



# **CLIMATE SCENARIOS:**

**5 traps to avoid to keep global  
warming under 1.5°C**



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## 5 traps to avoid to keep global warming under 1.5°C

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An increasing number of large companies and financial players claim to be working towards carbon neutrality and alignment with the climate goals of the Paris Agreement. To rationalize their strategy, these institutions are increasingly relying on climate scenarios aiming at stimulating the evolution of human activity, considering the goals set to limit global warming. The outcome of these actors' commitments depends on the scenarios they chose.

In most cases, due to a lack of ambition or short-sightedness, these scenarios guide us towards global warming widely exceeding 1.5°C above preindustrial levels. They become greenwashing tools, allowing corporations and financial players to maintain—and even develop—the most polluting activities while professing a strong climate commitment.

**The study of climate scenarios<sup>1</sup> reveals the existence of 5 main traps. The absolute reference on the matter, the «sustainable» scenario of the International Energy Agency (IEA) - named Sustainable Development Scenario (SDS)<sup>2</sup> - that influences the design of the scenarios of public, economic and financial players, falls into all of these pitfalls, thus guiding us toward global warming above 2°C.**

The so-called “representative” scenarios of the Network for<sup>3</sup> that will serve as a model for many regulators and financial supervisors reproduce the IEA's mistakes. If the NGFS does study a climate scenario that is truly “Paris-Aligned”, it is labeled “alternative” and sidelined to put forward “representative” scenarios presented as more realistic. These scenarios undermine the credibility of those who adopt them or use them as a model. Worse, they justify the development of fossil fuels and lead to an underestimation of the efforts needed to give us a chance to keep global warming under 1.5°C.

**This memo calls for financial, political, economic, and social actors to be responsible. They must demand robust 1.5°C scenarios from standard-setting agencies, such as the IEA. In the meantime, they must immediately become aware of the accumulated delay in tackling the climate emergency and raise their efforts above those implied by current scenarios such as the SDS.**



# 1. TRAJECTORIES OVERSHOOTING THE PARIS AGREEMENT

*Summary: Many actors claim to adopt scenarios "aligned with the Paris Agreement" but use scenarios that are less ambitious than the objectives adopted in 2015 and that lead us straight to global warming above 2°C.*

The Paris Accord aims to limit global warming to 1.5°C or "far below" 2°C. However, the special report of the Intergovernmental Panel on Climate Change (IPCC)—mandated by stakeholders at COP21 in 2015—shows that the consequences of a 1.5°C warming would be extremely more severe than those of a 2°C warming<sup>4</sup>. Global warming above 1.5°C would not spare any sectors, not even finance since it would trigger a considerable increase in physical risks and increase the likelihood of a sudden transition as well as systemic crises.

**Many economic, financial and political players, including the members of the Net-Zero Asset Owner Alliance – for example Allianz, AXA, CalPERS, CDC,**

**Zurich –, acknowledge that 1.5°C has become the new 2°C following the publication of the IPCC report in 2018. A growing number of them is committing to achieve carbon neutrality by 2050 and to align their business models with a 1.5°C scenario. However, most scenarios do not aim at limiting global warming to 1.5°C and actors adopting 2°C, "well-below" 2°C or "above" 1.5°C scenarios are, by default, not in alignment.**

Yet, as the IPCC indicates for its own scenarios, most give only a 50-60% probability of meeting their stated objectives. Not aiming to limit global warming to 1.5°C simply means abandoning the commitment to limit global warming to that level.

## 2. LEAVING OUT 30% OF GLOBAL GHG EMISSIONS

*Summary: Many climate scenarios only consider CO2 emissions from fossil fuel combustion and leave out around 30% of global greenhouse gas (GHG) emissions.*

Most scenarios only consider CO2 emissions from fossil fuel combustion and are thus unsuitable tools to document a transformation of the whole value chain to align with a specific global warming trajectory. For instance, **the International Energy Agency (IEA) scenarios do not include non-combustion emissions such as those from deforestation (10% of global GHG emissions), methane (15% of GHG emissions assuming an impact over 100 years) and nitrous oxide emissions coming mainly from the use of fertilizers (around 6% of GHG emissions). All in all, the IEA is thus leaving out about 30% of global emissions!**<sup>5</sup>

The poor accounting of methane emissions, the second most impactful

greenhouse gas after CO2, is particularly worrying. Today, methane emissions follow the +3°C trajectory of some IPCC scenarios. Gas is often promoted because it emits two times less CO2 emissions than coal when burned but could be as bad as coal -if not worst - emissions are accounted all along the value chain. In 2017, the IEA showed that natural gas can have a greater impact on global warming than coal if methane leaks are higher than 3%<sup>6</sup>. Multi-year research conducted by 140 scientists in the U.S. has shown that the U.S. Environmental Protection Agency (EPA) underestimates methane emissions from the U.S. oil and gas supply chain by 60% and that methane leaks are about 3.7%.<sup>7</sup>

### 3. TAKING GROWTH FOR A DIVINE PHENOMENON

*Summary: In many scenarios, growth is conceptualized as an exogenous phenomenon, identical regardless of the hypotheses set forth. However, scenarios have various and major impacts on economic development and can themselves be affected by it.*

**Most of the scenarios—such as the ones from IEA and IPCC—are constructed using the International Monetary Fund's (IMF) economic growth projections as exogenous data.** The close link between economic growth and energy<sup>8</sup> is ignored. Depending on the scenario, energy consumption will continue to grow, stagnate or decrease and energy prices will rise or diminish with no impact on growth projections. The scenarios adopt

a rock-solid economic optimism while simultaneously neglecting the benefits or disadvantages of each trajectory.

**Beyond this, one can question the reality of growth conceptualized as infinite, without considering planetary limits, such as raw material supply. A large part of the consequences of global warming and environmental degradation is excluded from the economic analysis.**

### 4. MAKING CO2 VANISH THANKS TO NEGATIVE EMISSIONS

*Summary: Many scenarios bet on negative emissions—using different CO2 capture and storage processes—to maintain fossil fuel production and a high level of GHG emissions even though the global deployment of these technologies and solutions is highly unlikely.*

Many put forward developing CO2 capture and storage technologies as a solution for the future in the fight against climate change. This technology, which promises to cancel the climate impact of our emissions in the future, allows to maintain or even expand fossil fuels and to limit progress in sobriety and energy efficiency.

To date, this remains limited to 19 operational projects<sup>9</sup>, and many uncertainties remain regarding its deployment on a local as well as a global scale<sup>10</sup>. **The technology is extremely costly; the storage process is not always accepted locally and raises many questions, especially since suitable reservoirs are not necessarily available nearby; one can also question the final objective of its deployment as it is currently mainly used by oil companies to boost the yield of their wells<sup>11</sup>.** Thus, the IPCC has clearly warned the international community about the risk of betting on such unproven technologies.

**Yet, in many climate scenarios, a significant part of the effort to reduce**

**emissions relies on CO2 capture and storage technologies. For the IEA, they would contribute to 9% of the effort to be provided<sup>12</sup> and would capture 28% of total emissions in 2050.** The scenario Equinor Renewal<sup>13</sup> requires the implementation of 1100 industrial CO2 projects the size of the largest project currently in operation; while the scenario Shell Sky<sup>14</sup> predicts the capture of a 100% of fossil fuel generated emission by 2070.

The impact of CO2 capture is intensified by the fact that scenarios are not limited to industrial capture technologies but also include CO2 capture via biomass. Yet, the development potential of these solutions is limited and their benefits are challenged. In addition to the difficulties specific to the CO2 capture and storage technologies - high cost and uncertain deployment capacity - there are considerable difficulties specific to the biomass sector - notably a highly questionable carbon footprint<sup>15</sup> and significant effects on biodiversity<sup>16</sup>.



# 5. CHRONICALLY UNDERESTIMATING THE ROLE OF RENEWABLE ENERGIES

*Summary: Climate scenarios underestimate the development capacities of renewable energies (RE) and their weight in the global energy mix, making them second-tier energies and encouraging the competing and continuous development of fossil energies.*

Countries' energy mixes are traditionally represented, notably by the IEA, in primary energies. But while it is necessary to convert primary energy from fossil fuels into electricity - with a conversion efficiency of 30 to 40% - this process is not relevant to renewable energies. Therefore, for the same electricity production fossil fuels account for three times more in primary energy than renewables. Some actors take this bias into account<sup>17</sup>, **but it is not the case of the IEA, which consequently structurally underestimate the share of renewable energies in the energy mix.**

Moreover, the exponential development of renewable energies has been poorly considered by scenarios. In particular, the **IEA has systematically underestimated the decrease of renewable energies' costs and their development at the international level<sup>18</sup>**. While several studies suggest that the cost of these energies will continue to fall over the long term, their growth potential can no longer be underestimated to favor more polluting and less competitive alternatives<sup>19</sup>.





# CONCLUSION

## Five traps hiding a sixth one: the protection of the fossil fuel sector at all costs

*Summary: While the reduction of fossil fuel production is essential to respect a 1.5°C or even 2°C trajectory, many scenarios take advantage of the five loopholes to keep fossil fuels at the heart of the world's energy systems beyond 2040-2050 and forecast massive investments in the sector.*

**A**ny credible scenario should gradually yet drastically reduce the production of fossil energies and immediately put an end to investments in the sector. The IEA admitted as early as 2018 that, without the massive deployment of CO<sub>2</sub> capture, there is no room for new fossil fuel projects to remain on a "2°C" compatible trajectory<sup>20</sup>. Oil Change International's research has shown that the burning the volume of oil, gas, and coal reserves currently exploited would exceed the available carbon budget for a +2°C trajectory. Even if coal were to disappear overnight, exploited oil and gas reserves would be enough to exceed a 1.5°C carbon budget<sup>21</sup>.

However, both governments and oil companies go against these realities by relying on fantasy scenarios to continue to develop hydrocarbon exploitation. The most widely used climate scenarios fall into many of the traps presented in this briefing and allow the development of fossil fuels.

- While the need to rapidly reduce coal, consumption is accounted for more widely, coal remains in use after 2040 and even 2050 in most scenarios. Additionally, oil and gas remain key components of the energy mix in 2050 and beyond and will continue to develop through sustained massive investments.
- The IEA's "low carbon" scenario (SDS) still foresees a 60% consumption of fossil energy in 2040. It allows for the investment of more than \$15 trillion in fossil fuels from 2019 to 2040—more than biofuels, renewable energy and nuclear power generation combined.
- The central "2°C" scenario of the NGFS is just as generous: \$25 trillion in investments for fossil fuels from 2020 to 2050, of which \$2.4 trillion is in coal, and 45% fossil fuels in the energy mix in 2050, with even an increase of almost 15% in natural gas consumption from 2020 to 2050.

The use of these scenarios partly explains why the world fossil energy production is projected to be 120% higher than that consistent with a trajectory of 1.5°C by 2030<sup>22</sup>. Exxon Mobil and Shell plan to increase their oil production by respectively 54 and 22%<sup>23</sup>.

**To avoid the worst-case scenario, political, economic, and financial actors must demand that the IEA develop a 1.5°C reference scenario, adopting a particularly cautious approach towards negative emissions technologies, covering all GHG emissions and taking full account the imperative to move away from fossil fuels.**

The IPCC 1.5°C scenarios<sup>24</sup> that strongly limit the use of CO<sub>2</sub> capture propose a much more realistic approach, compatible with the goals of the Paris Agreement and can be used by financial actors. However, as stated by the Principles for Financial Institutions Aligned with the Paris Agreement<sup>25</sup> signed by more than 60 organizations, alignment on a 1.5°C trajectory requires rapid and concrete actions

including the progressive reduction - and later on the end - of financial services granted to the most polluting activities.

**Thus, financial players must immediately commit to entirely phasing out fossil fuels by established and documented deadlines—2040 at the latest in Europe and 2050 elsewhere for gas and oil, and ten years earlier for coal—and immediately stop providing financial services to new projects and to companies that develop them.**

In the face of the climate emergency, while waiting for robust 1.5°C scenarios and credible and accepted alignment methodologies, we can judge financial players' commitments to respecting the Paris Agreement on these measures.



## Height scenarios put to the test

While international organizations specializing in the field of energy – such as the International Energy Agency (IEA)<sup>26</sup> and the International Renewable Energy Agency (IRENA)<sup>27</sup> - logically produce highly regarded climate scenarios, the oil majors Shell<sup>28</sup> and Equinor<sup>29</sup> produce their own projections. Financial players are also beginning to enter this field to assess their exposure to financial climate risks, starting with the Network for Greening the Finance System (NGFS)<sup>30</sup>, which brings together central banks and regulators. Additionally, researchers supported by foundations or associations can offer alternative scenarios, such as the Institute for Sustainable Future (ISF)<sup>31</sup> at the University of Technology of Sydney or Greenpeace<sup>32</sup>. The most complete and diversified scenarios remain derived from the work of the Intergovernmental Panel on Climate Change (IPCC)<sup>33</sup>, which notably offers 1.5°C scenarios without CO2 capture.

The following table checks the presence or absence of the six traps detailed in this note, in the climate scenarios of the cited actors that are displayed as aligned with the objectives of the Paris Agreement.

	AIE SDS	NGFS "Orderly" Representative (Immediate 2°C with CDR)	Shell Sky	Equinor Renewal	IRENA Transforming Energy Scenario 2050	NGFS "Disorderly" Alternative (Immediate 1.5°C with limited CDR)	UTS-IPF 1.5°C	IPCC 1.5°C Limited/No CDR
1. The adopted trajectory is aligned with climate goals of the Paris Agreement	NO	NO	NO	NO	NO	YES	YES	YES
2. Methane, deforestation and nitrous oxide emissions are adequately accounted for	NO	NO	PARTIALLY	NO	NO	NO	NO	YES
3. Growth is directly related to the impact of scenarios, energy consumption and energy prices	NO	NO	NO	PARTIALLY	NO	NO	NO	NO
4. Scenarios do not rely on large volumes of negative emissions	NO	NO	NO	NO	NO	YES	YES	YES
5. The development potential of renewable energies is adequately taken into account	NO	NO	NO	NO	YES	YES	YES	YES
6. The need to move away from fossil fuels and drastically reduce investments in the sector is taken into account	NO	NO	NO	NO	NO	YES	YES	YES

- The NGFS offers two 1.5°C scenarios, one with a full deployment of CO2 capture and one with limited deployment of CO2 capture. However, these scenarios are secondary to the 2°C baseline scenarios labelled “representative” scenarios. Branded as “alternative”, they are marginal to the NGFS’ documents and communication centered around two 2°C scenarios (“Orderly” and “Disorderly”). Only the 1.5°C scenario with limited CO2 capture, classified as an “alternative” scenario of a “disorderly” transition, appears potentially compatible with the Paris Agreement.
- The Energy Transition Outlook 2020 scenarios by the DNV GL corporation<sup>34</sup>—a projection exercise—and the New Global Energy Perspectives 2019 by the Mc Kinsey consulting firm<sup>35</sup>—a business as usual scenario—have not been included in this comparison insofar as they do not claim to be aligned with the Paris Accord. However, they provide useful data on current practices and their expected evolution which have informed this note.
- We did not include the IEA, NGFS, IRENA, Shell, Equinor and IPCC scenarios, in which global warming exceeds 2°C to this comparison.



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## Notes

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Reclaim Finance is an NGO affiliated with Friends of the Earth France. It was founded in 2020 and is 100% dedicated to issues linking finance with social and climate justice. In the context of the climate emergency and biodiversity losses, one of Reclaim Finance's priorities is to accelerate the decarbonization of financial flows. Reclaim Finance exposes the climate impacts of some financial actors, denounces the most harmful practices and puts its expertise at the service of public authorities and financial stakeholders who desire to bend existing practices to ecological imperatives.

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