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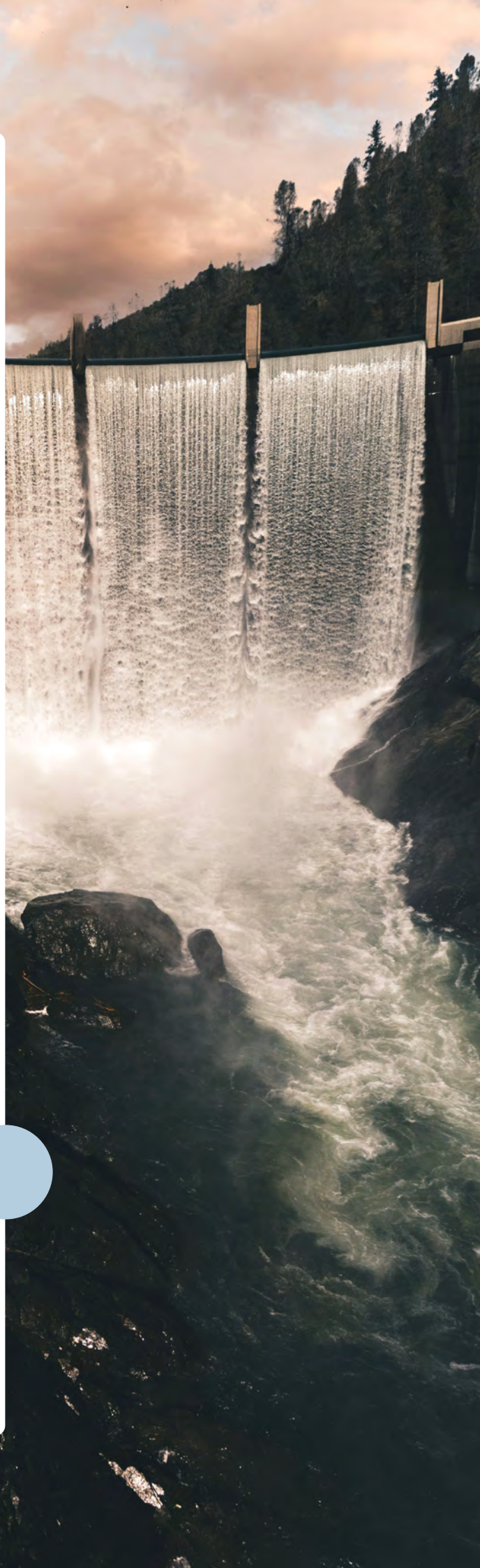
Capturing carbon in your strategy

Or why you should include climate in your investments



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Marketing communication

About the authors.

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Fabrice has been Deputy Head of Pension and Insurance Relations since 2022. He joined Candriam in 2012, performing a broad range of financial engineering functions, including tailored investment solutions and liability driven investments for insurers and pension fund clients, and design of innovative investment strategies.

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Climate change is becoming increasingly important for institutional investors, not only because of regulatory change, but also because of the risks involved.

But what are the measures of the climate footprint of investments? How can climate protection and decarbonization be integrated into institutional portfolios? And how are the characteristics and performance of these portfolios affected by climate-related considerations?

Each year, the World Economic Forum's *Global Risks Report* draws the attention of world leaders to the risks associated with climate change - long-term changes in temperature and weather conditions caused largely by human activity[1], and impacting all ecosystems and human activities on the planet. This is the **double materiality concept**.

The fight against climate change is therefore an increasingly important element of public policy and diplomacy, even if it takes different forms in different countries: the Green Deal in Europe, the Inflation Reduction Act in the USA and the "ecological civilization" in the constitution of the Chinese Communist Party, to name but the best-known. Private investment is essential to tackle climate change: public investment alone cannot provide the necessary funding. European pension funds and insurance companies are increasingly contributing to the fight against climate change, either out of conviction or under the influence of regulations. Indeed, with COP 21 and the Paris Agreement, Environmental, Social and Governance (ESG) factors and the impact of economic activities on the climate have become central for investors.

"The fight against climate change is therefore an increasingly important element of public policy and diplomacy.

Regulations: climate risks and stress tests for insurers?

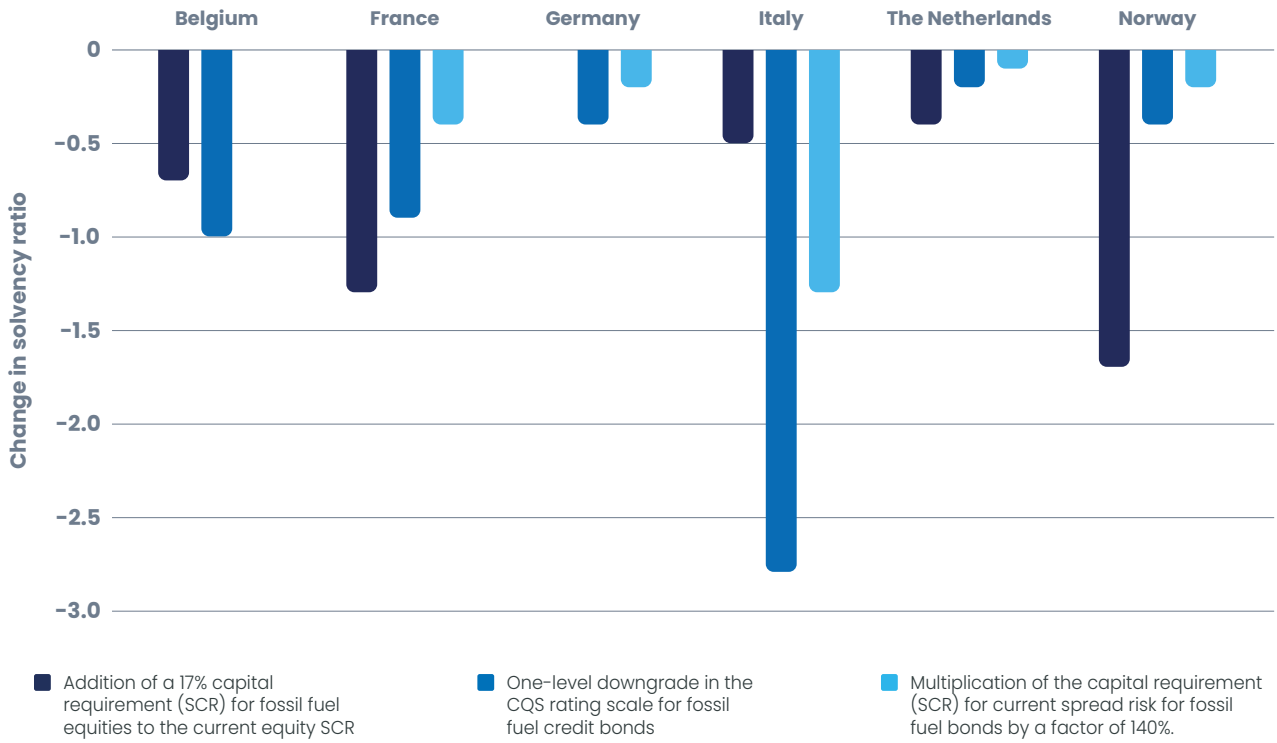
ESG and climate issues are a top priority for investors, primarily because of the communication and publication rules linked to them, including the Corporate Sustainability Reporting Directive (which replaced the Non-Financial Reporting Directive this year), the Sustainable Finance Disclosure Regulation (SFDR), and the Markets in Financial Instruments Directive (MiFID). These have led to profound changes, in terms of both marketing positioning and organization, and have enshrined the concept of dual materiality into law.

Today, climate risk assessment has become an obligation for insurance companies and pension funds. And for good reason : most balance sheets are likely to be affected by climate change, whether in terms of the physical risks arising from climate change, or through the effects on asset prices of the transition to a low-carbon economy. The physical risks could worsen insurers' overall balance sheets. On the liabilities side, claims are on the rise due to floods, droughts, storms and fires, as well as increased risks of morbidity and infection. On the assets side, weather variations can cause damage to real estate, infrastructure and plants exposed to these risks. Added to this is uncertainty about commercial demand for long-term savings products. Most investments are subject to transition risks, for example due to a possible increase in the price of CO_2. Long-term investors are all the more exposed to these risks, which will likely materialize over horizons similar to their commitments.

Climate change is seen by central banks and financial supervisors as an important issue for future economic stability, and therefore as a relevant area for prudential regulation. The financial supervisory authorities of the Network for Greening the Financial System (NGFS) are developing economic scenarios based on the possible occurrence of physical and transitional risks. These scenarios serve as the basis for various quantitative

rules, including stress tests for insurance companies and pension funds, and ultimately for setting capital requirements. In its consultation on the "Prudential treatment of sustainability risks", the European Insurance and Occupational Pensions Authority (EIOPA) examined how climate-related capital requirements could be incorporated into Solvency II. These capital requirements will probably be limited to commitments in the fossil fuel sector, which statistically seems to be the only one to present significantly significant financial risks and a negative impact on the climate. EIOPA considers that the impact of these additional capital requirements would be limited, as shown by the analysis below, which does not take into account investments via funds.[2]

Figure 1:
Estimated impact by EIOPA of raising the capital charge on some fossil-fuel exposures on insurance solvency ratios[3]



Measuring climate risks: the carbon footprint is not enough.

But what's the best way to quantify climate risks? The **carbon footprint** is often considered a holistic indicator of climate risk, as climate change is largely caused by the concentration of carbon dioxide and other greenhouse gases in the atmosphere. We consider different emission perimeters: Scopes 1 and 2 concern direct company emissions, such as office heating or purchased electricity. Scope 3 covers emissions from suppliers (upstream) and the use of purchased products (downstream). For example, for a car manufacturer, this means the carbon emitted by a car once it has been sold, or for an energy supplier, the carbon emitted by the fossil fuel used to power a turbine that produces energy for sale. They provide an important insight into the economic risks associated with carbon emissions. Scope 4 emissions, i.e. "avoided" emissions, are not recognized by the GHG Protocol - whose aim is to establish standards for the accounting and reporting of greenhouse gas emissions.

In general, carbon footprint figures need to be treated with caution: methods vary widely from country to country, sector to sector, and are not always audited at present. Some carbon-intensive sectors, such as electricity suppliers or the construction industry, can play an important role in the transition to a green economy, for example by developing smart electricity grids or manufacturing insulating glass: not all carbon emissions have the same impact on the climate when all elements are taken into consideration. Calculating a portfolio's carbon footprint therefore generally says much more about sector allocation than climate risk, but it remains useful for comparing similar investments. **In any case, decarbonizing a portfolio should go much further than simply reducing its carbon footprint.**

Yields and carbon intensity in the real estate sector

Analyzing the carbon intensity of the real estate sector means taking into account the specific activities of each player. Data centers have a fairly high Scope 1 and 2 carbon intensity. Most of the carbon intensity of the other sub-sectors comes from Scope 3 emissions. What's more, the reporting of carbon emissions is not harmonized, even if companies carry out the same type of activities. For example, some property management companies only include emissions from the existing portfolio in their Scope 1 and 2 emissions, while others also account for emissions linked to property development. Some listed retail property companies include in their Scope 3 estimates of emissions linked to the transportation of customers to their shopping centers, while others do not. The real estate services sector has the highest Scope 3 emissions, as they are proportional to the number of square meters of surface area for which a service or advice is provided, even if the service rendered is associated with the decarbonization of an underlying asset.

Figure 2:
Yield and carbon intensity in the real estate sector[4]

Sector	Number of securities	Cumulated net return	Scope 1-2 intensity (tCO_2/M€ invested)	Scope 1-2-3 intensity (tCO_2/M€ invested)
Data centers	2	101%	423	592
Residential	11	45%	71	160
Office	6	-2%	89	195
Real estate services	4	130%	20	1,920

Past performance is no guarantee of future results and is not constant over time.

The above table seems to suggest that the higher the carbon intensity, the higher the historical performance. To deduce that decarbonization means a loss of value would be a contradiction in terms: data centers are benefiting from the digital boom, while offices and housing have suffered from the financial crisis and rising interest rates. On the asset side, a "brown discount"[5] is weighing and will continue to weigh on performance, at least in Europe for regulatory reasons.

Future-oriented indicators: complex but indispensable.

Indicators such as the carbon footprint are not enough to answer the complex question of the impact and risks of climate change; we need to be able to assess **the alignment of the company's strategy** with climate objectives, as well as its ability and willingness to implement this strategy. However, the indicators that sum up this alignment are by their very nature highly complex, and subject to a series of methodological choices and assumptions - after all, it's all about anticipating the future. At Candriam, in order to integrate such measures into our climate assessment and ultimately evaluate the contribution of our investments to the Paris climate objectives, we have teamed up with data provider Carbon4Finance (C4F). C4F produces "temperature scores" that tell us to what extent the strategies of our portfolio companies are consistent with the objectives of the Paris Agreement. A low temperature score indicates a positive contribution to the Paris climate objectives, while a high score means that a company is contributing to global warming rather than combating it. We can convert a weighted average temperature score at portfolio level into an alignment with a temperature expressed in degrees Celsius over the long term.

We need to distinguish between two categories of business sectors: high-stake sectors, which include energy, utilities, mining, industry and all other sectors that can accelerate or slow climate change, and low-stake sectors. Low-stake companies generally have a temperature score in line with a "business as usual" scenario. The variability of temperature scores is best sought in high-stakes sectors, within which we define a sub-segment of companies that provide solutions to global warming (suppliers of renewable energies, development of power grids, thermal insulation of buildings, etc.).

Using this and other data sources, our proprietary analysis identifies sustainable investments across the universe, including other environmental considerations as well as social and governance factors.

The differences between carbon intensity and alignment with climate objectives become clear when we compare four groups of companies:

- Companies in sectors where the climate is a major issue and which are not sustainable according to our criteria,
- Companies in sectors with low climate challenges, such as healthcare or communication services,
- Companies in sectors where the climate is a major concern, and which meet our sustainability criteria, and
- Companies offering solutions to climate change (figure 3).

Figure 3:
Carbon intensity and alignment with the Paris climate objectives of various MSCI World segments[6]

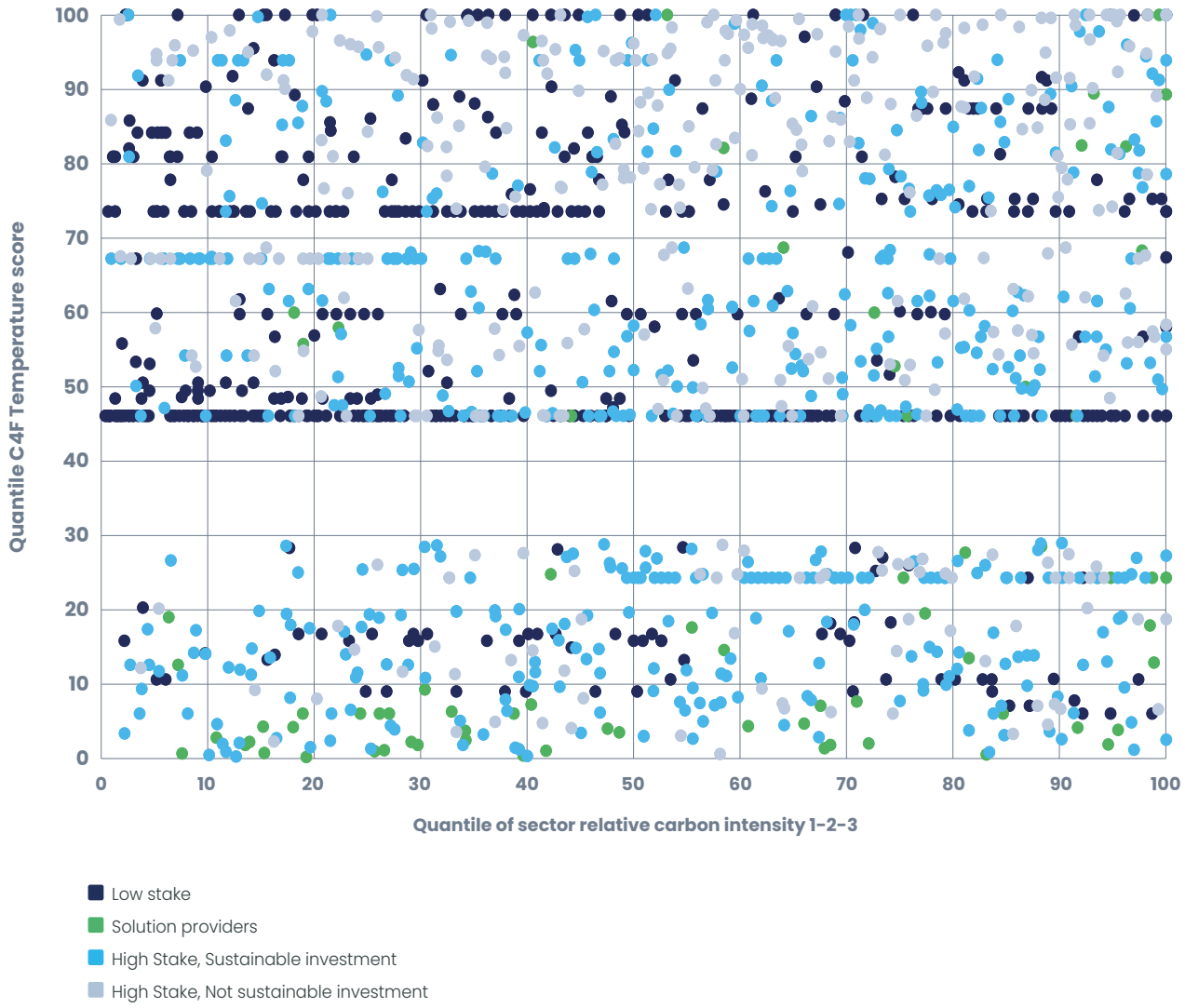
	High stake sectors non sustainable	Low stake sectors	High stake sectors sustainable	Climate solution providers
Carbon intensity Scope 1-2 (tCO_2 / M€ sales)	256	29	93	324
Carbon intensity Scope 1-2-3 (tCO_2 / M€ sales)	**2,469**	**230**	1,533	**2,212**
Alignment with climate target (C°)	**4.5**	**3.8**	2.9	**1.7**

While the climate change solutions provider segment has a high carbon intensity, especially if emissions from the 3 Scopes are included, it is also the one that benefits from the lowest temperature score, aligned with a climate trajectory compatible with the Paris Agreements, with warming of less than +2 degrees compared with pre-industrial temperatures.

Companies in low-stake sectors may have low carbon intensity, but they are not aligned with the Paris Agreements: investing in this segment of companies alone will not change the current climate trajectory. Unsustainable companies in high-stakes sectors have both a high carbon intensity and a high temperature score.

The link between current carbon emissions and long-term temperatures is therefore not obvious, and Figure 4 visually demonstrates the lack of statistical correlation between these two dimensions. However, it can be seen that companies providing climate solutions tend to be in the lower quartiles of temperature scores, but generally spread over the higher quantiles of carbon intensity. In fact, these companies are generally industrial firms, producing infrastructure, goods and services that either consume energy and resources, or respond to industrial challenges in high-emission sectors.

Figure 4:
Temperature score vs Scope 1-2-3 carbon emissions in the MSCI World index[7]




Indicators such as the carbon footprint are not enough to answer the complex question of the impact and risks of climate change.

Portfolio performance: it all depends on the filters.

Climate objectives are integrated into investment management using different approaches : from "thematic investments", focused on a restricted sub-universe of investments, to active and passive strategies on a large and diversified universe of securities that integrate climate considerations into the selection of securities and their weighting in the portfolio. Depending on the type of investment, performance may also differ from traditional market benchmarks. In our previous example, the climate solution providers segment is a thematic investment with significant sector distortions and a high tracking-error compared to a global index : this segment represents just 5.7% of the value of the MSCI World, or 72 of the 1,410 stocks in this index, and largely belongs to the industry, materials, utilities and information technology sectors (figure 5).

Figure 5:
Sector allocation and performance of MSCI World segments[8]

	Index	High stake sectors non sustainable	Low stake sectors	High stake sectors sustainable	Climate solution providers
Universe concentration					
Number of securities		334	481	523	**72**
Weight in MSCI World		21.0%	37.5%	34.0%	**5.7%**
GICS Sector allocation (%)					
Communication Services	7.2	0.1	18.3	0.3	
Consumer Discretionary	10.9	17.3	5.0	11.6	21.7
Consumer Staples	6.8	17.1	0.1	9.1	0.2
Energy	4.5	19.8		0.8	0.4
Financials	15.2	0.1	40.3	0.1	
Health Care	12,1	7.2	5,7	23,0	10,7
Industrials	11.1	18.1	4.4	11.3	22.2
Information Technology	23.0	6.1	25.5	32.1	15.6
Materials	4.1	9.9	0,0	2,5	17,9
Real Estate	2.5	0.4	0.7	6.1	0.7
Utilities	2.6	3.7		3.1	10.5
Cumulated performances (%)					
2019 - 2023	97.5	**81.9**	94.3	106.1	**152.2**
2019 - 2020	51.4	**30.5**	48.1	61.8	**122.9**
2021 - 2023	46.1	**51.4**	46.2	44.3	**29.4**

Past performance is no guarantee for future returns.

How does integrating climate considerations influence performance? In the example in Figure 5, we see a strong performance from the solution provider segment, but mainly from 2018 to 2020, after which the segment, on the other hand, experienced a slowdown. There are many reasons for this: from the search for alternative sources of fossil fuels and weapons since the start of the war in Ukraine, which has put climate change on the political back burner, to inflation, which has made some industrial projects less profitable. We believe this segment will develop well over the long term, but its concentration makes it vulnerable to strong cyclical changes. Institutional investors need to be able to diversify these concentration risks across their overall balance sheet. To measure how carbon intensity and temperature score can alter the investment portfolio, we filtered an investment grade corporate bond index (Iboxx Euro Corporate) and a global equity index (MSCI World), on these criteria and created different portfolios :

- a portfolio that includes securities with the lowest carbon intensity on Scope 1 and 2 or on Scopes 1, 2 and 3,
- a portfolio with low carbon intensity and low temperature scores,
- a portfolio that includes securities with the highest carbon intensity on Scope 1 and 2 or on Scopes 1, 2 and 3, and
- a carbon-intensive portfolio with high temperature scores.

> **Climate objectives are integrated into investment management using different approaches.**

In low-carbon bond portfolios with low temperature scores, the healthcare and telecoms sectors are naturally overweighted relative to the overall index, while the oil and gas sectors are underweighted (figure 6). We have observed that portfolio optimization can offset most of these biases with a relatively low tracking-error *ex ante* , because a significant part of bond performance remains determined by a common factor, interest rates, and because the upside and downside potential around this common factor remains limited on *investment grade* bonds.

Figure 6:
Sector allocation and performance of an Iboxx Euro Corporate Index segmentation[9]

Iboxx Euro Corporate	Index	Low carbon portfolio	Low carbon & low temperature portfolio	High carbon portfolio	High carbon & high temperature portfolio
Iboxx Sector (%)					
Basic Materials	2.7	3.5	**2.5**	**5.0**	3.9
Consumer Goods	12.7	**12.8**	12.6	**5.6**	8.6
Consumer Services	3.9	5.1	**2.6**	6.3	**7.3**
Financials	42.8	34.7	38.3	35.7	**29.3**
Health Care	5.6	7.0	**10.4**	8.0	0.9
Industrials	9.8	**7.3**	9.0	10.7	**14.9**
Oil & Gas	3.8	4.1	0.3	4.2	**15.4**
Technology	2.5	**4.3**	0.8	2.3	2.9
Telecommunications	5.2	8.3	**11.1**	6.7	7.0
Utilities	11.0	12.9	12.2	**15.4**	**9.9**
Ratings (%)					
AAA-AA	9.0	**8.7**	7.2	8.8	**6.4**
A	41.2	**47.7**	45.7	**35.0**	38.0
BBB	49.4	**43.0**	46.5	**56.0**	55.3
BB	0.3	0.5	0.6	0.2	0.2
Key metrics					
Bond yield (%)	3.55	3.46	3.48	3.50	3.50
OAS spread (basis points)	149	141	142	144	145
Duration	4.6	4.7	4.9	4.6	4.5
Carbon intensity Scope 1 and 2 (tCO_2 / M€ sales)	146	51	**35**	**577**	182
Carbon intensity Scope 1, 2 and 3 (tCO_2 / M€ sales)	1 131	**357**	580	**1 939**	1 808
Aligning the portfolio with the 2050 temperature target (C°)	2.8	2.9	**1.9**	2.5	**4.8**

Past performance is no guarantee for future returns.

By contrast, the differences between portfolios are greater for equities (Figure 7), as carbon intensity and temperature scores induce **sector, geographic,** style (growth or value) **and size biases,** which have a major influence on portfolios. The *tracking-error* with the broader index will remain higher for equities, although it could be significantly reduced. In terms of performance, it's particularly striking that the low-carbon portfolio and the portfolio with a low carbon footprint and "temperature" have both outperformed the market and other portfolios since 2018. In contrast, the high-carbon, high-temperature portfolio underperformed the market, both over the 2019-2020 and 2021-2023 periods. The analysis is admittedly biased by the fact that we use current data on emissions and temperature adjustment, which we compare with past performance. It does, however, show that **companies considered the least climate-friendly today have been riskier and less successful in recent years.** An accurate analysis of the influence of climatic considerations on portfolio performance should be carried out by correcting for the various biases identified above.

Figure 7:
Sector allocation and performance of another MSCI World segmentation[10]

MSCI World	Index	Low carbon portfolio	Low carbon & low temperature portfolio	High carbon portfolio	High carbon & high temperature portfolio
GICS Sector (%)					
Communication Services	7.2	1.3	**0.6**	5.5	**15.6**
Consumer Discretionary	10.9	**13.3**	12.2	**5.6**	12.6
Consumer Staples	6.8	7.9	**4.5**	**9.3**	7.5
Energy	4.5	6.4	**0.2**	2.3	**10.7**
Financials	15.2	16.4	11.4	**26.5**	**10.3**
Health Care	12.1	14.6	**21.8**	8.6	**3.7**
Industrials	11.1	**7.2**	7.2	8.8	**12.7**
Information Technology	23.0	25.4	**33.8**	**18.2**	19.5
Materials	4.1	3.3	**3.3**	**7.2**	3.8
Real Estate	2.5	2.5	2.7	**2.9**	**1.7**
Utilities	2.6	**1.8**	2.3	**5.1**	2.0
Style and Size (%)					
Value weight	49.4	42.6	**40.3**	**73.5**	44.6
Top 10 weights as a percentage of total weight	20.5	30.1	**45.6**	**26.0**	34.7
Key climate metrics					
Carbon intensity Scope 1 and 2 (tCO_2 / M€ sales)	119	51	35	**577**	182
Carbon intensity Scope 1, 2 and 3 (tCO_2 / M€ sales)	1.271	**357**	580	**1 939**	1 808
Aligning the portfolio with the 2050 temperature target (C°)	3.7	2.9	**1.9**	2.5	**4.8**
Cumulative yields (%)					
2019 - 2023	97.5	99.9	**129.5**	**67.3**	99.8
2019 - 2020	51.4	58.1	**73.2**	**33.4**	51.6
2021 - 2023	46.1	41.8	**56.2**	**33.9**	48.2
Average performance of bottom 10% (%)					
2019 - 2023	-25	**-20**	-24	**-33**	-27
2020 - 2023	-46	-51	**-42**	-42	**-53**

Past performance is no guarantee for future returns.

Integrating climatic factors can reduce risks.

Institutional investors are largely exposed to climate risks, both through their activities and through regulation. Stabilizing the climate is vital for them, but climate considerations are sometimes perceived as detrimental to their wallets. This is generally not true:**he measurement of climatic risks** is complex and sometimes delivers ambiguous messages, but it **helps to reduce risks and improve returns**, particularly for forward-looking indicators such as "temperature". However, taking climate aspects into account can induce different biases in portfolios and reduce diversification, and such financial risks should also be diversified.

Notes & References.

1 Eyring, V., N.P. Gillett, K.M. Achuta Rao, R. Barimalala, M. Barreiro Parrillo, N. Bellouin, C. Cassou, P.J. Durack, Y. Kosaka, S. McGregor, S. Min, O. Morgenstern, and Y. Sun, 2021: Human Influence on the Climate System. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*[Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 423-552, doi :10.1017/9781009157896.005.

2 Consultation on the Prudential Treatment of Sustainability Risks. European Union. https://www.eiopa.europa.eu/consultations/consultation-prudential-treatment-sustainability-risks_en

3 Source: EIOPA, see 2

4 Source: Candriam, Bloomberg, S&P Trucost. Cumulated net performances in USD from the 31st December 2018 to the 31st December 2023. Past performance is no guarantee of future results and is not constant over time.

5 How do you decarbonize real estate? An expert explains. World Economic Forum. https://www.weforum.org/agenda/2022/11/how-we-can-decarbonize-the-real-estate-sector

6 Candriam, C4F, S&P Trucost. The portfolio has been determined on the basis of data as at December 31, 2023. Average carbon intensity is weighted by market capitalization, while temperature in degrees Celsius is deduced from the C4F temperature score weighted by market capitalization.

7 Source: Candriam, C4F, S&P Trucost. Data as at 31.12.2023. The x-axis is a percentile of the company's temperature score in the MSCI World index (a low percentile means a low temperature score and therefore an orientation towards a lower temperature in 2050). The empty space in the graph corresponds to the concentration of C4F values on a single value, which corresponds to the "business as usual" scenario and distributes these values unevenly. The y-axis represents a percentile of the Scope 1, 2 and 3 company's carbon intensity within its GICS sector (a low percentile indicates a low carbon intensity relative to its sector).

8 As of 12/31/2023, except for the weightings used for performance: as of 12/31/2018, with no new weightings. Past performance is no guarantee of future performance. For further information, see note 6.

9 Segmentation is carried out by dividing the portfolio into quartiles of Scope 1 and 2 carbon emissions, and scope 1, 2 and 3 in relation to the sector, and into temperature levels based on the C4F assessment. Source: Candriam, Bloomberg, Trucost, C4F.

10 Segmentation is carried out by dividing the portfolio into quartiles of Scope 1 and 2 carbon emissions and Scope 1, 2 and 3 in relation to the sector, and into temperature levels based on the C4F assessment. Source: Candriam, Bloomberg, Trucost, C4F. Past performance is no guarantee of future performance.

€145 B

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+600

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*As of 31/12/2022, Candriam changed the Assets Under Management (AUM) calculation methodology, and AUM now includes certain assets, such as non-discretionary AUM, external fund selection, overlay services, including ESG screening services, [advisory consulting] services, white labeling services, and model portfolio delivery services that do not qualify as Regulatory Assets Under Management, as defined in the SEC's Form ADV. AUM is reported in USD. AUM not denominated in USD is converted at the spot rate as of 31/12/2023.

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