

Low Carbon Core Infrastructure

**An overview of PATRIZIA's climate risk
framework and practical implementation
for listed infrastructure**

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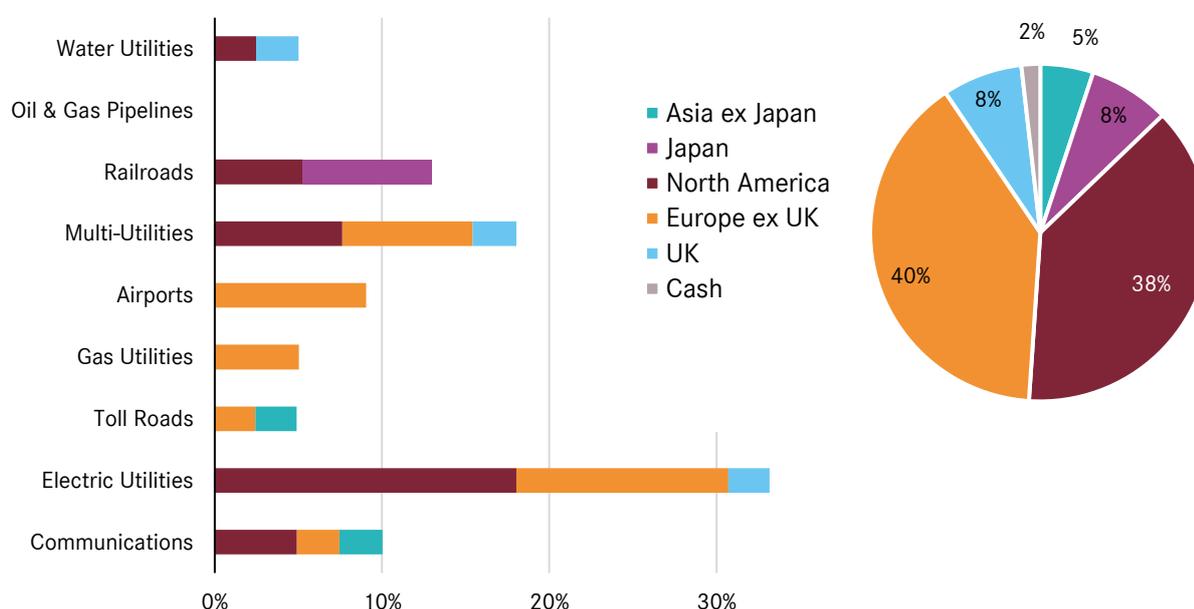
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EXECUTIVE SUMMARY

ABOUT PATRIZIA'S LOW CARBON CORE INFRASTRUCTURE STRATEGY

The PATRIZIA Low Carbon Core Infrastructure strategy holds between 30 and 50 high quality core infrastructure assets listed on global developed market stock exchanges. These include regulated electricity grids, water utilities, communication towers, toll roads and railways. The strategy is designed to provide a defensive equity exposure which provides a cash yield and downside protection. When selecting which stocks to hold PATRIZIA focuses on long term asset quality and sustainability. The charts below provide a snapshot of the sector and geographical breakdown of the Low Carbon Core Infrastructure strategy.

Chart 1: Fund Sector and Geographic Exposure



As at 31 December 2023. Source: PATRIZIA Infrastructure, FTSE, Bloomberg

PATRIZIA Infrastructure is a long-term investor; we look for high quality defensive assets which we could hold for many years. Taking this philosophy, we have a precautionary approach to ESG and global warming related risks. We apply a science-based pathway approach to modelling climate transition and physical risks, and companies with serious ESG violations or facing acute climate change risk are sold and excluded from our portfolios.

By avoiding these risks where we can, we expect that this will result in greater downside protection and ultimately higher returns for investors.

The strategy does not hold any material exposure to:

- Coal, gas, or uranium extraction and refining
- Coal handling and transport activities including ports infrastructure, rail, road, or marine shipment
- Oil pipelines
- Weapons, tobacco or pornography production, manufacturing, or distribution

THE IMPORTANCE OF LONG-TERM SUSTAINABILITY TO RETURNS

With long useful lives, large physical footprints and high amounts of debt, infrastructure assets can have elevated ESG risk profiles relative to other sectors. Assets in industrial sectors such as technology, retail, and manufacturing, have shorter useful lives, and may be able to evolve and adapt to longer term risks, but this is not the case with most infrastructure assets. Long term risks can have a large impact on asset values due to the value from earnings assumed in the outer years of the asset's useful life.

These risks must be assessed, appropriately priced, and either avoided or managed carefully. PATRIZIA fully embeds ESG into the investment process, and the Low Carbon Core Infrastructure strategy is designed to meet high ethical and sustainability standards while still providing investors with a defensive and differentiated return.

By reducing exposure to fossil fuel linked infrastructure assets, the PATRIZIA Low Carbon Core Infrastructure strategy will likely underperform listed infrastructure indices during periods when oil and gas prices are rising, but we expect that the lower downside risk combined with the positive exposure to the growth in renewable energy will more than make up for this over the medium term.

INFRASTRUCTURE AND GREENHOUSE GAS EMISSIONS

As an asset class, infrastructure carbon emissions intensity is high, due to the nature of the assets. Power and heat generation is responsible for nearly 60% of all global greenhouse gas emissions, and energy infrastructure right now is undergoing significant structural change. Similarly, transportation contributes over 20% of all anthropogenic greenhouse gas emissions, so transport infrastructure is also facing major change.

Table 1: PATRIZIA Low Carbon Core Infrastructure Strategy Carbon Intensity (2023)

Tons CO ₂ e per \$US mil in sales	Scope 1&2 Emissions per \$Revenue	Scope 3 & Facilitated Emissions per \$Revenue	Total Emissions per \$Revenue
PATRIZIA LCCI	334	1,289	1,624
FTSE Developed Core Infra Index	1,159	7,506	8,665
S&P Global Infrastructure Index	709	9,385	10,091
Dow Jones Brookfield Global Infra Index	356	10,894	11,250
MSCI World Index	151	891	1042
<i>LCCI vs FTSE DCI Index</i>	<i>-71%</i>	<i>-83%</i>	<i>-81%</i>

Source: ISS, Bloomberg, [MSCI IndexMetrics](#), PATRIZIA Infrastructure.

MSCI data as of 31 August 2022. LCCI and listed infrastructure indices holdings data as at 31 December 2023, using most recently available emissions data, largely CY22.

A SCIENCE-BASED PATHWAY APPROACH

Carbon intensity metrics, such as those in the table above, are a useful broad picture at the portfolio level, but can obscure the real risks at the asset level. For example, oil pipelines typically report very low emissions intensity, even scope 3, as the oil is not owned by the pipeline. Yet they are at significant risk of stranding and share prices have become more volatile over the past five years.

PATRIZIA considers at the asset cash flow resilience under a sector-specific science-based 'well-below 2°C warming scenario'. This approach recognises that companies that can adjust over time to the policy and market changes necessary to meet the well-below 2°C warming target will be less subject to stranded asset risk and the destruction of investor capital. This target is applied in several ways; by scenario modelling of asset cash flows under natural gas and fuel demand forecasts assuming zero use in 2050 or earlier; by applying a threshold of

carbon intensity of power generation for assets that have electricity generation capacity, and by assessing the adaptability of assets to alternative renewable fuels. Where relevant, carbon intensity data is used as a quantitative input in our stock selection process, but more importantly, we look qualitatively at the underlying climate change risks.

We are continually building on the research and tools we use in this area, especially as data and company reporting improves.

As a result of this approach, the PATRIZIA Low Carbon Core Infrastructure strategy has a low carbon intensity relative to other infrastructure strategies and benchmarks. We look not only at direct emissions, but also at facilitated (including Scope 3) emissions, which captures the embedded emissions carried by pipelines storage and transportation assets, and more accurately reflects the scale of climate change risks.

1. GREENHOUSE GAS EMISSIONS

PATRIZIA Infrastructure sources carbon emissions data on each stock in our core infrastructure universe, and we use this data in our stock selection process as both a quantitative and qualitative input. Carbon emissions data is sourced from ISS ESG, the Carbon Disclosure Project (CDP) and company reports, and we assess all facilitated emissions, not just direct emissions.

Emissions are classified as Scope 1 (direct emissions generated by the company or asset, for example, from owned on site power generation or vehicles), Scope 2 (emissions from the generation of purchased electricity consumed by a company or asset), and Scope 3 (indirect emissions, released because of operations, but from sources not owned or controlled by the company, for example emissions related to business travel, emissions embedded in fuels transported).

For most companies, Scope 3 emissions relate only to ancillary activities such as business travel and waste produced and are lower than Scope 1 and 2 emissions. However, for transport and pipeline sectors, which for example, carry gas to the power station where it will be burnt, or facilitate air travel (a Boeing 747 burns approximately 4.5 litres of fuel per second), Scope 3 emissions can be multiples larger than Scope 1 and 2 emissions, and more accurately reflect the climate change risk and size of the transition faced by these sectors.

We take 'well-below 2°C' pathway compliance approach. This approach recognises that companies that can adjust over time to the policy and market changes necessary to meet the below 2°C warming target will be less subject to stranded asset risk and the destruction of investor capital.

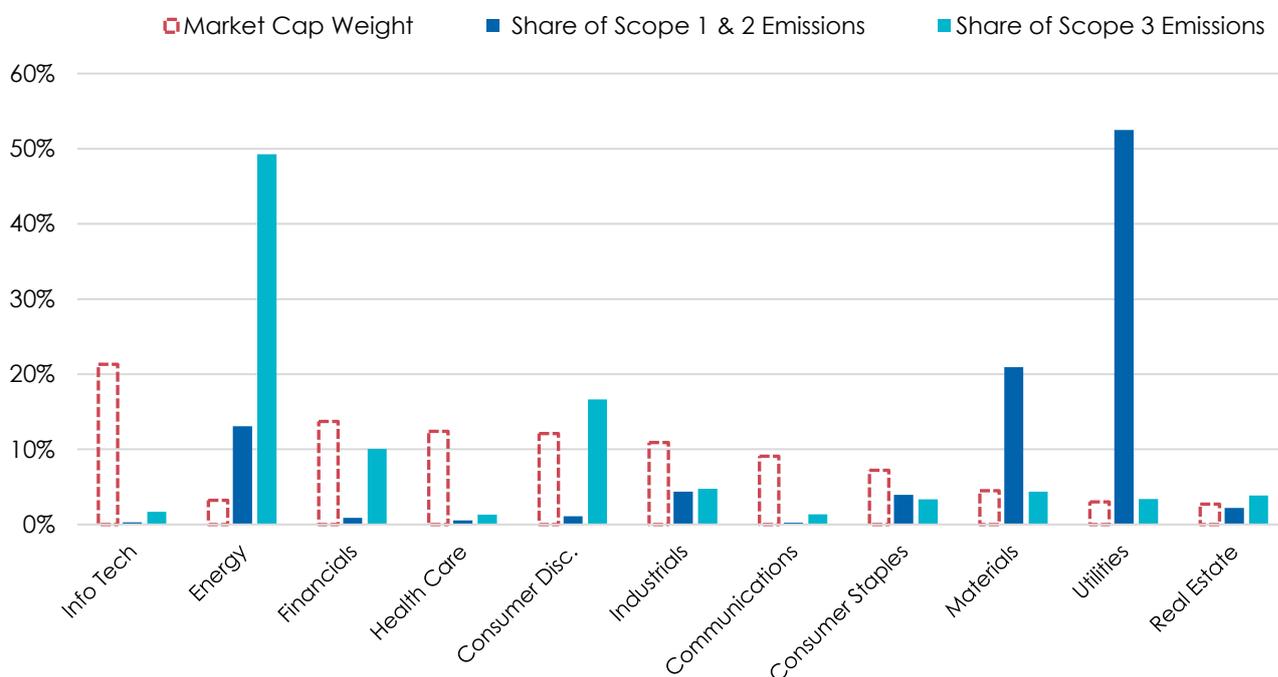
PATRIZIA is continually expanding our approach to the analysis of high emitting companies, and assessing how we can use the additional reporting that will come from the recommendations from the G20 Financial Stability Board's (FSB) Task Force on Climate-related Financial Disclosures (TCFD) and other regulatory reporting initiatives.

2. CURRENT PORTFOLIO EMISSIONS INTENSITY

In the context of global equity markets, infrastructure portfolios have high carbon emissions intensity, as sectors responsible for the burning of the fossil fuels (coal, gas, and oil), generate the most emissions. Chart 2 below shows the MSCI World index sectors, by market capitalisation weight, and by share of total Scope 1 & 2 and Scope 3 greenhouse gases emitted.

Utilities make up only 3% of the index, but over 60% of direct emissions. Within this context, the emissions intensity of the strategy is high relative to non-infrastructure sectors, but very low relative to other infrastructure strategies and benchmarks.

Chart 2: MSCI World Sector Weights and Share of Scope 1 & 2 Emissions



Source: MSCI ESG Research LLC, S&P Dow Jones Indices LLC. Chart shown for illustrative purposes only.

What also jumps out on this chart is the relatively low contribution to Scope 1 & 2 emissions by the oil and gas sector (Energy). For coal and gas, predominantly burned in power generation, the emissions are therefore reported against electric utilities. But this does not show the full picture of where stranded asset risks lie.

While Scope 1 & 2 emissions are the most widely reported, Scope 3 estimates capture most emissions not directly generated, but which are facilitated by the business activity. For example, as oil is not burned or consumed in a pipeline, the pipeline has very low Scope 1 and 2 emissions, but they can be reflected in Scope 3. In this case, the stranded asset risk of an oil pipeline is more accurately reflected in Scope 3 emissions. However a loophole in carbon emission reporting means that sometimes even Scope 3 figures don't capture this. To accurately capture the unreported facilitated emissions, PATRIZIA has calculated this for companies in the oil pipeline sector, based on the emissions intensity factors of the oil and petroleum liquids transported or processed in the relevant year. The chart above looks quite different on a Scope 3 basis, with the largest share by far going to the oil and gas sector, Consumer Goods coming in second, and the Utilities sector in-line with Industrials and Consumer Staples.

The emissions intensity of the PATRIZIA Low Carbon Core Infrastructure Strategy, measured as emissions per dollar of revenue and earnings generated, is shown in the table below, compared against the FTSE Developed Core Infrastructure Index, and the S&P Global Infrastructure Index. This shows that there is significantly lower stranded asset and energy transition risk in the PATRIZIA LCCI portfolio.

Table 2: PATRIZIA Low Carbon Core Infrastructure Strategy Carbon Intensity

Tons CO ₂ e per \$mil	Scope 1&2 Emissions per \$Revenue	Scope 3 & Facilitated Emissions per \$Revenue	Total Emissions per \$Revenue
PATRIZIA LCCI	334	1,289	1,624
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<i>LCCI vs FTSE DCI Index</i>	<i>-71%</i>	<i>-83%</i>	<i>-81%</i>

Source: ISS, Bloomberg, PATRIZIA Infrastructure. Holdings as at 31 December 2023, using most recent emissions data, typically for CY2022.

On a Scope 1 and 2, most of the difference between the PATRIZIA LCCI and the FTSE Developed Core Infrastructure Index is due to the exclusion of the Japanese electric companies (as they operate in a deregulated retail market, so are not considered to be core infrastructure) and the exclusion of North American integrated utilities with a CO₂e intensity of power generation above the 2°C maximum warming pathway. Scope 3 emissions show an even larger difference. This is due to the PATRIZIA LCCI strategy holding very limited exposure to oil and gas mid-stream infrastructure and oil pipeline stocks (predominantly US and Canadian listed stocks).

This result is similar to the S&P Global Infrastructure Index emissions intensity figures. This index has a higher exposure to North American oil and gas services and pipeline companies, and less exposure to electric utilities which results in lower Scope 1 and 2 emissions, but high Scope 3 emissions. The only oil and gas pipeline stocks that the PATRIZIA LCCI strategy holds are fully regulated natural gas transmission stocks.

3. A WELL-BELOW 2°C WARMING PATHWAY

Several international organisations provide sector by sector pathways for the greenhouse gas emissions reductions required to limit global warming to well below 2°C. Largely based on the detailed data models used by the IPCC, these science-based scenarios provide a road map for the energy transition.

The sector specific pathways we currently apply are based on:

- The International Energy Agency's (IEA) Net Zero Emissions (NZE) pathway, a below 1.5°C warming pathway with a 50% probability and limited overshoot.
- The IEA's Announced Pledges Scenario (APS) (from 2022 onwards, equivalent to the IEA pre-2022 Sustainable Development Scenario (SDS)). This is a well below 2°C pathway; holding the temperature rise to 1.7°C with a 50% probability without reliance on global net-negative CO₂ emissions.

The IEA pathways are used as a source by both the Transition Pathway Initiative (TPI) and the Science Based Targets project (SBTi), and we also use both the TPI and the SBTi tools in mapping investee companies historic and forecast carbon intensities against sector decarbonisation requirements.

We have applied the sector specific pathways for:

- Aviation
- Power generation
- Natural gas
- Road transport

For other sectors such as rail and communications, a non-sector specific economy wide emission reduction pathway is applied, and for these we rely to a greater extent on the TPI and SBTi tools.

Over the years, as data and modelling has improved, pathways and scenarios are modified and renamed. PATRIZIA will endeavour to use the most appropriate pathway that is available and may adopt a different pathway in the future.

Most of the PATRIZIA LCCI strategy holdings are contributing positively to the energy transition and will benefit from the increased penetration of renewable energy. For example, the majority of the Fund's electric utility exposure is via regulated grid operators which will grow revenues at a higher rate as grids expand to incorporate a greater diversity of power generation sites. Other sectors such as toll roads require very limited adaptation as electric cars replace internal combustion cars and may also evolve to provide driverless car infrastructure.

A summary of risk assessments and how we apply a 2°C maximum warming pathway to core infrastructure sectors is provided in the table below.

Table 3: Risk Assessment and Application of 2°C Warming Pathway by Sector

INDUSTRY	EXPOSURE	RISK	MAJOR RISKS	APPROACH
Non-renewable Power Generation (IPP's)	0%	Extreme	Stranded asset risk. Physical risks. Regulatory risk. Reputational risk. Legal risk. Financing risk.	<ul style="list-style-type: none"> • Do not invest
Oil & Unconventional Gas Pipelines	0%	Extreme	Stranded asset risk. Regulatory risk. Reputational risk. Physical risks. Financing risk. Legal risk.	<ul style="list-style-type: none"> • Do not invest
Gas Utilities	15%	High	Stranded asset risk. Regulatory risk. Physical risks. Financing risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Apply scenario analysis on a stock by stock basis. • Monitor stock and industry progress and capex on 'green' gases and green hydrogen. • Only invest in stocks with a zero terminal value for conventional gas assets provide sufficient returns under a a max 2°C pathway compliant strategy, using IEA APS gas demand assumptions.
Integrated Utilities	12.5%	Moderate	Stranded asset risk. Regulatory risk. Physical risks.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Only invest in utilities with rate regulated or long term contracted power generation. • Only invest in stocks with a max 2°C pathway compliant strategy: Applying the IEA APS CO2e/KWh pathway on a stock by stock basis.
Airports	10%	Moderate	Physical risks. Regulatory risk. Volume risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3 • Monitor airline industry progress to net-zero emissions flight (SAF's and biofuels, fuel cells, electrification), using max 2 degree warming pathway (IEA APS) assumptions for aviation (as applies the airport operator scope 3 emissions): i.e., fuel intensity reduced by around 3% per year; scale up of biofuels reduces CO₂ emissions by 50% below 2005 levels by 2050. • Assess substitution risks (e.g. high speed rail) on an asset by asset basis.

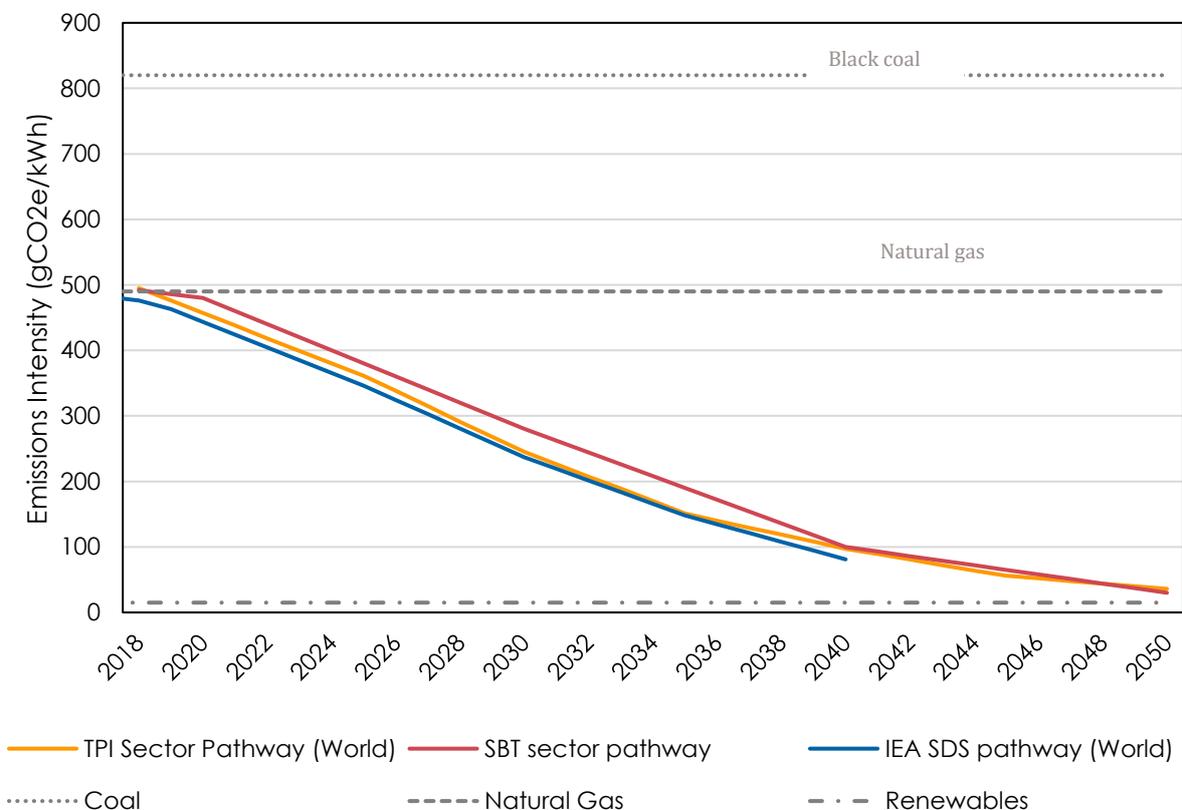
INDUSTRY	EXPOSURE	RISK	MAJOR RISKS	APPROACH
Storage Tank Terminals	0%	High (depending on commodity)	Stranded asset risk. Physical risks. Regulatory risk. Volume risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Assess exposure per commodity under a max 2°C pathway scenario.
Tollroads	2.5%	Low	Physical risk. Volume risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Monitor vehicle industry progress to net-zero emissions, and the long term risks posed by TAAS. • Monitor scope 3 emissions against the IEA APS pathway for road transport: on-road vehicle stock emissions intensity limited to 50 g CO2/km in countries with net zero pledges and around 130 g CO2/km elsewhere by 2040.
Rail (freight)	7.5%	Low	Physical risk. Volume risks Substitution risk	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Undertake additional analysis of shipment volumes of coal, oil, and fracking materials. • Monitor industry progress to zero emissions locomotives (biofuels, electrification etc). • Do not hold if coal or oil haulage contributes more than 10% of revenue. This can rise to 20% if the company has committed to a well below 2°C warming, or ambition for 1.5°C warming Science Based Target.
Regulated Electricity T&D	27.5%	Low	Physical risks. Stranded asset risk Regulatory & political risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Undertake additional analysis on emissions outliers. • Only invest in rate regulated assets
Rail (mass transit)	7.5%	Low	Physical risks.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3.
Water Utilities	7.5%	Low	Physical risks. Supply risk.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3. • Physical risks from storm and flooding are material but mitigated by regulation regimes.
Communications Infrastructure	5.0%	Low	Physical risks.	<ul style="list-style-type: none"> • Measure and assess physical risks and total emissions including scope 3.

While the majority of the strategy is invested in assets that are positively exposed to energy transition or carry a low risk level, there are three sectors which have a moderate or higher risk. Further detail is provided below on the three moderate or high-risk sectors: integrated utilities with power generation capacity, airports, and gas utilities.

3.1 POWER GENERATION

The IEA APS includes a specific pathway for the carbon intensity of power generation, measured as CO₂ equivalent grams per kilowatt hour of power produced (CO₂e/kWh). We have applied this as a threshold for the companies in the portfolio with power generation operations.

Chart 3: Emissions Intensity Reduction Pathways and Median Emissions Intensity of Coal, Gas and Renewables¹



Source: PATRIZIA Infrastructure, International Energy Agency, Science Based Targets Initiative, Transition Pathways Initiative.

Currently 12 stocks held in the portfolio, totalling 32% of portfolio holdings, have some power generation operations. These range from Avangrid, a regulated electricity grid operator which also owns a small renewable energy business, through to integrated electric utilities which do not break out what percentage of earnings is generated from power production versus distribution and retail.

PATRIZIA has calculated the current emission intensity of the electricity generated by each company and modelled its targets and announced capacity closures out to 2040 or 2050. All Low Carbon Core Infrastructure strategy holdings are compliant with the emission intensity thresholds required under a maximum 2°C warming scenario.

¹ The emissions intensity figures for coal, natural gas and renewables is based on the medians published by the IPCC: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_annex-iii.pdf#page=7

It is important to note that the strategy has immaterial exposure to merchant power plants and excludes all independent power producers with fossil fuel power generation. Companies with more than 10% of revenues from unregulated coal fired power generation or coal shipping and handling are also excluded (with the exception of freight rail, where the 10% can rise to 20% if the company has committed to a well below 2°C warming, or ambition for 1.5°C warming Science Based Target).

Table 4 (over page) shows a summary of the stocks with power generating capacity, including emissions intensity and fuel sources.

As with measuring carbon intensity however, this is a simplistic analysis, and does not sufficiently capture the underlying risk. As discussed above, direct emissions from power generation are only one part of the picture.

Other factors in determining a climate change risk profile include:

- regulation and pricing power,
- substitutable technologies, and
- future capex and R&D plans.

For our strategies, as well as being compliant with the emissions intensity pathway, the majority of carbon emissions are generated from regulated utilities. This means the climate change and stranded asset risk is mitigated by the regulatory environment which allows for a fully funded transition from fossil fuel to renewable power generation sources.

Table 4: Power Generation Exposures

Name	Country	% Revenue from power generation activity ²	Carbon intensity of electricity ³ : gCO ₂ /kWh	Power Fuel Mix %				
				Coal	Gas & Oil	Nuclear	Renewables	Other
Avangrid Inc	US	17%	53	0%	12%	0%	88%	0%
E.ON SE	Germany	2% ⁴	64	0%	1%	96%	0%	3%
Endesa SA	Spain	43%	183	3%	28%	46%	24%	0%
National Grid PLC	UK	3%	193	0%	100%	0%	0%	0%
Consolidated Edison	US	12%	252	0%	22%	0%	50%	28%
Avista Corp	US	Not disclosed	252	10%	29%	0%	46%	15%
SSE PLC	UK	19%	255	0%	63%	0%	37%	0%
A2A SpA	Italy	Not disclosed	310	1%	72%	0%	27%	0%
Fortis Inc	Canada	Not disclosed ⁵	350	16%	26%	8%	39%	11%
Portland General	US	Not disclosed	390	12%	38%	0%	25%	25%
Pinnacle West Capital	US	Not disclosed	394	20%	28%	27%	8%	17%
Hera SpA	Italy	0.7%	NA ⁶	0%	34%	0%	66%	0%
2022 hurdle to meet max. 2 degree warming scenario:			401					

Sources: Company reports, ISS ESG, Bloomberg.

² For Avangrid and Consolidated Edison, revenue provided is for the renewables power generation business. They also have power generation within their integrated electric utility operations but do not disclose % of revenue sourced from power generation for these segments.

³ For integrated US and Canadian utilities, carbon intensity is measured for combined own generation and purchased power. Typically, they have long term power purchase agreements with power generators to source power that cannot be met from their own capacity. In most cases, they are able to pass through the cost of power to end customers and earn a regulated return for power transmission and distribution services provided. The regulatory framework allows them to meet their clean energy targets by sourcing power from purchased sources that is less carbon intensive as they transition from fossil fuel to renewable power generation.

⁴ Power generation is not a core business for E.ON. In FY 2020, it earned 2% revenue from power generation assets. Post FY22, EON's power generation exposure will be limited to its equity interest in the Turkish electric utility Enerji Üretim which has power generation assets. E.ON's investment in Enerji Üretim is equity accounted and contributes less than 1% to operating earnings.

⁵ Fortis is principally an energy delivery company, with 93% of its assets related to transmission and distribution networks, with 5% of its assets invested in fossil fuel generation and 2% in renewable power generation.

⁶ Hera's carbon intensity for overall energy production is 453 gCO₂/kWh which includes heat and energy produced for district heating networks and from landfills and WTE plants. Hera has electric power installed capacity of 309 MW, with 79% of it considered to be from renewable sources including 51% contribution from its waste to energy plants. Hera has a SBTi validated emission reduction target to reduce absolute scope 1 and 2 GHG emissions 28% by 2030 from a 2019 base year and reduce scope 3 GHG emissions for all sold electricity 50% per MWh. The company has committed to increase annual sourcing of renewable electricity from 83% in 2019 to 100% by 2023.

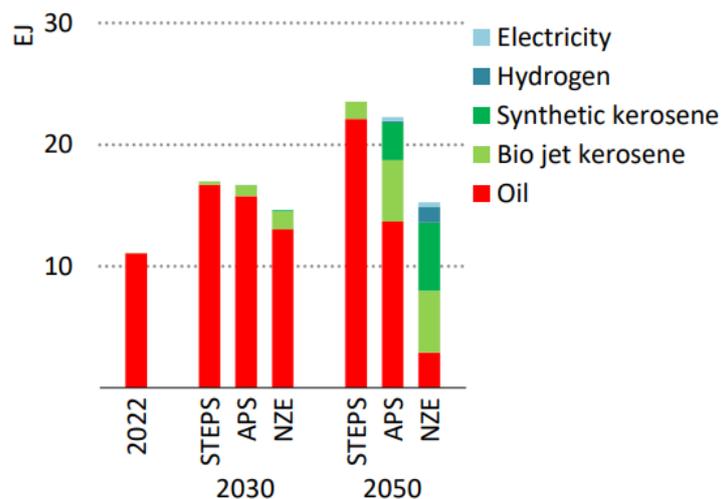
3.2 AIRPORTS

The PATRIZIA LCCI strategy holds three airport infrastructure stocks (Paris Airport, Zurich Airport and Aena, a Spanish airport operator). Together these stocks total around 8% of the Fund.

The airport holdings in the Fund have all made material progress on reducing emissions from their own operations and implementing programs in other areas such as waste reduction and the circular economy. For example, Paris Airport has reduced CO₂ emissions from its facilities by 71% per passenger since 2009 and has the target of carbon neutrality by 2030. Airports are reducing overall energy consumption through building energy efficiency programs (such as LED lighting), use of renewable energy sources (such as on-site solar panels) and electrification of ground transport fleet.

But no matter how ‘green’ the airport facilities are themselves; in the absence of carbon sequestration, long term sustainability of airports requires net zero emission flight. Although the pathway to zero emission flight is currently less clear than for other sectors, PATRIZIA considers that airports can survive and continue to provide reasonable investment returns in under a maximum 2°C warming pathway, and indeed 1.5°C pathways.

In a scenario that envisages net zero emissions by 2050, aviation industries face a significant task to reach zero-emission flight. Aviation contributes between 2%-3% of global CO₂e emissions (IPCC 2023) and is considered a ‘hard to abate’ sector. Under a well-below 2°C warming scenario, the current technical difficulties are recognised, and the pathway for aviation has a shallower reduction path out to 2040 compared to the electricity sector, then subsequent steeper declines as technological advances and cost reductions driven by scale are assumed.



Source: IEA

Gains in fuel efficiency will continue to be important from now until 2050, and are made from using newer more efficient planes, more efficient taxiing and routing. These efficiency gains are assumed to drive about 2% per annum reductions in fuel intensity under the NZE scenario. But the scale up of biofuels and synthetic fuels (or sustainable aviation fuels, SAFs) is then the largest driver of decreasing emissions, with these projected to make up about 40% and 70% of total fuel use in 2050 in the APS and NZE respectively. This will be a substantial task given that SAFs made up 1% of aviation fuel use in 2019⁷. The NZE scenario also envisions electric or fuel cell flight becoming commercially viable closer to 2050.

The Science Based Targets Initiative (SBTi) implements a 1.5°C pathway similar to the NZE, in fact a bit more ambitious, developed by the International Council on Clean Transportation (ICCT). According to the SBTi, a tighter 1.5°C warming scenario requires the aviation sector to reduce average carbon intensity by ~35-40% between 2019-2035, or ~65% from 2019-2050. These scenarios also allow for projected industry growth.

In addition to the massive scale up of SAFs required under these pathways, we also continue to monitor the advancements being made by industry participants in the development of zero emission flight through green hydrogen

⁷ <https://www.nature.com/articles/s41893-022-01046-9>

or electrification. For example, Boeing has announced it plans to sell aircraft capable of running on 100% sustainable biofuels by 2030. In 2020 Airbus released plans for three hydrogen powered aircraft models with a target for commercial production of at least one of these by 2035. The EU and US administrations will be providing significant funding and tax credit support to grow sustainable fuels production. According to [the International Air Transport Association \(IATA\)](#), each new generation of aircraft has averaged fuel efficiency improvements of 15% to 20%. [McKinsey estimates](#) that aircraft manufacturers have reduced the fuel consumption per passenger-kilometre by approximately 39% between 2005 and 2019, a compound annual growth rate of about 3.4% per year. Aircraft manufactured and sold in 2022 are expected to be in service until 2040.

While there are recent positive developments, the widespread use of zero emission fuels is still likely to be at least two decades away. In the interim, further emissions reductions of up to 50% can be made through aircraft and engine improvements and improved air traffic management. In this transitional period, there is also a role for offsetting. The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), adopted by the 190+ Member States of the International Civil Aviation Organization (ICAO), caps the net CO₂ emissions of international flights at the average of their 2019 emissions. Airlines must offset any emissions above this level using ICAO-eligible sustainable alternative fuels (SAF) or ICAO-approved carbon credits. Additionally, all flights within the EU are subject to the EU Emission Trading System (ETS), meaning airlines are required to provide evidence of emission certificates corresponding to their CO₂ emissions.

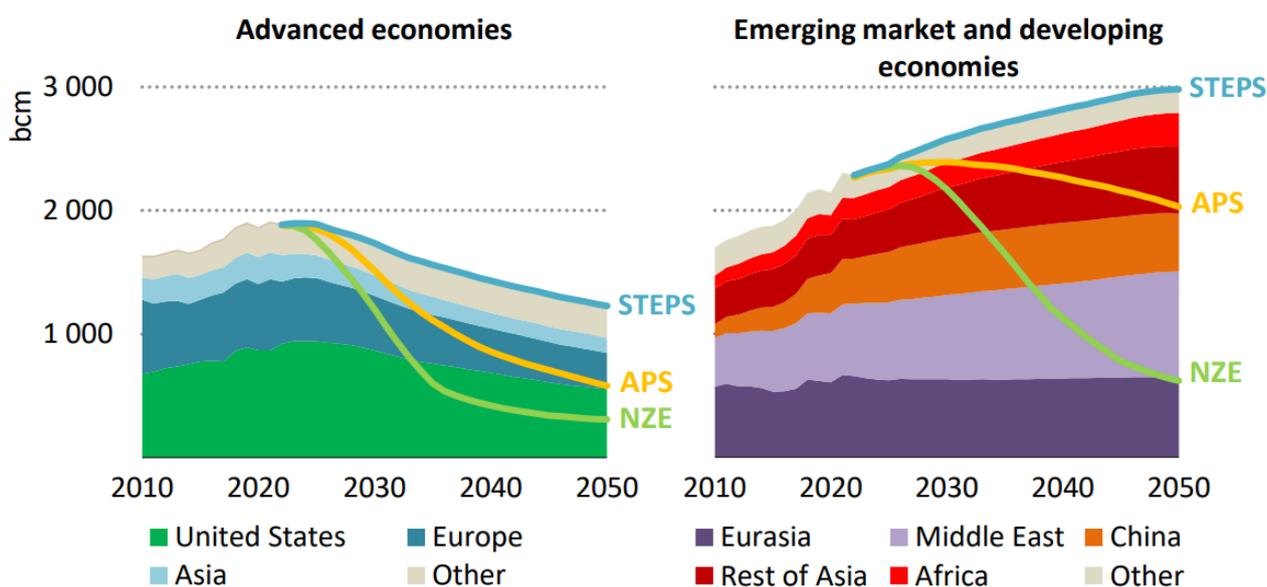
3.3 NATURAL GAS UTILITIES

The strategy currently has two holdings in natural gas transmission and distribution assets, totalling 5% of the portfolio.

By 2050 today’s conventional natural gas assets will no longer be sufficiently utilised to hold any significant value, and these assets are at high risk of becoming stranded well before 2050 as usage declines, and debt servicing and insurance costs become problematic. Under the IEA Announced Pledges Scenario, demand for natural gas rises in Asia from now to 2030, but slightly declines in other regions, before declining more steeply to 2040.

The gas demand forecast under the three IEA scenarios is shown below: the Stated Policies (STEPS) scenario (a ‘business as usual’ scenario based on actions already taken), the well-below 2 degree APS scenario, and the NZE scenario (a 1.5°C warming by 2100 with 67% probability scenario), measured in billion cubic metres (bcm).

Figure 1: Natural Gas Demand Forecasts Under IEA Scenarios



IEA. CC BY 4.0.

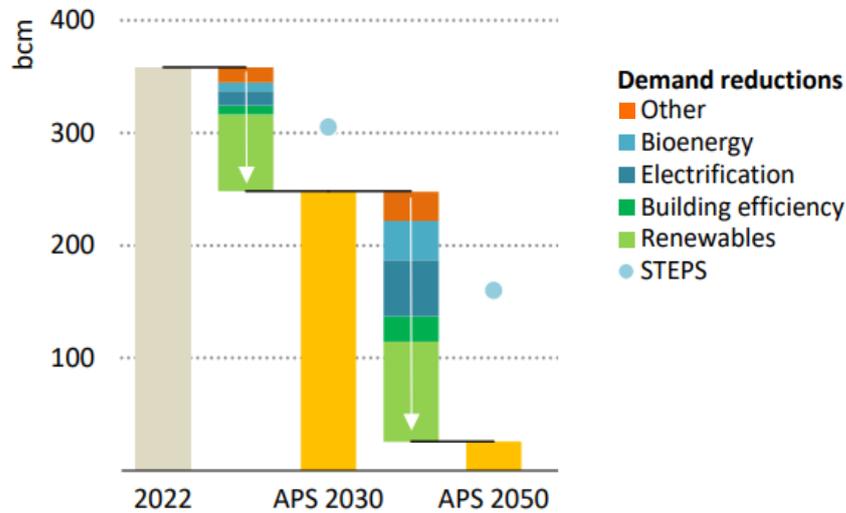
Source: IEA World Energy Outlook 2023

In the APS well-below 2°C scenario, natural gas usage declines by 42% from at a global level between 2022 and 2050. In the tighter NZE scenario, by 2050 natural gas demand drops by 77%. The difference between the APS and NZE gas demand assumptions is that in the NZE there is greater assumed green hydrogen use and lower gas demand for peaking power generation. According to the IEA, in the NZE Scenario, demand falls by more than 2% per year from 2022 to 2030, and by 8% per year between 2030 and 2040. Decline rates are moderated after 2040 by the growing use of natural gas with CCUS for the production of low-emissions hydrogen.

The 2023 IEA APS is equivalent to the “well below 2°C” pathway recommended by the Science Based Targets Initiative for natural gas related assets. The IEA NZE meets the SBTi’s “1.5 degrees” pathway.

Most of the reduction in demand comes from developed countries, with demand in North America and Europe slightly lower from now to 2030, with a steeper decline through to 2040. PATRIZIA has modelled this assumption for gas infrastructure investment.

Figure 2: Natural Gas Demand Reduction by Scenario in the European Union



Source: IEA World Energy Outlook 2023

Where we deviate slightly from the IEA’s APS scenario is to assume 0% utilisation by 2050. While gas may still be being used for industrial purposes (some with CCUS, which is still a very uncertain assumption), this usage is unlikely to support the continued financing of the current large-scale transmission and distribution networks, therefore a 2050 terminal value of zero is an appropriate base case. Our modelling and scenario analysis indicates that the assets held in the strategy are currently able to generate sufficient cash flows under the base case scenario to adequately compensate investors.

A mitigant to stranded asset risk is the potential for regulated gas utilities to be part of the build out of green hydrogen infrastructure. According to the IEA: “Some operators, notably in the case of pipelines, can take comfort from projected spending of USD 100 billion each year on hydrogen transport infrastructure in the NZE Scenario by 2050: this could provide a route for them to diversify into low-emissions gases”.

While our base case is that gas demand for residential and commercial buildings is replaced by electrification in most regions, there is potential for green hydrogen use in industry and hard-to-abate sectors. The large gas utilities are the natural operators of the infrastructure required. In Europe, regulatory frameworks for green hydrogen infrastructure are already being drafted, with the existing transmission system operators the natural operators of the proposed European ‘hydrogen backbone’.

Additionally, much of the gas T&D infrastructure across developed markets is aging and mostly depreciated, and gas utilities are spending significant amounts each year on asset renewal, asset replacement and upgrades. This capital expenditure will increasingly be made on a ‘hydrogen ready’ basis. This means that a meaningful portion of the existing asset base will potentially be hydrogen-ready by 2040, and therefore potentially able to avoid being stranded. While it is still early days, it is an area we are watching closely. In the meantime, the allocation to natural gas utilities is highly selective, and effectively capped at current levels.

The two current portfolio holdings are Italian; Snam and Italgas. It is not a coincidence the limited gas exposure in the portfolio is European. Based on the goals defined by the European Union, included in the Green Deal, REPowerEU and other recent plans, the attention of gas system operators has increasingly focused on renewable gases: biomethane and hydrogen will play a key role in the energy transition. Snam has a target for carbon neutrality by 2040; having adopted a 1.5-degree science-based pathway for emissions reduction and is actively investing in bio-methane and green hydrogen development. Italgas has adopted similar goals, including a 2028 target for 100% of the network to be ready to accommodate at least partial injection of hydrogen.

4. STEWARDSHIP

4.1 PROXY VOTING

Proxy voting is a key element of company engagement and PATRIZIA's approach to being a responsible asset manager. Where we are delegated to do so, all proxies are actively voted.

In deciding how to vote on behalf of clients, we use our own research, and also subscribe to the ISS Social Responsible Investment (SRI) guidelines, which includes research and recommendations. The ISS SRI policy directly incorporates ESG factors into voting recommendations compared to the standard ISS guidelines.

As part of our proxy voting policy, PATRIZIA will support all resolutions which are aimed at appropriately increasing transparency and improving management of environmental, social and governance issues. There are two main areas where global warming is starting to be incorporated into votable items at company AGM's. These are in executive remuneration and incentive plans, some of which are starting to incorporate climate and carbon emission related KPI's in incentive schemes for Chief Executives, and in companies putting up their climate change mitigation and adaptation plans for non-binding ratification.

4.2 ENGAGEMENT

PATRIZIA Infrastructure engages with investee companies on a range of issues, including environmental, social and governance issues. Given the materiality of the risks, both positive and negative, much of our engagement focuses on energy transition and climate risk. Reporting on our engagement activities is available in the annual [Sustainability Report](#).

In addition to our direct engagement with investee companies, in 2019 PATRIZIA Infrastructure joined the collaborative engagement platform of the UN backed Principles of Responsible Investment (PRI), and in 2020 joined the ISS pooled engagement service. By collaborating with other investors, the interests of Whitehelm Low Carbon Core Infrastructure Fund investors can be given greater weight, by communicating with investee companies alongside greater collective assets under management.

5. TCFD, SFDR AND REPORTING

PATRIZIA Infrastructure is an official supporter of the Taskforce on Climate Related Financial Disclosures (TCFD), and all parts of our business implement the disclosure guidelines. As a TCFD supporter, PATRIZIA commits to taking action to build a more resilient financial system through climate-related disclosure.

Full disclosures in line with TCFD guidelines are available in the annual Sustainability Report.

The PATRIZIA Low Carbon Core Infrastructure Fund is an Article 8 fund under the EU SFDR classification, and we endeavour to provide full reporting in line with SFDR requirements for the Fund.

5.1 EU TAXONOMY ALIGNMENT

As of 30 September 2023, we estimate that 35% of the strategy is aligned with the EU Taxonomy for sustainable investments, based on revenues. We have applied a target minimum alignment of 25%.

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