NGFS Climate Scenarios: pushing financial players into taking a risky gamble

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Contact:
Paul Schreiber, Reclaim Finance, Campaigner on financial regulation and central banking
paul@reclaimfinance.org

Introduction: Assessing the credibility of the NGFS 1.5°C scenarios

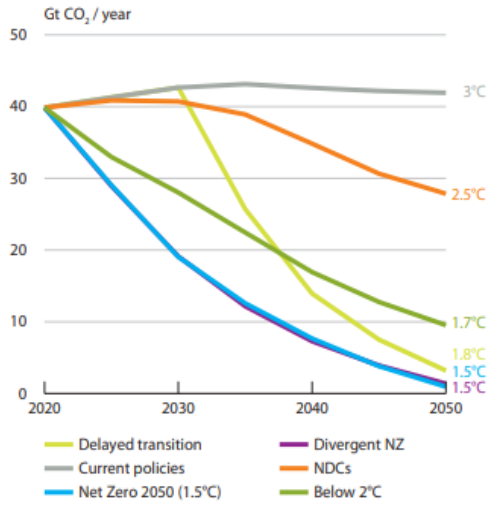
In February 2021, Oil Change International and Reclaim Finance published a detailed analysis of the first set of NGFS scenarios, released in June 2020. This analysis identified three major flaws: a framing that guides climate action toward slower and riskier pathways; a massive reliance on carbon dioxide removal (CDR) that allows scenarios to preserve fossil fuel combustion while allegedly remaining within climate limits; and a failure to acknowledge the limitations of scenario analysis and integrated assessment models (IAMs).

The scheduled review of NGFS scenarios was an opportunity to remedy these flaws by adopting a precautionary approach to CDR, framing the scenarios to center those that entail immediate climate action and promoting concrete measures to mitigate the limitations of IAMs.

Such improvements are crucial for guiding the financial system onto a more sustainable path. Indeed, the NGFS scenarios are already being used by French, British and European regulators to conduct risk analysis. They are strongly supported by the UK COP26 financial framework and the renewed EU sustainable finance strategy. Furthermore, the second set of NGFS scenarios came out in June 2021, in a context of multiplying climate commitments from financial institutions and just after the first Net-Zero scenario from the International Energy Agency. This scenario clearly stressed the need to stop investment in fossil fuel reserves and drastically reduce production.

In this context, this note analyzes the second round of NGFS scenarios, monitoring changes on key aspects to define whether they are fit for purpose and how they should be further reviewed. **It focuses on so-called "net-zero 2050" (NZ) and "divergent net-zero" (DNZ) sets of scenarios** (*see table below*)**, a total of six scenarios, with three IAMs[1] being used for NZ and DNZ. These are the only NGFS scenarios that aim at limiting global warming to 1.5°C warming** (*see graph below*). As recent leaks from the preliminary IPCC's sixth assessment report stressed, humanity is not equipped to deal with global warming past 1.5°C and the consequences of such a warming overshot would be dramatic.

CO2 emissions and global warming trajectories by NGFS scenario



Source: *NGFS Climate Scenarios for central banks and supervisors*, June 2021

[1] The NGFS uses the GCAM, MESSAGE and REMIND models to build its NZ and DNZ scenarios. More details on these models and their characteristics are available on the NGFS' database.

Presentation of Net Zero (NZ) and Divergent Net Zero (DNZ) sets of scenarios

Name	Labelling	NGFS description
Net Zero 2050 (NZ)	Orderly	"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 and Japan reach net zero for all GHGs."
Divergent Net Zero (DNZ)	Disorderly	"Divergent Net Zero reaches net zero around 2050 but with higher costs due to divergent policies introduced across sectors leading to a quicker phase out of oil use."

Source: *NGFS Climate Scenarios for central banks and supervisors*, June 2021

Looking at recommendations from Oil Change International and Reclaim Finance's previous report, the following table summarizes the progress and limitations of the NGFS's work. If the NGFS improved the framing of its scenarios, it did not remedy their fundamental weaknesses, notably an over-reliance on fossil fuels, enabled by a dangerous bet on CDR.

Assessment of progress and limitations of NGFS scenarios regarding key recommendations put forward in Oil Change International and Reclaim Finance's first analysis

Recommendation	Progress	Limitations
Reframe scenarios to support ambitious action and put robust 1.5°C scenarios at the center	• A 1.5°C scenario is placed at the forefront of both "orderly" and "disorderly" scenarios • The "representative" qualification, that previously put the emphasis on low ambition scenarios, has been suppressed	• In the NGFS presentation, higher CDR reliance is considered less risky *(see part III)* • So-called "orderly" scenarios rely on more CDR that "disorderly" ones
Adopt a precautionary approach to CDR and unproven technologies	• Mitigation from BECCS and afforestation has been reduced	• NZ and DNZ scenarios are still overly reliant on fossil fuels and biomass *(see part I and II)* • BECCS levels still exceed the sustainable potential in the long term *(see part III)* • CCS levels are overall high *(see part III)* • The distinction between "medium" and "limited" CCS scenarios is not convincing *(see part III)* • NGFS scenarios still rely significantly on new technologies
Limitations of IAMs and recommendations	• The NGFS clearly acknowledges and emphasizes the limitations of IAMs	• The NGFS fails to promote concrete measures and to highlight the need to act beyond what scenarios entail • The NGFS fails to acknowledge the need to stop investments in new fossil fuels projects to limit global warming and/or reach net zero *(see part I)*

Beyond the summary made above, **the following analysis looks at three dimensions of NZ and DNZ scenarios that are critical for climate action: fossil fuel use and investment; biomass use; and CDR mitigation**. It evaluates the credibility of these scenarios on these dimensions using scientific insight

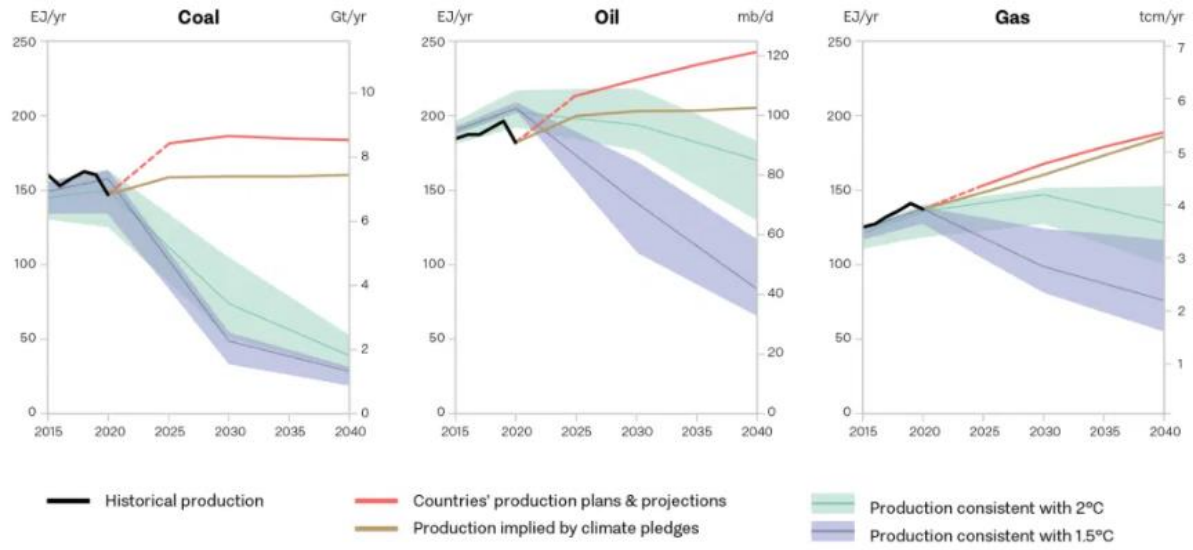
on what is needed to sustainably limit global warming to 1.5°C. A summary of key findings and recommendations is made in the conclusion.

I/ Fossil fuels in NGFS scenarios: still too much

A) NGFS scenarios are not aligned with 1.5°C compatible fossil fuel production trajectories

A key feature to assess alignment with a 1.5°C trajectory is the production and consumption of fossil fuels. The UN Production Gap Report 2020 indicates that fossil fuel production should drop by 6% a year from 2020 to 2030 – 11% for coal, 4% for gas and 3% for oil - to have a chance of reaching this objective.

Primary energy from and production of coal, oil and gas in various climate trajectories



Source: UN Production Gap Report 2020

The evolution of primary energy from fossil fuels from 2020 to 2030 and 2020 to 2050 in NGFS NZ and DNZ scenarios are summarized in the tables and graphs above.

Primary Energy from fossil fuels in 2030

Scenario	Coal		Gas		Oil	
	EJ/yr	% reduction from 2020	EJ/yr	% reduction from 2020	EJ/yr	% reduction from 2020
GCAM NZ	107.2	37.6	119	15.2	184.6	0.9
MESSAGE NZ	31.3	78	105	21.6	134.1	27.3
REMIND NZ	22	86.3	90.7	27.2	180.6	6.9
GCAM DNZ	78.9	54.1	107.4	23.5	150.4	19.2
MESSAGE DNZ	32.5	77.2	113.4	15.2	117	36.6
REMIND DNZ	27.8	82.7	91.8	26.3	168.5	5.3

Source: Reclaim Finance based on data from the IIASA[2] NGFS Climate Scenario Database

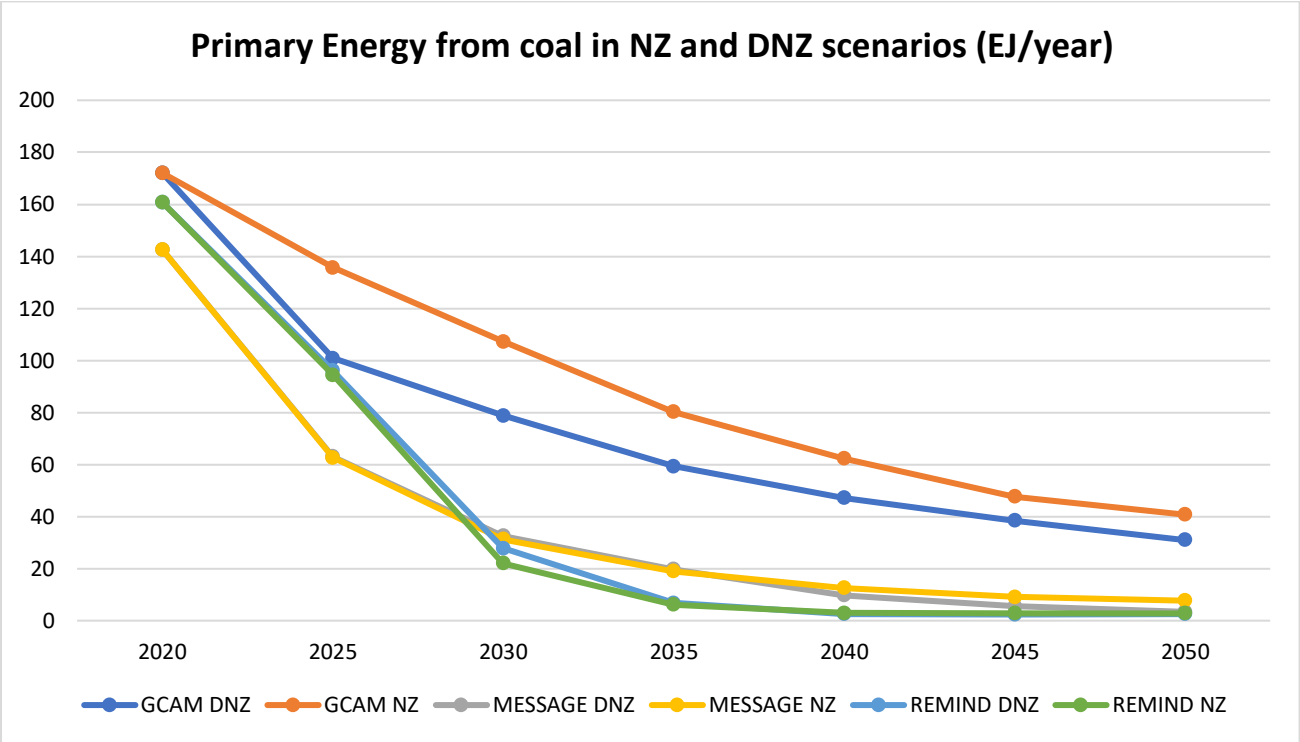
[2] The IIASA is the International Institute for Applied System Analysis and hosts the NFGS' scenario database.

Primary energy from fossil fuels in 2050

Scenario	Coal		Gas		Oil	
	EJ/yr	% reduction from 2020	EJ/yr	% reduction from 2020	EJ/yr	% reduction from 2020
GCAM NZ	40.7	76.3	86.3	38.5	111.7	40
MESSAGE NZ	7.7	94.6	82.5	38.3	42.6	76.9
REMIND NZ	2.9	98.2	38	69.4	79.7	55.2
GCAM DNZ	31	81.9	70.2	50	73.5	60.5
MESSAGE DNZ	3.4	97.2	67	49.9	31.7	82.8
REMIND DNZ	2.5	98.4	39.2	68.5	51.8	70.9

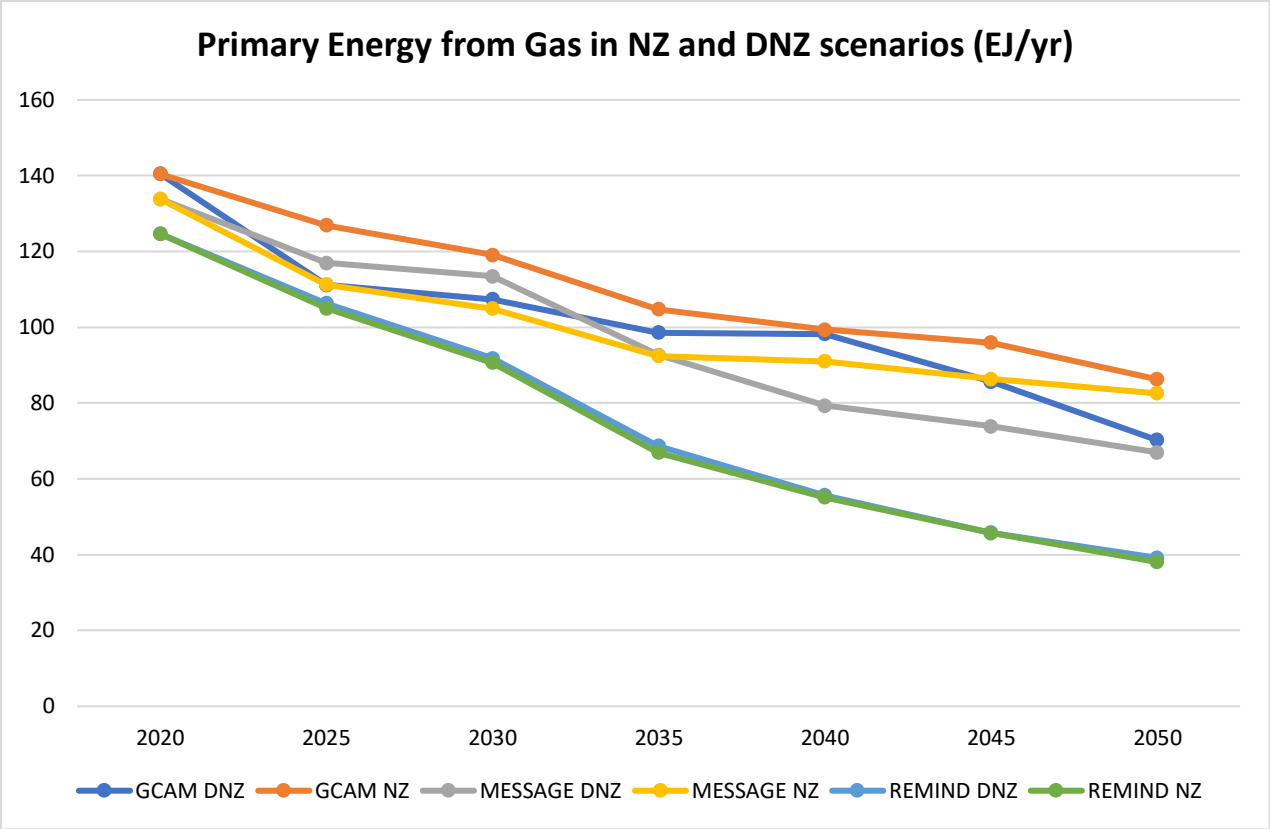
Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

Surprisingly, **one DNZ and NZ scenario spectacularly fails the coal test**: with the GCAM model, primary energy from coal only diminishes from – 37.6% in NZ scenario and – 54.1% in DNZ scenario by 2030, when it ought to be phased-out from OECD and EU countries by then and from the rest of the world by 2040. **Apart from these two scenarios, coal is drastically reduced by 2030 (from – 77 to - 86% compared to 2020) and nearly phased out by 2050**.



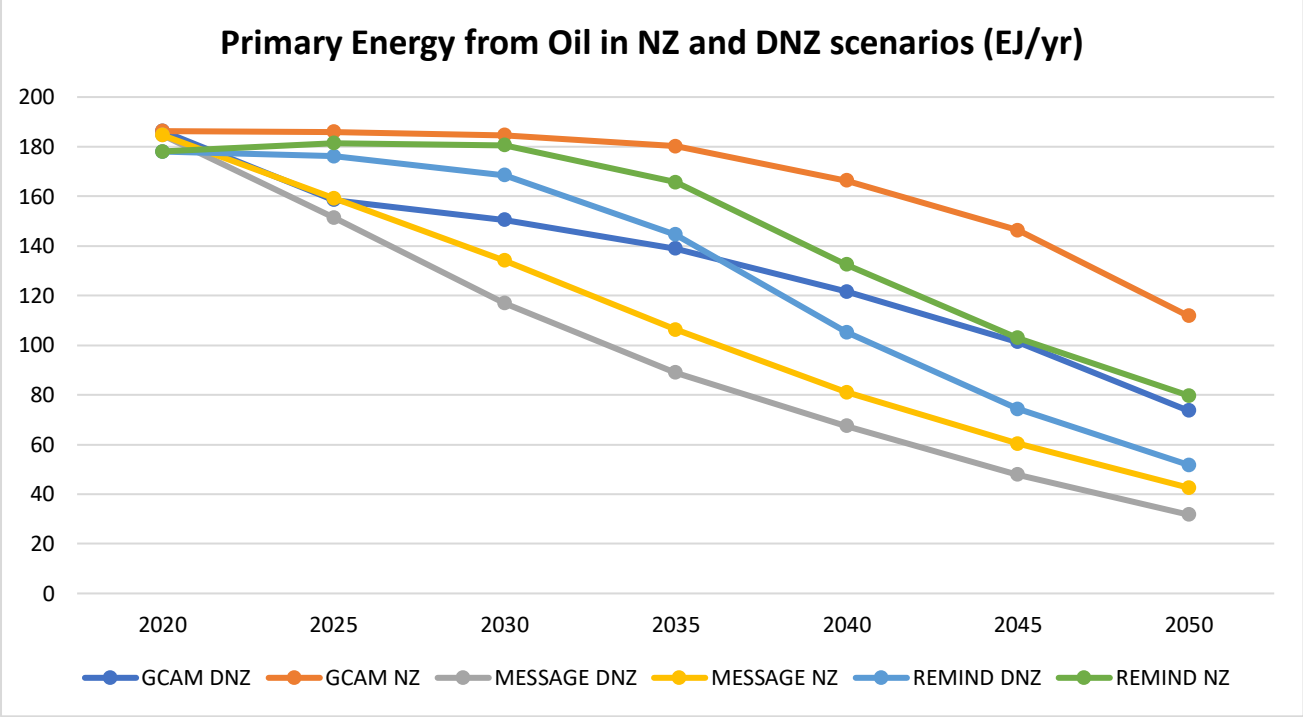
Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

All scenarios imply a significant drop in fossil gas use (between - 15 and - 27% by 2030 and - 28 and - 69% by 2050). However, **only two scenarios – the NZ and DNZ scenarios from the REMIND model – imply a significant drop in gas use aligned with the findings of the UN Production Gap Report** (- 26 or - 27% by 2030 and – 68.5 or – 69.4% by 2050). These scenarios are also the only ones that exceed the gas reduction trend of the IEA's Net-Zero scenario (- 55% gas demand by 2050).



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

All but two NGFS scenarios imply very slow reduction of oil use by 2030. MESSAGE NZ and DNZ scenarios require sharper oil reductions in the short and long term, with a DNZ oil trend aligned with the Production Gap report. Oil reduction trends accelerate after 2030 in all scenarios, to reach - 40 to - 77% in NZ scenarios and - 60,5 to - 83% in DNZ scenarios by 2050.



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

Overall, **none of the scenarios are in line with the coal, gas and oil reduction trends highlighted in the Production Gap Report**. By 2030, all but one scenario forecasts a steeper oil reduction trend than needed and four of them are over-reliant on gas. If a NZ scenario from the REMIND model shows strong coal and gas reductions, in line with those implied by the UN Production Gap report, it is also characterized by a very limited reduction of oil use by 2030.

Comparison of NGFS NZ and DNZ fossil fuel use with trends highlighted in the Production Gap Report by 2030

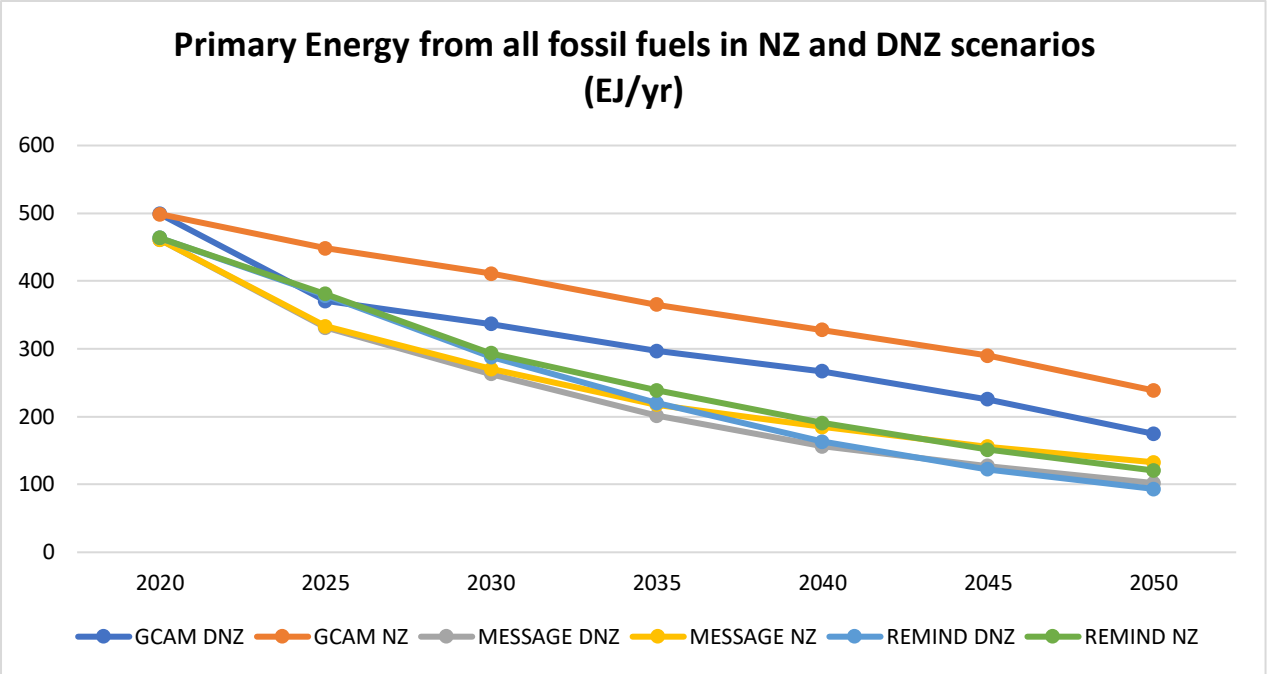
Scenario type	Model	Coal	Gas	Oil
Net Zero scenario (NZ)	GCAM			
	MESSAGE			
	REMIND			
Divergent Net Zero (DNZ)	GCAM			
	MESSAGE			
	REMIND			

Color code	
Equal or below Production Gap Report trend	
Above Production Gap Report trend	
Significantly above Production Gap Report trend (more than 20 EJ/yr in excess in 2030)	

Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

Significant quantities of fossil fuels remain in all models by 2050, with REMIND models providing the lowest fossil fuel use in 2050 (93 EJ in DNZ scenario) and GCAM the highest (239 EJ in NZ / 175 EJ in DNZ). GCAM scenarios are especially characterized by a very high reliance on fossil fuels in 2030 and 2050.

Furthermore, **in all models, NZ scenarios are linked to higher levels of primary energy from fossil fuels than DNZ scenarios**, a feature that could result from lower CDR use in DNZ scenario (*see part III*). **This means that the NGFS chose to label higher fossil fuel scenarios – NZ scenarios - as "orderly" and to position them as reference scenario for climate action.** This choice could push financial institutions to sideline the need to reduce their support to fossil fuels, thus undermining global transition efforts.

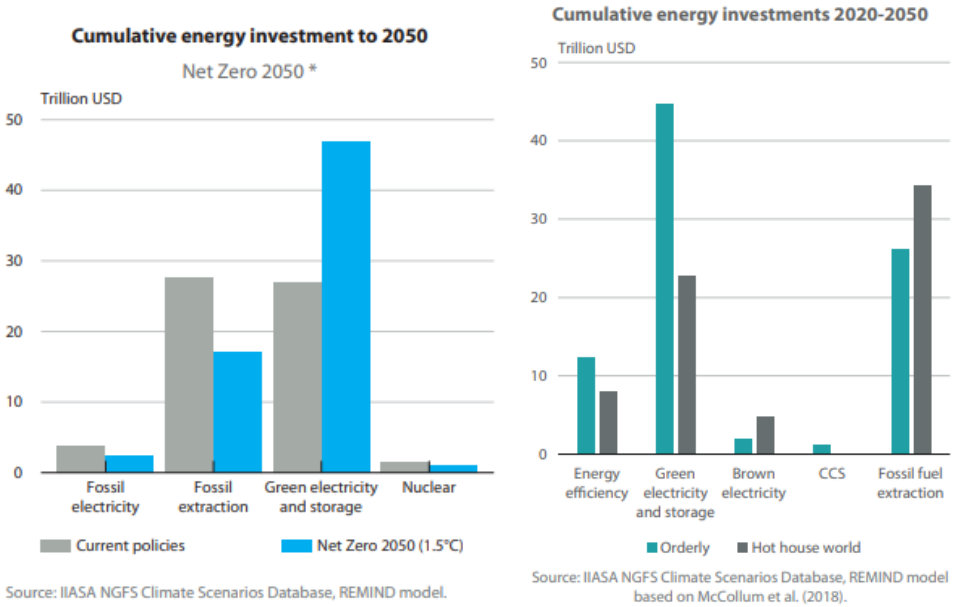


Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

B) NGFS scenarios do not account for the need to end fossil fuel expansion

The overreliance of NGFS scenarios on fossil fuels is accompanied by significant investments in fossil fuel infrastructures and projects. If the level of fossil fuel investment displayed seems to have diminished compared to the first set of NGFS scenarios, it remains high (*see graphs below*).

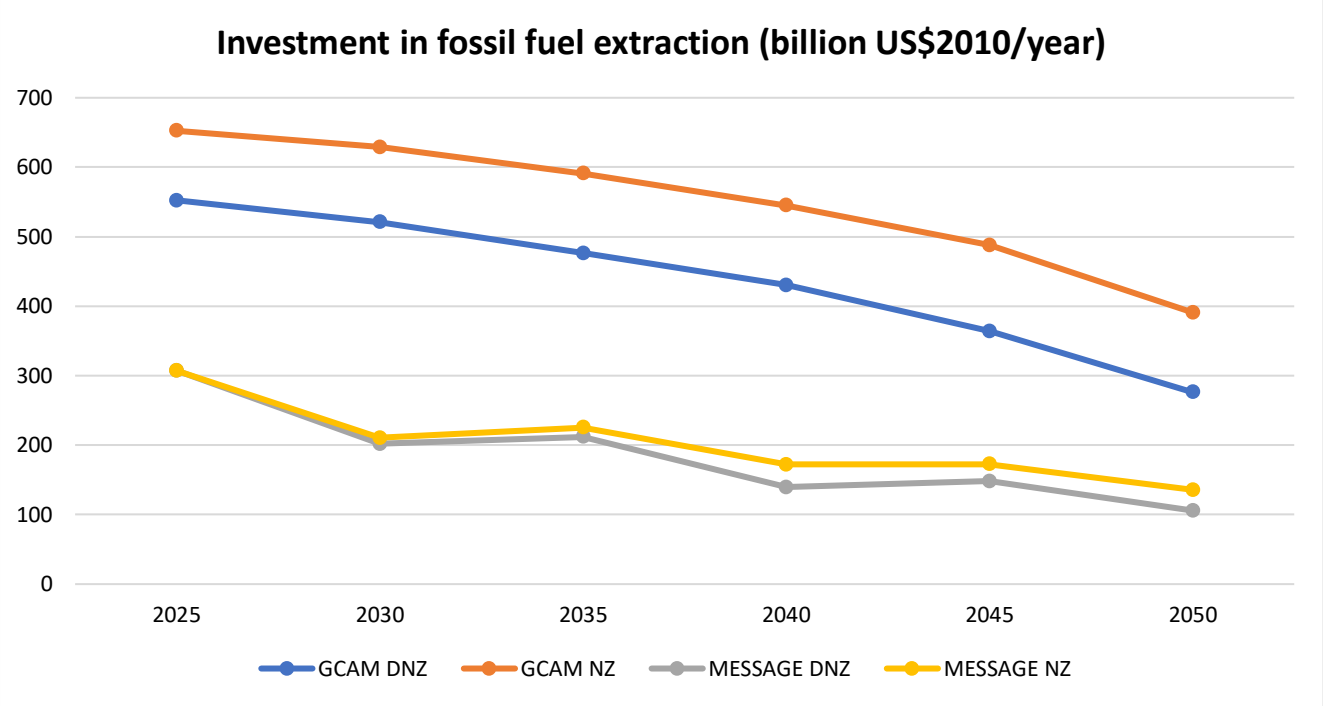
Comparison between fossil fuel investment in the first (right) and second (left) NGFS scenario reports



Sources: NGFS Climate scenarios reports (right panel / left panel)

Worryingly, **NGFS scenarios do not account for the need to end investment in the fossil fuel supply highlighted by the scientific research and the recent IEA Net-Zero scenario**:

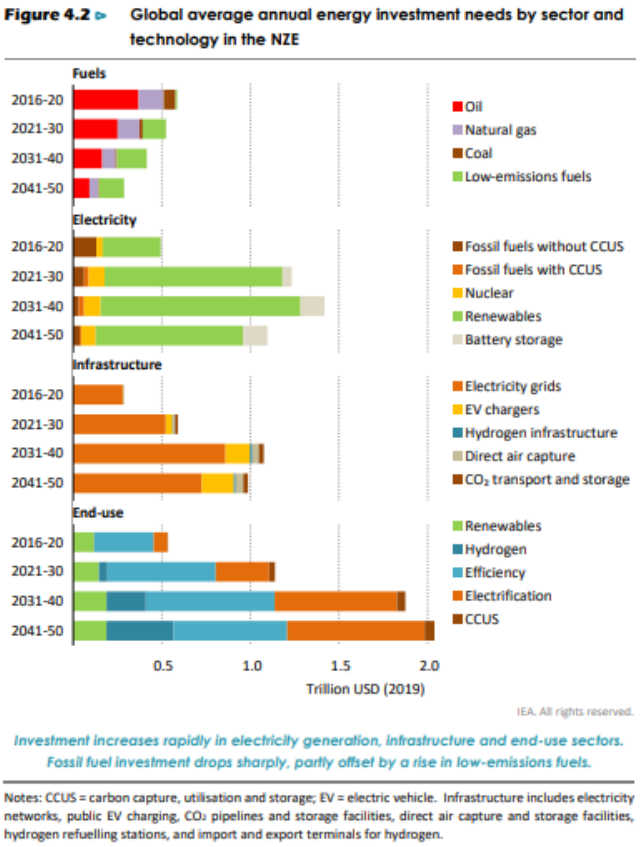
- **Two scenarios maintain very significant levels of fossil fuel extraction investments throughout the 2030's and 2040's**. When in the IEA Net-Zero scenario investments in fossil fuels drop to $350 billion a year in the 2020s, they still reach $552 billion and $652 billion a year from 2025[3] to 2030 in GCAM NZ and DNZ scenarios.
- While fossil fuel investment is drastically reduced in the IEA Net-Zero scenario after 2030, the reduction trend registered in NGFS scenarios is very slow. **NGFS NZ and DNZ scenarios therefore allow for significantly more fossil fuel extraction investments in the 2030s than the IEA Net-Zero scenario** (from $210 to $225 billion in MESSAGE scenarios compared to $170 billion in the IEA Net-Zero scenario).
- **In 2050, NGFS NZ scenarios register higher fossil fuel investments than the IEA Net-Zero scenario, with respectively $391 and $135 billion against $110 billion.**



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database / Data for the REMIND model unavailable

[3] In the NGFS' scenario database, fossil fuel extraction investment reach $677.83 billion per year in 2020. No data is provided on the evolution of these investments from 2020 to 2025 and this number that only reflects historical data is therefore not feet to be compared to the trends highlighted in the IEA Net-Zero report.

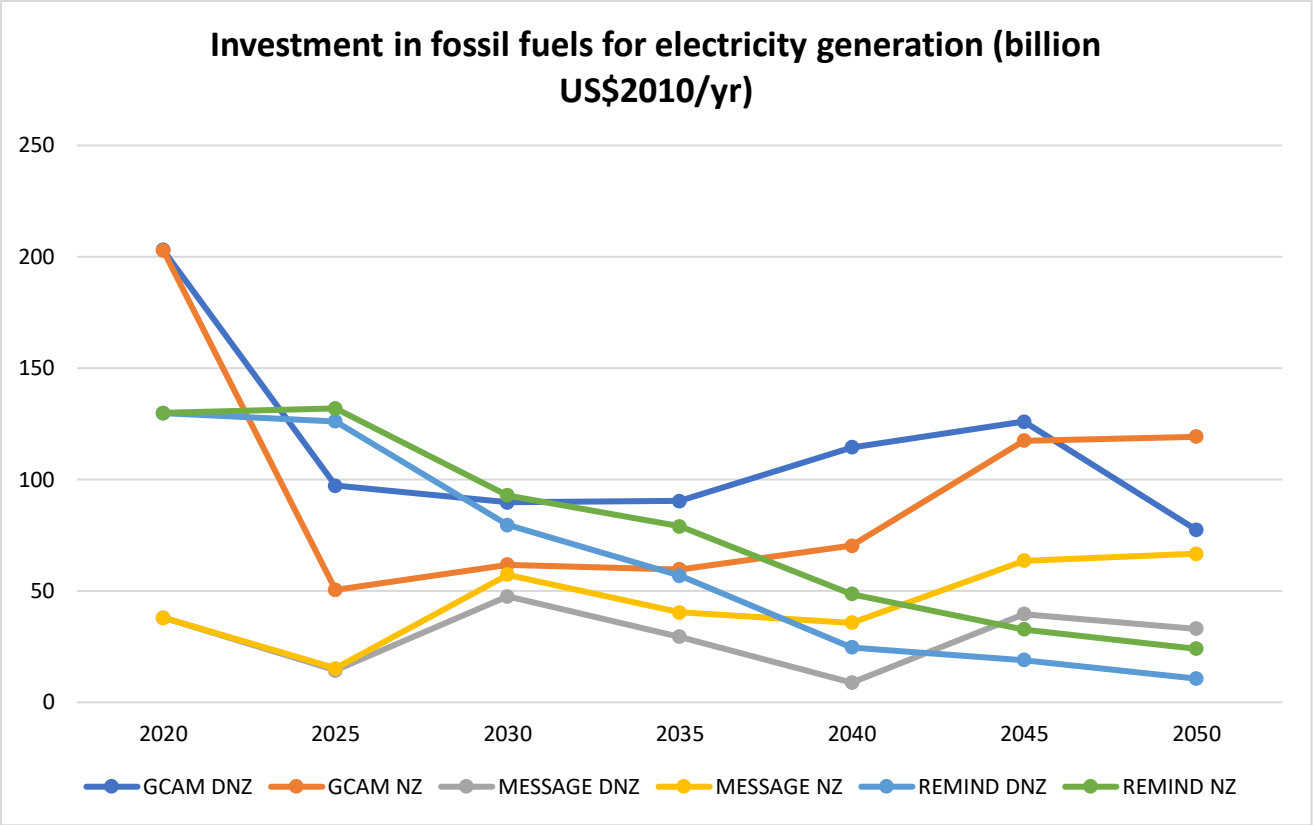
Investments in the IEA Net-Zero scenario



Source: IEA Net-Zero Report, May 2020

Similarly, NGFS scenarios allow for higher investments in fossil fuel electricity than the IEA Net-Zero scenario and do not seem to account for the need to achieve a carbon neutral power system well before 2050:

- **NZ and DNZ scenarios from the GCAM and REMIND models imply significant investment in fossil fuel electricity from 2020 to 2030**, well above the levels of the IEA Net-Zero scenario.
- **Several scenarios increase investment in fossil fuel electricity in the 2040's** (GCAM and MESSAGE scenarios), while these investments have nearly disappeared in the IEA Net-Zero scenario that requires a carbon neutral global power system by 2040.



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

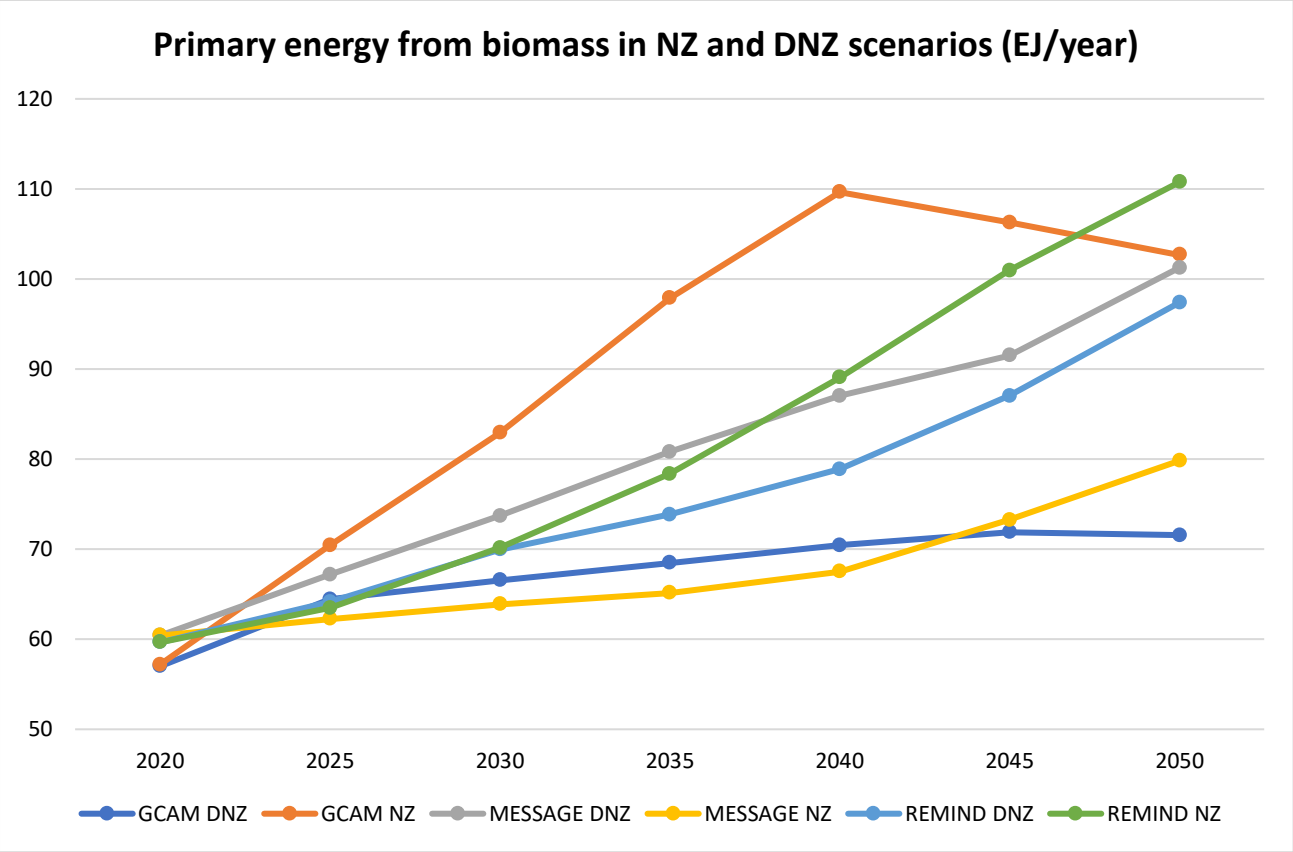
The fossil fuel investments trends of NGFS scenarios are very concerning. As an analysis from Reclaim Finance clearly demonstrated, the IEA Net-Zero scenario is not yet a truly sustainable scenario and continues to rely excessively on fossil fuels, with coal and gas use exceeding the levels authorized by the UN Production Gap report**. For NGFS scenarios, overshooting the IEA Net-Zero fossil fuel investment levels simply means that they allow for a fossil fuel development that is structurally at odds with a 1.5°C climate target**.

II/ Biomass: two scenarios paving the way for large-scale wood-burning

Apart from fossil fuels, NZ and DNZ scenarios significantly rely on another problematic energy source: biomass. Indeed, with a questionable carbon footprint, solid biomass can even emit between 3% and 50% more CO2 per unit of energy produced than coal. In addition to greenhouse gas emissions, the negative impacts on land and ecosystems from producing the required wood, combined with the health consequences due to air pollution resulting from incineration, make biomass a bad choice for investing in a healthy planet.

Two NZ and one DNZ scenario require massive biomass use to provide more than 100 EJ of primary energy in 2050. One scenario – GCAM NZ – notably forecasts an extremely rapid buildup of biomass production, peaking to 110 EJ of primary energy in 2040.

NZ MESSAGE and DNZ GCAM scenarios show a more moderate reliance on biomass. Looking at the IEA's recent findings, these scenarios could potentially be achieved with a limited increase in land use**.** In 2050, biomass would generate 80 or 71 EJ of primary energy, below the IEA's specific Net-Zero scenario (90 EJ) that entails "low biomass" use and no increase of land use[4] for biomass production according to the IEA.

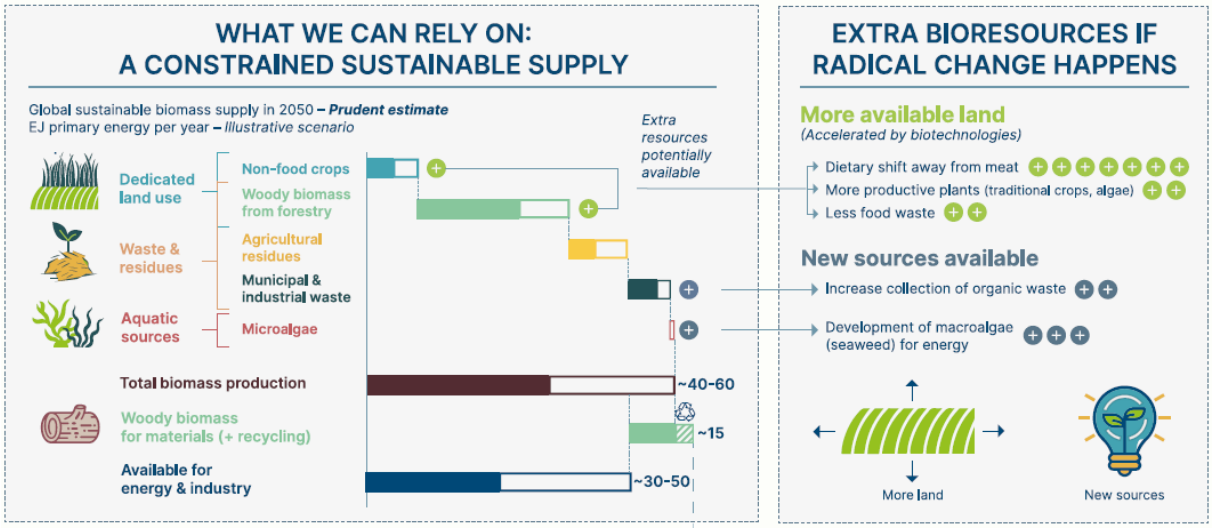


Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

According to the Energy Transitions Commission, 40 to 60 EJ of sustainable biomass could be generated globally each year by 2050. Reaching the 60 EJ threshold would require radical changes to free-up land and develop new biomass sources.

[4] The IEA develops a "low biomass case" in its Net-Zero report.

Sustainable biomass supply potential according to the Energy Transitions Commission



Source: ETC, *Bioresources within a Net-Zero Emissions Economy*, July 2021

In the NGFS scenarios, biomass production already reached the ETC's 60 EJ a year threshold in 2020 (from 57 to 59 EJ depending on the scenario). Ensuring sustainable biomass production would therefore at the very least require no increase in biomass production. Furthermore, providing that sustainably generating 60 EJ of biomass a year requires radical changes, biomass production levels would even have to be reduced to realistically stay within the ETC's sustainability range. **One thing is clear: all NGFS scenarios significantly over-rely on biomass by 2050.**

Comparison of NGFS NZ and DNZ biomass use with ETC and IEA Net-Zero "low biomass case"

Scenario type	Model	Sustainable use of biomass
Net Zero scenario (NZ)	GCAM	
	MESSAGE	
	REMIND	
Divergent Net Zero (DNZ)	GCAM	
	MESSAGE	
	REMIND	

Color code	
Lower the higher threshold of the ETC sustainability range (< 60 EJ)	
Above sustainability range (> 60 EJ) but below IEA "low biomass" case (< 90 EJ)	
Above IEA "low biomass case" (> 90 EJ)	

Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database ; sustainable biomass range from the Energy Transitions Commission (ETC) ; "low biomass" case from the IEA Net Zero Report

III/ CDR: "limited" or "medium" levels of carbon dioxide removal?

One of the key takeaways of Reclaim Finance and Oil Change International's first analysis of the NGFS scenarios was their overall over-reliance on carbon dioxide removal (CDR). It is worth noting that the NGFS seems to have taken this comment on board: it significantly changed its framing to announce "low" to "medium" levels of CDR in its scenarios.

Presentation of NGFS scenarios and the related hypothesis

		Physical risk	Transition risk			
Category	**Scenario**	**Policy ambition**	**Policy reaction**	**Technology change**	**Carbon dioxide removal**	**Regional policy variation+**
Orderly	Net Zero 2050	1.5°C	Immediate and smooth	Fast change	Medium use	Medium variation
	Below 2°C	1.7°C	Immediate and smooth	Moderate change	Medium use	Low variation
Disorderly	Divergent Net Zero	1.5°C	Immediate but divergent	Fast change	Low use	Medium variation
	Delayed transition	1.8°C	Delayed	Slow/Fast change	Low use	High variation
Hot House World	Nationally Determined Contributions (NDCs)	~2.5°C	NDCs	Slow change	Low use	Low variation
	Current Policies	3°C+	None – current policies	Slow change	Low use	Low variation

Colour coding indicates whether the characteristic makes the scenario more or less severe from a macro-financial risk perspective^
- Lower risk
- Moderate risk
- Higher risk

* See slide 18 for more details.
\+ Risks will be higher in the countries and regions that have stronger policy. For example in Net Zero 2050 the EU, USA and Japan reach net zero GHGs by 2050, but globally only net zero CO_2 is reached by this point.
^ This assessment is based on expert judgment based on how changing this assumption affects key drivers of physical and transition risk. For example, higher temperatures are correlated with higher impacts on physical assets and the economy. On the transition side economic and financial impacts increase with: a) strong, sudden and/or divergent policy, b) fast technological change even if carbon price changes are modest, c) limited availability of carbon dioxide removal meaning the transition must be more abrupt in other parts of the economy, d) stronger policy in those particular countries and/or regions.

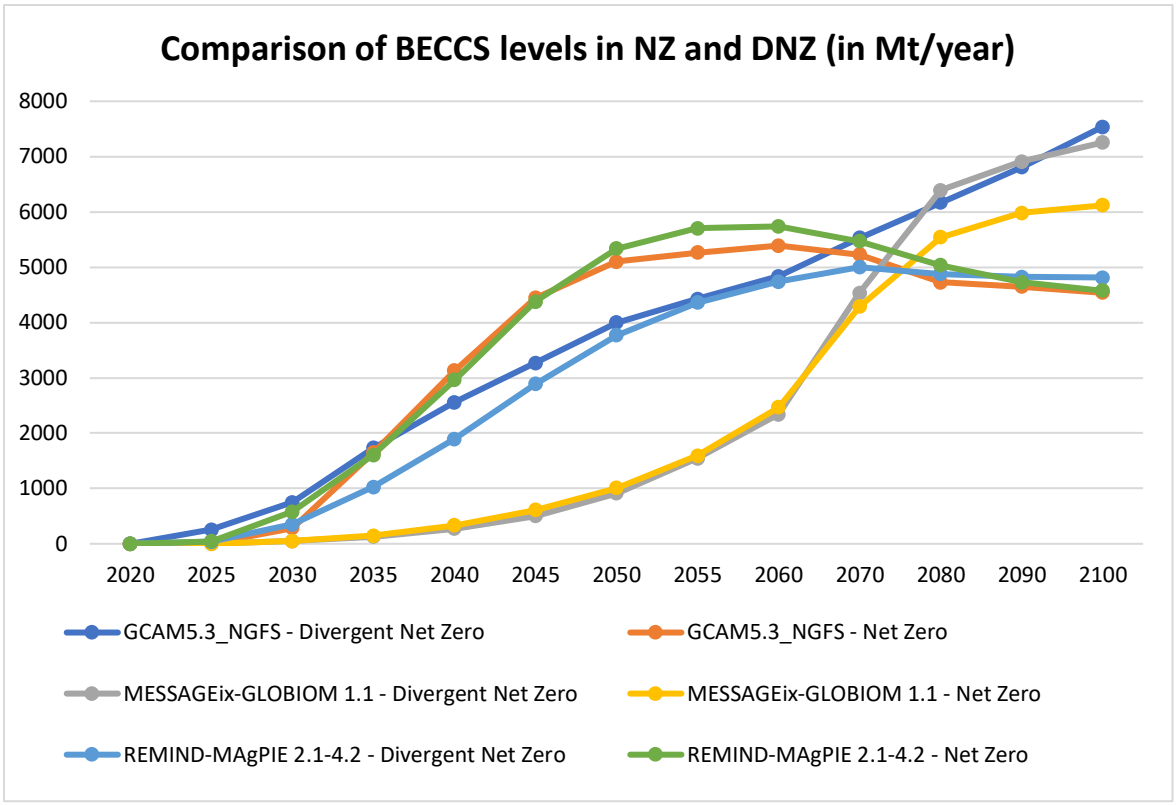
Source: *NGFS Climate Scenarios for central banks and supervisors*, June 2021

However, looking closely at CDR levels, it appears that this distinction is largely baseless, and that even so-called "limited" CDR scenarios are still dangerously betting on large amounts of CDR.

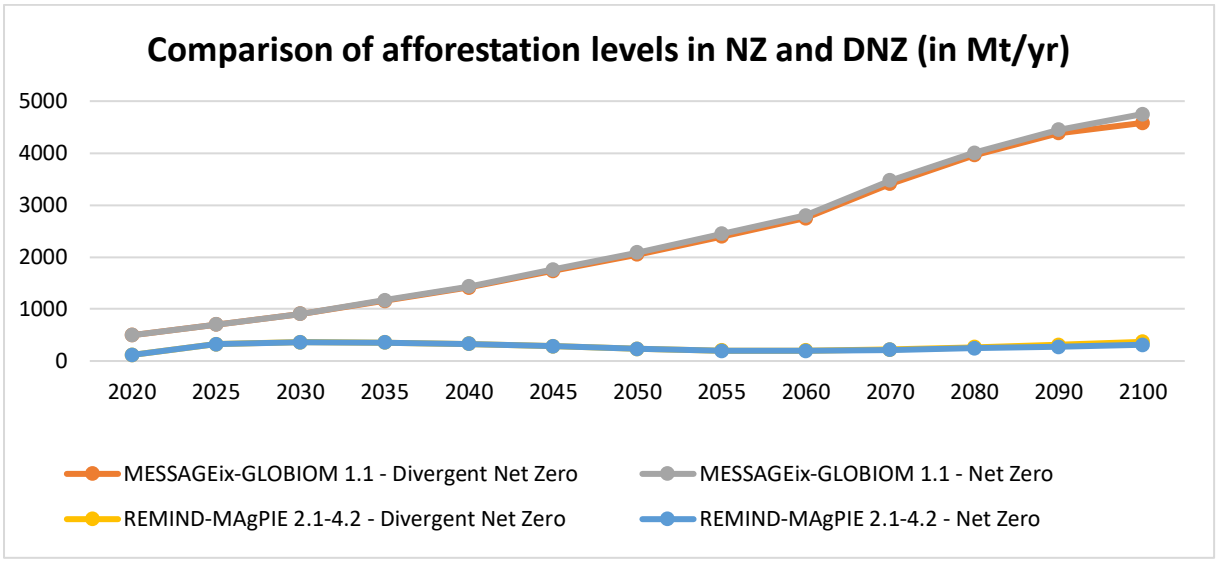
A) BECCS and afforestation: some insufficient progress

The analysis of the first set of NGFS scenarios revealed an overall massive reliance on BECCS and afforestation to capture carbon emissions, thus facilitating continued use of fossil fuels. While the second set of scenarios does better in that regard, NZ scenarios continues to clearly over-rely on these negative emissions:

- **All except one – REMIND DNZ - scenario exceed the sustainability range (0.5 to 5 Gt) for BECCS at some point between 2050 to 2100;**
- **Four scenarios require significant BECCS deployment by 2050**, with two of them exceeding the sustainability mitigation range by then. Furthermore, **three scenarios require massive BECCS in 2100** (6,1 to 7,5 Gt).
- **After 2050, a model – MESSAGE - significantly exceeds the sustainable mitigation range (0,5 to 3,6 Gt) for afforestation** and another – GCAM - does not provide the data necessary to form an opinion.



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

While DNZ scenarios supposedly rely on "limited" levels of CDR, two DNZ scenarios – GCAM and REMIND - still rely on significant levels of BECCS from 2020 to 2050. Furthermore, two DNZ scenarios – GCAM and MESSAGE – largely exceed the sustainability range for BECCS by 2100, exceeding 7 Gt in 2100. To summarize, **the "limited" CDR qualification has only a marginal impact on BECCS levels before 2050 and could be tied to sharp growth afterwards**. For afforestation, there is no significant difference between NZ and DNZ trajectories.

Assessment of BECCS and afforestation mitigation potentials in NZ and DNZ scenarios

Scenario type	Model	Sustainable BECCS range (0.5 to 5 GT)		Sustainable afforestation range (0.5 to 3.6 GT)	
		Before 2050	After 2050	Before 2050	After 2050
Net Zero scenario (NZ)	GCAM			NA	NA
	MESSAGE				
	REMIND				
Divergent Net Zero (DNZ)	GCAM			NA	NA
	MESSAGE				
	REMIND				

Color code	
Lower level of sustainability range (less than 4 Gt CO2 for BECCS)	
Upper level of sustainability range (between 4 and 5 Gt CO2 for BECCS)	
Above the sustainability range for a limited period	
Above the sustainability range	

Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

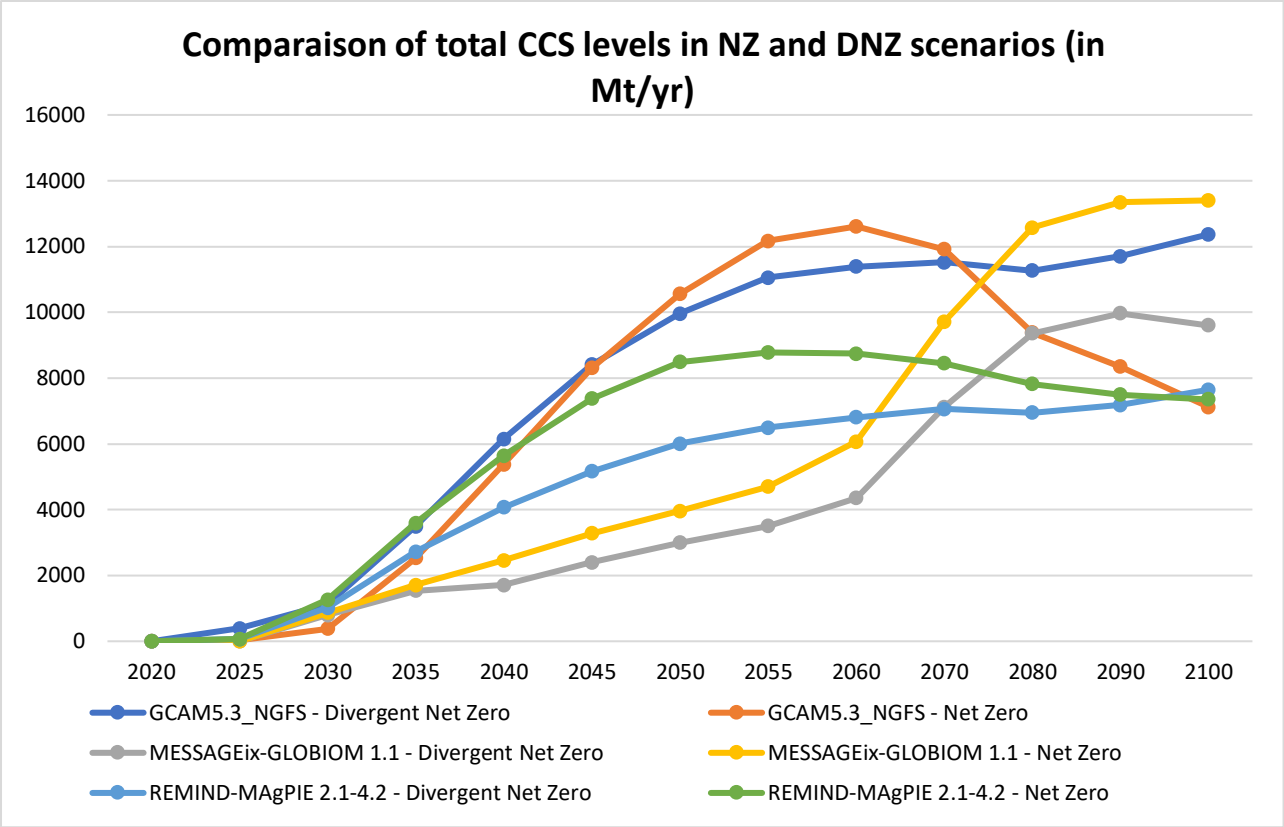
B) A very concerning reliance on CCS

Carbon capture and storage (CCS) is almost non-existent today (0.04 Gt in 2020) and its large-scale development is largely uncertain and can create sustainability and global warming risks. The IPCC itself warns about the risks of betting on such unproven technologies. Any pathway that pretends to have a high chance of limiting global warming to 1.5°C should rely on very limited amounts of CCS.

Carbon capture and storage is at the center of NGFS NZ scenarios. If one NZ scenario - MESSAGE – showcases moderate levels of CCS by 2050 (4 Gt CO2), **the two others massively rely on it (8.4 GT by 2050 in REMIND and 10.5 GT in GCAM)**. One of them – GCAM - would even require the capture of 1.2 Gt in 2030. Furthermore, **the only NZ scenario with limited CCS by 2050 – MESSAGE - requires a massive increase in CCS from 2050 to 2100**.

DNZ scenarios, labelled "limited" CDR, rely on lower levels of CCS then NZ scenarios but not on limited amounts:

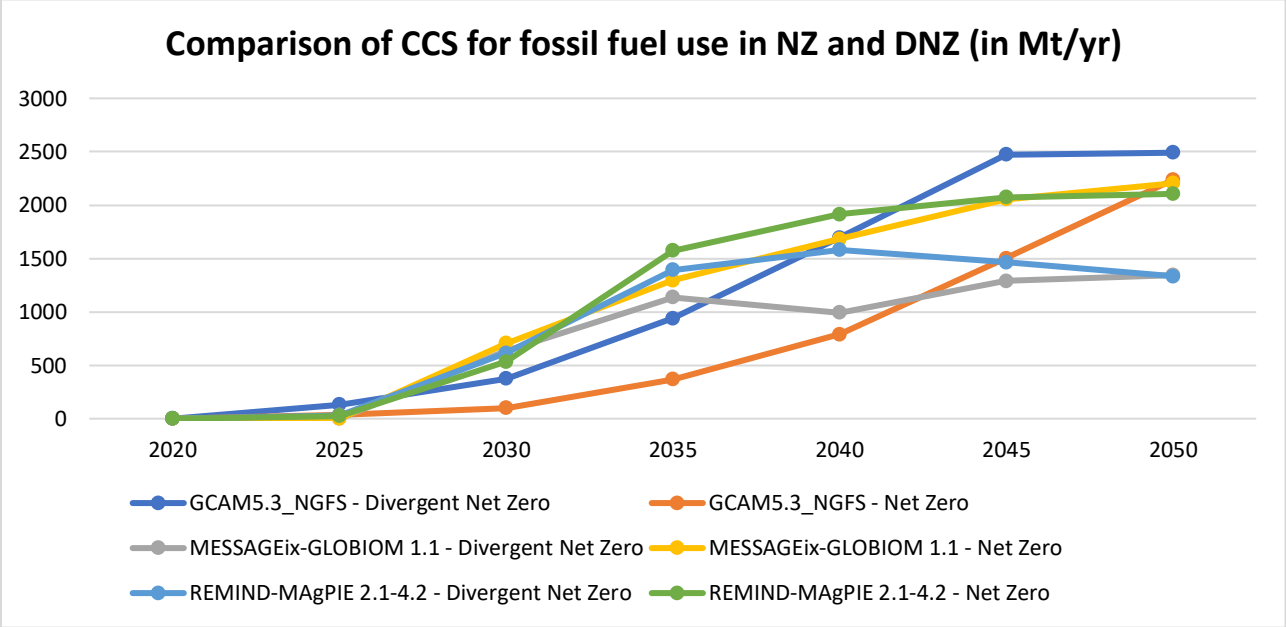
- CCS use increases significantly after 2050 in DNZ scenarios while it tends to diminish in NZ scenarios.
- **Two DNZ scenarios – GCAM and REMIND – require important levels of CCS by 2050 (9.9 and 6 Gt)**. The DNZ GCAM scenario also requires much larger amounts than its NZ equivalent by 2100.
- The lowest use of CCS in all DNZ scenarios by 2050 – MESSAGE DNZ – is still important (3 Gt in 2050).



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

When looking more specifically at CCS for fossil fuel use, the NZ/DNZ distinction is hard to make. The two DNZ scenarios with lower levels of CCS for fossil fuels by 2050 (around 1.3 Gt) imply significant levels of CCS in the 2030s. The other DNZ scenario entails a substantial increase after 2040, reaching more than 2 Gt in 2050.

Overall, four NGFS scenarios require more than 2 Gt of CCS for fossil fuel use by 2050.



Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

Conclusion: The NGFS is yet to provide a credible and low risk pathway to limit global warming

While the NGFS improved the framing of its scenarios, notably centering 1.5°C scenarios, the new framing remains problematic. By branding NZ scenarios - with higher fossil fuel use and CDR - as "orderly" and CDR as less risky, the NGFS pushes financial institutions to consider these features as desirable. More importantly, NGFS 1.5°C scenarios (NZ and DNZ) rely on several dangerous assumptions:

- **NGFS scenarios rely excessively on CCS, thus allowing a slower reduction of fossil fuel use.** In this regard the distinction made by the NGFS between allegedly "medium" and "low" CDR scenarios is largely misleading.
- **Fossil fuel investment levels in NGFS scenarios are especially concerning.** The NGFS did not acknowledge the need to end investments in new fossil fuels and to reach a carbon neutral power system well before 2050.
- NGFS scenarios are still betting on **significant BECCS in the long term.**
- **NGFS scenarios imply a substantial use of biomass.** They largely disregard the limited potential for sustainable biomass generation.

The table below summarizes the Paris-alignment and sustainability levels of NGFS NZ and DNZ scenarios and scores them according to the indicators analyzed in this document. **It shows that NGFS scenarios are not aligned with the Paris Agreement, nor sustainable: they fail on a large majority of indicators and no scenario even reaches the passing grade (9/18 points).**

Summary - Assessment and scoring of NGFS NZ and DNZ scenarios

Scenario type	Net Zero scenario (NZ)			Divergent Net Zero (DNZ)		
Model	**GCAM**	**MESSAGE**	**REMIND**	**GCAM**	**MESSAGE**	**REMIND**
Coal use						
Gas use						
Oil use						
Fossil fuel extraction investment			NA			NA
Fossil fuel electricity investment						
Biomass use						
BECCS						
Afforestation	NA			NA		
CCS						
Score (X/18 points)	**1**	**4.5**	**6.5**	**1**	**6**	**8.5**

Color code and scoring system	
At or below sustainable or Paris-aligned levels – 2 points	
Above sustainable or Paris-aligned levels – 0.5 point	
Significantly above sustainable or Paris-aligned levels – 0 point	

Source: Reclaim Finance based on data from the IIASA NGFS Climate Scenario Database

If they were to be followed or used as examples by companies and financial institutions, NGFS NZ and DNZ scenarios could severely derail climate change mitigation efforts, pushing us way past a 1.5°C global warming. They would also push financial institutions to take additional risks by financing more fossil fuels – including new projects that risk becoming stranded – potentially unsustainable biomass development and very uncertain carbon capture programs.

To provide a credible and low risk pathway forward, the NGFS must urgently:

1) **Acknowledge the need to end investment in new fossil fuels and reflect this in the fossil fuel investment forecast of its 1.5°C scenarios.**
2) **Base its 1.5°C scenarios on very low CDR levels or no CDR – notably for CCS – and stop branding higher CDR scenarios as less risky or "orderly".**
3) **Reflect the need to immediately and significantly reduce fossil fuel use and production.**
4) **Adopt a precautionary approach to biomass use, at a minimum avoiding additional land use and – if possible – staying within sustainability ranges defined by the ETC.**

Furthermore, as Oil Change International and Reclaim Finance stressed in their previous report on NGFS scenarios, scenario analysis is limited and should be supplemented with concrete measures to mitigate climate change and its related risks. **The NGFS should put forward concrete recommendations for immediate action, notably to cut support to companies developing new fossil fuel projects or significantly involved in coal and unconventional oil and gas.**