HOW RESILIENT ARE MUTUAL FUNDS TO THE LOW CARBON TRANSITION

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EXECUTIVE SUMMARY

A confluence of regulatory and non-regulatory factors is driving the adoption of renewable energy and other clean energy technologies globally, while headwinds facing fossil fuels continue to mount[1]. Measuring how one's investments are positioned relative to this transition towards a low carbon economy can help the end investor understand what long-term bets – intended and otherwise – are embedded in their portfolios. This in turn may help investors adopt more resilient investment and risk management strategies in the face of long-term shifts in the global energy mix.

While most analysis to date has been at the company level, we turn our attention to funds to understand how different investment strategies are positioned against the low carbon transition.

In this paper, we introduce our **Low Carbon Transition Matrix** to help investors evaluate where their investments are positioned against four categories: 1) Asset Stranding, 2) Value Migration, 3) Transition Resilient, and 4) Potential Upside. We classify 5,737 US domiciled equity mutual funds into these categories. The results are provided in the below table.

MSCI Low Carbon Transition Category	Number of Fund Families	% of Fund Families	Total Net Asset Value (billion USD)	% of total Net Asset Value
Asset Stranding	1,289	22.5%	2,689	23.8%
Value Migration	746	13.0%	1,395	12.3%
Transition Resilient	1,703	29.7%	3,190	28.2%
Potential Upside	1,999	34.8%	4,047	35.7%

KEY TAKEAWAYS

- Close to 1,300 fund families with approximately 2.7 trillion USD in Net Asset Value were exposed to Asset Stranding risk, representing about 24% of the total Net Asset Value of the US domiciled equity funds based on Lipper classification. These funds were dwarfed by the 3,702 fund families with approximately 7.2 trillion USD in Net Asset Value that either have Potential Upside or are Transition Resilient.

[1] See: Regulatory Easing: Potential Impact on Energy Sector

- Although sector funds in Energy and Materials are, unsurprisingly, classified in the Asset Stranding category, we find considerable variation of exposure within each peer group.
- Top ranked Utilities Sector funds include Fidelity Telecom & Utilities Fund, Wells Fargo Utilities & High Income Fund, and Putnam VT Global Utilities Fund.
- Japanese equity funds had the highest exposure to companies providing low carbon solutions.

LOW CARBON TRANSITION

Convergence of regulatory and non-regulatory factors is exerting headwinds on carbon intensive funds…

Historically, global and regional regulations have been the key drivers behind efforts to reduce carbon emissions and combat climate change. However, as the cost of renewable energy and other clean technologies fall, and as major energy importers seek greater energy independence, technological, market and strategic factors may be taking the driver's seat in altering the global energy mix.[2] Even without regulations to address climate change, the convergence of these non-regulatory factors could exert headwinds on carbon-intensive companies - which may in turn adversely affect their performance and of mutual funds & exchange traded funds (ETFs) with exposure to such companies.

In this paper, we propose a simple framework to compare the resilience of mutual funds and ETFs (jointly referred as 'Funds' in this paper) to the low carbon transition based on their exposure to low carbon transition risks and opportunities. We also discuss how climate-aligned investment strategies may differ depending on a fund's low carbon transition category.

ASSESSMENT FRAMEWORK

Funds can be grouped into four categories based on their exposure to risks and opportunities posed by the low carbon transition…

We used MSCI ESG Research's proprietary data sets, **Carbon Metrics** and **Environmental Impact Metrics**, to assess funds' exposure to low carbon transition risks and opportunities. In order to assess low carbon transition risk at the fund level, we computed the following metrics:

1. **Fund Weighted Average Carbon Intensity:** This metric indicates a fund's exposure to carbon intensive companies. It is computed as the sum of constituent companies' weights multiplied by the constituents' Carbon Intensity (tons CO2e relative to sales).

[2] See: Regulatory Easing: Potential Impact on the Energy Sector

2. **Fund Fossil Fuel Revenue Exposure:** This metric measures a fund's exposure to fossil fuel companies and related businesses e.g. thermal coal mining, thermal coal based power generation, oil and gas extraction and production, in addition to other upstream and downstream businesses such as equipment and services, transportation, refining, etc.

Similarly, to assess low carbon transition opportunities at the fund level, we computed the following metric:

1. **Fund Revenue Exposure to Low Carbon Solutions:** This metric measures a fund's exposure to companies deriving revenue from low carbon solutions such as renewable energy, energy efficient equipment, and green buildings.

Using the above metrics, we computed the **Low Carbon Transition risk score, Low Carbon Transition opportunity score,** and overall **Low Carbon Transition performance score** for more than 5,700 equity fund families domiciled in the U.S.[3] The overall Low Carbon Transition performance score was computed by combining the Low Carbon Transition risk score and Low Carbon Transition opportunity score.

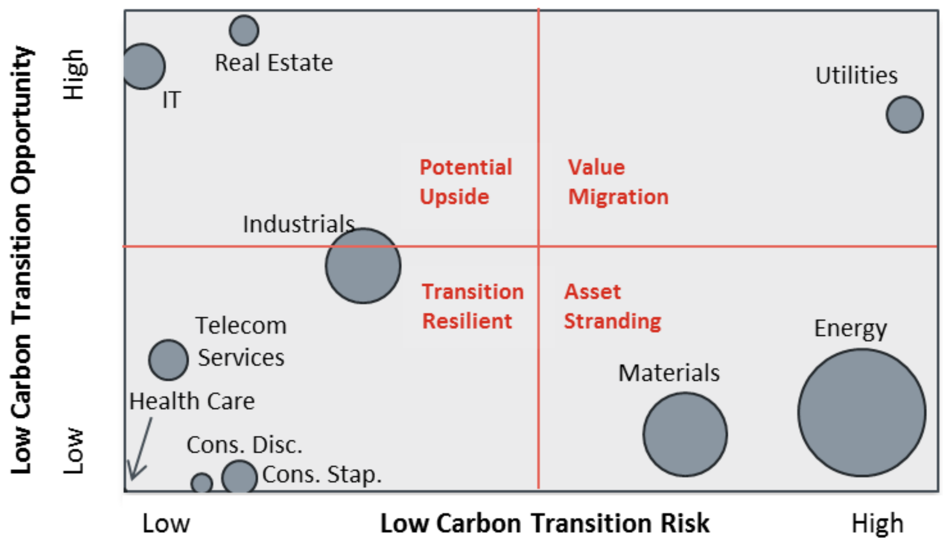
Funds were classified into four categories based on the Low Carbon Transition risk score and Low Carbon Transition opportunity score:

Low Carbon Transition category	Low Carbon Transition Risk score	Low Carbon Transition Opportunity score
Asset Stranding	High	Low
Value Migration	High	High
Potential Upside	Low	High
Transition Resilient	Low	Low

In Exhibit 1, we plot the average low carbon transition risk score and average low carbon transition opportunity score for sectoral funds (based on Lipper classification).

[3] Based on Lipper classification for mutual funds & exchange traded funds

Exhibit 1: Average Low Carbon Transition Risk and Low Carbon Transition Opportunity Score for Sectoral Equity Funds domiciled in the US (as of September 6th, 2017)



Bubble size denotes standard deviation of Low Carbon Transition performance score of funds classified under a specific sectoral fund class (based on Lipper classification).

Abbreviations: Cons. Disc. = Consumer Discretionary; Cons. Stap. = Consumer Staples; IT = Information Technology

ASSET STRANDING

Investment strategies with high exposure to carbon intensive assets may stand to lose from the low carbon transition…

This category is represented by funds exposed to high transition risk – based on carbon intensive assets or high revenue exposure to fossil fuel related activities – but low opportunities associated with low carbon technologies. Efforts to reduce global greenhouse gas (GHG) emissions may reduce the demand for fossil fuels thus negatively affecting companies in the Energy and Materials sectors.

In the recent past, fossil fuel companies have underperformed the broader market as demonstrated by the outperformance of MSCI ACWI ex Fossil Fuels Index compared to its parent MSCI ACWI Index by an average of 95 bps per year since

November 30, 2010 and by 115 bps per year over the last five years (as of August 31st, 2017).

Exhibit 2: MSCI ACWI ex Fossil Fuels Index

Index Performance—Net Returns (%) *(August 31, 2017)*

					Annualized			
	1 Mo	3 Mo	1 Yr	YTD	3Y	5Y	10Y	Since Nov 30, 2010
MSCI ACWI ex Fossil Fuels	0.45	3.71	17.68	16.28	6.91	11.61	na	9.94
MSCI ACWI	0.38	3.66	17.11	15.03	5.58	10.46	na	8.99

VALUE MIGRATION

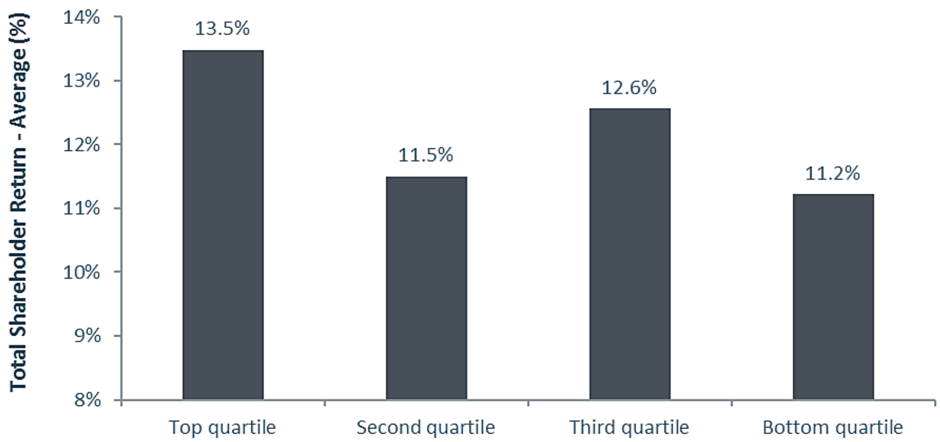
Companies with strong carbon risk management have outperformed companies with weaker carbon risk management…

The 'Value Migration' category is represented by funds exposed to both high risk and high opportunity in the low-carbon transition. Exhibit 1 indicates that this category is dominated by funds with high exposure to the Utilities sector. Propelled by regulatory and non-regulatory factors alike, electricity generation may become less carbon-intensive, as technology change drives value migration from fossil fuel based power generation to renewable energy based power generation.

In this category, companies with stronger carbon risk management programs – as demonstrated by their emission reduction performance, reduction targets, and focus on renewable energy and clean technologies – may demonstrate more resilience to the low carbon transition than companies with weaker carbon risk management efforts.

Our analysis (Exhibit 3) of US domiciled electric utilities in the MSCI ACWI Index indicated that companies with top quartile carbon risk management outperformed the laggards (bottom quartile) by more than 2.3% in terms of annual Total Shareholder Returns over the last five years.

Exhibit 3: Total Shareholder Returns vs. Carbon Risk Management (as of September 6th, 2017)



Horizontal Axis: A set of US domiciled Electric Utilities companies in MSCI ACWI Index categorized in different quartiles based on their Carbon Risk Management score (as of September 2017).
Vertical Axis: This axis shows average value of Total Shareholder Returns (annulized total return over the past five years - from Sept. 6, 2012 to Sept. 5, 2017) for the respective quartile. Total Shareholder Return **(TSR)** is the total return of a stock to an investor that includes both capital gain and dividends.
Data Source: MSCI ESG Research, Thomson Reuters

TRANSITION RESILIENT

Funds with relatively lower exposure to low carbon transition risk may still be exposed to other dimensions of climate change risk…

This category of funds is represented by sectors which are not carbon intensive and do not have direct exposure to carbon intensive sectors. Exhibit 1 indicates that this category is dominated by Health Care, Telecommunications, Consumer Staples, Consumer Discretionary and Industrials. Though, it should be noted that:

1. Some sub-sectors within the Consumer Discretionary and Industrials such as automobile manufacturers, auto-component manufacturers, and thermal power plant equipment manufacturing may be affected by the low carbon transition and could be classified in other categories on standalone basis.

2. We are considering only direct exposure to carbon-intensive sectors in our current analysis. There could be some companies in this category that have

carbon-intensive supply chains (e.g. Consumer Staples sector) and thus may be affected indirectly by the low carbon transition.

3. We are looking at only low-carbon transition risk in this paper. Funds in this category and other categories could be exposed to physical risk – another dimension of climate change.

POTENTIAL UPSIDE

Investment strategies with exposure to companies providing low carbon solutions may stand to benefit from the low carbon transition …

While carbon-intensive assets may face increased risk of stranding during the low carbon transition, adoption of zero-carbon or low-carbon technologies is likely to gather pace. In order to achieve the goal of a de-carbonized economy, substantial investment will be required in technologies such as renewable energy, electric vehicles, and energy efficient equipment. This category of funds is dominated by the Information Technology and Industrials sectors (Exhibit 1).

The MSCI Global Climate Index that includes companies providing low carbon solutions outperformed its parent, the MSCI World IMI, by close to 2% in terms of annualized net return over the last five years (Exhibit 4). Though, it underperformed its parent by 188 bps in terms of annual return since August 31, 2010.

Exhibit 4: MSCI Global Climate Index

Index Performance—Net Returns (%) *(August 31, 2017)*

					Annualized			
	1 Mo	3 Mo	1 Yr	YTD	3Y	5Y	10Y	Since Aug 31, 2010
MSCI Global Climate	0.15	4.50	22.66	21.49	6.22	13.31	na	9.46
MSCI World IMI	0.11	3.05	16.29	13.29	6.05	11.31	na	11.34

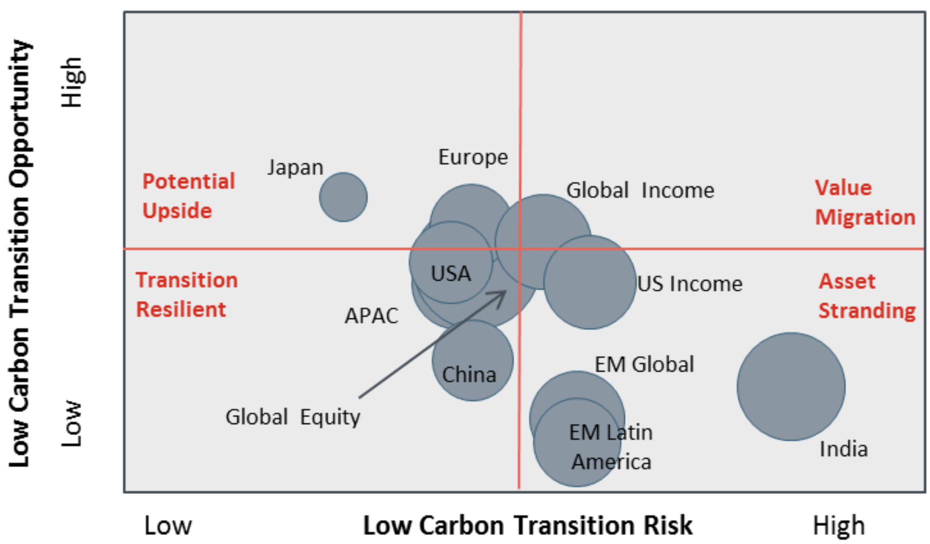
LOW CARBON TRANSITION CLASSIFICATION OF DIVERSIFIED FUNDS

Exhibit 5 plots the average low carbon transition risk score and low carbon transition opportunity score for diversified fund peer groups. Funds' sectoral or regional bias may expose them to risks and opportunities presented by the low carbon transition.

For example, emerging market funds may have more exposure to asset stranding risk due to the high presence of Energy and Materials sector companies in these markets, whereas US, European, and Japanese equity funds may have higher exposure to companies providing low carbon solutions.

Some income funds could be at high risk of asset stranding and value migration mainly due to their higher exposure to the Utilities sector. However, we observed differing levels of exposure among U.S. Income funds, with some funds more aligned with the low carbon transition than others (Exhibit 3).

Exhibit 5: Classifying Diversified Equity Funds into the Low Carbon Transition Matrix (US domiciled equity funds, as of September 6th, 2017)

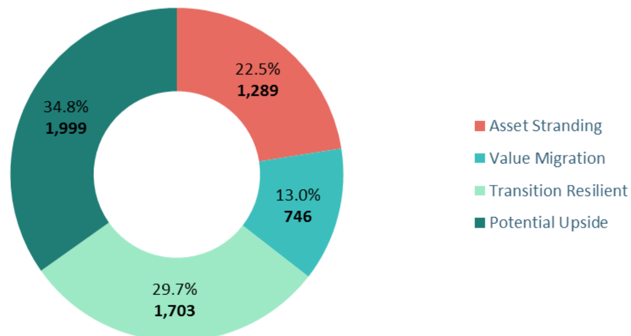


Bubble size denotes standard deviation of Low Carbon Transition performance score of funds classified under a given fund category (based on Lipper classification).

We categorized 5,737 equity fund families domiciled in the U.S. based on their low carbon transition risk score and low carbon transition opportunity score. The results are provided in Exhibit 6 and 7.

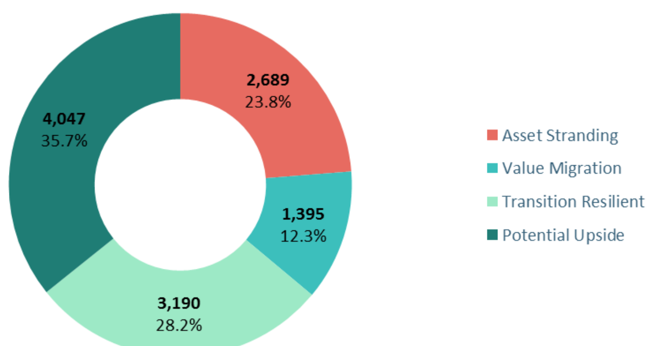
It can be observed that close to 1,300 fund families with approximately 2.7 trillion USD in Net Asset Value were exposed to Asset Stranding risk, representing about 24% of the total Net Asset Value of the US domiciled equity funds based on Lipper classification. These funds were dwarfed by the 3,702 fund families with approximately 7.2 trillion USD in Net Asset Value that either have Potential Upside or are Transition Resilient.

Exhibit 6: Positioning of US domiciled Equity Fund Families against Low Carbon Transition (by number of fund families, as of September 6th, 2017)



Note: (1) Total number of US domiciled equity fund families: 5,737 (as *of July 2017).* (2) Percentage values on chart denote % of total number of fund families classified under a given low carbon transition category. (3) Values in **bold** font on chart show number of fund families classified under a given low carbon transition category.

Exhibit 7: Positioning of US domiciled Equity Fund Families against Low Carbon Transition (by Total Net Asset Values of fund families, as of September 6th, 2017)



Note: (1) Total Net Asset Value of 5,737 US domiciled equity fund families: 11.3 trillion USD (a*s of July 2017).* (2) Values in **bold** font on chart show Total Net Asset Value of US domiciled equity fund families classified under a given low carbon transition category. (3) Percentage values on chart denote % of Total Net Asset Value of US domiciled equity fund families classified under a given low carbon transition category.

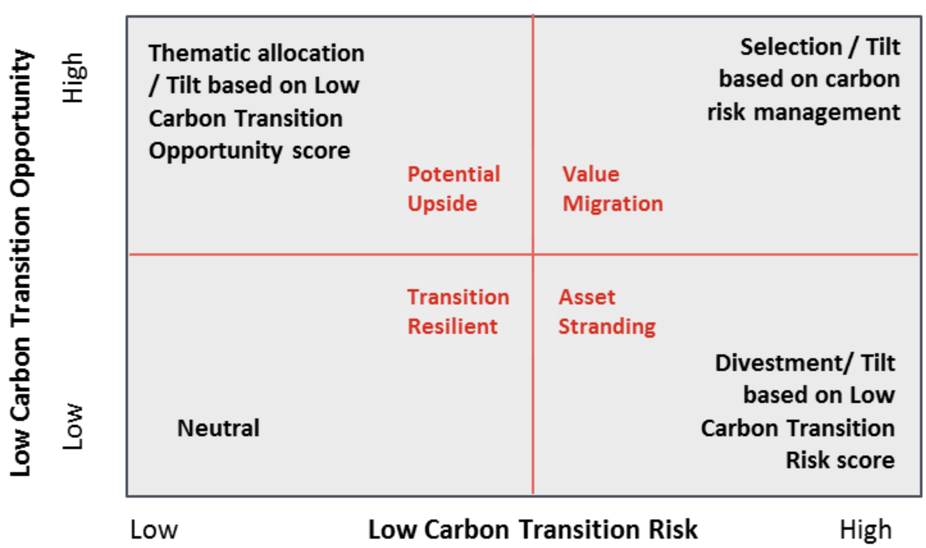
RELEVANT INTEGRATION STRATEGIES FOR EACH FUND CATEGORY

Our fund classification into a Low Carbon Transition Matrix could be used by:

- Fund managers to inform their climate risk integration strategies;
- Fund allocators, when screening or selecting more climate-aligned funds;
- End investors, to understand the intended and unintended bets embedded in their portfolios.

For example, funds in the value migration category could employ integration strategies that involve selecting companies based on their carbon risk management efforts. While funds in asset stranding category may be a viable investment option in the short-term, they may become increasingly untenable in the low carbon transition. These funds could adopt investment strategies that involve divesting from or tilting the weight of the companies based on their extent of involvement in carbon-intensive assets.

Exhibit 8: Integration Strategy for Each Fund Category



FUNDS THAT STAND THE MOST TO GAIN IN LOW-CARBON TRANSITION

The average Low Carbon Transition performance of sector funds may not be surprising, but we also observed considerable variation of exposures within each peer group based on the funds' investment strategies and security selection.

As an illustration, Exhibit 9, 10, and 11 lists the U.S. domiciled top five Energy sector, Utilities sector and US Income equity funds respectively that - based on our rankings - stand the most to gain in a low-carbon transition scenario.

Exhibit 9: Top Ranked Energy Sector Funds

Top 5 funds	Low Carbon Transition performance score
First Trust NASDAQ Clean Edge Green Energy Index Fund	9.09
Guggenheim Invest Solar ETF	9.02
PowerShares WilderHill Clean Energy Portfolio	8.64
VanEck Vectors Global Alternative Energy ETF	8.19
Firsthand Alternative Energy Fund	8.08

Exhibit 10: Top Ranked Utilities Sector Funds

Top 5 funds	Low Carbon Transition performance score
Fidelity Telecom & Utilities Fund	3.16
Wells Fargo Utilities & High Income Fund	2.72
Putnam VT Global Utilities Fund	2.67
Putnam Global Utilities Fund	2.67
ICON Utilities Fund	2.50

Exhibit 11: Top Ranked US Income Funds

Top 5 funds	Low Carbon Transition performance score
Geneva Advisors Equity Income Fund	8.72
Catalyst/Groesbeck Growth of Income Fund	8.34
Guggenheim RBP Dividend Fund	8.11
Fidelity Core Dividend ETF	7.95
Westfield Capital Dividend Growth Fund	7.81

Note: The rankings are based on funds' Low Carbon Transition performance score (0: worst in class; 10: best in class). Peer sets defined based on Lipper classification.

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