Weekly Summary

Economics of Climate Change

December 13, 2024

What are the most likely long term climate scenarios? Not the most ambitious

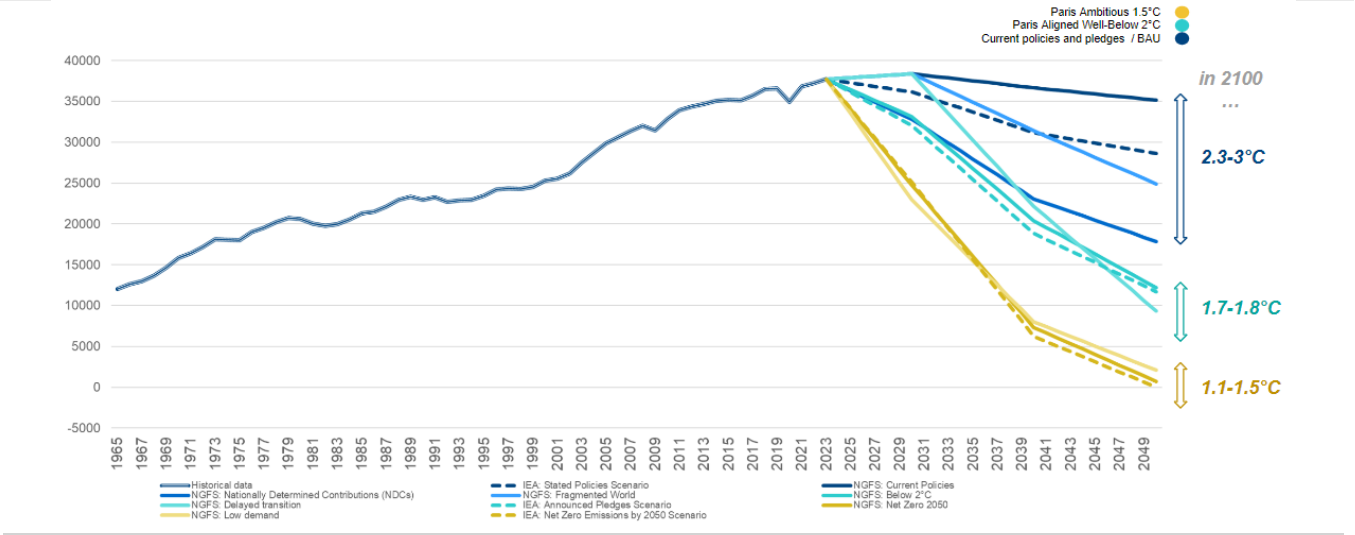
Climate scenarios can be clustered by temperature goals and ranked by the feasibility of the policies to achieve them. Under current commitments, scenarios projecting a 2.3°C–3.0°C temperature increase are the most plausible, while more ambitious targets requiring significant policy shifts -and fostering breakthrough innovation- are much less likely.

Climate scenarios are not forecast with uncertainty around, they are alternative futures. Climate scenarios are inherently complex constructs designed to explore how different pathways can lead to various long-term temperature outcomes. They are built upon a multitude of assumptions that encompass a wide range of variables, including physical climate factors, socioeconomic trends, carbon pricing mechanisms, and policy measures required to achieve specific temperature targets. **The probability of a particular scenario unfolding exactly as outlined tends toward zero** due to the innumerable combinations of influencing factors. It is worth noting that scenarios serve as tools to help policymakers, researchers, and stakeholders understand the potential implications of different actions (or inactions) and to explore the range of possible outcomes that could result from various decisions.

Ranking long term climate scenarios by temperature target. It is feasible to rank groups of scenarios from key institutions, such as the International Energy Agency (IEA) or the Network for Greening the Financial System (NGFS); they could be clustered according to their temperature goal -the most comparable variable among them- regardless of the specific methods or strategies proposed to achieve the target. By focusing on the temperature goals, it can be evaluated and compared the plausibility of different scenario groups, considering which temperature outcome seems more likely given current trends -highly inertial- and policy commitments consistent with them.

Three clusters of climate scenarios. Looking at both, NGFS -Phase V, November 2024- and IEA -2024 WEO-, it can be identified three primary groups of climate scenarios **(Figure 1)**:

Figure 1. **WORLD. ENERGY RELATED CO2 EMISSIONS. IEA AND NGFS SCENARIOS(*)**
MILLION TONNES OF CO2/YEAR



(*) NGFS long-term scenarios, updated as of March 2024 and released by November 2024, have been adjusted so that data from NGFS and IEA aligns with observed historical data (that IEA's WEO scenarios already incorporate). To achieve this, we reconciled the observed data with forward projections assumed in NGFS scenarios.
Source: BBVA Research

1. **2.3°C–3.0°C: Current Policies and Pledges / Business As Usual (BAU).** This group assumes a carry on trajectory, implementing mainly the policies and pledges that have already been officially adopted -with some additional policies in the most optimistic scenarios-. Under this cluster, global temperatures are projected to increase by approximately 2.3°C to 3.0°C above pre-industrial levels by the end of the century.
2. **Well Below 2°C**: **Paris Aligned.** This group envisions more ambitious efforts to limit global warming, aiming to keep the temperature increase well below 2°C, as outlined in the Paris Agreement. It assumes the implementation of additional policies and measures beyond current commitments, requiring countries to strengthen their nationally determined contributions (NDCs) and to adopt more aggressive emission reduction strategies.
3. **1.5°C or Below / Net Zero: Paris Ambitious**. This is the most ambitious cluster, targeting a temperature rise of no more than 1.5°C by 2100 and achieving net-zero greenhouse gas emissions by the middle of the century. It requires significant and rapid transformations in energy systems, economies, and societies, including widespread adoption of renewable energy, substantial improvements in energy efficiency, and changes in consumption patterns.

Assessing plausibility through the ambition of climate policies needed to meet temperature targets. When assessing the plausibility of these scenario groups, a key criterion is the combination of policies and technological innovation required to achieve the specified temperature targets. This assessment focuses on the feasibility and likelihood of implementing such policies, while disregarding potential differences among other variables or variations in the level of ambition throughout the forecast period that ultimately lead to the same temperature goal.[1]

1: It's important to note that scenarios included in each cluster involve significant differences across various critical aspects. These include climate assumptions, policy frameworks, socioeconomic trajectories, and technological innovations. All of these factors play essential roles in determining the ability to reach specific temperature goals. For instance, some scenarios may rely heavily on technological breakthroughs that are not yet realized, while others may depend on significant behavioral changes or unprecedented levels of international cooperation.

Given the current information and global background, the most plausible scenarios appear to be those that do not require massive structural shifts in policy frameworks or the rapid deployment of green technologies on an unprecedented scale. While the world has taken some steps to mitigate the worst outcomes of climate change -such as increasing investments in renewable energy, improving energy efficiency, and implementing certain emission reduction policies-these actions are generally insufficient to achieve the stringent targets of limiting warming to well below 2°C or 1.5°C. Under this framework, the "Current Policies and Pledges / BAU" scenario group emerges as the most plausible, given that it is based on policies already in place or officially pledged.[2]

The scenarios aiming for a temperature increase well below 2°C are considered less plausible, as they require additional policy interventions and commitments beyond what is currently enacted. The most ambitious scenarios, targeting a 1.5°C limit or achieving net-zero emissions, are deemed the least plausible. These scenarios necessitate profound and rapid policy shifts, extensive technological advancements, and significant societal transformations that are not yet evident in current global trends.

All in all, unless there is a substantial and sustained global effort to enhance policy measures, invest in new technologies, and drive societal change, the world is on a trajectory that falls short of the most ambitious climate targets.

Table 1. **MAPPING IEA AND NGFS LONG TERM SCENARIOS**

NGFS (phase v)	°C (mean) 2100 vs pre-industrial levels	DESCRIPTION	IEA (WEO 2024)	°C (mean) 2100 vs pre-industrial levels	DESCRIPTION	RANK
Current Policies	3.0	Current Policies assumes that only currently implemented policies are preserved, leading to high physical risks.				1- 1
Fragmented World	2.4	Fragmented World assumes a delayed and divergent climate policy response among countries globally, leading to high physical and transition risks. Countries without zero targets follow current policies, while other achieve them partially (80% of the target).				1-2
Nationally Determined Contributions	2.3	Nationally Determined Contributions (NDCs) includes all pledged targets even if not yet backed up by implemented effective policies.	Stated policies (STEPS)	2.4	This scenario looks not at what governments say they will achieve, but at what they are doing to reach the targets and objectives that they have set out. It is based on a detailed sector-by-sector review of the policies and measures that are in place or under development, including NDCs under the Paris Agreement.	1- 3
Below 2°C	1.8	Below 2°C gradually increases the stringency of climate policies, giving a 67% chance of limiting global warming to below 2°C. Additionally, countries with net zero targets reach them partially (80% of the target).	Announced pledges (APS)	1.7	This scenario assumes that governments will meet, in full and on time, all the climate-related commitments that they have announced. This includes longer term net zero emissions targets and pledges in NDCs, as well as commitments in related areas such as energy access. It includes all recent major national announcements (as of August 2024), regardless of whether they have been anchored in legislation or in updated NDCs.	2- 1
Delayed Transition	1.7	Delayed Transition assumes annual emissions do not decrease until 2030. Strong policies are needed to limit warming to below 2°C. Negative emissions are limited.				2- 2
Net Zero 2050	1.4	Net Zero 2050 limits global warming to 1.5°C through stringent climate policies and innovation, reaching global net zero CO2 emissions around 2050. Some jurisdictions such as the US, EU, UK, Canada, Australia, and Japan reach net zero for all GHGs.	Net Zero by 2050	1.5	This scenario sets out a pathway to the stabilisation of global average temperatures at 1.5°C above pre-industrial levels. The NZE Scenario achieves net zero emissions by 2050 without relying on emissions reductions from outside the energy sector. Advanced economies reach net zero emissions before developing economies do.	3- 1
Low Demand	1.1	Low Demand explores the global efforts needed to be able to limit global warming to below 1.5°C by 2050 in an orderly fashion, aligned with the Paris Agreement, driven by lower energy demands due to behavioural changes.				3- 2

Source: BBVA Research

2: This approach is coherent with common practices in Economics where prospective baseline scenarios typically assume continuity in policy unless there is compelling evidence to suggest significant changes.

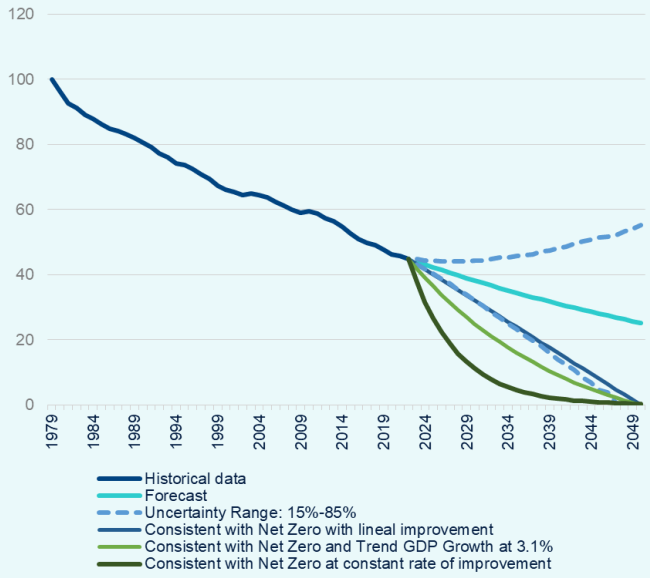
Box 1. (A naif exercise) How likely is a net-zero scenario if the current trend persists? Not higher than 15% unless there is an innovation leap

The intensity of greenhouse gas (GHG) energy emissions per unit of GDP has been continuously declining over recent decades at an average annual rate of 1.8%, resulting in a reduction of more than half (55%) compared to its 1979 level (**Figure 2**). In this way, the increase in annual emissions level during the period, which has almost doubled between 1979 and 2022, is due to the increase in GDP, which has quadrupled.

The 2050 forecast of emissions intensity, and its uncertainty range, both obtained with a simple univariate time series model, reflects the persistence of its historical evolution, shaped by the combination of innovation and efficiency on the one hand, and increasing global activity on the other. In essence, forecasts -including uncertainty- assume that the current compound of emissions and activity will not be significantly altered in the future. Thus, it can be noted that being net zero at the end of the 2040s (having a zero emissions intensity ratio at that time) is in the very unlikely range (below 15%) with the current mix of activity and emissions. However, there are multiple pathways to reach net zero, three of them are included in **Figure 2**. None of the selected alternative paths exceeds the 15% confidence level of the current forecast, and could be below the 5% threshold in the nearest term of the forecast period. Apart from the specific figures, what is relevant is the **very low level of confidence in achieving a zero-net pathway without substantive changes in the evolution of emissions intensity**.

To make a leap in emission intensity trend that sets its path on a trajectory consistent with net-zero, **innovation for improving efficiency is necessary; and innovation is fostered by ambitious climate policies**. Countries that expand their climate policy portfolio exhibit higher climate change mitigation patent filings, low carbon technology trade flows, and green foreign direct investment flows. The coordination and cooperation of international policies is also very relevant, showcasing evidence of potential climate policy spillovers.[3]

Figure 2. **WORLD. INTENSITY OF GHG ENERGY EMISSIONS PER UNIT OF GDP** (1979=100)



Source: BBVA Research own calculations with emissions data from IEA and GDP data from IMF

3: Reference: Global | Green Innovation to boost activity and cut emissions | BBVA Research. March, 4 2024.

Highlights of the Week

- **Global | Fintech Applications for Boosting Climate Finance**. **IMF**. Climate fintech-the intersection between climate change, financial services, and digital technologies-is playing an important role in attracting more investment into climate finance by leveraging innovative technologies, thereby addressing some financing barriers.

- **Global | Q&A: What could a US-China trade war mean for the energy transition?. CarbonBrief**. Ahead of Donald Trump's second term as US president, a rerun of his first trade war with China is firmly on the cards – and minerals key to the energy transition may end up in the crossfire.

- **EE.UU. | ¿Votan los fondos de inversión ambientales y sociales lo mismo que predican?** No siempre, sobre todo cuando entran en conflicto la maximización del retorno financiero y las preferencias de sostenibilidad.

- **España | España suma un nuevo otoño muy cálido este 2024 y no tiene uno frío desde hace 14 años | Clima y Medio Ambiente | EL PAÍS.** Octubre fue el mes con más precipitaciones desde que hay registros debido al trágico temporal de lluvias torrenciales en el área mediterránea a finales de mes.

DISCLAIMER

The present document does not constitute an “Investment Recommendation”, as defined in Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (“MAR”). In particular, this document does not constitute “Investment Research” nor “Marketing Material”, for the purposes of article 36 of the Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Directive (MIFID II).

Readers should be aware that under no circumstances should they base their investment decisions on the information contained in this document. Those persons or entities offering investment products to these potential investors are legally required to provide the information needed for them to take an appropriate investment decision.

This document has been prepared by BBVA Research Department. It is provided for information purposes only and expresses data or opinions regarding the date of issue of the report, prepared by BBVA or obtained from or based on sources we consider to be reliable, and have not been independently verified by BBVA. Therefore, BBVA offers no warranty, either express or implicit, regarding its accuracy, integrity or correctness.

This document and its contents are subject to changes without prior notice depending on variables such as the economic context or market fluctuations. BBVA is not responsible for updating these contents or for giving notice of such changes.

BBVA accepts no liability for any loss, direct or indirect, that may result from the use of this document or its contents.

This document and its contents do not constitute an offer, invitation or solicitation to purchase, divest or enter into any interest in financial assets or instruments. Neither shall this document nor its contents form the basis of any contract, commitment or decision of any kind.

The content of this document is protected by intellectual property laws. Reproduction, transformation, distribution, public communication, making available, extraction, reuse, forwarding or use of any nature by any means or process is prohibited, except in cases where it is legally permitted or expressly authorised by BBVA on its website www.bbvaresearch.com.

ENQUIRIES TO:
BBVA Research: Azul Street, 4. La Vela Building – 4th and 5th floor. 28050 Madrid (Spain).
Tel. +34 91 374 60 00 y +34 91 537 70 00 / Fax (+34) 91 374 25
www.bbvaresearch.com