

Consensus Climate Scenario

24 October 2024

Summary

The choice of a consensus climate scenario depends on a range of factors including the current state of the global economy as well as progress to date in transitioning to Net Zero. As acute and chronic physical risks and their associated costs accumulate, and as investor and public concern regarding climate change increases, Current Policies scenarios (i.e., NGFS, IEA) are less likely to be deemed acceptable. Reliance on Nationally Determined Contributions (NDC's) to achieve Net Zero goals is further undermined by both a lack of enforceability and credible transition plans from industry constituents. For these reasons, Current policy and related orderly transition scenarios may be construed by investors as unrealistically benign. More realistic scenarios would consider potentially disruptive actions to make up for lost time in the transition to Net Zero emissions. Alternative scenarios, such as the Delayed Transition and Fragmented World scenarios, are more credible insofar as they reflect shortcomings of current global policies and the geopolitical challenges of reaching consensus.

There are several arguments for disorderly transition scenarios:

- Carbon pricing, which places an incremental cost on emission producing activity, has been fragmented and sparse. Mispricing of fossil fuel driven outputs has slowed the transition to renewables.
- Regulatory frameworks to address financed emissions are unevenly applied across major markets including the United States, hampering efforts to manage risk taking on heavy emitting obligors and assets at risk of devaluation due to climate risk.
- Proportionately few institutions have credible, science based, transition plans and targets, undermining efforts to reduce emissions at the company level.
- While most nations have committed to NDC's, NDC's are not binding, limiting their effectiveness in achieving Net Zero 2050 goals.
- Unstable and competitive geopolitical conditions have led to trade sanctions and barriers which are important in the transfer of technologies that can accelerate the transition to clean energy.
- Sectors that are heavy emitters face industry specific challenges in transitioning to low carbon energy sources, with some sectors significantly lagging in the transition.
- The time horizon of climate change scenarios is long, making near term reactions by investors less likely—this issue was coined by former BoE Governor Mark Carney as the Tragedy of the Horizon.¹

Current geopolitical dynamics work against development of cohesive policies for measuring and managing financed emissions, transition planning, and regulating climate sensitive investments

¹ Breaking the Tragedy of the Horizon – climate change and financial stability, Speech by Mark Carney, Governor of the Bank of England, September 29, 2015

and risk taking by asset managers and financial institutions. In part owing to geopolitical tensions and national security concerns, it is also doubtful that policies will be fully harmonized across markets. Fragmentation in policies under the NGFS Fragmented World scenario is far more damaging than policy delays alone, with oil consumption falling in 2045—only five years ahead of NZ50. That said, governments are still likely to implement additional climate policies to support their respective NDC's, making a delayed but fragmented policy reaction plausible. Under the Fragmented World scenario, the temperature increase by 2100 is 2.3°C.

Emissions and temperature outcomes in the future are subject to a wide range of sources of uncertainty. For example, there is significant variation in predictions of when global oil consumption will diminish. Given the level of uncertainty in how climate transition risk will unfold over time, alternative scenarios are worth considering. One strategy (used in accounting-based regimes for life of loan estimation) is to have a baseline or primary scenario with upside and downside alternative scenarios in which key assumptions are varied. For example, the NGFS Fragmented World scenario forecasts may be made more or less benign based on assumptions related to carbon pricing and energy.

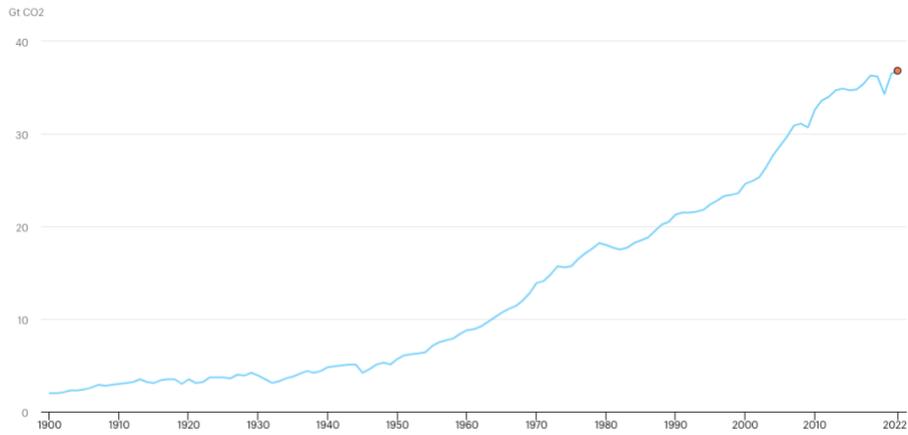
Background

The choice of a consensus scenario may be driven by a range of factors including industry perceptions of scenario severity, convictions about asset prices, views on regulation and pricing, and finally degree of harmonization across regions. The current state of global emissions and actual temperature levels also provide important context when evaluating forecast outcomes through the Net Zero target date of 2050. The aspiration of the Paris Accord was to attain a rise above pre-industrial levels of no more than 1.5 degrees Celsius, which would require emissions to be cut by 50 percent by 2030. While emissions growth has slowed due to investments in renewables, the overall trend has continued upward. Further, recent temperature history indicates that the 1.5°C benchmark is at significant risk of breach.

Global CO2 emissions from energy combustion and industrial processes, 1900-2022

Last updated 2 Mar 2023

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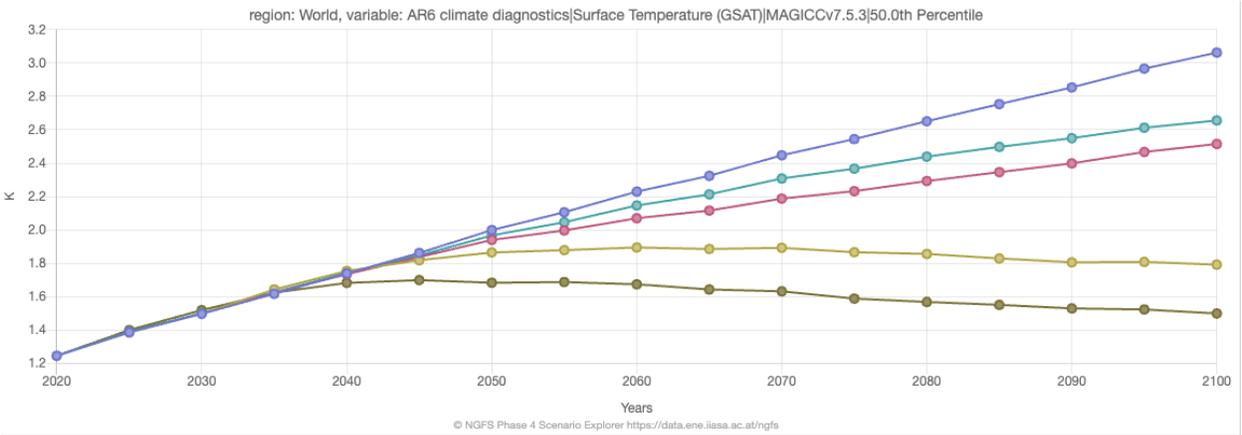


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Industry perceptions of climate scenarios are important to consider. In the Federal Reserve Climate Scenario Analysis pilot study, financial industry participants observed that the transition risk scenarios, NGFS Current Policies and Net Zero 2050 were orderly and relatively benign with steadily increasing temperatures.² Similar to the NGFS Current Policies scenario, the IEA Stated Policies scenario (STEPS) assumes global temperatures continue to rise as only existing climate policies are enacted. The STEPS scenario assumes that climate targets are not met and that a temperature increase to 2.4°C by 2100 is the most likely outcome. From an industry perspective, the continued rise in acute and chronic physical risks under these two status quo scenarios may lack credibility as it is assumed no further action is taken to stem the costs of extreme weather events and climate risk mitigation, rising insurance premia, and pressure from the public and investors to address climate concerns.

A third scenario, Nationally Determined Contributions (NDC's) also limits global warming to below 2°C. Heavy emitting nations have made pledges through Nationally Determined Contributions (NDCs) to reduce lower emissions. Compliance with NDC commitments is crucial to achieving Net Zero. While 85% of global emissions are currently covered by NDC submissions, there is no binding legal agreement (or penalty) for compliance, and it would take full compliance to achieve peak emissions before 2030.

Other alternative scenarios follow more disorderly transition pathways. These include the NGFS Delayed Transition and Fragmented World scenarios. The Delayed Transition assumes annual emissions do not decrease until 2030, and that strong policies are implemented to limit warming to below 2°C. Fragmented World assumes a delayed and divergent climate policy response among countries globally, leading to high physical and transition risks. The choice between these two scenarios depends in part on the degree to which climate policies are harmonized and adopted globally. Both scenarios assume that global warming is limited to below 2°C by 2050; however, the Fragmented Policies scenario projects a 2.3 °C temperature increase by 2100 and is far less benign than the Delayed Transition scenario which stems the increase to 1.8°C by 2100.³



² Pilot Climate Scenario Analysis Exercise, Summary of Participants’ Risk Management Practices and Estimates, May 2024

³ NGFS Scenario Explorer, Global Temperature Pathways under GCAM 6.0

Irrespective of the choice between these two disorderly scenarios, several factors contribute to delays in the transition to clean energy in the next several years. These include regional differences in carbon pricing and regulation, transition plans and investments, as well as sectoral trends.

Carbon Pricing

Only 1% of global emissions are priced above the recommended level of \$167 (US\$/tCO₂e).⁴ And Globally, about 23% of energy-related emissions are now covered by a carbon price of some type.⁵ While carbon pricing has increased and standards for pricing are improving, it is unlikely that the amount of price increase will be adequate to fully capture the cost of emissions in the near term.

Carbon pricing strategies also differ across markets. China has implemented and increased its Emissions Trading System (ETS), while India (the second largest emitting country) has only recently begun developing a carbon market. Developing countries are similarly slow to adopt carbon credit mechanisms. The United States has no national carbon taxation and is largely reliant on state and local governments to implement ETS programs. A national tax would take time to develop and would require US Congressional approval, which to date has been unlikely due to party divisions in the House and Senate.

The combination of slow adoption, inadequate GHG emissions coverage, and low pricing contribute to a delay in the transition away from fossil fuels. Fragmentation of policies globally may further contribute to arbitrage opportunities which can undermine reductions in emissions.

Regulatory Frameworks

Implementation of regulatory frameworks to address financed emissions has been uneven. While the Bank of International Settlements has set forth guidance on Climate Risks, central banks are not harmonized in their interpretation of risk management requirements. The ECB has issued comprehensive guidelines, with the objective of making the EU the first climate-neutral continent by 2050. Guidance is directly tied to macroprudential rules, which mandate capital requirements. The US has taken a principles-based approach with guidance applying across risk stripes generally under safe and sound risk management practices. The Federal Reserve Board has further taken the position that climate change does not pose systemic risk. The current Fed Chairman, Jay Powell, has stated that he will serve out his term through 2026, making a more proactive stance with respect to US climate change capital requirements unlikely in the short term.

A significant shift in US policies could still occur in the next decade and have substantial impacts on transition investments and US emissions trajectories. The US is currently the second largest CO₂ in total emissions behind China.

⁴ <https://carbonpricingdashboard.worldbank.org/compliance/price>

⁵ World Energy Outlook 2023, International Energy Administration

Transition Investments

Investments in green technologies have been inadequate, while adherence to transition targets by corporates has lagged. Financing by members of the Clean Energy Partnership has not increased at the expected pace, falling from 26b USD in 2022 to 21b in 2023.⁶ Climate financing to support NDCs are estimated to be only 11 percent of what is needed by 2030, highlighting a huge gap in investment spending required for the transition.⁷

Transition plans and transition targets are also key in informing investor choices and in attaining NDC commitments. According to the MSCI Survey, 93 percent of investors expect company performance to be impacted by climate issues in the next several years.⁸ The Survey also reports that while ESG characteristics of an investment weigh heavily in investment decisions, most investors will not invest in a company with unattractive fundamentals, even if its ESG characteristics are positive. One implication of the survey is that lower rated new entrants which offer climate change solutions may find it more difficult to attract investors.

Achieving NDC's also depends in large part on the transition plans and targets of constituent companies. While standards around transition plans and disclosures are improving, adoption has been slow. Heavily regulated sectors including utilities and infrastructure development have high rates of transition plan disclosure, but the transportation sector lags other industries significantly.⁹ Further, less than 35 percent of companies' emissions reductions targets are viewed as credible with under a third of surveyed companies having a low carbon transition plan.¹⁰

Sector Differences & Pricing Valuations

Industry sectors that are heavy emitters include: energy, utilities, industrial production, as well as transportation and real estate. The pricing and pace of energy transition for these sectors depends heavily on the scope of emissions considered, transition plans of sector constituents, and environmental factors.

In the US, transportation emissions come from cars and light duty trucks.¹¹ About 94% of fuel used for transportation comes from petroleum products. The share of EV cars in global car sales more than tripled to 14% in the last two years, and 40 percent of all vehicle sales are expected to be EV's by 2030.¹² That said, social norms in purchasing EV's are driven in part by the relatively high up front cost of an EV (about 7K USD) relative to internal combustion engine vehicles. Current geopolitical conditions have further given rise to trade barriers that prevent less expensive EV's from gaining share in Europe and the US. Although EV's are less costly to own, availability

⁶ International Institute for Sustainable Development, Out with the Old, Slow With the New Countries are underdelivering on fossil-to-clean energy finance pledge, August 2024

⁷ <https://www.imf.org/en/Blogs/Articles/2023/11/27/world-needs-more-policy-ambition-private-funds-and-innovation-to-meet-climate-goals>

⁸ 2024 Institutional Investor Survey on Sustainability, MSCI

⁹ The State of Play, 2023 Climate Transition Plan Disclosure, CDP

¹⁰ <https://www.cdp.net/en/articles/companies/just-a-third-of-companies-4002-13-100-that-disclosed-through-cdp-in-2021-have-climate-transition-plans>

¹¹ <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

¹² IEA World Energy Outlook 2023, p. 148

of charging stations and the length of time to recharge are barriers to increasing the share of EV's on the road. Transforming the transportation market remains a daunting task.

Utilities face growing demand for electricity from a range of sources including more extreme hot weather, increased population, development, and new sources of demand including generative AI. While the utilities industry is making strides to electrify energy consumption and drive energy sources from renewables¹³, there are gating factors that slow the transition away from fossil fuels. Investment in infrastructure to source and provide more electricity (expanding the grid) drives significant cost pressures and energy rate increases. Rate increases have been met with public resistance. Capture and storage technologies used for intermittent power sources including solar and wind are still evolving, limiting reliance on green energy as a primary source. Recent investments in nuclear energy are heavily governed and will take a decade or more to reach implementation.

The energy sector also produces high levels of Scope 3 emissions. Demand for fossil fuel products continues to rise, particularly in developing nations but also in nations that continue to experience growing demand including the United States. Across major markets including the US, it is unlikely that a harmonized policy on carbon pricing will be achieved. Appropriate pricing would help to accelerate the transition away from fossil fuels.

Industry direct emissions, which come from burning fossil fuels during the production process (e.g., steel, cement) accounts for 23 percent of total US GhG's. Most industry efforts to reduce emissions have come from industrial efficiency initiatives. This is similarly true of residential. Capital and equipment required to increase efficiency are dependent on a range of factors including government incentives (e.g., the Inflation Reduction Act) and the state of the economy. Estimated capital investments are in the trillions of dollars, again highlighting the critical importance of closing the financing gap.

Regional Differences

The ability of the world's regions to transition to clean energy hinges in part on financing. Financing has been uneven, largely going to developed countries including the US and European countries.¹⁴ Developing countries including India (third largest emitter) and China (largest emitter), depend heavily on imported oil or readily available coal. Approximately 63% of China's energy is sourced from coal, while about 61% of India's energy consumption is sourced from Coal. India is also experiencing rapid development and economic growth, population growth—factors that act as significant headwinds to overall emissions reduction. Russia, the world's fourth heaviest emitter, is currently locked in geopolitical tensions which is leading to increased manufacturing to support a substantial military buildup while Russia continues to be a major producer of petrochemicals.

While heavy emitting nations have made pledges through Nationally Determined Contributions (NDCs) to reduce lower emissions, compliance is crucial to achieving Net Zero. If all the NDC's

¹³ https://www.eia.gov/outlooks/steo/report/elec_coal_renew.php

¹⁴ International Institute for Sustainable Development, Out with the Old, Slow with the New Countries are underdelivering on fossil-to-clean energy finance pledge, August 2024

were fully implemented globally, it is estimated that global emissions could peak before 2030.¹⁵ About 85% of global emissions are currently covered by NDC submissions. That said, while countries are required under the Paris Accord to adopt NDC's, there is no binding legal agreement (or penalty) for compliance.

Scenario Analysis - Two better than one?

The uncertainty of projecting climate transition given policy and regulatory shifts, changes in social and investor norms, as well as unexpected technology developments argues for alternative scenarios. A possible strategy is to choose a consensus scenario which is surrounded by a Bull and Bear scenarios. The alternatives to the consensus might consider idiosyncratic factors such as technology advancements or unexpected policy changes. Another approach is to vary key assumptions including energy prices and carbon policies.

The high degree of uncertainty in predicting climate change scenarios makes the choice of a single scenario challenging. Traditional transition scenario factors include investor and consumer norms, technology change, changes in regulation and/or policies, and external environmental factors. Each of these factors carries with it a high degree of uncertainty – for example, the outcome of the upcoming US Presidential election could significantly alter energy and climate change policies.

Further adding to scenario uncertainty are economic cycles. The Covid epidemic contributed to a 4.9% reduction in global emissions.¹⁶ Recessions can have a profound impact on the transition pathways and the timing of recessions are hard to specify.

Finally, climate change scenarios are frequently downplayed due to the length of the forecast time horizon. As the length of the forecast horizon increases, uncertainty also increases, undermining the credibility of choosing any one climate scenario.

¹⁵ <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/ndc-synthesis-report/ndc-synthesis-report#Projected-GHG-emission-levels>

¹⁶ World Resources, Institute, <https://www.wri.org/insights/interactive-chart-shows-changes-worlds-top-10-emitters>