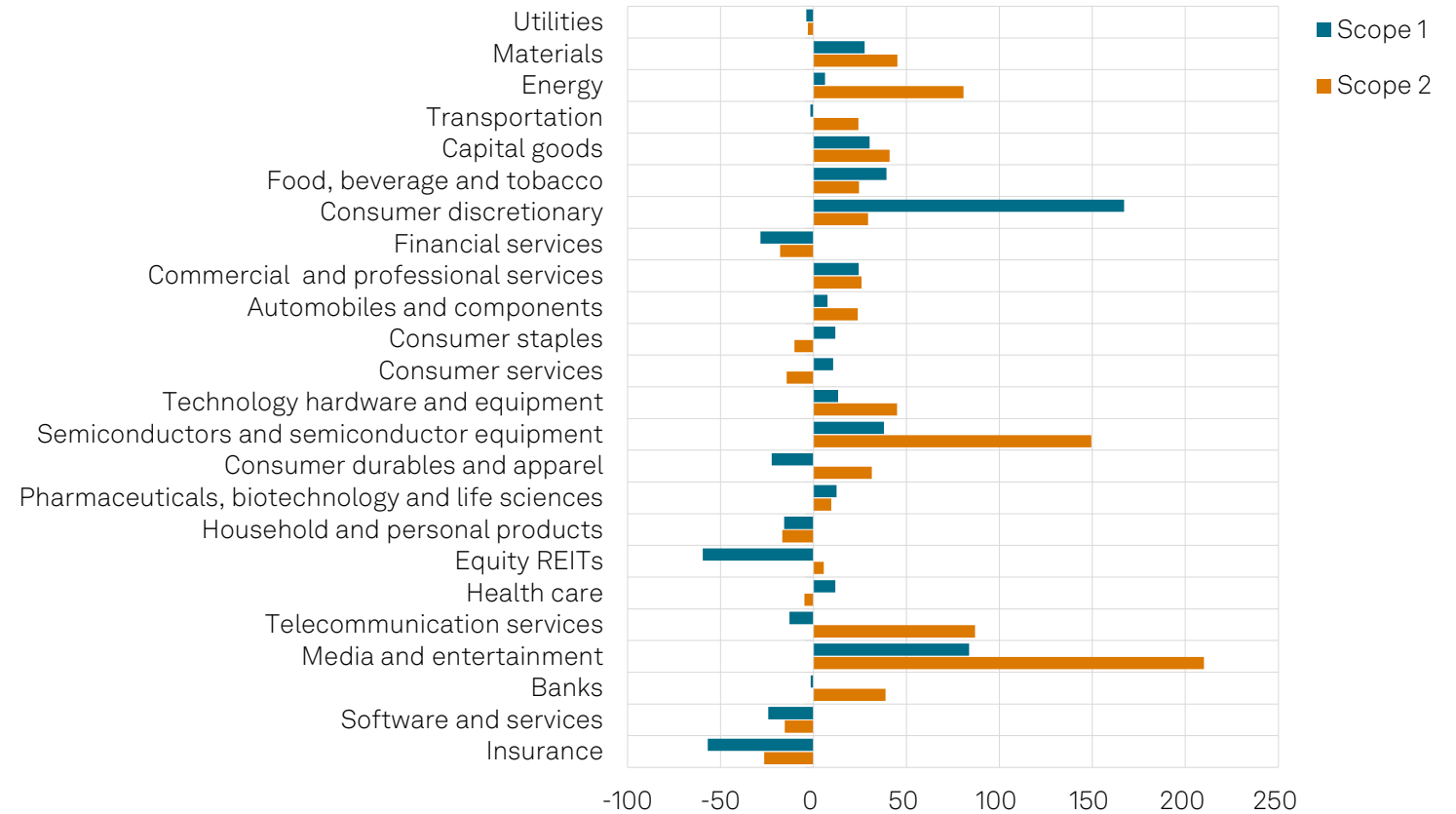


CO2e--Carbon dioxide equivalent. As of June 15, 2024. Source: S&P Global Sustainable1.

# Few industry groups show a decline in scopes 1 and 2 emissions

- Of the 24 industry groups, 10 showed a decline in scope 1 greenhouse gas emissions in 2022 compared with the volume in 2016.
- For scope 2 greenhouse gas emissions, only eight industry groups showed a decline when compared to the volume in 2016.

Changes in Scope 1 and 2 emissions across industry groups 2016 to 2022 (%)



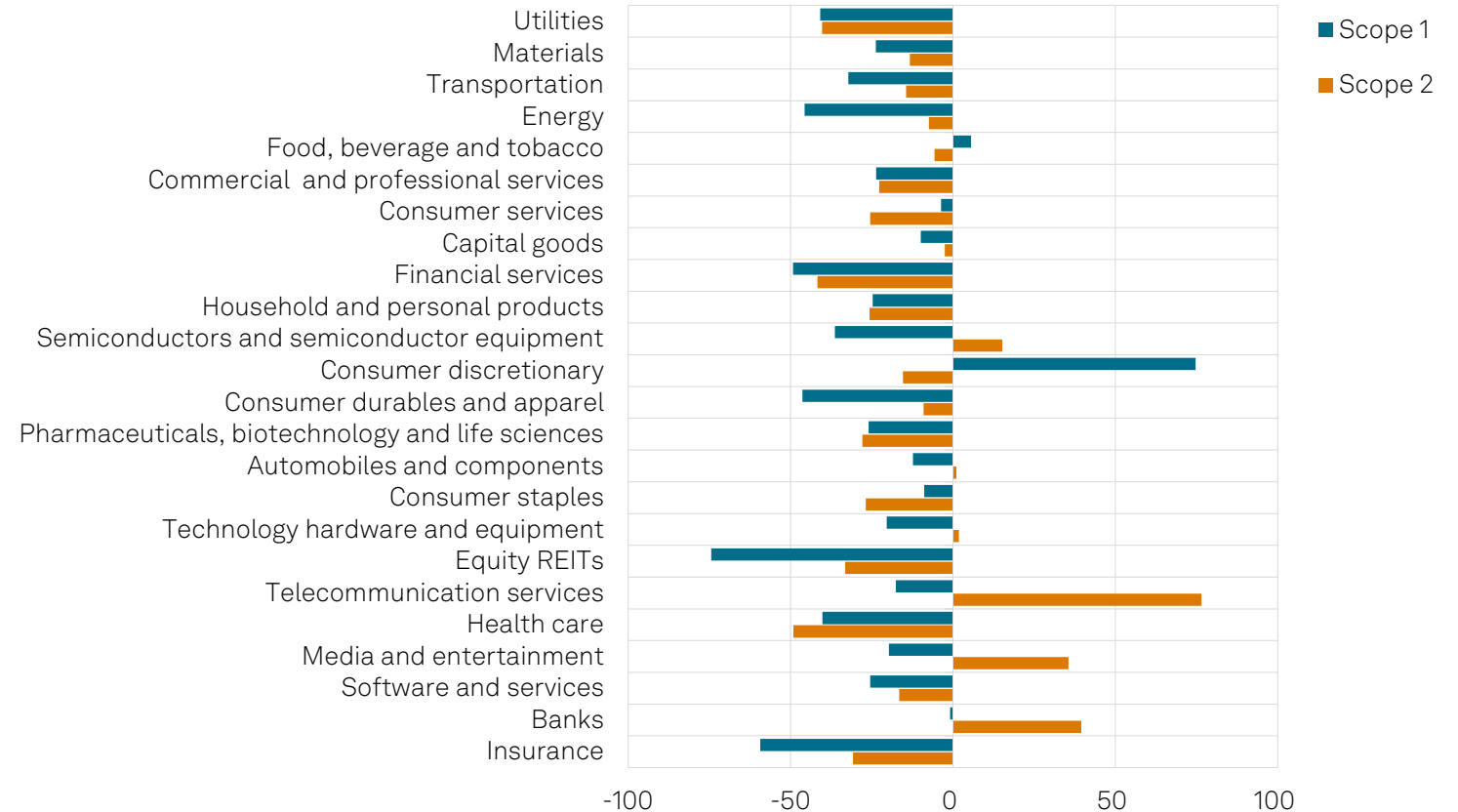
As of June 15, 2024. Industry groups are listed in descending order of scope 1 emissions in 2022. Source: S&P Global Sustainable1.



# For most industry groups, scopes 1 and 2 emissions intensity declined

- For scope 1, 22 of the 24 industry groups showed a decrease in greenhouse gas emissions intensity in 2022 versus 2016.
- For scope 2, only 18 industry groups showed a decrease in greenhouse gas emissions intensity in 2022 versus 2016.

Changes in Scope 1 and 2 emissions intensity across industry groups 2016 to 2022 (%)

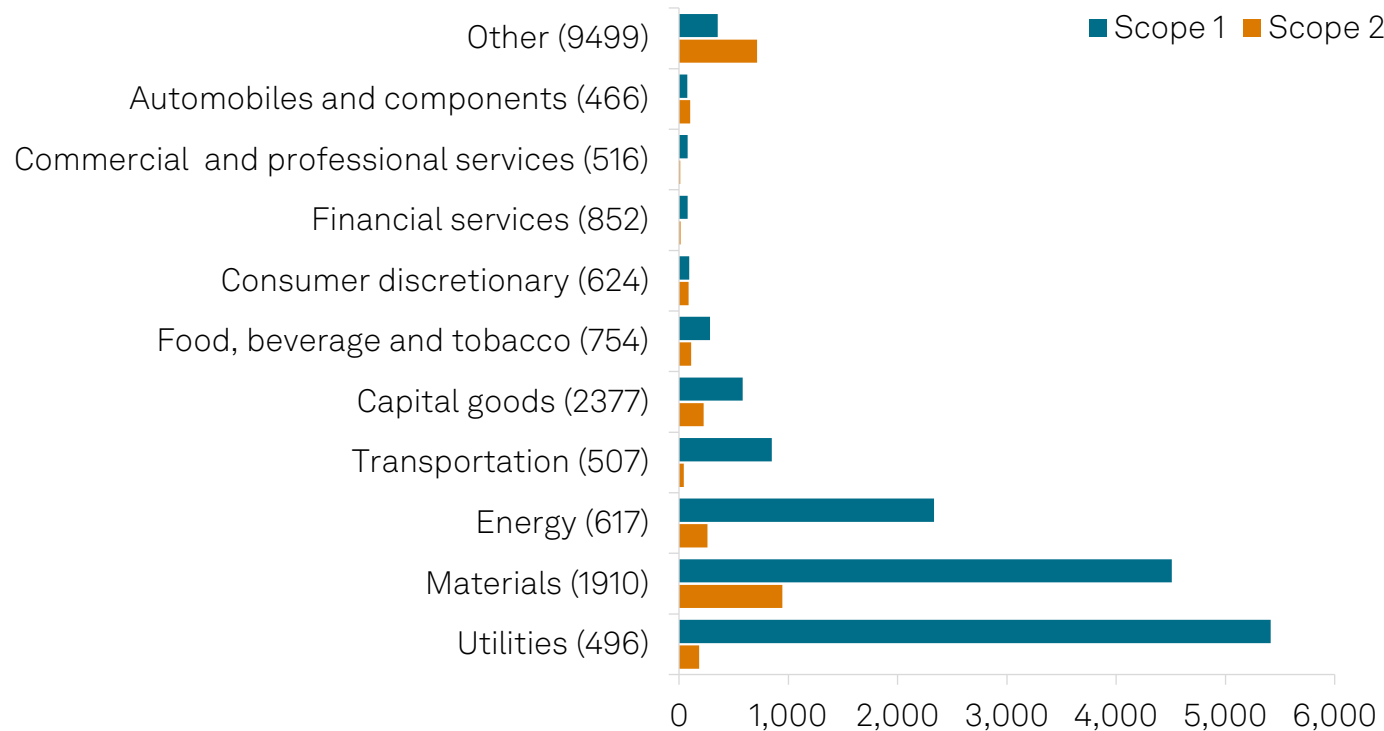


As of June 15, 2024. CO2e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

What were the industry and geographic concentrations of greenhouse gas emissions in 2022?

# Scope 1 emissions are concentrated in a few industry groups, while scope 2 emissions are more widely spread

Greenhouse gas emissions per GICS industry group, 2022  
Mil. metric tons of CO2e



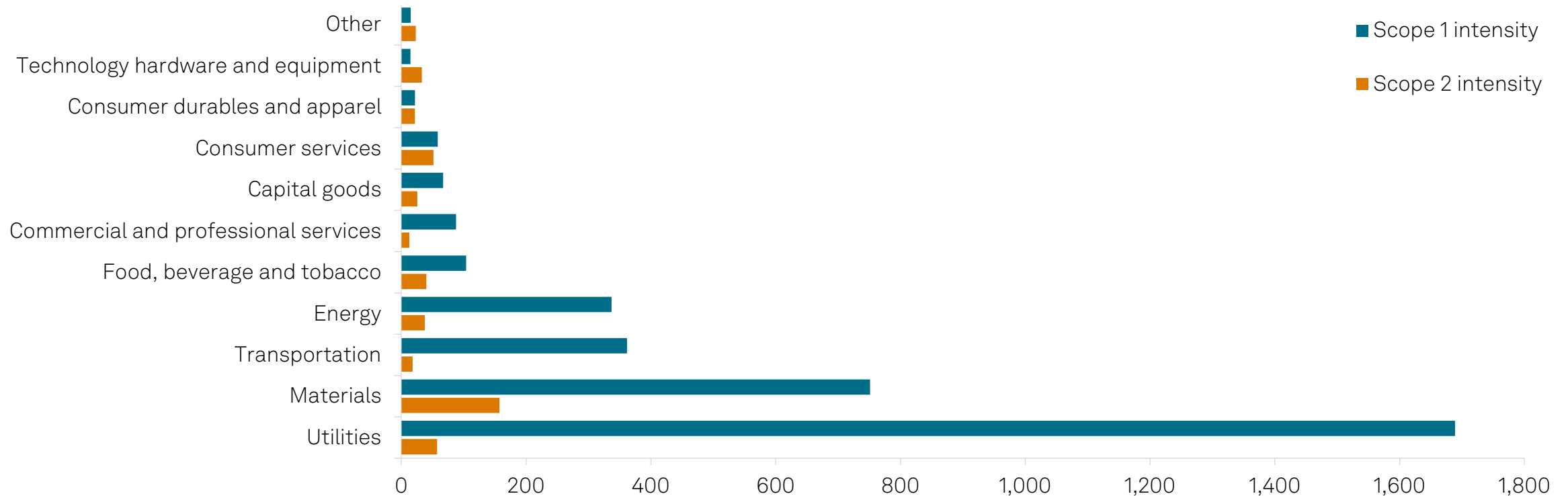
As of June 15, 2024. Number of companies in 2022 is shown next to industry group.  
GICS--Global Industry Classification Standard. CO2e--Carbon dioxide equivalent.  
Source: S&P Global Sustainable<sup>1</sup>.

- The industry groups with the most scope 1 greenhouse gas emissions in 2022 were utilities, materials, energy, and transportation.
- Together, these industry groups accounted for 90% of total scope 1 emissions.
- The total scope 2 greenhouse gas emissions appear to be almost six times lower than the total scope 1 emissions.
- Total scope 1 greenhouse gas emissions for the materials and utilities industry groups are close in magnitude. This is partly because the number of covered companies for the materials industry group (1,910 companies) is more than three times larger than for the utilities industry group (496 companies).

# Emissions intensity shows the same trend, with scope 1 mainly in four industry groups and scope 2 across many industry groups

Greenhouse gas emissions intensity per GICS industry group, weighted average by revenue, 2022

Metric tons CO<sub>2</sub>e/mil. \$



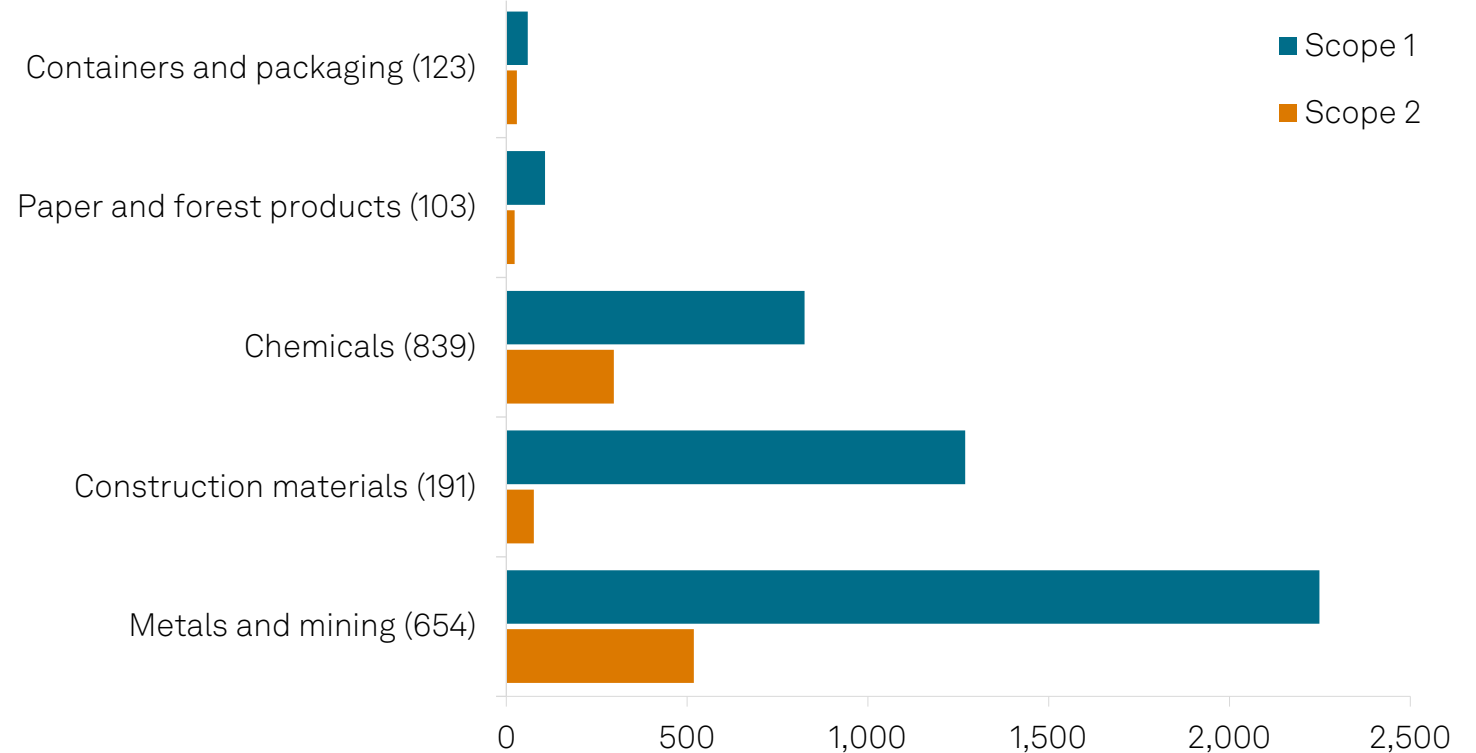
As of June 15, 2024.  
GICS--Global Industry Classification Standard. CO<sub>2</sub>e--Carbon dioxide equivalent.  
Source: S&P Global Sustainable1.

# Within the materials industry group, metals and mining exhibit the highest absolute emissions

- Metals and mining companies account for more than 30% of the materials industry group and about half of that group's total emissions.
- Although the chemicals industry accounts for 40% of the companies in the group, its scope 1 emissions are less than half those of metals and mining.

## Greenhouse gas emissions for the materials industry group, 2022

Mil. metric tons of CO<sub>2</sub>e



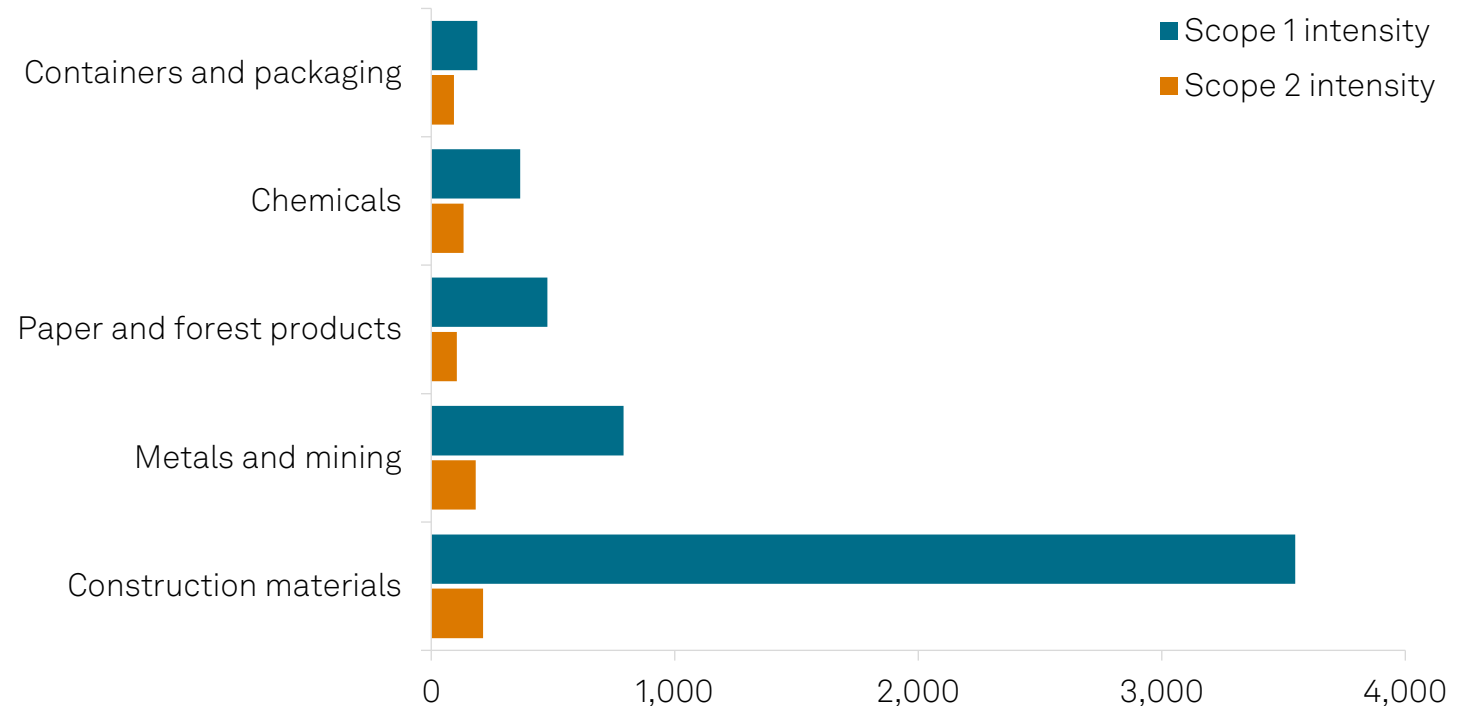
As of June 15, 2024. Note: Number of companies in 2022 is shown next in parentheses next to industry. CO<sub>2</sub>e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Construction materials exhibit the highest emissions intensity among companies in the materials industry group

- The construction materials industry has the highest greenhouse gas emissions intensity, mainly due to the cement sector.
- The metals and mining industry has a lower greenhouse gas emissions intensity.
- In our dataset, the average revenue for metals and mining companies is twice that for construction materials companies, thus contributing to lower emissions intensity.

## Greenhouse gas emissions intensity for the materials industry group, weighted average by revenue, 2022

Metric tons of CO<sub>2</sub>e/mil. \$



As of June 15, 2024.  
CO<sub>2</sub>e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

Do greenhouse gas emissions  
relate to a company's size?

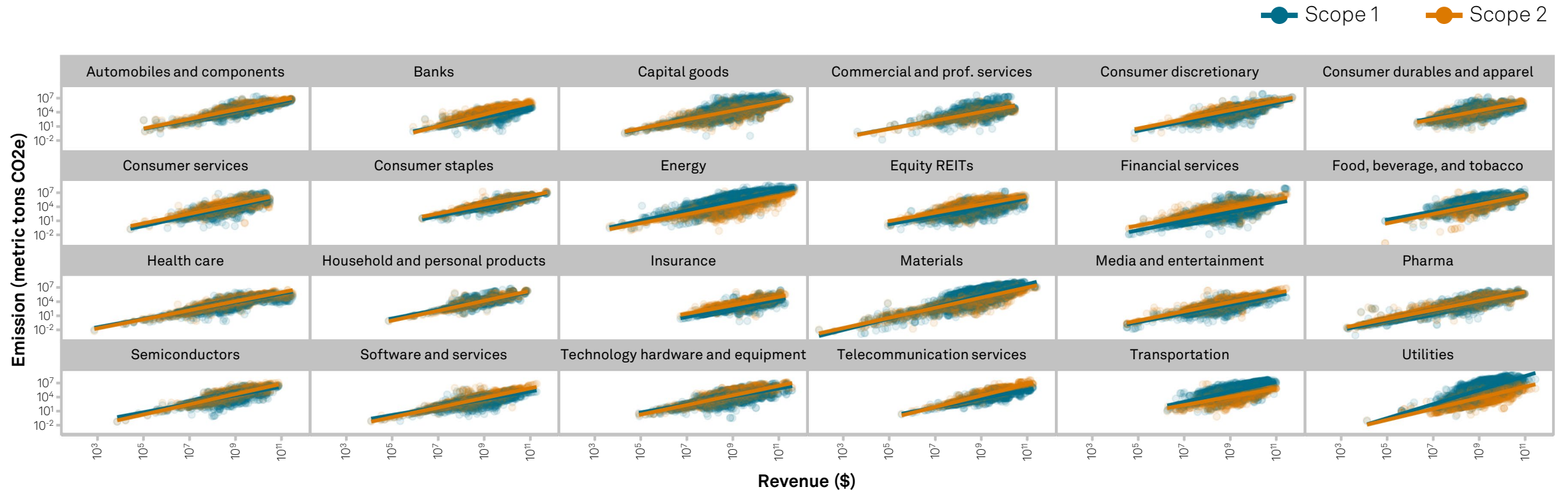
## To explore this, we show the relationship between a company's revenue and the volume and intensity of its greenhouse gas emissions

- We find a high correlation (see [\[5\]](#) in the endnotes table) between scope 1 and scope 2 greenhouse gas emissions and company size (as measured by revenue), as shown in the next three pages.
- We plot, for each industry group, the yearly revenue (on the horizontal axis) and the corresponding scope 1 and 2 greenhouse gas emission levels (on the vertical axis) using a logarithm transformation (see [\[4\]](#) in the endnotes table).
- The blue dots represent scope 1 greenhouse gas emissions for a particular company in each year from 2016 through 2022.
- The yellow dots represent scope 2 greenhouse gas emissions for a particular company in each year from 2016 through 2022.



# Scopes 1 and 2 emissions exhibit a high correlation with company size, as measured by revenue across **industry groups**

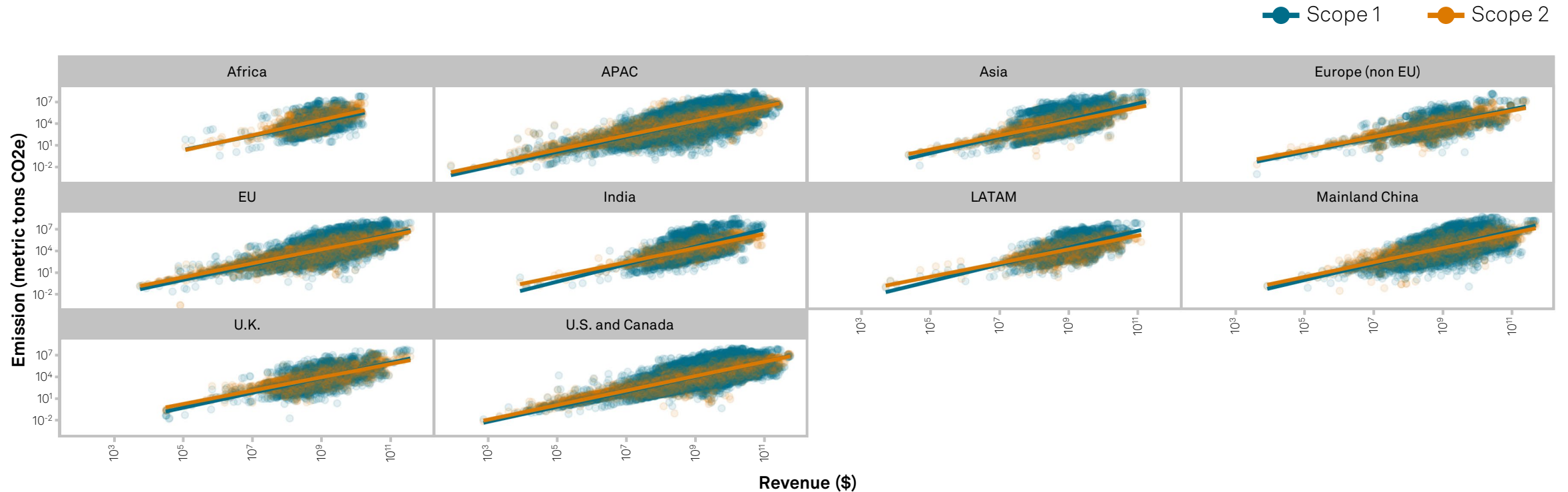
Greenhouse gas emissions to revenue across industry groups in 2016-2022



As of June 15, 2024. Source: S&P Global Sustainable1.

# Scopes 1 and 2 emissions show a high correlation with company size, as measured by revenue across regions

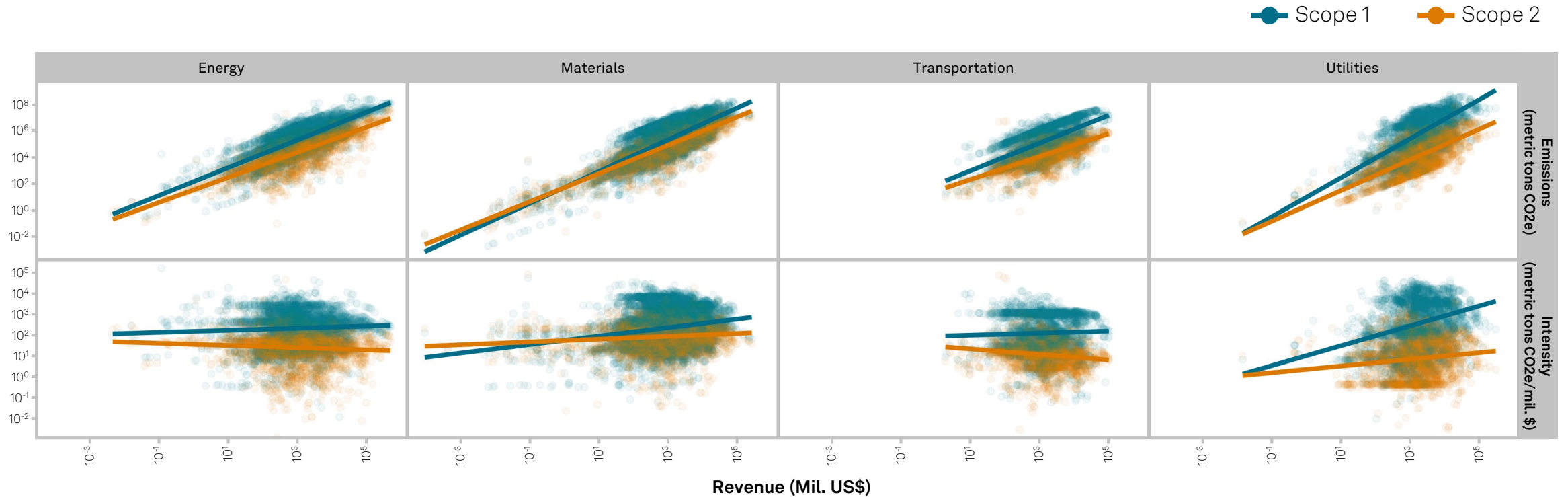
Greenhouse gas emissions to revenue across industry groups by region in 2016-2022



As of June 15, 2024. Source: S&P Global Sustainable1.

# Scopes 1 and 2 emissions intensity decouple from revenue more than scope 1 and scope 2 absolute emissions for the top four industries

Absolute emissions and emissions intensity to revenue for the top four industry groups in 2016-2022



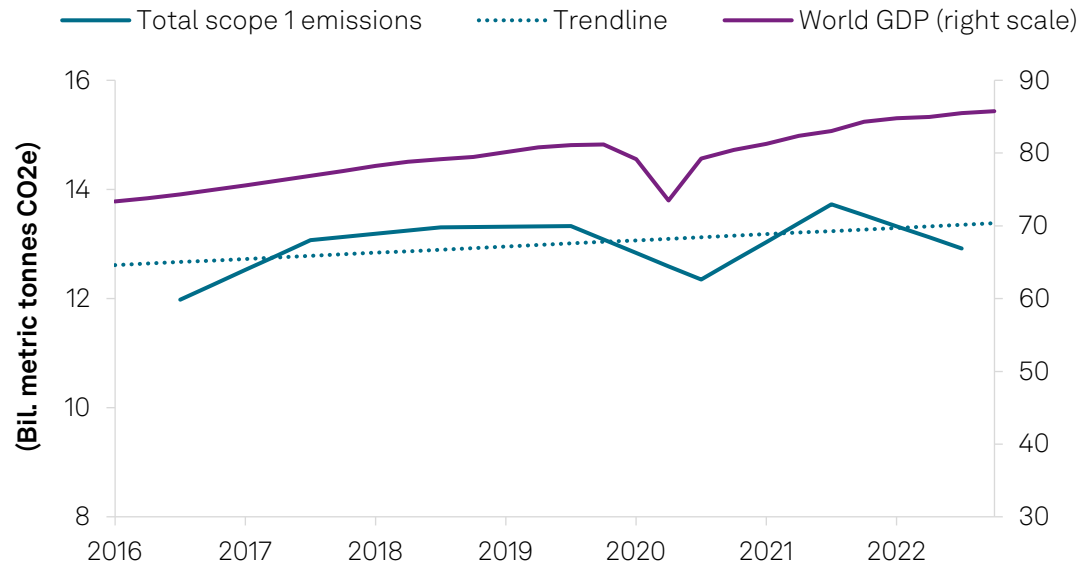
As of June 15, 2024. Source: S&P Global Sustainable1.

Is there a relationship between greenhouse gas emissions and economic growth?

# We see a positive relationship between GDP and scope 1 and 2 greenhouse gas emissions for the companies in our dataset

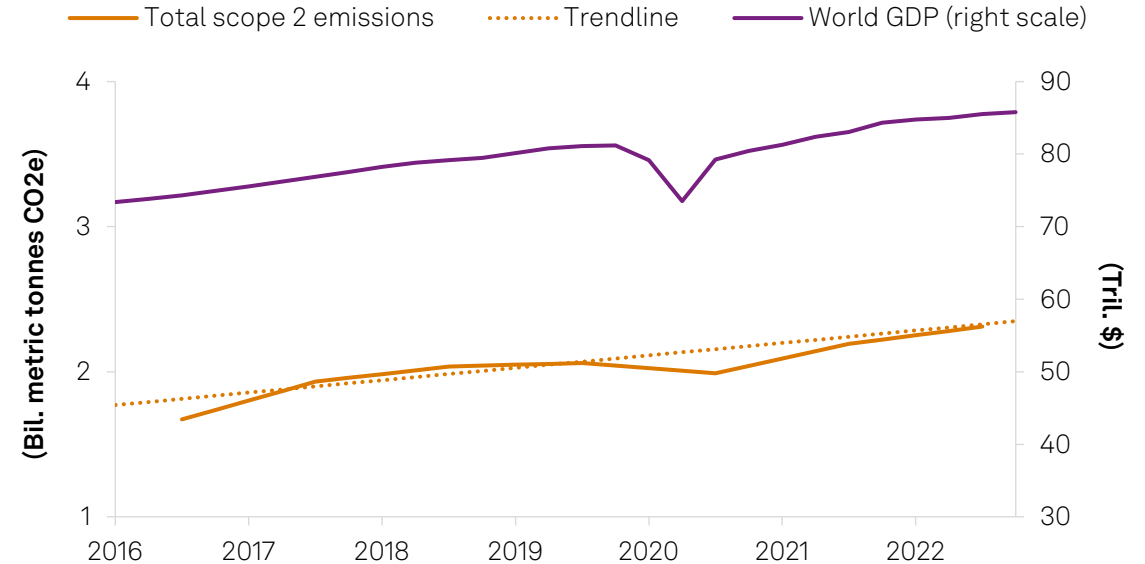
Our dataset covers only about one-third of total global emissions, which excludes many other economic activities that contribute to GDP or use or generate energy from fossil fuels. These include, for example, personal transportation, service-based activities such as retail and education, the agriculture sector, and government activities, which in some jurisdictions could include infrastructure, utilities, and transportation services.

## Scope 1 emissions compared to world real GDP



As of June 15, 2024.  
Sources: S&P Global Market Intelligence, S&P Global Sustainable1.

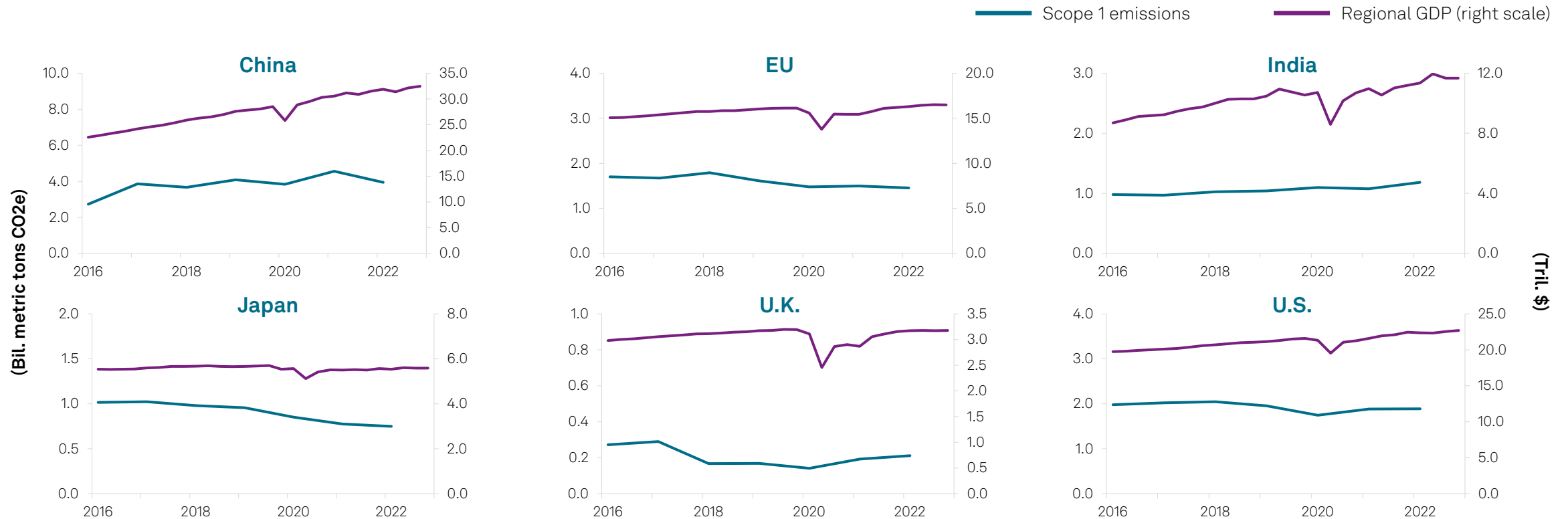
## Scope 2 emissions compared to world real GDP



As of June 15, 2024.  
Sources: S&P Global Market Intelligence, S&P Global Sustainable1.

# Economic growth has decoupled from scope 1 emissions in some regions

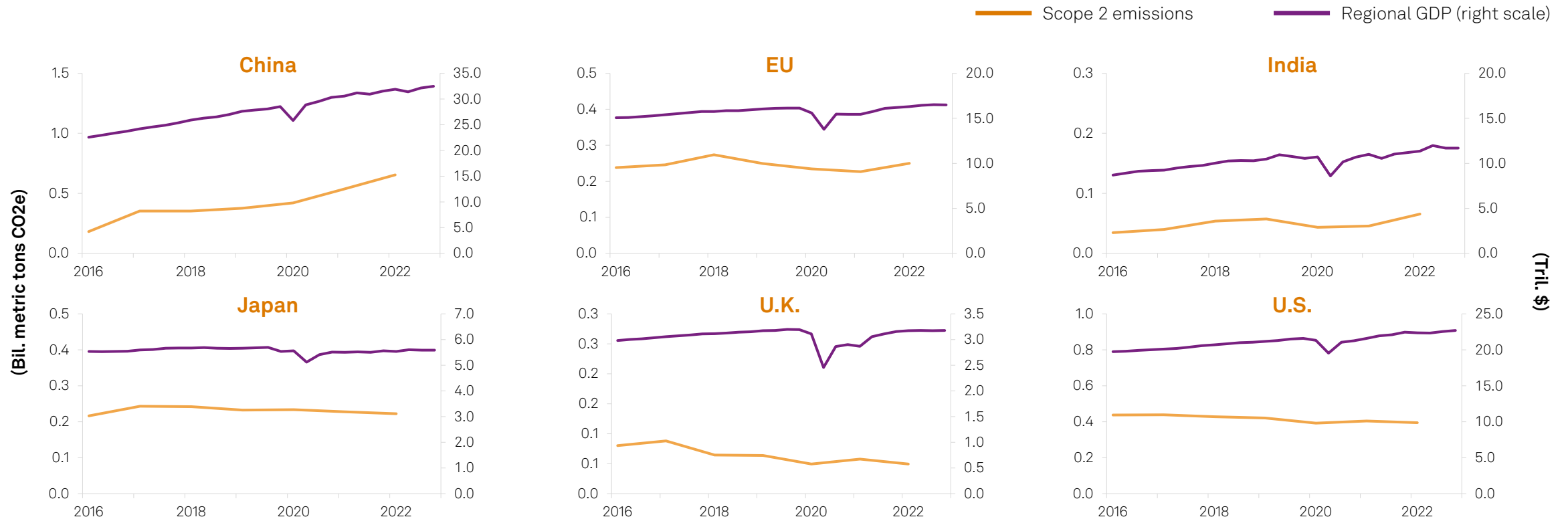
## Scope 1 greenhouse emissions in dataset versus regional GDP



As of June 15, 2024.  
Sources: S&P Global Market Intelligence, S&P Global Sustainable1.

# Scope 2 emissions trends have a low correlation to GDP in some regions

## Scope 2 greenhouse gas emissions in dataset versus regional GDP



As of June 15, 2024.  
Sources: S&P Global Market Intelligence, S&P Global Sustainable1.

# Appendix



# Data And Approach

- Our dataset draws upon S&P Global Sustainable1's historical annual data for scope 1 and 2 greenhouse gas absolute emissions and greenhouse gas emissions intensity for companies in 24 industry groups. The companies are classified using the level-two Global Industry Classification Standard (GICS; see [\[2\]](#) in the endnotes table for a definition) and cover more than 100 geographies.
- Using this data, we performed a comparative study of greenhouse gas emissions and greenhouse gas emissions intensity for the companies in those industry groups from 2016 to 2022 to analyze greenhouse gas emissions trends for that period.
- For the charts where we show historical trends since 2016, we use a representative cohort of 11,351 companies that have annual data available for each year from 2016 to 2022.

## Scope

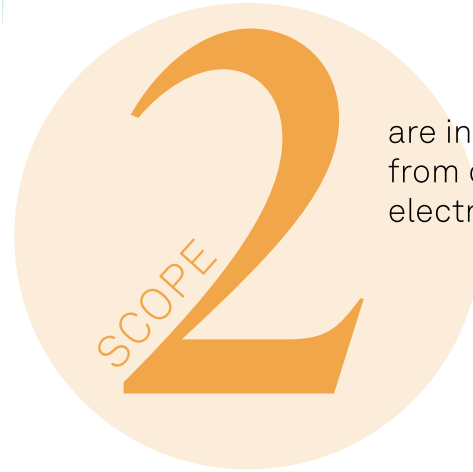
**Our study does not focus on specific companies but rather on industry groups.** For our geographical analysis, we use the location of the company's headquarters, which does not reflect the fact that many companies operate internationally. For this analysis, given that the scope 3 data coverage is incomplete and subject to measurement challenges, we focus on scopes 1 and 2 greenhouse gas emissions, which are derived from a company's activities and are easier to measure.

**How we define scopes 1, 2, and 3 emissions.** Scope 1 emissions include greenhouse gas emissions from burning fossil fuels and from production processes that are owned or controlled by a company. Scope 2 emissions relate to purchased heat and electricity, and our data takes a location-based approach in accounting for these emissions. For some sectors--such as banking and insurance, or those with significant supply chains--scope 3 emissions, also referred to as value-chain emissions, may be more important than scopes 1 and 2 emissions.

# What are the scopes of carbon emissions?



includes greenhouse gas emissions generated from burning fossil fuels and production processes which are owned or controlled by a company.



are indirect greenhouse gas emissions from consumption of purchased electricity, heat or steam by a company.



are all other indirect GHG emissions relating to the value chain of the company, including purchased materials and use of sold products.

Scope 3 **upstream GHG emissions** include emissions coming from suppliers.

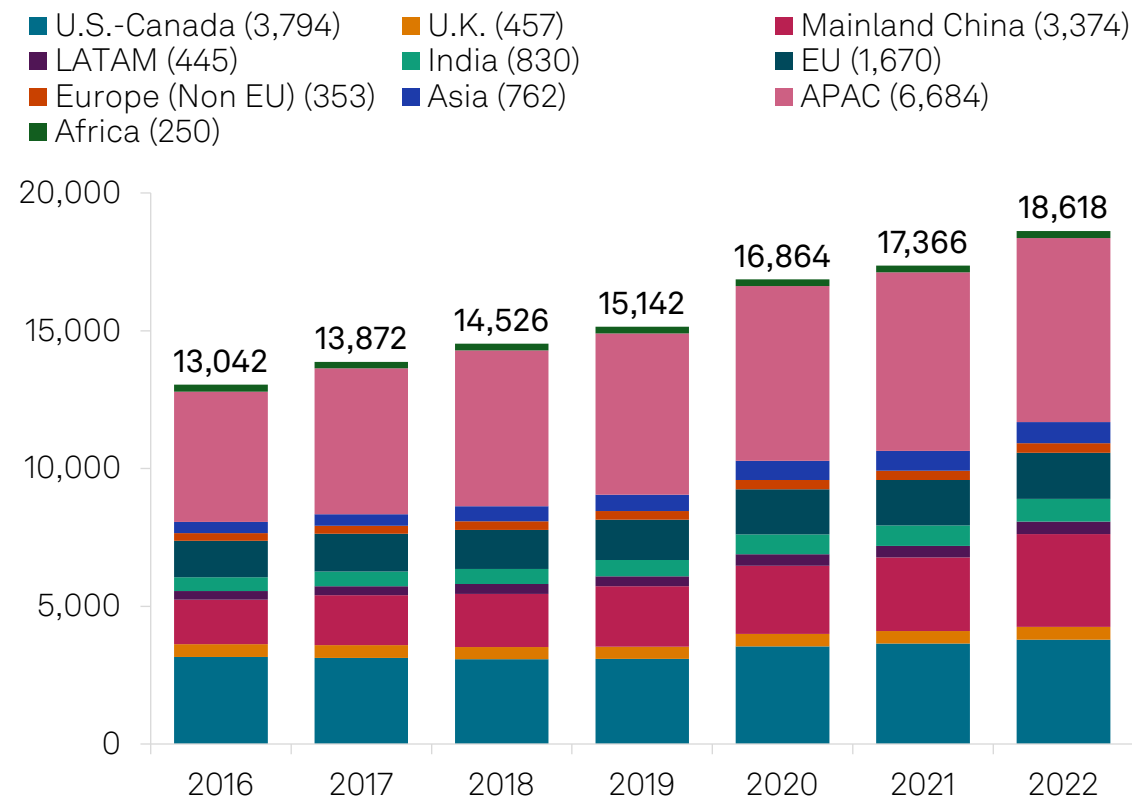
Scope 3 **downstream GHG emissions** are associated with the distribution, sale, use and disposal of products produced by an entity.

Scope 3 **upstream indirect GHG emissions** include emissions from the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc. (*in line with GHG Protocol standards*).

Source: GHG Protocol.

# Reporting Greenhouse Gas Data Is Becoming Common Practice

Number of companies in our dataset, 2016-2022



	2016	2017	2018	2019	2020	2021	2022
<b>Africa</b>	249	241	243	244	249	251	250
<b>APAC</b>	4,729	5,288	5,648	5,846	6,337	6,480	6,684
<b>Asia</b>	404	422	547	596	698	719	762
<b>Europe (Non EU)</b>	285	292	310	314	336	333	353
<b>EU</b>	1,321	1,369	1,421	1,461	1,633	1,653	1,670
<b>India</b>	494	527	552	588	722	740	830
<b>LATAM</b>	318	334	351	361	421	416	445
<b>Mainland China</b>	1,612	1,802	1,936	2,202	2,469	2,672	3,373
<b>U.K.</b>	472	470	442	436	457	455	457
<b>U.S.-Canada</b>	3,158	3,127	3,076	3,094	3,542	3,647	3,794

As of June 15, 2024. Number of companies in 2022 is shown in legend next to region. Sources: S&P Global Market Intelligence, S&P Global Sustainable1.

# Constituents Of Each Region

Region	Constituents
Asia-Pacific (16)	Australia, Hong Kong, Indonesia, Japan, South Korea, Macao, Malaysia, Marshall Islands, Mongolia, New Zealand, Papua New Guinea, Philippines, Singapore, Taiwan, Thailand, Vietnam
Africa (19)	Botswana, Côte D'Ivoire, Egypt, Ghana, Kenya, Malawi, Mauritius, Morocco, Namibia, Nigeria, Réunion, Rwanda, Senegal, South Africa, Togo, Tunisia, Uganda, Zambia, Zimbabwe
Asia (16)	Bahrain, Bangladesh, Georgia, Israel, Jordan, Kazakhstan, Kuwait, Lebanon, Oman, Pakistan, Qatar, Russian Federation, Saudi Arabia, Sri Lanka, Turkey, United Arab Emirates
Mainland China (1)	Mainland China
Europe (non-EU) (12)	Bosnia And Herzegovina, Gibraltar, Guernsey, Iceland, Isle Of Man, Jersey, Liechtenstein, Monaco, Norway, Serbia, Switzerland, Ukraine
EU (27)	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden
India (1)	India
Latin America (13)	Argentina, Bahamas, Brazil, Cayman Islands, Chile, Colombia, Jamaica, Mexico, Panama, Peru, Trinidad and Tobago, Uruguay, British Virgin Islands
U.K. (1)	United Kingdom
U.S.-Canada (3)	Bermuda, Canada, United States

As of June 15, 2024. Source: S&P Global Sustainable1.

# Summary Statistics For The 2022 Dataset

Industry group	Total revenue (bil. \$)*	Share of total revenue in our dataset (%)§	Avg. revenue per industry group (bil. \$)†	Total scope 1 emissions (mil. metric tons of CO2e)*	Total scope 2 emissions (mil. metric tons of CO2e)*
Banks	2,885	4.3	4	4	24
Automobiles and components	3,663	5.4	8	76	101
Capital goods	8,688	12.8	4	583	224
Commercial and professional services	881	1.3	2	77	12
Consumer discretionary	3,168	4.7	5	95	86
Consumer durables and apparel	1,805	2.7	2	40	40
Consumer services	794	1.2	1	47	41
Consumer staples	3,341	4.9	13	62	79
Energy	6,922	10.2	11	2,333	262
Equity REITs	1,656	2.4	1	21	60
Financial services	2,085	3.1	2	78	15
Food, beverage and tobacco	2,724	4.0	4	283	110
Health care	3,215	4.7	4	19	22
Household and personal products	478	0.7	3	20	13
Insurance	3,128	4.6	11	2	6
Materials	6,000	8.9	3	4,508	945
Media and entertainment	1,655	2.4	2	7	30
Pharmaceuticals, biotechnology and life sciences	1,659	2.4	1	27	28
Semiconductors and semiconductor equipment	1,035	1.5	2	40	96
Software and services	1,265	1.9	1	4	18
Technology hardware and equipment	3,332	4.9	3	49	110
Telecommunication services	1,857	2.7	9	12	147
Transportation	2,342	3.5	5	848	43
Utilities	3,207	4.7	6	5,415	185
<b>Total</b>	<b>67,787</b>	<b>100.0</b>		<b>14,650</b>	<b>2,695</b>

As of June 15, 2024. \*Numbers have been rounded to the nearest units of measure. §Numbers have been rounded to the first decimal of percent. †Numbers have been rounded to the first decimal in units of measure. REIT--Real estate investment trust. CO2e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Scope 1 Greenhouse Gas Emissions Across Industry Groups

Mil. Metric tons CO<sub>2</sub>e\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions 2016-2022(§)
Utilities	5124.1	5208.1	5343.1	5403.1	4687.1	5138.1	4930.1	-4
Materials	2918.1	3345.1	3502.1	3543.1	3741.1	4275.1	3722.1	28
Energy	2034.1	2367.1	2295.1	2186.1	2040.1	2252.1	2160.1	6
Transportation	797.1	853.1	907.1	934.1	648.1	708.1	783.1	-2
Capital goods	395.1	514.1	469.1	471.1	486.1	575.1	514.1	30
Food, beverage and tobacco	170.1	178.1	183.1	205.1	220.1	247.1	236.1	39
Consumer discretionary	33.1	40.1	40.1	40.1	44.1	42.1	88.1	167
Financial services	106.1	107.1	106.1	95.1	79.1	84.1	76.1	-28
Commercial and professional services	54.1	94.1	71.1	74.1	61.1	71.1	67.1	24
Automobiles and components	51.1	58.1	57.1	58.1	49.1	51.1	54.1	8
Consumer staples	42.1	43.1	40.1	44.1	45.1	44.1	47.1	12
Consumer services	40.1	45.1	47.1	43.1	29.1	27.1	44.1	11
Technology hardware and equipment	37.1	41.1	59.1	59.1	55.1	49.1	42.1	13
Semiconductors and semiconductor equipment	22.1	22.1	24.1	24.1	29.1	31.1	31.1	38
Consumer durables and apparel	37.1	41.1	47.1	32.1	29.1	36.1	29.1	-22
Pharmaceuticals, biotechnology and life sciences	21.1	23.1	24.1	25.1	25.1	24.1	24.1	13
Household and personal products	22.1	16.1	16.1	14.1	18.1	17.1	18.1	-16
Equity REITs	38.1	36.1	35.1	38.1	26.1	17.1	15.1	-59
Health care	13.1	13.1	13.1	14.1	15.1	17.1	14.1	12
Telecommunication services	11.1	10.1	11.1	11.1	8.1	10.1	10.1	-13
Media and entertainment	4.1	4.1	5.1	5.1	4.1	4.1	7.1	84
Banks	3.1	4.1	4.1	3.1	3.1	3.1	3.1	-1
Software and services	4.1	3.1	4.1	4.1	4.1	4.1	3.1	-24
Insurance	5.1	6.1	6.1	4.1	3.1	3.1	2.1	-57

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO<sub>2</sub>e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Scope 1 Greenhouse Gas Emissions Intensity (Weighted Average By Revenue) Across Industry Groups

Metric tons CO2e/mil. \$\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions intensity 2016-2022 (%)§
Utilities	2865.1	2777.1	2749.1	2810.1	2444.1	2081.1	1696.1	-41
Materials	940.1	927.1	873.1	913.1	1012.1	896.1	717.1	-24
Transportation	546.1	527.1	505.1	528.1	431.1	396.1	370.1	-32
Energy	612.1	596.1	475.1	468.1	606.1	485.1	333.1	-46
Food, beverage and tobacco	92.1	94.1	92.1	102.1	111.1	109.1	97.1	6
Commercial and professional services	111.1	168.1	116.1	122.1	105.1	104.1	85.1	-24
Consumer services	70.1	74.1	72.1	66.1	65.1	51.1	68.1	-4
Capital goods	74.1	90.1	76.1	73.1	78.1	81.1	67.1	-10
Financial services	83.1	75.1	74.1	65.1	55.1	53.1	42.1	-49
Household and personal products	54.1	39.1	39.1	32.1	43.1	37.1	40.1	-25
Semiconductors and semiconductor equipment	53.1	45.1	43.1	44.1	48.1	40.1	34.1	-36
Consumer discretionary	18.1	20.1	18.1	17.1	18.1	15.1	31.1	75
Consumer durables and apparel	33.1	32.1	34.1	23.1	22.1	23.1	18.1	-46
Pharmaceuticals, biotechnology and life sciences	22.1	22.1	22.1	22.1	20.1	17.1	16.1	-26
Automobiles and components	18.1	19.1	18.1	18.1	16.1	16.1	16.1	-12
Consumer staples	17.1	16.1	16.1	18.1	18.1	16.1	15.1	-9
Technology hardware and equipment	18.1	18.1	24.1	24.1	22.1	17.1	14.1	-20
Equity REITs	43.1	37.1	31.1	30.1	20.1	11.1	11.1	-74
Telecommunication services	7.1	6.1	6.1	6.1	5.1	5.1	5.1	-18
Health care	8.1	7.1	6.1	6.1	6.1	6.1	5.1	-40
Media and entertainment	6.1	5.1	5.1	4.1	4.1	3.1	5.1	-20
Software and services	3.1	4.1	4.1	4.1	3.1	3.1	3.1	-25
Banks	1.1	1.1	1.1	1.1	1.1	1.1	1.1	-1
Insurance	2.1	2.1	2.1	1.1	1.1	1.1	1.1	-59

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO2e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Scope 2 Greenhouse Gas Emissions Across Industry Groups

Mil. Metric tons CO<sub>2</sub>e\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions 2016-2022 (%)§
Materials	563.1	655.1	696.1	670.1	638.1	726.1	817.1	45
Energy	137.1	184.1	207.1	246.1	221.1	225.1	247.1	81
Capital goods	141.1	168.1	170.1	167.1	170.1	220.1	199.1	41
Telecommunication services	77.1	99.1	94.1	110.1	136.1	133.1	144.1	87
Utilities	103.1	101.1	96.1	107.1	90.1	99.1	100.1	-3
Technology hardware and equipment	69.1	85.1	97.1	96.1	91.1	98.1	100.1	45
Automobiles and components	78.1	84.1	91.1	91.1	84.1	95.1	96.1	24
Food, beverage and tobacco	67.1	77.1	76.1	76.1	82.1	92.1	84.1	24
Semiconductors and semiconductor equipment	33.1	41.1	46.1	51.1	57.1	67.1	81.1	149
Consumer discretionary	60.1	70.1	72.1	67.1	61.1	57.1	78.1	29
Consumer staples	74.1	76.1	73.1	71.1	75.1	72.1	66.1	-10
Equity REITs	46.1	52.1	60.1	60.1	53.1	53.1	49.1	6
Consumer durables and apparel	27.1	32.1	45.1	43.1	29.1	36.1	36.1	31
Consumer services	41.1	42.1	42.1	40.1	32.1	37.1	35.1	-14
Transportation	25.1	30.1	31.1	26.1	28.1	31.1	31.1	24
Media and entertainment	9.1	15.1	17.1	18.1	20.1	26.1	28.1	210
Pharmaceuticals, biotechnology and life sciences	22.1	21.1	22.1	20.1	23.1	25.1	24.1	10
Banks	17.1	18.1	18.1	17.1	16.1	20.1	23.1	39
Health care	20.1	23.1	21.1	20.1	21.1	22.1	19.1	-5
Software and services	17.1	12.1	13.1	14.1	14.1	14.1	14.1	-15
Financial services	17.1	20.1	22.1	20.1	18.1	16.1	14.1	-18
Household and personal products	15.1	14.1	14.1	14.1	14.1	12.1	13.1	-17
Commercial and professional services	8.1	8.1	11.1	10.1	10.1	10.1	10.1	26
Insurance	7.1	7.1	7.1	7.1	8.1	8.1	5.1	-27

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO<sub>2</sub>e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.



# Scope 2 greenhouse gas emissions intensity (weighted average by revenue) across industry groups

Metric tons CO2e/mil. \$\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions intensity 2016-2022 (%)§
Materials	182.1	182.1	174.1	173.1	173.1	152.1	157.1	-13
Semiconductors and semiconductor equipment	78.1	82.1	80.1	92.1	94.1	86.1	89.1	15
Telecommunication services	47.1	58.1	54.1	65.1	79.1	74.1	83.1	77
Consumer services	72.1	68.1	64.1	62.1	72.1	70.1	54.1	-25
Energy	41.1	46.1	43.1	53.1	66.1	48.1	38.1	-7
Equity REITs	53.1	53.1	52.1	48.1	40.1	35.1	35.1	-33
Food, beverage and tobacco	37.1	41.1	38.1	38.1	41.1	41.1	34.1	-6
Utilities	58.1	54.1	49.1	56.1	47.1	40.1	34.1	-40
Technology hardware and equipment	34.1	37.1	39.1	39.1	36.1	35.1	34.1	2
Household and personal products	38.1	35.1	34.1	32.1	32.1	28.1	28.1	-26
Consumer discretionary	33.1	35.1	32.1	29.1	25.1	21.1	28.1	-15
Automobiles and components	27.1	27.1	28.1	28.1	28.1	29.1	27.1	1
Capital goods	26.1	29.1	28.1	26.1	28.1	31.1	26.1	-2
Consumer durables and apparel	24.1	26.1	32.1	30.1	22.1	23.1	22.1	-9
Consumer staples	29.1	30.1	30.1	29.1	30.1	27.1	21.1	-27
Media and entertainment	14.1	16.1	16.1	16.1	17.1	19.1	19.1	36
Pharmaceuticals, biotechnology and life sciences	22.1	20.1	20.1	18.1	19.1	17.1	16.1	-28
Transportation	17.1	19.1	17.1	15.1	18.1	17.1	14.1	-14
Software and services	16.1	14.1	14.1	13.1	12.1	12.1	13.1	-17
Commercial and professional services	16.1	15.1	18.1	16.1	17.1	15.1	12.1	-23
Banks	6.1	6.1	6.1	6.1	7.1	7.1	8.1	40
Financial services	13.1	14.1	15.1	14.1	13.1	10.1	8.1	-42
Health care	13.1	13.1	10.1	9.1	8.1	8.1	6.1	-49
Insurance	3.1	2.1	2.1	2.1	2.1	2.1	2.1	-31

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO2e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Scope 1 greenhouse gas emissions intensity (weighted average by revenue)

Metric tons CO<sub>2</sub>e/mil. \$\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions intensity 2016-2022 (%)§
Africa	527.1	496.1	481.1	439.1	476.1	452.1	389.1	-26
APAC	257.1	230.1	233.1	223.1	210.1	211.1	193.1	-25
Asia	737.1	677.1	700.1	657.1	703.1	697.1	566.1	-23
Europe (Non EU)	249.1	232.1	180.1	193.1	178.1	151.1	114.1	-54
EU	237.1	213.1	205.1	190.1	195.1	168.1	152.1	-36
India	1105.1	1047.1	950.1	923.1	1042.1	1098.1	936.1	-15
LATAM	386.1	366.1	327.1	320.1	355.1	300.1	227.1	-41
Mainland China	494.1	591.1	539.1	575.1	532.1	505.1	420.1	-15
U.K.	129.1	124.1	86.1	87.1	86.1	97.1	94.1	-27
U.S.-Canada	166.1	160.1	151.1	141.1	130.1	119.1	107.1	-35

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO<sub>2</sub>e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Scope 2 greenhouse gas emissions intensity (weighted average by revenue)

Metric tons CO2e/mil. \$\*

	2016	2017	2018	2019	2020	2021	2022	Change in GHG emissions intensity 2016-2022 (%)§
Africa	172.1	158.1	145.1	151.1	162.1	141.1	136.1	-21
APAC	44.1	46.1	48.1	50.1	50.1	50.1	47.1	5
Asia	78.1	75.1	70.1	70.1	69.1	67.1	59.1	-25
Europe (Non EU)	37.1	35.1	34.1	34.1	32.1	26.1	22.1	-42
EU	33.1	31.1	31.1	29.1	31.1	25.1	26.1	-21
India	39.1	43.1	50.1	51.1	41.1	46.1	52.1	33
LATAM	49.1	48.1	42.1	42.1	46.1	42.1	34.1	-32
Mainland China	33.1	54.1	52.1	53.1	58.1	59.1	70.1	113
U.K.	38.1	38.1	33.1	33.1	30.1	29.1	22.1	-42
U.S.-Canada	35.1	34.1	31.1	30.1	28.1	25.1	22.1	-38

As of June 15, 2024. Note: The industries are shown in descending order based on 2022 data. \*Rounded to the first decimal in units of measure. §Rounded to the nearest percent. CO2e--Carbon dioxide equivalent. Source: S&P Global Sustainable1.

# Endnotes

- [1] The Paris Agreement on climate change is an international treaty on climate change negotiated by 196 parties at the 2015 UN Climate Change Conference near Paris. The agreement was adopted Dec. 12, 2015, and entered into force on Nov. 4, 2016. Its main goal is to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels” (Source: United Nations Framework Convention on Climate Change). According to the UN Framework Convention on Climate Change, “to limit global warming to 1.5°C, greenhouse gas emissions must peak before 2025 at the latest and decline 43% by 2030.”
- [2] GICS® was developed by MSCI and S&P Global to enhance the investment research and asset management process for financial professionals worldwide. GICS® is a four-tiered, hierarchical industry classification system. As of March 2023, the GICS structure consists of 11 sectors, 25 industry groups, 74 industries, and 163 sub-industries. The taxonomy and structure of the classification system are available in the public domain. Our dataset covers 2016–2022, when GICS® had 24 industry groups, and we keep that classification throughout the study.
- [3] Industry groups comprise several industries:
- The utilities industry group includes companies from the electric utilities, gas utilities, independent power and renewable electricity producers, multi-utilities and water utilities industries.
  - The materials industry group includes companies from the chemicals, construction materials, containers and packaging, metals and mining, and paper and forest products industries.
  - The energy industry group includes companies from the energy equipment and services, and oil, gas, and consumable fuels industries.
  - The transportation industry group includes companies from the air freight and logistics, ground transportation, marine transportation, passenger airlines, and transportation infrastructure industries.
- [4] The log scale has been used, since differences in revenue and emissions between industries grow increasingly large depending on the characteristics of different industries, including whether the industry generates significant Scope 1 and 2 greenhouse gas emissions. Taking the logarithm of these variables allows us to create a more evenly spaced scale of magnitude, that is, data becomes more evenly spread. This does not lead to any loss of information; it only makes it easier to both visualize and undertake statistical analysis. We show the actual values on the two axes for ease of readability.
- [5] We used the Pearson linear correlation between the log-transformed variables.

# Contacts

## Cristina Polizu, PhD

Global Analytics and Methodologies

New York

[cristina.polizu@spglobal.com](mailto:cristina.polizu@spglobal.com)

## Areeb Khan, CFA

Global Analytics and Methodologies

London

[areeb.khan@spglobal.com](mailto:areeb.khan@spglobal.com)

## Peter Kernan

Global Analytics and Methodologies

London

[peter.kernan@spglobal.com](mailto:peter.kernan@spglobal.com)

## Terry Ellis

Sustainability Research

London

[terry.ellis@spglobal.com](mailto:terry.ellis@spglobal.com)

## Pierre Georges

Corporate Ratings

Paris

[pierre.georges@spglobal.com](mailto:pierre.georges@spglobal.com)

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