Climate Change Risk
A Stress-Testing of The Global Capital Markets

FutureZero

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CLOSE GROUP CONSULTING

FutureZero & CGC U.S. Securities and Exchange Commission

Response for Climate Change Disclosures

August 2021

August 7th, 2021

Ms. Vanessa A. Countryman
Secretary
U.S. Securities and Exchange Commission
100 F Street, NE
Washington, D.C. 20549-1090

Submitted online via https://www.sec.gov/cgi-bin/ruling-comments

Re: Request for Input on Climate Change Disclosures

Dear Ms. Countryman

FutureZero Inc. ("FZ") and Close Group Consulting Inc. ("CGC") respectfully submit the following response to the Request for Input ("RFI") on Sustainability and Climate Change Disclosures. We commend the Securities and Exchange Commission ("SEC") for taking this step. It is an exciting and critical time requiring transformational leadership in both investee companies and in the investment industry due to the challenges of reshaping the North American and Global economy to Zero / Net Zero GHG emissions. We encourage the SEC to mandate through its rule-making authority climate-related Net Zero Business Model strategy, design and transition plan disclosures for corporate issuers in order to bring both transparency to the capital markets as well as to help investors better identify and manage "mission critical" ESG and climate-related risks and opportunities that are "material" to company performance and long-term valuations.

The attached brings insights from over 50 years of combined advisory experience in both organization design, strategic leadership assessment and incentive design practice for some of the largest companies globally as well as investment, risk and ESG (Environmental, Social, Governance) integration and advisory work for global asset owners and asset managers.

The discussions we have held in the last 3 months with a number of Board Directors from leading global companies that are U.S listed corporations, clarifies that disclosure rules for ESG, sustainability and climate metrics that are clear, consistent, and aligned with both performance metrics and climate science for a Zero or Net Zero emission global economy and a positive return on capital, are urgently needed, otherwise the majority of Boards will continue to approve enterprise performance metrics and incentive designs for named officers of U.S listed companies that will continue to be shorter-term focused (3 years and less), 90% financial focused, and hence continue to lock-in potentially high carbon business models.

Our views are also informed by our recent analytical research performed on over 11,000 global companies and 1500 of the largest issuers in North America from a carbon price shock stress test. The details and conclusions of this analytical research are provided in Part 3 of this response paper.

Below are **six key findings and insights from our Net Zero Business Model risk analytics** which highlight the significant impacts from a carbon shock[1] and the fact that a large portion of North American companies (across many sectors) will require not just a business model transition, but a complete business model transformation to achieve Net Zero business model outcomes and ideally returns on capital that exceed or approximately equal the long-term cost of capital by no later than 2040 - 2050.

1. With the exception of the Energy sector, the global and North American capital markets appear to be mis-pricing a future rise in the price on carbon, possible carbon shock and COP26. Details on this by industry sector are included in the attached.

2. BEFORE a carbon shock, a significant portion of Energy (57%), Utilities (30%) and Materials (23%) companies had “failing business models” with a 3 yr. negative Economic Profit, a Return on Capital less than the Cost of Capital, and a very low / negative Future Value of the company, even though the majority of these Utility and Materials companies have had a positive 5-year Total Shareholder Return (TSR).

3. Within the same sector there can be a broad range of Business Model carbon intensity. For example, in North American Investor Owned Utilities, Hydro One produces 69 Tons of CO2e / $ 1 million revenues, whereas NRG produces over 5,000 tons CO2e / $ 1 million revenues

[1]If the results show these significant and alarming impacts on a firm’s business model using only one factor of climate risk (in this case, scope 1 & 2 carbon emissions), one can only imagine the exponential impacts when also including other climate change impacts. These include scope 3 emissions, the physical risks of climate change (acute and chronic) to a company’s operations and supply chain, other transition risks such as policy changes and new technologies, as well as further material ESG issues such water use, biodiversity, and social issues such as impacts on workers and communities.

4. After adjusting and stress-testing for a rising cost of carbon, a large portion of Energy (67%), Utilities (50%), and Materials (39%) companies have a "failing business model" as measured by their Carbon-Adjusted Return on Capital (CAROC), Carbon-Adjusted Performance Spread (CAPS) and Future Value (FV). Details about key strategic insights from these findings are attached.

5. For all North American companies in our sample, 28% have a Net Zero Transition Cash Risk Ratio (TCRR) of less than 1, which means they do not generate enough internal cashflows to fund the net zero business model transition internally. Of these, approximately 92% of Utilities, 67% of Energy, 11% of Materials companies will have to raise external financing.

6. Every sector of the economy has higher carbon business models that will require complete business model transformation, not just transition, and in North America alone this includes over 500 listed companies, most of which are headquartered in North America but with global operations. These 500 companies represent over $10 trillion of Enterprise Value (EV) in the North American capital markets.

One of the overarching conclusions of our Net Zero and Carbon Shock strategic analytics was that **the biggest risks to getting to a Net Zero economy are the gaps in organizational design, incentive design and strategic and transformational leadership capacity and related risks[2].**

Our views on mandatory climate-related disclosures, as a subset of ESG issues, can be summarized as follows:

- **Two major challenges faced by companies and Boards include**:
    - The proliferation of various sustainability frameworks and standards which confuses company Boards, institutional investors and creates undue reporting costs and burden on listed companies.
    - The "quarterly earnings reporting treadmill" which does not allow the time and strategic perspective required for either named executive officers and or the Board to focus on true long-term business strategy, including Net Zero business model assessment and re-design, long-term R&D and strategic capital allocation to create long term value.
- **Current reporting and disclosure frameworks are not sufficient**: For companies and investors, the lack of clear strategy and organizational alignment increases the possible risk of a carbon shock and material disruptions in both the real economy (as recently experienced by the COVID 2020 year) and in the capital markets. Firms need to understand their total exposure to climate change impacts and risks, and their impact on climate change, to be able to make the needed strategic business model design change decisions and aligned strategic capital allocation decisions. It is not enough to simply report and disclose

[2] Organizational structure and leadership capacity is a systemic risk for all companies facing a business model transformation. Senior leaders capable of transforming business models, are less than 5 % of the world's adult population.

metrics and targets to an industry framework, firms need to have detailed transition plans in place, including investment plans, transitional pathways for business model transition or transformation, as well as guiding key metrics and incentive designs to get to Net Zero or better[3].

- **Industry initiatives provide an essential first step but need to go further**: There are a significant number of industry initiatives with major investors as signatories, and they have succeeded in increasing awareness of various sustainability issues including the need for rapid and extensive climate action[4]. However, while successful from a diplomatic standpoint, concrete actions are less evident. Although these initiatives may have high participation rates, they need to be followed by concrete, meaningful actions to truly have an impact on the real economy. In addition, the emphasis of some of these initiatives is the carbon emissions of companies, both from a reporting and disclosures perspective. However, the significant impact on the real economy will only happen with transformational change to business models and industry eco-systems in some of the most impacted sectors like Power Utilities, Materials, Transportation, Energy, Industrials and Financial Services. ***The emphasis therefore needs to be on business model transformation and how a company is managing its key business model transformation risks, not only on reporting and disclosures related to its GHG and CO2e emissions.***

- While the Task Force on Climate Related Financial Disclosures (TCFD), Value Reporting Foundation (formerly SASB and IIRC), Climate Action-100 Net Zero Benchmarks, Transition Pathways Initiative (TPI), UNPRI, and Race to Zero all provide good reference points, together we believe that these **industry frameworks and initiatives come up short on two foundational measurement, reporting and capital markets disclosure issues**:

  (1) First, they do not have a clear financial model with a direct link to capital markets pricing, the cost of capital, the life-cycle of innovation and returns on capital, company valuations or the measurement of Enterprise Value.

  (2) Secondly, they do not provide specific guidance, processes or tools for the analysis of current state business model design. For instance, this could include full CO2e emissions (scope 1, 2 and 3), the identification of key business model design lever options and technologies, the scoping and sizing of the required level of Net Zero business model transformation required, current state benchmarking relative to their industry sector medians, as well as the level of risk needed to achieve Zero, Net Zero or negative CO2e emissions business model design[5].

[3] For all those companies facing a complete business model transformation (we estimate over 500 listed companies in North America representing over $10 trillion in EV at risk in the capital markets), organizational structure and transformational leadership capacity are critical and material organizational gaps. Hence the greatest risk to achieving a net zero global economy are actually organizational and strategic leadership risks (organizational structure, strategic leadership capacity, incentive designs) which today are not effectively audited, measured and or disclosed by 90 % of issuers.

[4] Such as the Climate Action 100+, and the Transition Pathway Initiative (TPI) and including such organizations as CERES,

[5] We do believe that a TCFD version 2.0 would be beneficial for issuers as a standard, aligned not only to climate disclosures but to Business Strategy and Business Model design disclosures alignment to a Zero, Net Zero or Net Negative emissions business model (details are outlined in the attached response paper).

- **We cannot keep voting for and approving metrics and executive incentive designs that lock in higher carbon business models**: We analyzed global data from ISS and found that ***the disclosed and filed GHG and or CO2e metrics and targets in proxy statements are used less than 10% of the time in executive incentive design for listed companies, with the longest performance period for LTIP design at 3 yrs. or less for 90% of listed companies.*** Our previous research for CFA Chicago on metrics, incentive design and sustainability for North America's largest listed companies identified the same metrics and incentive design disconnect, and that they had been overwhelmingly voted "FOR" and approved by most of the major asset owners (including the largest USA and Canadian pension funds) and the world's largest asset managers in their proxy and say on pay voting. To transition globally in the required time to a net zero economy, we cannot keep voting for and approving metrics and executive incentive designs that lock in higher carbon business models in the real economy of the largest listed companies.

- **New performance metrics and incentive designs are required**: A new set of metrics and incentive designs for named officers for listed companies including new zero or net zero enterprise performance metrics are essential for companies to help them identify risk exposures and gaps in their business model design but also for active and engaged investors for fundamental value analysis, assessments of business model value drivers, risk management, and investee company engagement which impacts long-term sustained company value creation and capital markets valuations. We propose a new set of 20 must have performance metrics / targets and 8 to 10 year disclosures and trendlines which are critical for the Zero Economy transition and include. These are detailed in Part 1 of the attached response paper. They include metrics such as:

    - Tons of Carbon Produced per $Million of Revenues (TC/R) – CO2e / $ 1 million
    - Carbon-Adjusted Return on Capital (CAROC)
    - Carbon-Adjusted Performance Spread (CAPS)
    - Net Zero Transition Cash Risk Ratios (TCRR)[6]

    Building on the identified key strategic metrics, we propose **a set of foundational questions**[7] that long horizon institutional asset owners, Board directors, fiduciaries, regulators and stakeholders should be asking of all companies/investments as we enter into a net zero global transformation together.

- **Net Zero commitments need Real Zero or Net Negative business plans**: While net zero, zero and net negative commitments should be applauded, simply getting to net zero emissions is not enough – it is the pathway and the portfolio of

[6] These metrics and methodologies are detailed in the the accompanying response paper.
[7] These are detailed in Part 3 of the accompanying response paper.

solutions and level of business model transformation that matters to ensure the achievement of emissions mitigation required to limit global temperature rise to 1.5 degrees Celsius. Strategic Business and investment plans and pathways "must prioritize early, deep, sustained, and technologically feasible direct emissions reductions in every sector" [8].

The strategic framework outlined by net-negative.tech[9] identifies three stages and types of systems required for creating the net zero economy and the required critical key technologies that will enable it: low carbon systems, zero emissions systems and carbon negative systems. "Different parts of the economy are likely to be at different points in their journey between these stages. The overall climate requires a balance: any activity that is still producing carbon must be offset by carbon absorbing activity elsewhere in order for net zero to be achieved."

We believe the **new SEC ESG / Climate disclosure standards must be integrated into the annual MD&A disclosure section**, **and also be disclosed in the proxy statement**, to demonstrate Business Model strategy alignment with key longer-term performance metrics, longer-term incentive design, 20-year CEO succession planning, executive pay for operating performance and executive pay for business model transformation to Zero or Net Zero business model design. All of these disclosures should be certified by the CEO/CFO, the full Board and be filed documents not furnished documents to the SEC.

These newly required SEC disclosures must cover all mission critical EESG (economic, environmental, social, and governance) factors that are material to long-term operating performance, returns on capital and company valuation for investors.

We believe our recommendations as set forth it the attached response paper represent the critical disclosures of current business model design and carbon profile assessment and re-design, performance metrics and assessment of strategic leadership capacity (Board and C-Suite) that companies and investors need to evaluate the business model risk arising from the impacts of carbon price shocks as a result of climate change risk. However, while our research has focused on carbon price shocks as material transition risk from climate change, climate change is not carbon-centric. Companies and investors need to ensure that they have performed a comprehensive and holistic ESG materiality assessment from a stakeholder point of view to identify the critical sustainability issues so as to be able to mitigate the business model design risks and leverage the opportunities.

We thank you for taking the time to review our recommendations and look forward to answering any questions that the SEC or any other key stakeholder may have. Our contact information is in the biography section of this report.

With Best Regards,

Mark Van Clieaf, Managing Director, FutureZero, and Tamara Close, Managing Director, CGC

[8] https://www.pembina.org/pub/how-get-net-zero-right
[9] Developed by Diana Fox Carney and Beatrice Lee, https://net-negative.tech/

cc.
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PART 1: Responses to SEC consultation questions

Response to Questions 1 and 2

1. ***How can the Commission best regulate, monitor, review, and guide climate change disclosures in order to provide more consistent, comparable, and reliable information for investors while also providing greater clarity to registrants as to what is expected of them? Where and how should such disclosures be provided? Should any such disclosures be included in annual reports, other periodic filings, or otherwise be furnished?***

2. ***What information related to climate risks can be quantified and measured? How are markets currently using quantified information? Are there specific metrics on which all registrants should report (such as, for example, scopes 1, 2, and 3 greenhouse gas emissions, and greenhouse gas reduction goals)? What quantified and measured information or metrics should be disclosed because it may be material to an investment or voting decision? Should disclosures be tiered or scaled based on the size and/or type of registrant)? If so, how? Should disclosures be phased in over time? If so, how? How are markets evaluating and pricing externalities of contributions to climate change? Do climate change related impacts affect the cost of capital, and if so, how and in what ways? How have registrants or investors analyzed risks and costs associated with climate change? What are registrants doing internally to evaluate or project climate scenarios, and what information from or about such internal evaluations should be disclosed to investors to inform investment and voting decisions? How does the absence or presence of robust carbon markets impact firms' analysis of the risks and costs associated with climate change?***

Below we provide our responses to select questions from the SEC. The remainder of this response (Part 2 and 3) provides some context and background into our recent analytical research and how this has convinced us that beyond merely identifying metrics for disclosure, the measure of how a company is truly managing climate change risks needs to go beyond disclosure of industry framework aligned metrics. To utterly understand how impacted a company is by climate change and how they are managing these risks, requires a new set of performance metrics. From the analysis of a new set of metrics that we present below, we have also concluded that climate change risk is really about business model risk and the greatest risk to those companies that need to transform their business models is actually organizational design and leadership capacity.

In this response paper we focus on a particular transition risk, the rising price of carbon, as one aspect of business model and climate change risk. However, other mission critical EESG[1] factors for a company will also need to be identified, measured and managed accordingly.

We believe new carbon-adjusted performance metrics and targets are necessary for the identification of the exposure of a company to carbon risk as well as to identify the ability of a company to pivot and transition to a net zero or net negative business model. These new metrics, presented below, and the remainder of this response paper details how we calculate the performance metrics as well as how they can be used to situate a firm in the lifecycle of innovation and future value.

In the below response, we also present a classification methodology based on the FAS 157 model used after the 2008/09 financial crisis for OTC derivative products. We believe this straightforward classification methodology, supported by regulators, will bring clarity to the level of unassessed climate change risk to an investment portfolio. This may help long-horizon institutional investors identify where they need to take action to mitigate climate change risk within their investment portfolios.

(1) New carbon adjusted metrics

The Need for a New Measurement Model in a Net Zero World

It became abundantly clear to us as we searched for metrics and methodologies to be able to evaluate the exposure of a company's business model to carbon and related regulatory risk and to evaluate a company's ability to transition to net zero, that the investment industry is undergoing a paradigm shift. Metrics such as Total Shareholder Return (TSR) are no longer sufficient or suitable in a transitioning economy. To be able to effectively identify risks and opportunities within companies, industries, and sectors, requires a new set of performance metrics, methodologies, and a shift in mindset in performance measurement and pay for performance based on value creation for shareholders and value creation for society as a whole.

As Board directors evolve their understanding of their companies' current Business Model design and its strategic risks including exposures to carbon risk and the transition to a zero carbon emission global economy, and as companies pivot, transition and in some cases completely transform their business models, the investment industry needs to be able to thoroughly understand the operating drivers of investee companies and how they are truly creating value.

These new "carbon-adjusted" performance metrics are needed to manage risks, strategically allocate capital, and leverage opportunities but also to engage and create value within investment portfolios, effectively building a bridge between the operating companies and institutional investors. A new multi-dimensional value creation paradigm is evolving for climate savvy boards, companies, and investors, which goes beyond just a shareholder value paradigm.

Methodology for New Carbon-Adjusted Metrics

The world of Net Zero Business Models (NZBM) will require the use of new performance metrics that have rarely or never been used by companies to measure enterprise performance, top officer performance and the alignment with long term incentive plans (LTIP). In searching for new metrics that could be used by investee companies, we reviewed the published guidelines, methodologies and

[1] Economic, Environment, Social and Governance

metrics advocated by a number of organizations. These included: TCFD, VRF/SASB, S&P Global, MSCI, UN Net Zero Asset Owners Alliance-2025 Target Setting Protocol, UN PRI Climate Accounting Reporting Project, GHG Accounting and Reporting Standards for the finance industry, Climate Action-100+, the GHG Reporting Protocol, Carbon Tracker, CDP, Sustainalytics / Morningstar, and the Network for the Greening of the Financial System (NFGFS). This review also included over 100 SEC comment letters related to ESG and climate related disclosures that advocated for mandatory disclosures. These comment letters included responses from some of the largest global asset managers and asset owners.

The overall industry consensus is that to determine how many GHG emissions have been generated and released into the atmosphere, companies need to disclose their GHG emissions completely and 100% across their entire business model / business system: from the upstream sourcing of materials to the downstream delivery, end-users and even the recycling of a product. This covers what is universally recognized as scope 1, 2 and scope 3 GHG emissions. In addition, the disclosure of the absolute GHG reduction targets (short, mid and long-term) and dates for these targets, is also required.

Some market participants have advocated for more investment oriented metrics such as the Enterprise Value or Market Capitalization adjusted for the carbon emissions of the issuer, which then extends to a metric such as the Weighted Average Carbon Intensity (WACI) of an investment portfolio. Others have suggested relative carbon intensity metrics for the business model as measured by CO2e Tons / Enterprise Value or CO2e Tons / $ 1 million of revenues. There is also the disclosure of Zero Emission Revenues vs GHG Emission revenues. Some organizations have gone deeper into the income statement to calculate a carbon adjusted earnings at risk performance metric[2]. **While compelling from an investor's point of view, we felt that many of these metrics would not be relevant for Board directors at investee companies who need to evolve their understanding of their companies' strategic risks and opportunities including exposures to carbon risk and their risks due to the global transition to a net zero global economy**.

Building on the foundations of finance and business strategy, we started to conceptualize the need for new generic carbon adjusted performance metrics, such as a Carbon Adjusted Return on Capital (CAROC) that could be created, measured and disclosed by issuers. The carbon fee cost on the income statement could result in a Carbon Adjusted Net Operating Profit After Tax or CA-NOPAT. This CA-NOPAT could then be transformed into a Carbon Adjusted Return on Capital (CAROC) measured as:

Carbon Adjusted NOPAT / Invested Capital = Carbon Adjusted Return on Invested Capital (CAROC)

This CAROC metric as an integrated performance measure could then be extended further to also include a fully loaded performance metric of the returns on capital after cost of capital and after cost of carbon and could be called a Carbon Adjusted Performance Spread (CAPS). This new generic carbon adjusted metric could be measured as:

Carbon Adjusted Return on Capital – Weighted Average Cost of Capital = Carbon Adjusted Performance Spread (CAPS)

[2] This starts with the current operating performance of the business model as measured to the EBITDA or EBIT performance level, and then based on carbon pricing (current or future risk) and the current carbon disclosures by issuers, the adjusted and stress-tested earnings at risk due to a carbon price increase is calculated.

In the world of Net Zero these new carbon adjusted metrics could be the new true north of a multi-capital value creation model[3]. Companies, their executive officers, and total workforce would then not be seen as having created true value for customers, shareholders and society UNLESS ***their performance clears the double thresholds of a return on capital greater than the cost of capital, including the full cost of carbon imputed into the income statement and returns on capital, including net zero emission new R&D and new CAPEX***.

In our search for a partner who might have similar carbon adjusted performance data and analytics already imputed, we reached out to our many contacts globally in both the investment banking community and at financial data providers. We discovered that Credit Suisse HOLT® had, over the last 5 years, undertaken some leading-edge financial analysis and model building to identify how to measure long-term investee company performance and carbon adjusted performance. The Credit Suisse HOLT® model is a unique and proprietary model for assessing company performance, returns on capital, and warranted value of the company using a life cycle approach to innovation, returns on capital, and fade of returns on capital, all underpinned by a discounted cashflow and inflation adjusted company valuation model.

Thus, our conceptualized and generic performance metric which we named Carbon Adjusted Return on Capital (CAROC) had a derivative version that was already being deployed by Credit Suisse HOLT® called the “Carbon Adjusted – Cash Flow Return on Investment” or CA-CFROI.

Our generic Carbon Adjusted Performance Spread (CAPS) also had a very similar derivative metric being deployed by Credit Suisse HOLT® called the “Carbon Adjusted – CFROI – Discount Rate spread”.

While our generic Carbon Adjusted performance metrics of CAROC and CAPS are not exactly the same as the proprietary Credit Suisse HOLT® carbon adjusted performance metrics, they were close enough in measurement outcome and followed the same business strategy, finance and capital allocation principles such as the company life-cycle and returns on capital life-cycle, that we believed were imperative to use. We therefore decided to collaborate with Credit Suisse HOLT® for this analytical research study and the carbon shock stress testing of the global and North American capital markets. We have yet to find any other investment bank or financial data provider that is as far advanced in their thinking about the new world of carbon adjusted performance and pay for performance than the global team at Credit Suisse HOLT®.

In the balance of this response paper, we use the generic new term Carbon Adjusted Return on Capital (CAROC) and Carbon Adjusted Performance Spread (CAPS), which in this case refers to the proprietary versions of these generic metrics and transformed data as provided to us from Credit Suisse HOLT®. The Credit Suisse HOLT® version also had far better coverage of global securities than most and we felt their approach to inflation adjusted assets and fade adjusted returns on capital is one of the leading models in the industry for this type of performance modeling and carbon adjusted cashflow stress-testing.

In this paper we present results from a bottom-up quantification of the scale and risk of a net zero transformation in the global capital markets with a specific emphasis on the North American markets, to determine which firms are most at risk from the transition to a net zero global economy. We did this by stress-testing a carbon shock scenario from a rise in carbon prices, and the impact on returns on capital for a sample of over 11,100 listed global companies.

[3] See the MultiCapital Scorecard, a new performance accounting method which makes it possible to measure, manage and report Triple Bottom Line performance relative to organization specific norms for impacts on multiple capitals. https://www.multicapitalscorecard.com

The cost of carbon, in its ability to be quantifiable (we can actually observe a market price for carbon) is one metric that has been used extensively when attempting to model the impacts of climate change on an investment or investment portfolio.

The intent of this consultation comment paper for the SEC is not to provide evidence that a carbon shock will happen but rather to stress-test what would be the consequences on global and North American listed companies and their performance if a carbon shock were to happen.

Whether there is a carbon shock or not, it is generally accepted that the price of carbon will most probably rise throughout the global economy given the various scenarios and legal commitments that are being observed in the capital markets[4].

Climate change is not just a carbon centric issue but is a business model design, business strategy and risk management issue.

Board directors at investee companies need to provide strategic oversight to evaluate and help guide / transform these investee companies to net zero business models (NZBM), and as such, help create NZBM eco-systems and industry structures. Institutional investors, and in particular, large global investors with long term capital can drastically and permanently transform the transition to Net Zero with a new type of investment model – one that is founded on long-term investment horizons, systems level investing, beta activism and strategic engagement.

We believe the large global asset managers and asset owners can play a critical role in this historical transition. As sophisticated investors and stewards of long-term patient capital, they could implement this new type of investment model as well as develop and effectively deploy “strategic engagement” capabilities with companies to enable this total systems transformation and help shape this journey.

Given the critical importance of these new integrated performance metrics for sustainable business we would be pleased to share our detailed securities research, industry benchmarks and performance percentiles for each industry sector and make this data and our strategic Net Zero risk analytics available at no cost to the SEC.

Climate Change and Business Model Risk is Not Only About Disclosures

For companies, asset owners and asset managers, the lack of clear strategy and organizational alignment increases the possible risk of a carbon shock and material disruptions in the real economy (as recently experienced by the COVID 2020 year) and in the capital markets. Firms need to understand their exposure to climate change impacts, their impact on climate change, and then make the requisite strategic business model decisions and strategic capital allocations decisions. It is not enough to simply report to an industry framework[5], firms need to have transition plans in place[6].

While the disclosure of climate-related financial risks can certainly help investors assess companies’ climate change risks, what is of crucial importance, is **how the company is managing these risks** not solely what they are reporting. Voluntary disclosures such as those based on the recommendations of the Task Force for Climate-related Financial Disclosures (TCFD) are being “hailed as an

[4] Canada for instance is set for a carbon fee of $170 / ton CO2e by 2030.

[5] Such as the TCFD

[6] As noted in Mark Carney’s new book “*Value(s): Building a Better World for All*” Random House Canada Limited, 2021, and in Larry Fink’s latest letter to CEOs

effective measure for better climate risk management". A recent academic study[7] uses a deep neural language model to determine whether this expectation is justified.[8] The authors conclude that the firms' TCFD reporting is however mostly "cheap talk" and that firms tend to "cherry-pick to report primarily non-material climate risk information"[9]. The authors conclude that "the only way out of this dilemma is to turn voluntary reporting into regulatory disclosures."[10]

Below provides an overview to some of the key findings from our strategic performance and capital markets analytical research. For more details on the methodology and findings please see PART 3 of this paper.

Main Findings

This section provides an overview of some of the main findings of our research.

Two foundational findings from our carbon stress testing of a sample of 1,500 of the largest listed companies in North America, underscore the fact that:

(1) The race to Net Zero needs ***better disclosures for investors and society at large*** - between 40% and 60% of key listed North American companies in each sector have not completely disclosed their GHG emissions,[11] and

(2) ***Better regulatory guidance and rules are clearly needed.*** Our research identifies that 38% of North American companies had higher emissions on average over the last 4 years than the previous 4 years[12], and of those companies that reduced emissions over the last 5 years, 25% had reduced GHG emission by less than 7% per annum. Thus together 63% of North American listed companies are not aligned to Net Zero goals or the interim milestones to 2030 that must be achieved for a Net Zero world[13].

Following these findings, we analyzed global data from ISS[14] and found that ***GHG metrics and targets are used less than 10% of the time in named officer incentive designs, with the longest performance period for LTIP design at 3 yrs. or less for 90% of listed companies.*** These incentives have been overwhelmingly approved by most of the major asset owners and asset managers in their proxy and say on pay voting. To transition globally to a net zero economy in the required timelines, ***Boards and institutional investors cannot keep voting for and approving higher carbon business models in the real economy of the largest listed companies.***

Our cross-sector analysis[15] in collaboration with Credit Suisse HOLT®, showed that 27% of firms (equivalent to more than 3,400 listed companies) in our global sample (of over 11,100 listed companies) saw a 5% or greater decrease in their return on capital

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[7] Bingler, Julia Anna and Kraus, Mathias and Leippold, Markus, Cheap Talk and Cherry-Picking: What ClimateBert has to say on Corporate Climate Risk Disclosures (March 2, 2021). Available at SSRN: https://ssrn.com/abstract=379612

[8] They call their model "ClimateBert" and analyzed the disclosures of TCFD-supporting firms.

[9] Ibid.

[10] Ibid.

[11] Asset owners and asset managers need to pressure on regulators for new rules that require 100 % compliance on valid, reliable, and audited GHG emissions (scope 1/2/3) and their disclosures to all stakeholders.

[12] Some of these results could be explained by the fact that companies may simply be reporting more than they were 4 years ago.

[13] According to a recent study by MSCI (https://www.institutionalassetmanager.co.uk/2021/07/12/303243/listed-companies-have-less-six-years-align-15degc-warming-target-inaugural-msci), the world's publicly listed companies must dramatically accelerate climate action if the 1.5C warming target set out in the 2015 Paris Agreement is to be met. Emissions levels are still where they were in 2013.

[14] Institutional Shareholder Services

[15] For details on the analysis, including methodologies and data sources, please contact Mark Van Clieaf at Mark.VanClieaf@FutureZero.com

when their business models were stress-tested at a $75 / ton price for carbon (CO2e), based on current business performance and current disclosed GHG emissions (using only scope 1 & 2 data). Not surprisingly, sectors such as Energy, Utilities and Materials had between 64% and 75% of companies impacted negatively by a carbon price shock of $75 / ton CO2e (scope 1 & 2). Overall, companies with over US$20 trillion in Enterprise Value (EV) had significant negative impacts on their returns on capital.

A 5% or greater decline meets the test of "materiality" under securities law in many jurisdictions, and thus Directors and Officers are therefore required to disclose the risks to shareholders[16].

For the companies that were most impacted from a $75 / ton price shock for carbon, over 50% were in North America. We therefore undertook a second analysis of over 1,500 of the largest securities in Enterprise Value in North America. This time we stress-tested at $100 / ton CO2e, using scope 1 + 2 emissions data. This was a logical price shock in our view given that Canada is scheduled to go to $170 / ton carbon fees by 2030.

Within our North American sample, 46% of the Utilities sector were companies that had business models that were highly sensitive to carbon[17] yet also had positive Future Value (FV) which suggests that the capital markets may not be integrating future carbon and regulatory risk in the Utilities sector into company valuations, future returns on capital, and discounted cashflows.

Within the North American Energy sector, 73% of the companies had negative FV and had high carbon business models, suggesting that the capital markets are effectively pricing in carbon risk and these companies may be recognized by the capital markets as companies with high business model transition risk / transformation risk.

After adjusting for a cost of carbon and stress test at $100 / ton CO2e, we found that 93% of Utilities end up with a negative Carbon Adjusted Return on Capital (CAROC)[18], and a negative Carbon Adjusted Performance Spread *(CAPS)*[19]. However, most had positive Future Value (FV) and positive 5-year Total Shareholder Return (TSR). The majority (87%) of Energy companies had a negative CAROC, and 86% also had a negative CAPS. More than half the Energy companies by contrast had a negative 5-year TSR.

Upon further investigation, we found that 93% of the Utilities companies do not currently generate positive internal cash flows to fund any transition to a low or a net zero business model design, hence external financing will be required. This was measured using the Net Zero Transition Cash Risk Ratio (TCRR)[20]. Nearly three quarters (72%) of the Energy companies do not currently generate positive internal cash flows to fund any transition to a low or a net zero business model design, hence external financing will be required.

[16] See SEC definition of materiality.
[17] Defined as companies over 50 tons of carbon emissions (CO2e) per million dollars of revenue.
[18] FutureZero has many treatments for cost of carbon impact on financial statements and company valuation; this study uses Credit Suisse HOLT's proprietary CA-CFROI, where CA-CFROI = Credit Suisse HOLT Carbon Adjusted – Cash Flow Return on Investment
[19] FutureZero has many treatments for cost of carbon impact on financial statements and company valuation; this study uses Credit Suisse HOLT's proprietary calculations for Carbon Adjusted CFROI – Discount Rate Spread, where CA-CFROI-DR Spread = HOLT Carbon Adjusted CFROI – Discount Rate = a return on invested capital after cost of carbon and cost of capital
[20] Calculated as the ratio of key cash expenses for R&D, CAPEX, SGA and cash financing (interest and dividend payments) relative to gross cash flow using data from Morningstar / Sustainalytics and S&P Global (Compustat and CAPIQ). We also analyzed the 3-year cumulative new CAPEX investment.

Therefore, from our findings, even though the majority of the Utilities companies in our sample seem to be at significant risk from a net-zero transition and do not currently generate positive internal cash flows, they have created positive shareholder value and the capital markets seem to still be expecting positive future value (FV) and future positive returns on capital for these companies and this sector. This may be indicative that the capital markets have not been pricing in a rising price of carbon for power Utilities companies and are not pricing in a future carbon risk for the Utilities sector, all else being equal. In contrast, the capital markets seem to be expecting and pricing in a negative future value (FV) for the majority (75%) of North American Energy companies. These have also generally had negative shareholder returns, implying that the markets may be pricing in current and future carbon risk for the Energy sector, all else being equal.

Given that there are significant impacts on a majority of firms across sectors we propose a new classification methodology that can be used now to easily identify and classify securities based on whether a climate change and/or business model transformation risk assessment analysis was performed or not.

(2) New classification methodology

Climate change and a Net Zero Business Model Assessment Categorization Methodology for Investment Managers[21]

Climate change is increasingly being viewed as a systemic risk[22] and the valuation of climate change risks (both business model transition risks and physical risks) represents a complex and multi-dimensional process for which there is no agreed upon industry standard. Due to the inherent complexities of business model design and climate change risk valuation, many investors are not factoring these risks into their investment decisions, or they are doing so at a high, broad macro-level, effectively leaving business model and climate change risk as a largely unknown, unpriced, and yet material risk in their investment portfolios.

During the 2008-2009 financial crisis, the valuation of complex OTC derivatives, became increasingly unclear due to their dependence on certain key industry and model assumptions and relationships that no longer held their validity as markets became dislocated. The FAS 157 classification methodology was developed to give Boards, investors and regulators a clearer view into the amount of assets that had uncertain valuations (classified as Level 3) in an investment portfolio.[23]

The same concept could be applied to the assessment of Net Zero business model (NZBM) transformation and climate change risks performed on the individual securities in an investment portfolio. For instance, one could classify securities based on whether a climate change and/or business model transformation risk assessment analysis was performed or not, and if so, what was the underlying methodology.

For example:

[21] Reference: Close, Tamara, Applying the FAS 157 classification methodology to ESG risks in an investment portfolio – a focus on climate change (November 30, 2020). Available at SSRN: https://ssrn.com/abstract=3838369
[22] https://www.theregreview.org/2020/11/04/ramani-climate-change-systemic-financial-risk/
[23] This includes investment funds, pension funds, etc.

- Securities that have not been assessed for their business model risk and climate change risk exposures (no matter what the industry) could be classified as **Level 3 securities (*therefore considered most at risk because they would have unassessed yet potentially material risks*).**
- Securities for which a business model risk and climate change assessment had been completed but that employed a more subjective or qualitative methodology[24], that used the ESG ratings from an external data provider (with an unknown ratings methodology), or that used a top-down approach could be classified as **Level 2 securities.**
- Securities and their current business model design, emission profile and carbon footprint that had been assessed using a quantitative, science-based methodology, and that used a micro-level holdings-based approach could be classified as **Level 1 securities.**

Classifying a security based on whether its current business model design has been assessed and stress-tested for its exposure to climate change and business model transformation risks does not require the manager to necessarily change a security's official valuation in external investment reports. However, the classification of the security provides insight into how the asset manager or firm views the future impact of climate change on that security, enabling greater transparency and insight into the potential risks of their investments and holdings. It also identifies whether an asset manager has actually performed a climate change analysis of the securities in their portfolio.

This implies a **reverse burden of proof on investment managers**. If they have not performed a business model transformation and climate change risk assessment, then the security is automatically categorized as Level 3. The manager needs to prove/show that they have performed a science-based and security level Business Model design, GHG risk profile and NZBM risk assessment to be able to categorize it in Level 1. Boards of asset managers or asset owners may decide to limit the number or percentage of assets under management (AUM) that are considered Level 3 assets for climate change risks. By not performing a level 1 type climate change assessment, investment managers may thus be subjected to additional constraints on their investment portfolios.

[24] For instance, similar to a high/med/low analysis

Table 1: Overview of a proposed classification methodology for climate change assessments for a portfolio of securities[25]

	Level 1	Level 2	Level 3
Definition	Securities and their business model design that have been assessed using a quantitative, science-based, and bottom-up or granular methodology including ESG and complete Carbon Cost and return on capital stress testing at $75, $100 and $150 / ton CO2e	Securities and their business model design that have been assessed using a subjective or qualitative approach / or securities that have been assessed using a top-down methodology	Securities that have not been assessed for their climate change risk exposures
Examples	Extensive business model design, carbon adjusted stress-testing of financial performance and climate risk assessment (including the firm's strategy for climate change, the financial and competitive position of the firm; carbon-adjusted return on capital and carbon-adjusted performance spread; as well how the firm is positioning themselves for the just transition)	Scenario analysis using a top-down or sector analysis Use of qualitative data from ESG ratings providers (with little understanding of the methodology, value drivers, and ESG correlations to sustainable business performance) Subjective or qualitative methodologies such as using High/Med/Low assessments	No climate change assessment has been performed

Benefits and Challenges

There are numerous benefits that can be derived for capital markets stakeholders such as investors, boards, and regulatory authorities from a classification of climate change risks in an investment portfolio.

Benefits include, but are not limited to:

- Increased transparency into the current and future expected key material risks of an investment portfolio.
- Help in fostering the essential conversation around Net Zero business model climate change transformation risks and impacts on company valuations and discounted cashflows and a determination of Future Value in the capital markets. This may encourage asset owners with portfolios exposed to physical and/or transition risks to assess the Net Zero business model climate change impacts in their portfolios so as to mitigate risks and/or leverage opportunities.
- Enabling a smooth transition to integrating business model transformation and climate change assessments into company valuations and discounted cashflow modeling.[26]

[25] Reference: Close, Tamara, Applying the FAS 157 classification methodology to ESG risks in an investment portfolio – a focus on climate change (November 30, 2020). Available at SSRN: https://ssrn.com/abstract=3838369

[26] The methodology does not impact current NAVs, so valuations do not necessarily require adjustments.

- Universal application as the methodology is investment strategy and asset class agnostic.[27]

Challenges to the methodology include the fact that since this is a classification methodology, it does not identify the specific climate change risks inherent in the underlying securities, only whether the securities have been assessed for business model design and climate change risks. In addition, as there is no single industry-wide accepted valuation or risk methodology for business model and climate change risk, firms will need to be continuously adjusting their climate change risk measures as the industry evolves. This may create an uneven playing field for those managers that have larger risk management teams and access to more resources, including data, staff and budget.

We have found in our global Net Zero business model (NZBM) stress-testing, that at a minimum, all securities need to be analyzed on the following metrics: Economic Profit, Future Value, Tons of CO2e / Million Dollars of Revenue, Return on Capital, Carbon-Adjusted Return on Capital (CAROC), EV/EBITDA, P/E, Price/Book Value and Net Zero Transition Cash Risk Ratio (TCRR) and where they stand on all of these same metrics compared to the median, average and quintiles of performance relative to their GICS sector peer group. The above strategic Net Zero business model analytics needs to be undertaken over at least a 10 yr. historical lookback and then use of management disclosures and equity analysts' reports for a forward business strategy and business model risk review.

[27] It can be applied to both active and passive mandates as well as across all asset classes.

Response to Question 8

8. How, if at all, should registrants disclose their internal governance and oversight of climate-related issues? For example, what are the advantages and disadvantages of requiring disclosure concerning the connection between executive or employee compensation and climate change risks and impacts?

We believe there are significant advantages to connecting executive and Board performance metrics and incentive design, (short-term, mid-term and longer-term) compensation pay delivery to Business Model Design and transformation to Zero or Net Zero and climate change risks and impacts. However, before this can be done, C-suite executives and Boards need to be equipped with the requisite data, analytics, current state business model design and total business system emissions profile analysis from which to make strategic oversight and Board approval decisions for potential business model transformation.

This of course assumes that the right directors and leaders are in place to successfully mitigate climate change risks and leverage any opportunities. Companies need to first assess their exposure to climate change risks and then determine their ability to mitigate these risks. Again, focusing on the transition risk to a low carbon economy from a rising price of carbon, based on the Net Zero Business Model (NZBM) analytics we believe there are four potential types of net zero business models for transition. Once the Net Zero Business Model design and pathway options have been determined, then the required types of Board directors and leaders with transformational leadership experience and or potential can be assessed and selected.

For those companies that require a significant transformation of their business model, a new organizational structure, new enterprise performance metrics and named officer incentive designs and that lack the depth of strategic leadership capacity in the C-Suite team, there is a significant risk for the Directors of the Board (including shareholder litigation risk), and for long-horizon shareholders.

Research on levels of cognitive development, critical thinking and problem solving identifies that less than 5% of the world's adult population have the level of conceptual capacity and systems thinking to conceptualize and implement business model and industry eco-system transformations.

Thus identifying, selecting, and developing CEOs, C-Suite team members and Board Directors with the minimum Level of Capacity for Complexity, Systems Thinking and Conceptual Capacity required for business model transformation to Net Zero will be a material challenge and key risk for most companies.

The below response contains a set of decision critical performance analytics that Boards must have. To achieve this critical data and to evaluate a company's ability to transition to a Net Zero or Net Negative business Model along with a positive Return on Capital , we also present a set of core processes that need to be put in place, as well as the different types of net-zero business models.

Climate Change: A Business Model Design and Strategic Transformation Issue

A recent PwC analysis[28] shows that as of February 2021, "only about 8% of the world's largest companies represented by the Global Fortune 500 have pledged to become net zero". Another concerning statistic was that "27% of CEOs report being 'not concerned at all' or 'not very concerned' about climate change". In addition, "60% of CEOs have not yet factored climate change into their strategic risk management activities." Even more surprising is that these companies tend to be in countries with the most exposure to, and the largest contributors of, CO2 emissions.[29]

These sobering statistics mean that a majority of companies will be left out of the required climate action and required business model transformation planning, imperiling the ability to transition globally to a Net Zero economy.

Climate change is not something that can be simply delegated to a Chief Sustainability Officer or other C-Suite staff member. All companies and their business models will be impacted by climate change either directly or indirectly and this means that for certain companies, climate change is a business model risk and strategic issue that needs to come under the purview of the entire Board as part of their fiduciary and "strategic duty" as Directors.

Boards need to provide strategic oversight to business model transformation.

Measuring the impact from sustainability risk is inherently difficult. Data and reporting processes are critical to evaluate the ability of a company to transition to Zero or Net Zero emissions business model design. To be equipped to tackle the previously never before seen issues related to a global transition to a 1.5°C economy, and as part of the Net Zero transition, it is critical for Boards of investee companies to be armed with sufficient relevant data, analytics and business strategy insights from which to make strategic oversight and Board approval decisions. This includes deciding if the board has selected the right CEO to lead business model transformation. Directors therefore must ensure that their companies put in place the appropriate and relevant processes, data, information, and reporting systems to evaluate the ability to transition to Net Zero (see Table 2). While Directors will require a certain level of knowledge about climate change (and ESG issues in general)[30], of critical importance is their ability to be able to translate these issues into risks and opportunities for their companies' business models.

Three essential steps for Boards to take

The climate crisis and the transformation to net zero business models and industry sectors will require the majority of companies to fundamentally revisit their business strategy and business model design.

[28] https://www.pwc.com/gx/en/issues/reinventing-the-future/take-on-tomorrow/business-achieving-net-zero.html?icid=feature-lnk-tot
[29] Ibid
[30] While there are several preparation courses available to increase the knowledge level of Board directors on ESG issues and climate change. However, on their own, these are not sufficient for a Board member to be able to understand the business model specific risks of their companies. To do so, Board directors need to become experts in the underlying business models of their companies, their related value drivers and value destroyers, and be equipped with the right metrics and data to be able to do so.

A first step is to ensure the Directors have complete visibility into the GHG (CO2e) emissions of the firm and its current business model including scope 1, 2 and 3 emissions. A second critical step is to then identify the risk to the business model if there was a carbon price shock. The third step is then to undertake a life-cycle review of the Business Model to determine where it is currently positioned on the lifecycle of competitiveness, innovation and returns on capital. This analysis requires a process to analyze and plot a firm's Future Value relative to its operating competitive advantage by using such metrics as economic profit.

Based on the results of (1) the carbon analysis (including foot printing, carbon intensities, etc.), (2) stress testing of the current business model at, say a $100 per ton CO2e carbon pricing, and (3) the Life-Cycle review, Directors should then be able to determine the scope and scale of business model transformation required to achieve Net Zero. Directors should also ask to benchmark all these key performance metrics relative to the median and quintiles of their GICS industry sector and peer group for a relative performance comparison.

Table 2: *Decision critical Board metrics, analytics, business intelligence and reporting to assess a company's ability to transition to Net Zero*

Board critical decision metrics to assess ability / track progress to Net Zero	Time frame
Return on Invested Capital or similar such as HOLT CFROI	1,3,5,10 yr.
Carbon Adjusted Return on Capital (CAROC) or similar such as HOLT CA-CFROI	1,3,5,10 yr.
Weighted Average Cost of Capital or HOLT Discount Rate	1,3,5 yr.
Tons of Carbon Emissions / Million Dollars of Revenue	1, 3, 5 and 10 yr.
Absolute GHG emissions - CO2e – scope 1+2 and scope 3	1,3,5,10 yr.
GHG reduction targets – CO2e scope 1+2 and scope 3	e.g.: 30% reduction targets by 2025 and 50% by 2030
% Targets for the amount of Carbon Free Energy (CFE) relative to Total Energy used in the business model design	1,3,5 10 yr.
% Absolute CO2e reduction targets through carbon credits or carbon offsets	1,3,5 10 yr.
Future Value % of Enterprise Value (EV)	Current and past 3 to 5 yrs.
Net Zero Transition Cash Risk Ratio (TCRR)	1,3,5,10 yr.
Full Time Equivalent Headcount (FTE)	1,3,5 10 yr.
CO2e Tons / FTE	1,3,5 10 yr.
# Management Layers from CEO to Front Line Worker	1,3,5 10 yr.
CEO Total Pay ratio to Median Total Pay Layer 2 and Layer 3	1,3,5 10 yr.
% and $ of R&D for zero emissions new products / new business models	1,3,5 10 yr.
% and $ of CAPEX for zero emissions new products / new business models	1,3,5 10 yr.
# Ready Now and Ready in 5 yrs. C-Suite and Board Directors with business model transformation experience or potential and processes and tools used to assess	1,3,5 10 yr. and trendlines
% of variable LTIP executive compensation and pay for performance aligned to Zero or Net Zero or Net Negative Emission business model design and implementation including to 2025 and 2030 targets	1,3,5 10 yr. and trendlines

To gather this critical data and net zero business intelligence, and to evaluate a company's ability to transition to Net Zero, the following core processes need to be put in place (see Table 3).

***Table 3**: Critical Board approved processes to evaluate the ability to transition to Net Zero*

Critical Board approved process to evaluate the ability to transition to Net Zero	Outcome
Review of the life cycle of innovation, capital allocation and returns on capital	Current and Future value of the business
C-Suite succession planning processes and tools for assessing the current and future potential to Innovation Zones 5/6/7 for CEO / C-Suite roles- transformational leadership capacity	Insight into the ability of the current and future CEO / C-suite to transform the business model to Net Zero
Business strategy: 5,10,15+ yr. Net Zero business model design, key performance metrics aligned to strategy, R&D and CAPEX plans to transform the business model to Net Zero	Business plan and capital allocation that is needed to transform the business to a Net Zero business model
Enterprise performance metrics / targets and MTIP and LTIP incentive designs over 5-7 years – aligned with the business strategy and business model design to Net Zero	Aligned incentives to transition the business to Net Zero

The above data and processes comprise some of the critical information and structure needed for Directors to exercise their "business judgement" under the business judgement rule, to evaluate and to guide / transform a business to a low or net zero business model (their "strategic duty").

Members of the Judiciary have suggested that if three or more of the above core board processes are missing, this represents a "systemic breach of strategic duty"[31] and Directors may be found in breach of their Fiduciary Duty, including Duty of Care and Duty of Loyalty to the enterprise and long horizon shareholders.

Types of Net Zero Business Models for Transition

Our analysis of the carbon intensity of current business models in North America's largest 1500 securities, based on current GHG disclosures (scope 1 & 2 and not scope 3) provides a robust starting point for insights on the required extent, scale, and challenge of the transformation of current business models to achieve a business model transition and or transformation that is net zero GHG emissions.

[31] Mark Van Clieaf, "New Liabilities for Compensation Committees", The Corporate Board, Jan/Feb 2005

Applying the tons of CO2 produced per million dollars of revenue as computed in the Credit Suisse HOLT® global database, identifies that there is a very wide range of business model carbon intensities in North America. The range at the 4 yr. median by industry sector for tons of CO2 / million dollars of revenue varied from 9.2 Tons to 1,851 Tons CO2e. At the 80th percentile of business model carbon intensity the range was from 29 Tons to 4,060 Tons CO2e[32].

Companies that have current business models with a lower intensity carbon range of 2 to 20 tons CO2e / million dollars of revenue may be able to achieve net zero GHG emission rather quickly solely by the following:

1) focusing on energy efficiency improvements

2) contracting for 100% clean energy

3) plus, a limited use of carbon offsets or credits.

This type of company we class as a **Net Zero 1 GHG intensity business model (NZBM-1)**.

At the other end of the spectrum, are companies that have business model design with high intensity carbon ranges of 1,000 to 5,000 tons CO2e / million dollars of revenue. To achieve net zero GHG emissions they will require a complete end to end business model re-design and transformation including:

1) a focus on energy efficiency improvements

2) 100% clean energy

3) 100% clean fleet and logistics

4) a total product and services portfolio transformation to carbon neutral

5) possible application of Negative Emission Technologies (NETS) and / or Carbon Capture CCUS

6) plus, limited use of carbon offsets and credits

This type of company we class as a **Net Zero-4 GHG intensity business model (NZBM-4)**.

Between these two extremes, sit business model designs that can be classified as Net-Zero-2 and 3 GHG intensity business models.

The level of innovation and transformation required for a NZBM-4 class company is expected to be a 15 X multiple of the level of innovation and business model re-design than that required of a NZBM-1 class company. This has a direct impact on organization design, performance metric design, incentive design and the level of “strategic leadership” capacity for business model transformation required in the C-Suite at investee companies. Strategic leadership with the capacity for complexity and level of systems thinking is critical to re-design complete business models and in some cases complete industry eco-systems to zero emission industries such as electric power, steel and aviation.

[32] For full results of the analytical research, contact Mark Van Clieaf at Mark.Van Clieaf@FutureZero.com

These different classes of net zero business models become more evident when we compare companies in the same industry such as electric power utilities and power generation. For instance, Hydro One the key power generator for the province of Ontario has a business model current carbon intensity of 69 tons of CO2e / million dollars of revenue. Hydro One is 97% clean energy with nuclear, hydro and wind as the core energy portfolio generation mix. This is in stark contrast with the current carbon intensity of the business models for other North American power utilities such as NRG at 5,042 tons, Emera at 4,383 tons, Southern Co at 4,355 tons, and Duke Energy at 4,060 tons of CO2e per million dollars of revenue.

These latter four utilities will require a complete business model transformation and re-design to achieve the IEA's target of clean power for the world by 2040. These are all Net Zero Business Model 4 (NZBM-4) class companies and will require a high level of innovation to achieve Net Zero emissions. Even more challenging is that 3 of these 4 high carbon intensity business model utilities have low Net Zero Transition Cash Risk Ratios and thus do not generate enough cash flows internally to fund their transformation to Net Zero and will thus require external capital markets financing with a high carbon transition and possible stranded asset risk.

Organizational Structure and Strategic Leadership Capacity Risk

Organizational structure and leadership Capacity is a systemic risk for all companies facing a business model transformation such as Net Zero-4 GHG intensity business models. The greatest risk to achieving a net zero global economy is actually organizational and leadership risk.

The organizational risk to Net-Zero Business Model-4 GHG intensity business models, includes:

- a lack of alignment of organizational structure with allocation of capital that is misaligned to the Organizational Life-cycle, and key performance metrics / targets with a Net Zero Business Model transformation
- a gap in the talent pool for the number of required strategic leaders with business model transformational experience or potential for C-Suite roles or Board of Directors

If the analytical results show these significant and alarming impacts on a firm's business model using only one factor of climate risk (in this case, scope 1 & 2 carbon emissions), one can only imagine the exponential impacts when also including other climate change impacts. These include scope 3 emissions, the physical risks of climate change (acute and chronic) to a company's operations and supply chain, other transition risks such as policy changes and new technologies, as well as further material ESG issues such water use, biodiversity, and social issues including impacts on workers and communities.

Within our research we present a methodology to identify where a company is positioned within the lifecycle of innovation and returns on capital when adjusting for an increase in the cost of carbon and a carbon shock for many. This will be critical for Boards and investors to understand so that they can both identify how exposed a company is to net-zero business model (NZBM) transition risks, as well as the level of probability and Carbon Adjusted Returns on Capital (CAROC) that the company can actually transition to given the current business model and organizational leadership (see Part 3 for an overview of the analytical methodology and results).

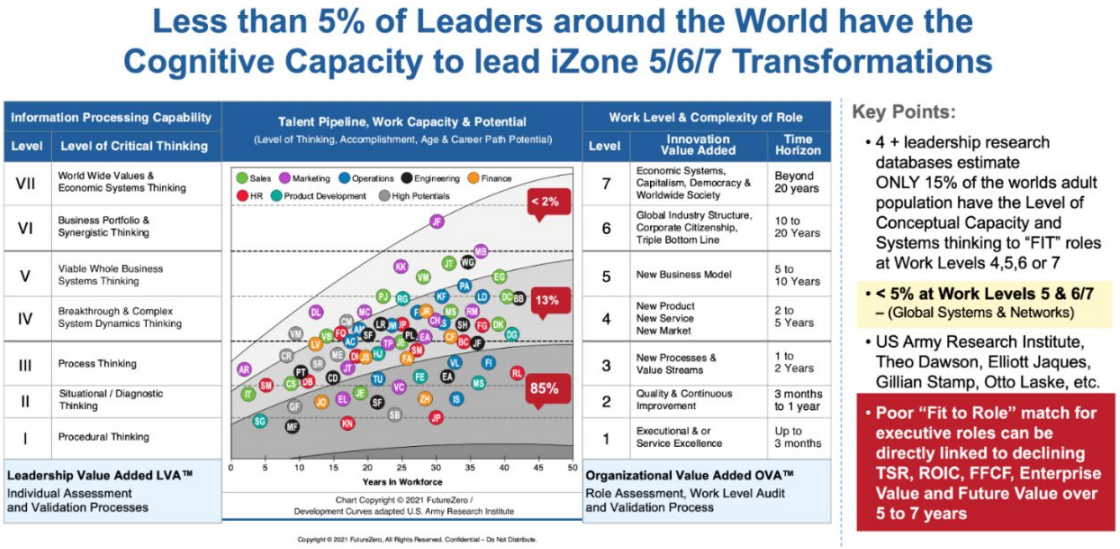
The biggest risk to the level of business model transformations that will be required in critical industries such as Electric Utilities, Airlines, Smart Buildings & Homes, Mining, Steel, Cement, Oil & Gas, Chemicals, Road and Rail Transportation, and Food Products is the potential lack of "strategic and transformational leadership" capacity in executive teams with the potential to lead business model and industry sector transformations.

Research on levels of cognitive development, critical thinking and problem solving identifies that less than 5% of the world's adult population have the level of conceptual capacity and systems thinking to conceptualize and implement business model and industry eco-system transformations.[33]

Thus identifying, selecting, and developing CEO's, C-Suite team members and even Board Directors with the minimum level of Capacity for Complexity, Systems Thinking and Conceptual Capacity required for business model transformation to Net Zero will be a material challenge and risk for most companies.

Companies who lack a deep C-Suite talent pipeline with these traits and leadership development tools for "Strategic and Transformational Leadership" will be challenged to implement Net Zero Business Model transformations.

Figure 1:



Source: FutureZero

[33] This research includes over 40 years of "strategic leadership" research at the US Armed Forces in the selection and development of 1, 2, 3 and 4 Star Generals. One of the authors of this comment letter has ties to the "Strategic Leadership" research at the Army Research Institute (ARI), Industrial College of the Armed Forces and the National Defense University of the USA, including both classified and unclassified leadership assessment and research findings conducted over the last 50 years.

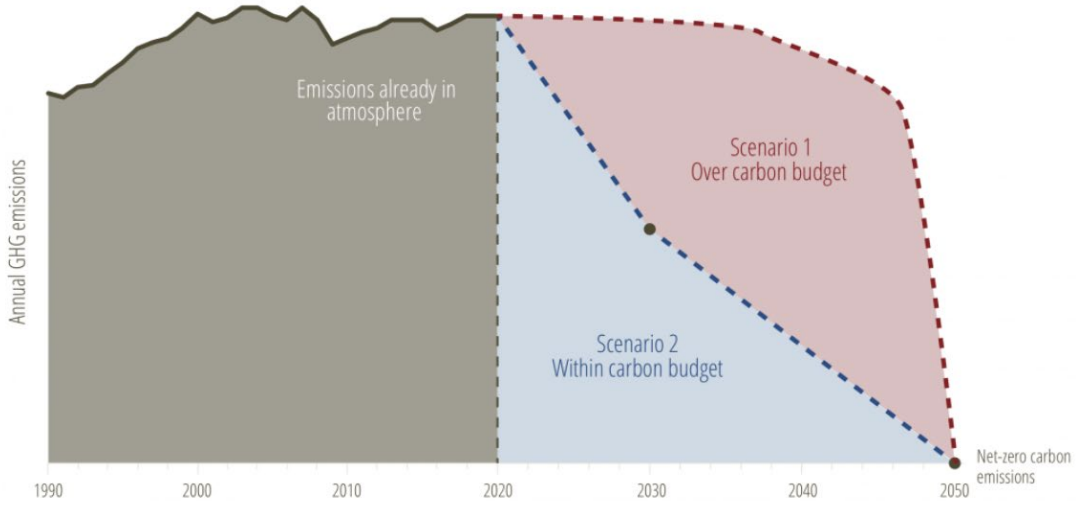
PART 2: Context and Background for Analytical Research

What Does Net Zero Mean and the Risks of Zero-Washing

There are various methods of attaining a net zero business model. The most initiated involves simply purchasing offsets to cancel out the GHG emissions that a company / project or portfolio has produced. Canada defines Net Zero[34] as "achieving net-zero emissions means our economy either emits no greenhouse gas emissions or offsets its emissions, for example, through actions such as tree planting or employing technologies that can capture carbon before it is released into the air. This is essential to keeping the world safe and livable for our kids and grandkids."

A recent publication from the Pembina Institute[35] includes guiding principles to get to a net zero economy which includes pathways that "must prioritize early, deep, sustained, and technologically feasible direct emissions reductions in every sector" and an appropriate role for carbon removal and offsets, as achieving net-zero will require the use of "carbon removal to address hard-to-decarbonize sectors or essential end uses that cannot yet be decarbonized." They point out that simply getting to net zero emissions is not enough – it is the pathway that matters (see Figure 2 below) to ultimately achieving the emissions mitigation required to limit global temperature rise to 1.5 degrees Celsius.

Figure 2: Different pathways to Net Zero and the impact on global temperature rise



Scenario 1 (red) achieves net-zero but fails to safely limit temperature rise because it does not use a carbon budget and delays emissions reductions, resulting in a much greater release of total emissions into the atmosphere in the same time period.

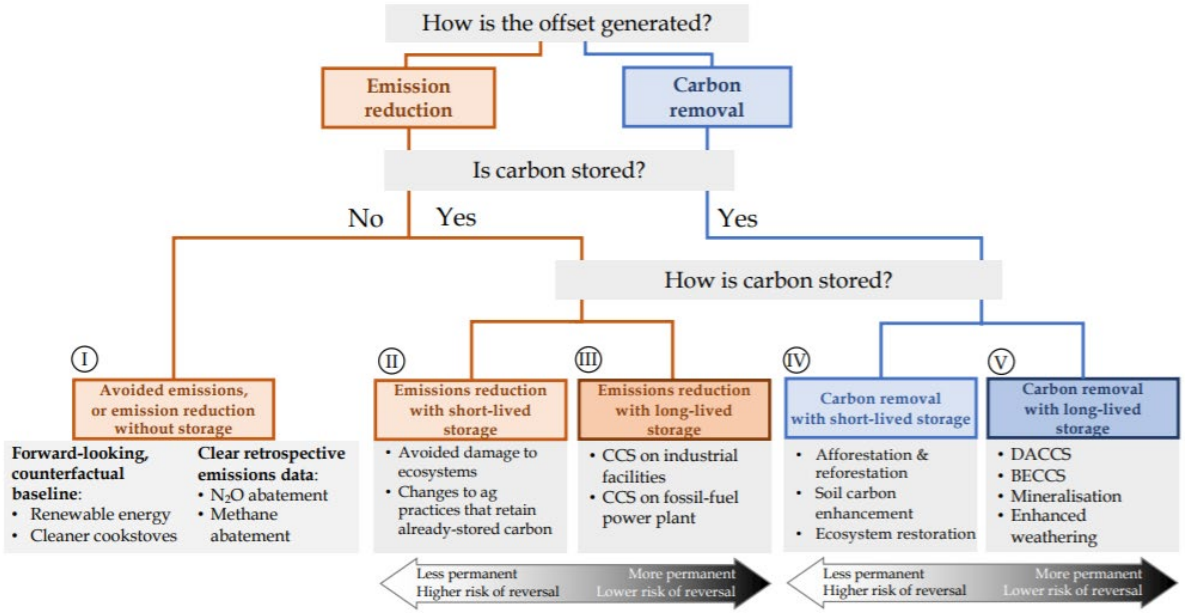
Scenario 2 (blue) uses early, deep, and sustained emissions reductions in adherence with a climate budget to achieve emissions mitigation required to limit global temperature rise to 1.5 degrees Celsius .

Source: The Pembina Institute

[34] https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html
[35] https://www.pembina.org/pub/how-get-net-zero-right

Offsets as a method of attaining a net zero business model are a useful and necessary tool. However not all offsets are created equal. The Oxford Offsetting Principles[36], released in 2020, identify 5 major types of offsets (see Figure 3 below) and outline how offsetting needs to be approached to ensure it helps achieve a net zero society. Offsets range from avoided emissions at the lowest end to offsets that enable carbon removal with long-lived storage at the higher end.

Figure 3: Five different types of offsets



Source: The Oxford Offsetting Principles

The strategic framework outlined by net-negative.tech[37] identifies three stages and types of systems required for creating the net zero economy and the required critical key technologies that will enable: low carbon systems, zero emissions systems and carbon negative systems. “Different parts of the economy are likely to be at different points in their journey between these stages. The overall climate requires a balance: any activity that is still producing carbon must be offset by carbon absorbing activity elsewhere in order for net zero to be achieved.”

[36] https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf
[37] Developed by Diana Fox Carney and Beatrice Lee, https://net-negative.tech/

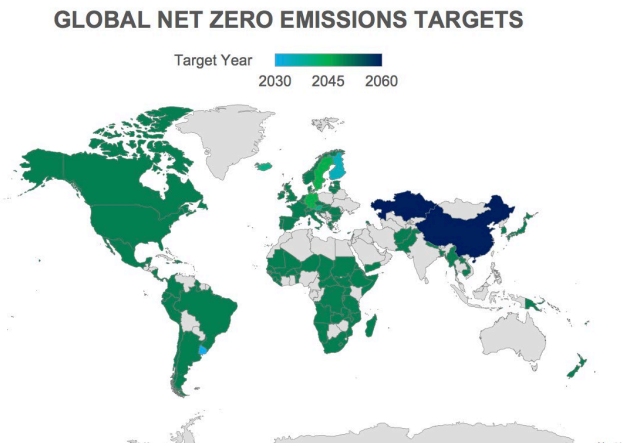
As investors become more sophisticated in the identification and assessment of net zero business models of companies, they will ultimately allocate capital to those companies that have implemented a more robust “True Net Zero”, “Real Zero” or “Net-Negative” business model and plan. This, we believe at a minimum should include 100% clean energy sources for operations, a clean fleet for both inbound and outbound products and services, a reduction of GHG emissions and a plan/target for further GHG emission reduction (scope 1, 2 and 3), and finally the use of type 5 offsets when unable to reduce emissions any further.

The Goal of Net Zero

Beyond the multitude of global agreements that have taken place since COP25 and the Paris Accord, the number of countries announcing commitments to achieve net-zero GHG emissions over the next 20 and 30 years continues to rapidly accelerate. Today, nine out of the ten largest economies of the world have now set ambitious targets to reach their Net Zero pledges in the coming decades (see Figure 4). This translates into trillions of dollars of investment and will result in numerous industries that will inevitably be restructured. While this will undoubtedly create opportunities (for instance with the advent of new technologies and solutions), it will also massively disrupt certain sectors of the economy.

Figure 4: *Net-Zero targets per country*[38]

	Target Year
Canada	2050
China	2060
European Union	2050
France	2050
Germany	2045
Italy	2050
Japan	2050
South Korea	2050
United Kingdom	2050
US	2050



International organizations and global thought leaders have been preparing the foundations for a global transition, but we are now at a critical juncture. The evolution of the impacts of climate change has significantly magnified the relevance and materiality of climate change-related risks and opportunities to the governance of limited liability corporations, as well as to pension funds and bank as fiduciaries. In the first half of 2021, we have seen significant progress that a path forward is possible:

[38] Source: KKS Advisors (www.kksadvisors.com), adapted from: Energy & Climate Intelligence Unit., (2021), Net Zero Emissions Race; https://eciu.net/netzerotracker

- The International Energy Agency (IEA) declared that a net-zero emissions global economy is possible and suggested a stress-tested roadmap with key milestones and target dates for some of the hardest to transition sectors. This **Net Zero 2050 IEA landmark** report released in May 2021, has sent shockwaves across all sectors around the world.
- Mark Carney, the former Governor of the Bank of Canada and Bank of England who co-led in the creation of the Task Force on Climate-Related Financial Disclosures (TCFD), has now, as the UN Special Envoy on Climate Action launched the **Glasgow Financial Alliance for Net Zero (GFANZ)** which includes over 160 institutional investors, banks and insurance companies who have a combined $70 trillion in assets under management. They are "All In" and have committed to Net Zero and key milestones along the way.
- In **landmark legal cases**, a Dutch court ruled and advised Shell that it needed to accelerate its business model transformation and emissions reduction plan timeline and the Canadian Supreme court rule that the Canadian Federal Government has the legal authority for the country to set a carbon fee.
- **Climate activist investors** were successful in nominating four directors to Exxon Mobil's board of directors and having three of them elected.
- The World Economic Forum recently identified **climate change and related environmental issues as five out of the top six risks to the global economy**.
- Lastly Blackrock, the world's largest asset manager, has put public company CEOs and Boards on notice that they need to have transition plans to conform their businesses model design to a net-zero emissions economy. As Larry Fink's 2021 letter to CEO's clearly states the tectonic shift of assets towards sustainable assets materially accelerated in 2021 and "there is **no company whose business model won't be profoundly affected by the transition to a net zero economy** – one that emits no more carbon dioxide than it removes from the atmosphere by 2050".

While all sectors will be impacted either directly or indirectly, to truly achieve a net-zero global economy, the heavy GHG emitting industry sectors and companies such as those in the Energy and Utilities sectors, as well as Mining and Materials will need to pivot, adapt, and for some, significantly re-design their business models. For others, the companies should plan for winddown.

Some higher emitting companies currently have assets on their balance sheet that are at risk of becoming stranded and may be subject to complete write downs in value. Stranded assets associated with a carbon neutral, or net-zero transition are unique in that they are not strictly driven by technological innovation, but rather by a need to limit carbon emissions to mitigate the worst effects of climate change[39]. This underlines the need for global pathways that explore what would need to happen to the fossil fuel energy sector (both from a global and North American perspective) to achieve net-zero emissions by 2050.

In line with an official request by the COP26 Presidency, the International Energy Agency (IEA) recently released a report[40] "Net Zero by 2050 – A Roadmap for the Global Energy Sector" providing the first comprehensive Energy sector pathway towards

[39] Olaf Weber, Truzaar Dordi, and Adeboye Oyegunle, Stranded Assets and the Transition to Low-Carbon Economy, Sustainability and Financial Risks, Palgrave Studies in Impact Finance, https://doi.org/10.1007/978-3-030-54530-7_3
https://doi.org/10.1007/978-3-030-54530-7_3

[40] https://iea.blob.core.windows.net/assets/ad0d4830-bd7e-47b6-838c-40d115733c13/NetZeroby2050-ARoadmapfortheGlobalEnergySector.pdf

global net-zero emissions by 2050. The IEA landmark report assesses the policy requirements, the deployment and innovation needs, the necessary investments, the economic benefits, and the wider implications for the world of getting to Net Zero for the energy sector and beyond.[41]

The global energy system is currently dominated by fossil fuels. As demonstrated within the IEA report, in 2050 the global energy system needs to be dominated by clean energy. To get to Net Zero by 2050, in line with a 1.5°C economy, more than 400 milestones were identified to help monitor whether countries are on or off track. As of this year (2021), these critical milestones include:

- No more fossil fuel supply capital expenditure (CAPEX) investments (oil, gas and coal)
- No more construction of unabated coal fired power plants

As of 2035, milestones include:

- No new sales of internal combustion engine (ICE) vehicles

In addition, by 2040:

- The electric power systems of the world must be 100% clean and carbon neutral electric power

The sobering and exhaustive report and related energy systems modeling from the IEA highlights what needs to happen, and by when, to get the global energy system to Net Zero. This challenge is further compounded by the fact that that many of the largest electric public power utilities owned by cities and sovereign nations around the world do not disclose their GHG emissions to the CDP[42]. This includes the largest public power producers in China and most of the members of the American Public Power Association (comprising 1400 public power utility members)[43].

Specific Challenges for North America

An additional challenge in North America is the interconnectedness and interdependence of the electric power grid. For instance, if Ontario and Quebec, which together are 96.5 % clean power, as members of the Northeast Power Coordinating Council (NPCC), flipped the off switch, the lights would go out in Washington, D.C and New York City. The electrical power grid is a North American integrated power system and the electrons do not stop at either U.S. or Canadian Customs for entry (see Figure 5).

The American power generating capacity as of March 2021, is still 66.9% fossil fuels (natural gas, coal, and fuel oil), and permitted new capacity to be built is still 35% natural gas power generation. The risk of stranded assets in many of these utilities is high in light of the IEA's new 2050 Net Zero scenario and their milestone of 100% clean power for the world by 2040. More importantly is President Biden's new goals to create a carbon pollution-free power sector by 2035 and net zero emissions economy by no later than 2050[44].

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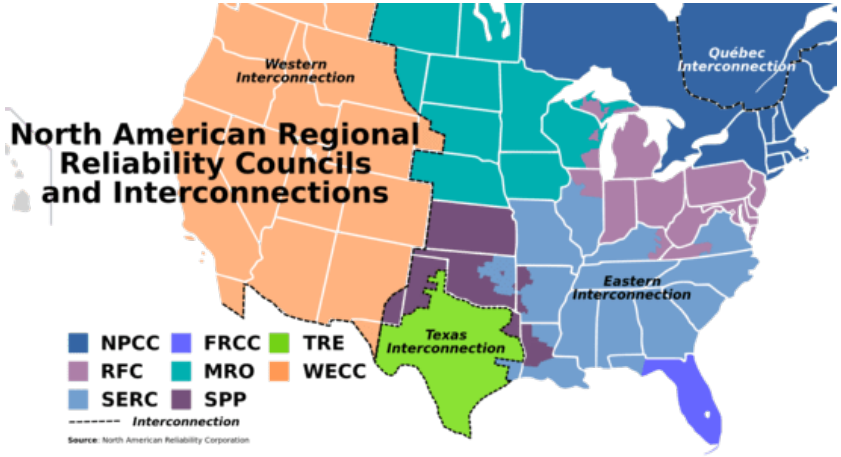
[41] https://www.youtube.com/watch?v=WQ5HsTyU_5Q

[42] Previously known as the Carbon Disclosure Project (www.cdp.net). CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.

[43] One of the authors of this OSFI report has been an advisor over the last 30 years to the Boards and C-Suites of some of the largest electrical utilities in the world, including those with nuclear power; https://www.publicpower.org/our-members; https://www.publicpower.org/resource/americas-electricity-generating-capacity

[44] https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/

Figure 5: *Interconnectedness of the North American power grid*[45]



The "Smart Continent"

To achieve a Net Zero North American power grid, what some describe as "the largest machine in the world", by 2040 and replace the last 150 years of infrastructure built with 85% fossil fuel electric power will require an almost wartime-like orientation and cross-border planning. This includes massive investment in new R&D and innovation[46] and investment in infrastructure, to build back better a new clean energy North American power grid which will be essential in enabling the idea of a "Smart Continent".

The Smart Net Zero Continent and transformation will be composed of:

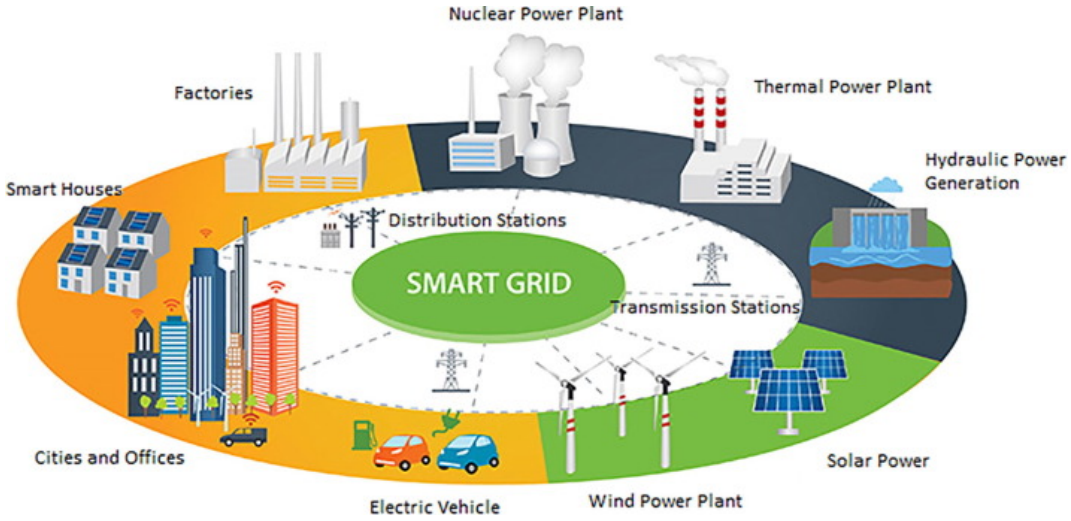
- A smart, clean, cyber-secure North American electric power grid
- A smart, clean distributed energy generation systems, including small modular nuclear
- Smart, clean energy efficient homes, buildings and factories
- Smart ground transportation (cars, trucks, trains, ships)
- Smart logistics and warehousing
- Smart air travel, air transport and biofuels
- Smart mining, smelting, and zero emissions steel and cement
- Smart agriculture and food systems
- Smart leisure and travel
- Smart cities

[45] Source: North American Reliability Councils
[46] Such as hydrogen energy, biofuels, carbon capture & storage (CCS), bioenergy with carbon capture and storage (BECCS) technologies, distributed generation, battery energy intensity and storage, direct air capture (DAC), negative emission technologies (NETS) and small modular nuclear (SMN).

- Smart homes

The foundation for this new infrastructure will be smart computing, artificial intelligence, and next generation 3D semiconductors.

Figure 6: *Clean and smart power grid will be the core of the smart continent*[47]



The transformation of sectors required to attain a net-zero global economy and smart continent will inevitably see some companies within these sectors transition and transform their business models, some companies that will struggle to transition, and some companies that will need to enter into a managed decline state or, depending on the forces of the capital markets, may simply see their total enterprise value completely erode. The ability of a company to transition its business model and become part of the new eco-system of the smart continent, will depend largely on where they reside in the corporate life cycle for innovation and return on capital and whether they have a positive or negative future value.

The Corporate Lifecycle, Innovation and Future Value[48]

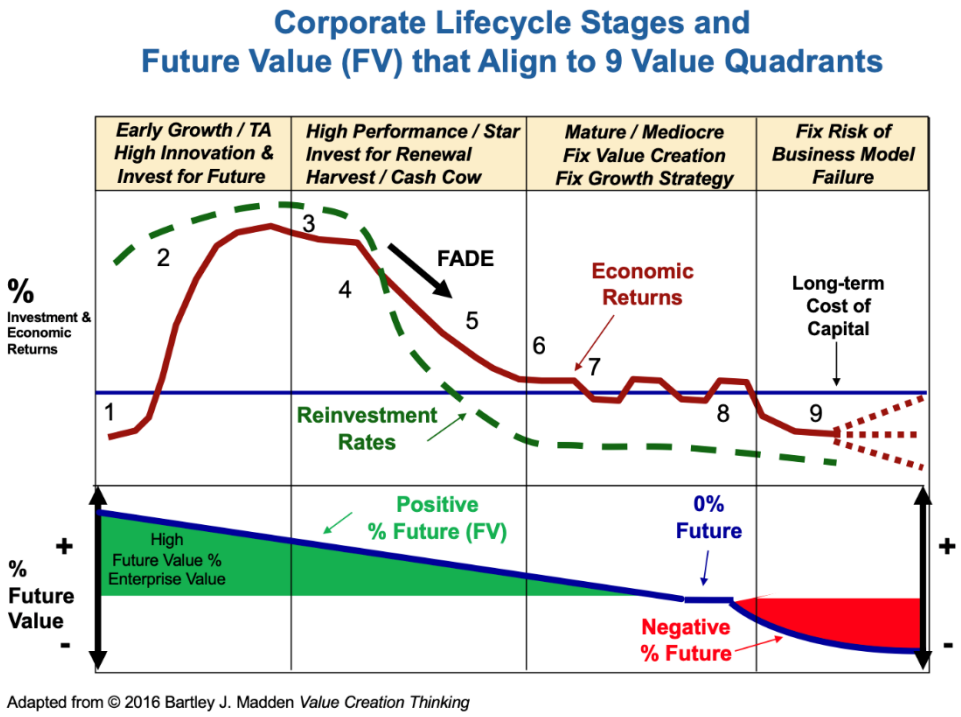
The company life cycle for growth, innovation, competitiveness and returns on capital, provides boards, institutional investors, and regulators with insights related to where in the life cycle a company is (and even where the entire industry is) using either the median or average of the industry for Economic Returns on Capital and Future Value (see Figure 7). As discussed in an article by Mark Frigo

[47] Source: www.sciencedirect.com

[48] See the Book "Value Creation Principles: The Pragmatic Theory of the Firm Begins with Purpose and Ends with Sustainable Capitalism and Sustainable Capitalism" by Bart Madden, 2020 Wiley & Sons and also "Beyond Earnings: Applying the HOLT CFROI and Economic Profit Framework" by David Holland and Bryant Mathews, Credit Suisse, Wiley 2018

and Bartley Madden,[49] the "competitive life-cycle framework helps CFOs, executive teams, and Boards make better investment decisions using an underlying logic for management's priorities, which are driven by the company's or business unit's life-cycle position". The lifecycle-framework also "provides a disciplined logic for making capital investment decisions, especially as pertaining to intangible assets in the New Economy."

***Figure 7**: The Corporate Life-Cycle Stages, Innovation and Future Value*



Adapted from © 2016 Bartley J. Madden *Value Creation Thinking*

As the global economy is committing to a net-zero environment, companies in higher emission industry sectors, in order to survive, will face the required challenge of re-designing their business models and in some cases their entire industry eco-systems to achieve:

- A positive Carbon Adjusted Return on Capital (CAROC) above their cost of capital (also measured as the HOLT CFROI > Discount Rate using the Credit Suisse HOLT ® model)
- Net-zero GHG emissions and zero waste by no later than 2050

[49] Frigo, M. and Madden, B, "Strategic Lifecycle Analysis: The Role of the CFO", Strategic Finance, October 2020.

At times of major disruption of industries and business models, the transformation to positive Carbon Adjusted Return on Capital (CAROC) and Zero/Net Zero GHG emissions will become a major strategic challenge for many companies.

The below points describe part of the company life cycle of innovation and returns on capital that must be recognized by Officers and Directors of public companies for effective strategic capital allocation in operating companies.

Global capital markets research by Credit Suisse HOLT® identifies that, based on over 25 years of global analytics[50]:

- Companies starting as "Failing Business Models" with a 5 yr. Return on Capital (HOLT CFROI) less than their Cost of Capital (HOLT® Discount Rate) and a "Future Value" that is low or negative, have a 59% probability of ending up as a "Failing / Failed Business Model", destroying shareholder value, in the next 5 years
- Companies starting as "Value Myth" with a 5 yr. Return on Capital less than their Cost of Capital but with a Future Value that is positive, have a 40% probability of being wound down or acquired in the next 5 years
- Companies starting as "Hidden Value" with a 5-yr. Return on Capital greater than their Cost of Capital but with a Future Value that is low to negative, have a 38 % probability of being wound down or acquired in the next 5 years

Within this paper we present a methodology to identify where a company is positioned within the lifecycle of innovation and returns on capital when adjusting for an increase in the cost of carbon and a carbon shock for many. This will be critical for Boards and investors to understand so that they can both identify how exposed a company is to net-zero business model (NZBM) transition risks as well as the level of probability and Carbon Adjusted Returns on Capital (CAROC) that the company can actually transition to, given the current business model and organizational leadership.

[50] Holland, David and Matthews, Bryant, "Beyond Earnings", 2018, Credit Suisse Securities, Wiley & Sons p. 278

PART 3: Overview of Analytical Research for Carbon Shock Stress Testing

Summary of Our Analytical Research

Enterprise value exposed to a carbon shock

Working in close collaboration with Credit Suisse HOLT® in both London and Chicago, we requested a special custom data run, based on our specifications, from the Credit Suisse HOLT® global securities database. Using this custom data, we completed a pioneering global analysis to create greater strategic insight for the Government of Canada and the Office the Superintendent of Financial Institutions, the U.S. Securities and Exchange Commission, and the Net Zero Asset Owners Alliance.

The results provide a unique and bottom-up quantification of the scale and risk of a Net Zero transformation in the global capital markets[51] by stress-testing a rise in carbon prices on the cost of capital of a sample of global firms, based on their disclosed scope 1 & 2 emissions, and assuming no cost pass through to consumers.

Of the 12,883 companies in our global sample, 11,163 companies (87%) had disclosed or estimated (by ISS) carbon emissions data (scope 1 & 2) in the Credit Suisse HOLT® global database. The data source for carbon emissions was ISS[52]. When we applied an estimated cost of $75 / ton CO2e to the 11,163 securities, 3,470 securities (27%) had a greater than 5% decline in their Carbon Adjusted Return on Capital (CAROC)[53].

From Table 4 below, we can see that this varies considerably from sector to sector. Not surprisingly, sectors such as Energy, Utilities and Materials have 64-75% of companies impacted negatively by a carbon price of $75 / ton.

At the 80th percentile, some sectors like Utilities, Energy, and Materials had a negative 300 to 700 basis point (bp) decline in CAROC as measured in this research study using the HOLT Carbon Adjusted-CFROI.

The total Enterprise Value at risk[54] of a greater than 5% decline in Return on Capital of these 3,470 global securities is over $20 trillion in the global capital markets[55] (see Table 4). This figure is not immaterial for the risk-adjusted and more specifically, the carbon-adjusted portfolio returns, of global, long horizon investors such as pension funds.

[51] With their significant exposure to global markets, Canadian and US pension funds are at particular risk.
[52] Institutional Shareholder Services
[53] Where return on capital is measured by the > 5 % negative change in CFROI calculated by Credit Suisse HOLT®
[54] As measured by the total combined Enterprise Value of the of the 3,470 global securities that had a greater than 5% decline in Return on Capital
[55] We also found that Asia/China only had 12% of their listed companies with a material negative impact when stress tested at $ 75 / ton CO2e, which raised questions about the accuracy of their GHG disclosures

Table 4[56]: *Impacts on the return on capital on a global sample of over 11,100 companies after applying a $75 / ton price of carbon to scope 1&2 data. This table identifies those companies that had great than a 5 % negative change in their return on capital (HOLT CFROI) and their total combined Enterprise Value at risk.*

	GLOBAL					
	Companies	Carbon Data		>5% Impact		Enterprise Value ($m)
Materials	962	854	89%	179	75%	$ 4,041,014
Utilities	259	234	96%	70	64%	$ 3,698,549
Energy	480	451	97%	187	73%	$ 3,416,406
Industrials	2,475	2,236	95%	190	35%	$ 3,504,753
Consumer Staples	741	693	90%	87	63%	$ 2,228,310
Consumer Discretionary	1,997	1,693	85%	135	24%	$ 1,516,140
Financials	1,417	1,264	91%	4	1%	$ 722,296
Information Technology	1,703	1,397	87%	62	15%	$ 722,423
Health Care	1,308	1,052	82%	28	6%	$ 197,264
Real Estate	796	725	98%	13	5%	$ 194,073
Communication Services	740	564	89%	12	5%	$ 133,197
	12,883	**11,163**	**87%**	**3,470**	**27%**	**$ 20,374,424**

Source: Credit Suisse HOLT®

North American securities at risk

In the above sample of securities that were at risk from a $75 / ton CO2e price shock and stress test, over 50% of the securities were in North America (see Table 5). We therefore undertook a second analysis of over 1,500 of the largest securities in Enterprise Value in North America. This time we stress-tested at $100 / ton CO2e, using scope 1 & 2 emissions data and assuming no carbon cost pass through to consumers. We believe this was a conservative price shock given that Canada is scheduled to go to $170 / ton carbon fees by 2030. The results can be found in Table 5. As can be seen, 23% of the sample of the North American sample of securities had greater than a 5% negative change in their return on capital and their total combined Enterprise Value. This is equivalent to $10.9 trillion in EV.

[56] Source: Credit Suisse HOLT ®

Table 5[57]: *Impacts on the Return of Capital (HOLT CFROI) on the North American securities in our sample after applying a $75 / ton price of carbon to scope 1&2 data. This table identifies those companies that had greater than a 5 % negative change in their return on capital (HOLT CFROI) and their total combined Enterprise Value at risk.*

	CAN/USA						
	Companies	Carbon Data		>5% Impact		Enterprise Value ($m)	
Materials	252	225	89%	179	71%	$	1,621,617
Utilities	93	89	96%	70	75%	$	1,935,249
Energy	233	225	97%	187	80%	$	2,243,173
Industrials	578	547	95%	190	33%	$	1,855,363
Consumer Staples	170	153	90%	87	51%	$	1,235,936
Consumer Discretionary	500	426	85%	135	27%	$	822,827
Financials	754	684	91%	4	1%	$	688,634
Information Technology	586	507	87%	62	11%	$	317,157
Health Care	720	590	82%	28	4%	$	64,411
Real Estate	222	218	98%	13	6%	$	135,252
Communication Services	183	162	89%	12	7%	$	52,863
Unknown	2	0	0%	0	0%	$	-
	4,293	**3,826**	**89%**	**967**	**23%**	**$**	**10,972,481**

Source: Credit Suisse HOLT ®

[57] Source: Credit Suisse HOLT ®

Four Questions to Determine a Firm's Net Zero Transition Capacity

While the exposure and carbon risk of companies will differ from firm to firm, there is a set of foundational questions that long horizon institutional Asset Owners, Board directors at investee companies, fiduciaries, regulators and stakeholders should be asking of all companies as we enter into a net zero global transformation together. Below are four questions to help us determine which firms were most at risk from the transition to a net zero global and North American economy:

1. **Does the company currently have an economically strong business model** and therefore would be able to transition to a net zero business model (NZBM) as measured by its current positive Return on Capital (ROC) and Economic Profit (EP) business model profile?
2. **What is the level of exposure and carbon emissions intensity within the current business model design and total business system** and therefore what is the expected distance of travel and level of complexity of transition required for the business model to achieve net zero or net zero emissions?
   - Measured as **Tons of CO2e produced per Million Dollars of Revenues**

3. **What will be the impact if there is a positive carbon price shock of $100 / ton CO2e**. Specifically, what is the impact on the company's:
   - Return on Capital (therefore a **Carbon Adjusted Return on Capital or CAROC**)
   - Carbon Adjusted Performance Spread (therefore a **Carbon Adjusted Performance Spread or CAPS**) – an ultimate new performance metric which measures the Return on Capital after the cost of capital and after the cost of carbon

4. **Is the company able to fund their required transition** given their current business model and cash flows?
   - Measured by the ratio of key operating cash expenses and cash financing (interest and dividend payments) relative to gross cashflows (therefore a **Net Zero Transition Cash Risk Ratio or NZTCRRS**) since most companies will require some level of R&D and new CAPEX to transform to a GHG neutral, low, or negative business model

After answering the above questions and solving for the expected net zero or carbon risk of a company. Two follow-on core questions naturally arise, that all investors, Board directors, fiduciaries, regulators, and stakeholders need to ask:

- Are the **capital markets accurately pricing in the Carbon Risk** of the company and its current Business Model design? Is this risk accurately reflected in investment portfolios or is there excess uncompensated risk (like in the 2008/2009 financial crisis) that the capital markets are not pricing in? Is this a product of short-termism?

- Are capital market participants being evaluated on the right set of metrics (i.e., total shareholder return, quarterly/annual alpha, etc.) or are **new performance metrics and incentive designs required to accelerate the transition to a Net Zero Business Models (NZBM) and a Net Zero economy?**

- Does the company CEO, C-suite or the Board have the right level of "**Strategic Leadership" and Systems Level Thinking** required to transition a business model effectively and successfully to a Net Zero Business Model and its contribution to a net zero economy? Do the asset owners?

We then sought to align our findings for the 1500 largest listed companies to identify where they sit in the corporate lifecycle of the business model, the lifecycle of innovation and returns on capital, and the current position of their business model performance into the requisite value creation quadrants using Economic Returns on Capital (Economic Profit) and Future Value to determine the position[58].

This paper outlines a methodology and introduces a new set of research-based performance metrics and Net Zero Transition "strategic analytical insights" to help Boards at investee companies, capital market participants and key financial system regulators answer the above questions. It also outlines a framework to determine the strategic leadership positioning of a firm. To illustrate the impact from a carbon shock, we present results from a global and North American analysis that includes over 11,100 securities with carbon emissions disclosed or defensibly estimated.

The point of our Net Zero Transition stress-test research study was to:

- Identify the percentage of firms exposed to carbon risk within the core fundamentals of their current business model design as well as the percentage of companies that today have failing business models with consistent returns on capital below their cost of capital
- From the above companies, we then wanted to identify which higher carbon business models also had a high 5 yr. Total Shareholder Return (TSR) and Future Value (FV), therefore indicating a possible capital markets mispricing.

[58] For the detailed methodology and results, contact Mark Van Clieaf at Mark.VanClieaf@FutureZero.com

Five Key Findings and Insights from our Net Zero Analysis and Carbon Shock Stress Testing[59]

1) With the exception of the Energy sector, the global and North American capital markets appear to be mis-pricing a future rise in the price on carbon and possible carbon shock.

2) BEFORE a carbon shock, a significant portion of Energy (57%), Utilities (30%) and Materials (23%) companies had failing business models with a 3 yr. negative Economic Profit, a Return on Capital less than the Cost of Capital, and a very low / negative Future Value of the company, even though the majority of these Utility and Materials companies had a positive 5-year Total Shareholder Return (TSR).

3) Within the same sector there can be a broad range of Business Model carbon intensity. For example, in North American Investor Owned Utilities:

   - Hydro One produces 69 Tons of CO2e / $ 1 million revenues
   - Emera, Southern Co and Duke all produce > 4,000 tons of CO2e / $ 1 million
   - NRG is the highest with over 5,000 tons CO2e / $ 1 million revenues

   These last 4 investor-owned utilities are examples of companies that need a significant business model transformation. The entire North American electric power system will also require significant industry sector / eco-system transformation as well to get to a Clean Power Grid for North America by 2040

4) After adjusting and stress-testing for a rising cost of carbon, a large portion of Energy (67%), Utilities (50%), and Materials (39%) companies have failing business models as measured by their Carbon Adjusted Return on Capital (CAROC), CAPS and Future Value (FV).

5) For all North American companies in our sample, 28% have a Net Zero Transition Cash Risk Ratio less than 1 which means they do not generate enough internal cashflows to fund the net zero business model transition internally. Of these, 92% of Utilities, 67% of Energy, 11% of Materials companies will have to raise external financing to drive the Business Model transformation to Net Zero.

   For these companies it is NOT a Business Model Transition but a complete Business Model Transformation!

[59] For the full methodology and results contact Mark Van Clieaf at Mark.VanClieaf@FutureZero.com

Summary of Sector Findings[60]

North America - Overall

- The majority of companies are in Value Quadrant 2 in our value creation analyses, demonstrating that most North American companies (across all the various industries in the sample) have strong business models, positive FV and will still manage to create a positive Return on Capital and Performance Spread above cost of capital when we adjust for a carbon stress-test at $100 / ton CO2e (scope 1 & 2). Note, we have not adjusted our findings for the market value of the underlying companies, nor applied any industry or sector weightings to the sample of 1500 companies.

North America - Utilities

- 57 % of North American utilities had a return on capital less than their cost of capital and a 3-year cumulative negative economic profit. 30% of the Utilities companies analyzed had a "failing business model" (as defined by a 3-year negative Economic Profit and negative Future Value (FV))
- 98% of companies in the Utilities sample were considered "higher carbon" business models and nearly half of these high / higher carbon companies also had a positive FV and thus expectations for positive returns on capital in the future
- When we adjust and stress-test for a $100 / ton price of carbon:
    - The majority (92%) of companies had a negative Carbon Adjusted Return on Capital (CAROC - which in this research study used the HOLT Carbon Adjusted CFROI), yet 44% of these companies also had a positive Future Value (FV).
    - 91% of companies had a negative Carbon-Adjusted Performance Spread (CAPS – which in this research study used the HOLT Carbon Adjusted CFROI – Discount Rate spread), and thus the business model is destroying shareholder value after cost of capital and after a cost of carbon stress test at $100 / ton CO2e (scope 1 & 2). However, 86% of these had a positive 5 yr. Total Shareholder Return (TSR). The capital markets therefore seem to be mis-pricing potential future carbon price risk, new clean energy technologies, and regulatory risk.
- 93% of Utilities companies had a Net Zero Transition Cash Risk Ratio (TCRR) of less than 1, and therefore these companies do not generate enough free cash flows in their current business models to internally finance / invest in a Net Zero Business Model transition, all else being equal.

These findings may be indicative that the capital markets are not pricing in a rising price of carbon, or transition risk, for Utilities companies, all else being equal.

[60] Our data from multiple data sources is as of April 30, 2021. For the full methodology and results contact Mark Van Clieaf at Mark.VanClieaf@FutureZero.com

North America - Energy

- 57% of the Energy companies analysed had a “failing business model” (as defined by a 3 yr. negative Economic Profit (EP) and negative Future value (FV)) before considering any carbon shock risk.
- Not surprisingly, the Energy sub-sector had 92% of companies that were considered high carbon, and 73% of these had a negative Future Value (FV).
- When we adjust and stress test for a $100 / ton CO2e (scope 1&2) price of carbon:
    - The majority (87%) of companies had a negative Carbon-Adjusted Return on Capital (CAROC), and 79% of these companies also had a negative FV.
    - 86% of companies also had a negative Carbon-Adjusted Performance Spread (CAPS) thus the business model is destroying shareholder value after cost of capital and after a cost of carbon stress test at $100 / ton CO2e (scope 1 & 2). 75% of these also had a negative 5 yr. Total Shareholder Return (TSR).
- 66% of Energy companies had a Net Zero Transition Cash Risk Ratio (TCRR) less than 1 and 34% had an TCRR greater than 1, indicating that, as opposed to Utilities, over a third of Energy companies do have sufficient free cash flows in their current business models to internally finance / invest in a Net Zero Business Model transition, all else being equal.

These findings may be indicative that capital markets have been pricing in a rising price of carbon, reduced demand for fossil fuels, and increased technologies for clean energy, and hence are pricing in a rising price of carbon, or transition risk for the Energy sector, all else being equal.

North America - Materials

- 23% of the Materials companies analysed had a “failing business model” (as defined by a negative EP and negative FV) and 46% were “High Performers” with a 3 yr. positive EP and Positive FV.
- Not surprisingly the Materials sector of our sample had 85% of companies that were considered higher carbon, and 54% of these had a negative FV.
- When we adjust and stress test for a $100 / ton price of carbon:
    - 47.7 % of companies end up with a negative return on capital (CAROC), and 31% of these companies also had a positive FV
    - 57% of companies end up with a negative carbon-adjusted performance spread (CAPS) thus the business model is destroying shareholder value after cost of capital and after a cost of carbon stress test at $100 / ton CO2e (scope 1 & 2), but 76% of these companies had a positive 5 yr. TSR.
- 89% of the Materials companies had a Net Zero Transition Cash Risk Ratio (TCRR) greater than 1, and more than three quarters (76%) of these companies had a positive FV, indicating that most Materials companies have sufficient free cash flows in their current business models to internally finance / invest in a Net Zero Business Model transition, all else being equal.

This may suggest that either over the past five years, the capital markets have not been pricing in the impact of a future increase in the price of carbon, or this may be indicative that the markets believe that the companies have created, or will create, viable strategies to reduce the carbon sensitivity of their business models.

North America - Financials

- Only 14% of the Financials companies analysed had a “failing business model” (as defined by a negative EP and negative FV) and 77% were “High Performers”.
- 82% of companies were low carbon companies (83%), which is not surprising as we are only looking at scope 1 & 2 emissions. If scope 3 emissions, such as those resulting from financing and lending activities were included, then the Carbon-Adjusted returns would be much lower.
- When we adjust and stress-test for a $100 / ton price of carbon:
    - 83% of companies had a positive return on capital (CAROC), and 82% of these companies also had a positive FV.
    - 73% of companies had a positive Carbon-Adjusted Performance Spread (CAPS). However, 89% of these had a positive 5 yr. TSR.
- 67% had a Net Zero Transition Cash Risk Ratio (TCRR) less than 1, meaning these companies may not have sufficient free cash flows in their current business models to internally finance / invest in a Net Zero Business Model transition, all else being equal.

These results suggest that a rise in the price of carbon does not have as much impact on Financials companies than the other sectors. However, this does not reflect any carbon risk in the investment or loan portfolio of Financial Institutions (Banks and Insurance companies) since we are only using scope1 & 2 disclosed data.

Biographies for FutureZero & CGC

Mark Van Clieaf

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FutureZero

Mark Van Clieaf is Managing Director at FutureZero, a leading consultancy advising Global Institutional Investors, Boards, CEO's, CFO's on Organization Design, Enterprise Performance Measurement, CEO succession planning and selection, and Named Executive Officer Long-Term Incentive Plan design all aligned to shareholder and societal value. A core focus includes Organization Design, Executive Succession planning & selection, and LTIP design for the Net Zero Transformation to 2050.

He brings over 30 years consulting experience in Boardrooms and C-Suites on 3 continents across a broad range of industries. This includes Consumer Marketing, Marketing Services, Retail, Financial Services, Pension Funds, Technology, Healthcare, Energy, Utilities, Mining and Telecoms sectors. Over the last 30 years he has assisted in recruiting over 400 senior officers and assisted in negotiating their employment agreements at some of the largest companies in the world. This experience also includes over 20 yrs. Advisory capacity to Omnicom Inc. the worlds' leading group in Marketing Communication, Advertising and Branding.

His research on company valuation, Carbon - Adjusted Return on Capital (CAROC), Future Value and the direct link to the Five Zones of CEO Innovation & Sustainability, management structure design, and executive talent assessment and the alignment to Net Zero transformational leadership, has been applied by number of leading companies and Institutional Investors around the world.

Management structure design, executive talent management, and LTIP design as "Organizational Capital" and the new drivers of long-term (10 year +) shareholder and societal value.

For the last 20 years he was based in Tampa, Florida, working worldwide and has recently return to Toronto, Canada full-time.

While at Price Waterhouse in his earlier career in the Executive Search and Business Strategy consulting practices, he developed the first CEO role profile for the newly formed Board of the Ontario Teachers' Pension Plan and was part of the PWC team to recruit its first Chief Executive Officer. He has been an advisor on Organization Design, CEO Succession and Executive Incentive Design for Ontario Teachers' and or their investee companies, and other major global Asset Owners and Asset Managers for over 30 yrs.

He was on a two-year retainer with CitiCorp Inc providing organization design and executive search in setting up their corporate banking, merchant banking, leverage finance, M&A advisory, Corporate Workout and Corporate Credit teams and P&L centers.

His began his career in account management in the advertising, graphic design, direct marketing, and marketing services industries. He has continued in an advisory capacity to Boards and Executives on Madison Ave, Wall Street, Bay Street, Canary Wharf and Silicon Valley for over 30 yrs.

His consulting experience, research and thought leadership has been published in a number of leading publications including:

- Handbook of Board Governance – 1st and 2nd Editions
- Directorship
- Corporate Governance Advisor
- The Corporate Board
- The Ivey Business Journal
- Business Horizons
- American Journal of Management Development

And he is frequently quoted by:

- New York Times
- Wall Street Journal
- USA Today
- Financial Times
- And on TV for CNBC

His appointments & memberships have included:

- International Corporate Governance Network – London, UK – 2021 - Panel Chair - Metrics & Incentive Design for Investee Companies and integration with Sustainability and the Net Zero Transformation to 2050
- CFA Chicago – PDDARI – Lead on Corporate Governance and Proxy Voting Research
- Investor Responsibility Research Center Institute, Report on Value Creation, Metrics + Long Term Incentive Design
- Guest Lecturer and Researcher for over 8 yrs., Corporate Governance, Ivey School of Business, University of Western Ontario
- Commissioner for the National Association of Corporate Directors, Blue Ribbon Commission on CEO Succession Planning, Washington, D.C.
- Founding Member, Executive Selection Research Advisory Board, Center for Creative Leadership, Greensboro, North Carolina
- Guest Lecturer – Ph.D. Level I/O psychology University of Guelph, Ontario, Canada
- Guest Lecturer, The Center for Strategy, Execution and Company Valuation, Driehaus College of Business – School of Accountancy, DePaul University, Chicago, USA
- Sustainability Accounting Standards Board, Advisory Group Member
- Past President of the Strategic Leadership Forum, Toronto – Largest Chapter in North America for Strategic Leadership Education

Tamara Close

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Tamara is the founder of Close Group Consulting, an independent ESG advisory firm, which focusing on ESG integration across investment and risk management frameworks for asset managers, general partners, and asset owners.

She brings over 20 years of experience in the global capital markets in both risk management and Investment management roles.

She has served as Managing Director and Head of ESG Integration for KKS Advisors and recently developed an industry-leading ESG integration maturity assessment model (Sustainable Risk Assessment Framework) and tool for investment managers, providing standardized industry best practices benchmarking in a scalable technology-driven solution.

Prior to founding CGC, she was at PSP Investments in Montreal, for over 10 years, in senior management roles within the Risk Management and Public Markets Investment groups.

PSP Investments is one of Canada's largest pension funds with over $160 billion in AUM. It invests retirement funds for the pension plans of the Canadian Public Service, the Canadian Armed Forces, the Royal Canadian Mounted Police and the Reserve Force.

https://www.investpsp.com/en/

PSP has more than 800 professionals that manage a diversified global investment portfolio composed of assets in the public financial markets, private equity, real estate, infrastructure, natural resources and private debt.

Prior to PSP, Tamara was head of research and risk management for a fixed income asset management firm in Montreal

In her early career, she held various front office investment management positions for the Bank of Montreal and Credit Lyonnais in the global derivatives and foreign exchange markets.

Tamara holds a:

Chartered Financial Analyst (CFA) designation

Bachelor of Arts in Economics from McGill University

Master of Science in Finance from Concordia University's John Molson School of Business.

She has also completed Ph.D. level studies in Finance at Concordia University.

She is also a Certified Sustainable Investment Professional (SIPC), Concordia University, John Molson School on Business

Her appointments & memberships include:

- Board Director of CFA Montreal
- Chair of the ESG Committee for CFA Montreal
- Council member of the Canadian Advocacy Council for CFA Societies Canada
- Advisory Board member of PracticalESG
- Member CFA Global Industry Standards ESG Expert Network
- Women in Capital Markets; Co-chair Montreal Steering Committee

Lori Mattes

Chief Data Scientist

FutureZero

Lori is Chief Data Scientist for FutureZero and brings over 20 years' experience in **Analytics / Modeling / Reporting / Metrics** design across disciplines of **Market Research, Finance, Statistics/Actuarial, Marketing, Legal, Strategy, Pricing & Profitability and Operational excellence.**

Her 20 yrs. of experience in Strategic and Operational Analytics, Data mining, Business Intelligence and Reporting cuts across the Finance, Healthcare, Insurance sectors and Strategic Analytics and consulting across the Industrial, Consumer Goods, High Tech, Banking, Asset Owner and Asset Manager industry sectors.

EMD Serono Inc., ***2016 – Present***
Rockland, MA
Manager, Sales Analytics

FutureZero Inc and prior Organizational Capital Partners, ***2012 – Present***
Tampa, Florida
Chief Data Scientist

DELL, ***2013 – 2016***
Quincy, MA,
Harvard Pilgrim Health Care
Management of account reporting for contractor of leading health insurer in the New England region
Metrics and Reporting Senior Advisor

ARBELLA INSURANCE, 1993 – 2012
Quincy, MA
Property/casualty insurance company with personal and commercial revenues of $650M in New England.
Manager Research Analytics
Manager Research & Development
Program Manager Profit & Product Development
Research Analyst

SOFTWARE SKILLS

- Statistical Applications: Base SAS, JMP, R
- Spreadsheet/Database Applications: Excel, Access, PL/SQL, Teradata
- Reporting: Business Objects, Brio, Microstrategy
- Presentation: Word, PowerPoint
- Programming: Java Script, SQL, Visual Basic

EDUCATION

Graduate Level Applied Statistics
Texas A&M University, College Station, TX

M.B.A.
Babson College, Wellesley, MA

B.A., Foreign Languages
Bowdoin College, Brunswick, ME

Women's Leadership Program
Babson College, Wellesley, MA

Denise Bonte

Chief Graphic Design, Visualization & Presentation Artist

FutureZero

Denise specializes in creative, marketing, and document solutions to empower businesses communications and collaboration.

A broad portfolio of graphic design, logo design and the development of brand assets using Adobe to design and implement type, photography and brand styles into professional presentations, white papers, proposals and for Instructional Design / Training & Development.

With 30+ years working with Financial Analysts, Asset Owners, Advertising Agencies, Marketing Groups, and Business Consultants, she creates MS Office documents that function in a collaborative work environment.

Portfolio:

https://www.behance.net/denise_bonte

Denise Bonte Design, 1990 – Present

Presentation Designer Ontario, Canada

Genigraphics Canada, 1985 - 1990

Senior designer / 35mm slide production

Maclean Hunter Cable TV, 1981-1984

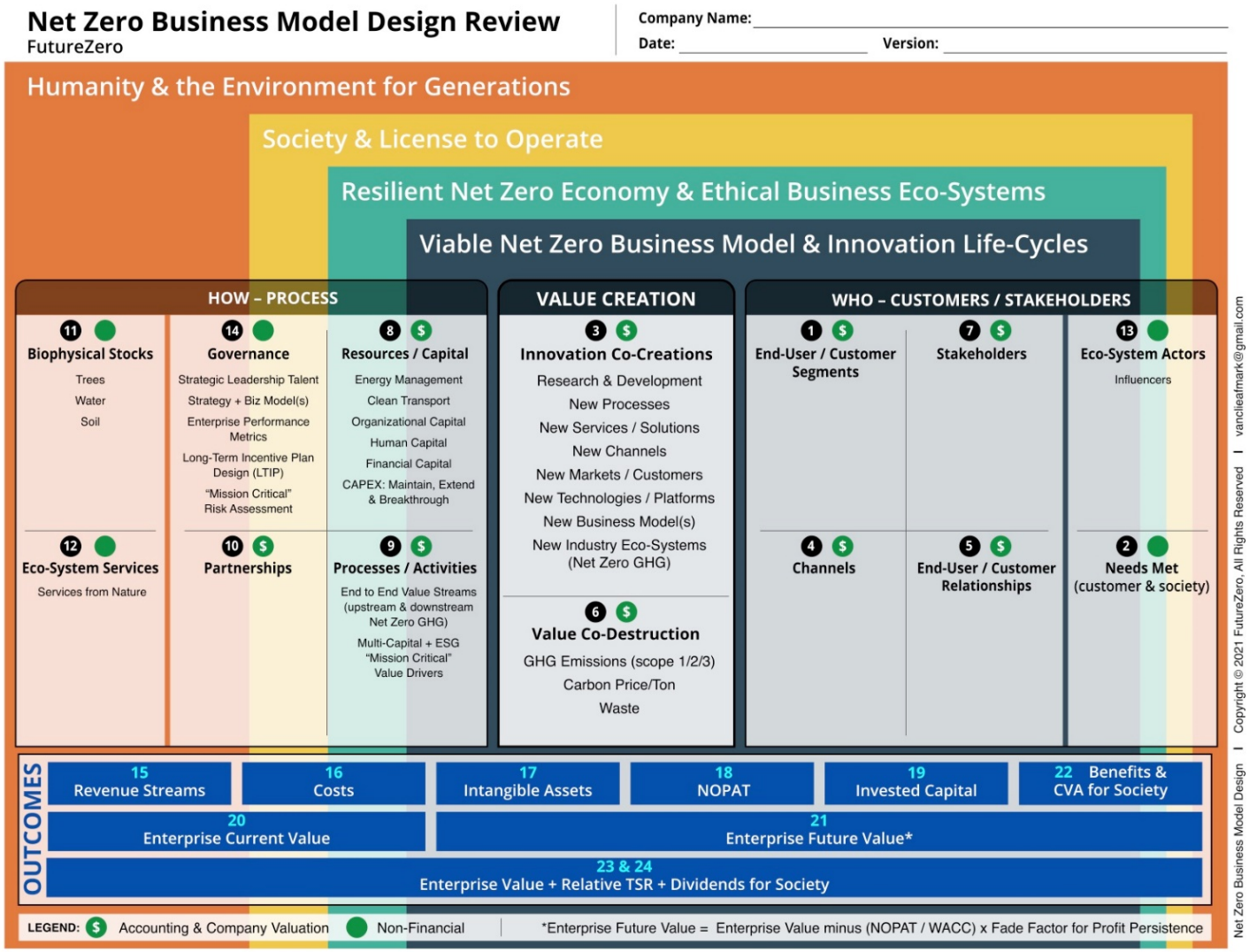
Community TV Producer / Program Director

Georgian College, 1978 - 1980

3 yr Graduate Diploma in Design Arts, Applied Arts & Technology

FutureZero

VALUE • TRANSFORM • SUSTAIN



DISCLAIMERS

Note to readers:

The preceding white paper presents our analysis, observations, and findings. ***We have not undertaken an extensive literature review into the existing empirical research on this subject, nor have we applied the same level of rigor to our analysis that one would find in a peer reviewed academic paper***.

However, we believe that the findings are significant enough to serve as a catalyst to start the conversation for capital markets participants in the board rooms of corporates, asset owners and asset managers. While certain assumptions have been made in our analysis (as detailed in the specific tables), we believe the findings can serve as a foundation for further empirical research into this topic.

Information contained in this integrated analysis is generated using the Credit Suisse HOLT Lens® model for company Life-Cycle competitive performance and company valuation and the Morningstar Model for company Moat analysis. The information and data in the report are current as of the publication date and subject to change without notice.

The information provided is not intended to provide a sufficient basis on which to make an investment decision.

This analysis is provided by Future Zero for the purposes of Corporate Governance and insight related to business strategy, relative and absolute enterprise performance assessment and possible risks related to Net Zero Business Model Transition. The raw data sources for these “strategic analytics” includes S&P Global Compustat, S&P Capital IQ, and Sustainalytics / Morningstar and like all data sources is subject to error. All Errors & Omissions Excepted, and should be interpreted and used accordingly.