Zero Carbon Analytics

Briefing · November 2023

Towards a science-based definition of 'unabated' fossil fuels

Key points:

- Unabated fossil fuels refers to the use of coal, oil and gas without substantial efforts to reduce the emissions produced throughout their life cycle.
- However, there is no rigorous definition of the term that is widely agreed on.
- Despite this, the term 'unabated' in relation to fossil fuels has become central to international negotiations at the G7, G20 and UN climate summits, and is set to be a key point of debate at COP28.
- Without a rigorous definition, the use of inadequate technologies and weak policies on abatement could fail to curb fossil fuel emissions, undermining global efforts to limit temperature rises.
- A science-based definition of abatement should include near-total capture of emissions, permanent storage of captured carbon dioxide, the near-total elimination of upstream and transport emissions, and rigorous monitoring and reporting processes for fossil fuel companies and projects.
- To limit warming to 1.5°C, the use of fossil fuels that do not meet these stringent requirements must be rapidly and substantially reduced to a minimum by 2050.

Abated vs unabated fossil fuels

Abated fossil fuels refer to the use of coal, oil and gas where the emissions from their extraction are minimised, and emissions from their use are almost completely prevented from entering the atmosphere through technologies like carbon capture and storage. Unabated fossil fuels are the use of coal, oil and natural gas where this does not take place – which currently account for 99.9% of fossil fuel emissions.[1]

At this year's COP28 summit, the term 'unabated' is set to be key to negotiations on phasing out fossil fuels. The concept was first used in major international agreements on climate and energy two and half years ago, and since then it has been mentioned repeatedly in G7, G20 and UN Framework Convention on Climate Change agreements and communiques. Despite this, the term has not been officially defined, and countries have signed agreements that refer to unabated fossil fuels without agreeing on its meaning.

[1] Global CCS capacity represents 0.1% of global fossil fuel emissions https://www.iea.org/data-and-statistics/data-tools/ccus-projects-explorer & https://www.globalcarbonproject.org/carbonbudget/22/files/GCP_CarbonBudget_2022.pdf.

The absence of a clear definition presents a huge threat to efforts towards mitigating climate change, and risks a situation where governments and companies pursue policies that are far removed from what is needed to achieve the Paris Agreement goal of limiting warming to 1.5°C.

What is carbon capture and storage?

Carbon capture and storage (CCS) technology separates carbon dioxide from other gases, and then transports and stores it. CCS is mostly used to refer to the removal of carbon dioxide from large single-source emitters, such as power stations or industrial facilities.

'Unabated' fossil fuels in international diplomacy

2021

The term 'unabated' was first used in major climate and energy negotiations in the concluding statement of the G7 climate and energy ministers meeting in the UK in May 2021, when governments committed to end direct support for unabated thermal coal power. The same promise was made by the G20 in October that year. At COP26, 39 countries went further and committed to end direct international support for all unabated fossil fuel energy projects. The Glasgow Climate Pact, summarising key agreements from COP26, called on countries to phase down unabated coal power for the first time.

2022

In 2022, building on the commitments from the previous year, G7 countries pledged to phase out generation of unabated coal power domestically, while G20 states agreed to accelerate the phase-down of unabated coal power. Ahead of the COP27 summit in Egypt, India said it wanted to expand the agreement made at COP26 and reach a deal on phasing down all unabated fossil fuels. This proposal gathered significant support from around 80 countries, including the EU, US, Canada and Australia. However, the final summit agreement only repeated the commitment from COP26 to accelerate the phase-down of unabated coal power, with Saudi Arabia and Russia reportedly strongly opposed to any broader deal on fossil fuels.

2023

This year, G7 countries committed to work towards ending the construction of new unabated coal fired power generation and to accelerate the phase-out of unabated fossil fuels. However, G20 countries failed to agree on a similar proposal to phase down all unabated fossil fuels - only agreeing to phase down unabated coal power.

Heading into COP28, the battle over unabated fossil fuels is now centre stage in the UN climate talks. This year's COP President Sultan Al Jaber wants the summit to accelerate work that leads to an "energy system free of unabated fossil fuels in the middle of this century" and support "a responsible phase down of unabated fossil fuels". The EU is backing this in its negotiating position for COP, recognising the need for a global phase-out of unabated fossil fuels. However, the bloc has noted that abatement technologies currently only exist at limited scale and should be used for hard to abate sectors. The US is slightly less committed, saying only that it aims for a 'shift away' from unabated fossil fuels

rather than a phase-out. A coalition of 131 major global companies have also thrown their weight behind the phase-out of unabated fossil fuels.

The 16-country High Ambition Coalition is calling on governments to go further at COP28 and agree to a full phase-out of all fossil fuel production and use, noting that current abatement technologies will play a minor role in reducing emissions and they should not be used to delay climate action. At the other end of the spectrum, the same countries that blocked an agreement on an unabated fossil fuel phase-out at the G20 and last year's COP - such as Saudi Arabia, Russia and China - could remain staunchly opposed to any reference to fossil fuels at COP28.

While there are significant gaps between the negotiating positions of countries heading to COP28, it is clear that debates on the phasing down or phasing out of fossil fuels, abated or unabated, will be central to negotiations.

Differing definitions of unabated fossil fuels

There are currently a range of differing definitions of 'unabated' fossil fuels:

- Dictionary definitions highlight the breadth of potential interpretations of the term abatement, varying from a 'reduction in the amount or degree' to 'putting an end to'.
- US Special Envoy for Climate John Kerry has said that the term means "something different to different people" and that countries' intentions aren't all the same. In his view, abatement means "capturing the emissions to keep you on a track to reach the Paris goals. Very straightforward."
- The International Energy Agency (IEA) defines unabated fossil fuels as the use of those fuels for combustion without carbon capture, utilisation and storage (CCUS).[2]
- The Intergovernmental Panel on Climate Change (IPCC) defines them as *"fossil fuels produced and used without interventions that substantially reduce the amount of GHG emitted throughout the life cycle; for example, capturing 90% or more* CO_2 *from power plants, or 50–80% of fugitive methane emissions from energy supply."*

Agreeing this definition in the IPCC report was itself controversial and contested. According to one of the IPCC report's lead authors "A few [countries] came out very aggressively wanting this abated, unabated language in there right in front of fossil fuels, because otherwise, we just want a fossil fuel phase out or phase down. Fundamentally, it's about a political collision between those parties that want to keep using fossil fuels and those parties that want to phase them out completely."

The dangers of an ambiguous definition

An ambiguous definition of unabated fossil fuels could have huge implications for future warming, since fossil fuel emissions could be nearly completely halted or just reduced. On top of this, there are risks around the term allowing for low carbon capture rates or excluding upstream emissions.

[2] CCUS includes the use of carbon technology where captured carbon dioxide is used, for example in other industrial processes, whereas CCS refers only to where captured carbon is stored.

Carbon capture rates

The IEA and Kerry's definitions of unabated fossil fuels are problematic as they both refer to carbon capture – but not all CCS projects capture high rates of carbon. As a recent study pointed out, not having a clear definition of abatement could allow for carbon capture rates as low as 50%.

This is very relevant given the track record of CCS projects to date. There are currently only 41 CCS facilities operating worldwide, and many of those have achieved relatively low capture rates. For example, the estimated capture rates at some high-profile CCS projects are:

- 65% at Boundary Dam, a coal power plant in Washington State, US
- 45% at Gorgon, a gas processing facility on Barrow Island, Australia
- 39% at Quest, an oil refinery in Alberta, Canada
- Under 10% at Century Gas Processing Plant in Texas, US

Upstream emissions

Upstream emissions – which come from the extraction and production of fossil fuels – are not included in the IEA and Kerry's definitions of unabated fossil fuels, despite accounting for almost 15% of total energy-related greenhouse gas emissions. This figure includes emissions of methane, a greenhouse gas far more powerful than carbon dioxide. The global energy industry is responsible for an estimated 37% of human-caused methane emissions. The IEA does not incorporate upstream emissions into its definition, despite stating that significant reductions in operational and methane emissions from the energy sector are necessary to reach net-zero emissions by 2050.[3] A definition of abatement that only looks at carbon capture, without addressing upstream emissions, misses a significant share of global fossil fuel emissions.

Key components of a science-based definition

Based on the latest reports from the IPCC, IEA and academic literature, the following key components are needed for a rigorous, science-based definition of abatement:

1. **High carbon capture rates:** There must be near-total capture of fossil fuel combustion emissions, with carbon capture rates of at least 90–95%. If carbon capture technology successfully and consistently reaches this rate, then the definition should be reviewed and increased to further reduce residual emissions. Carbon capture technology is not feasible for mobile or small emitters, such as in transport or domestic gas boilers and stoves. The IEA does not see any role for CCS in the use of oil in its net zero scenario, only for gas and coal.
2. **Geological storage:** Once captured, carbon dioxide must be stored underground permanently. Alternative uses of captured carbon dioxide, such as increasing rates of oil extraction or for short-lived products like fizzy drinks, are incompatible with a science-based definition of abatement as the carbon is not permanently removed.
3. **Near total containment of upstream and transport emissions:** Emissions from the production and transport of fossil fuels, including methane emissions, need to be virtually eliminated. This should include methane intensity levels of 0.5% at the very

[3] The IEA's Net Zero Emissions scenario provides a pathway for the global energy sector to achieve net-zero carbon dioxide emissions by 2050.

most, and ideally 0.2% or lower – which large parts of the oil and gas industry claim to have achieved.[4] Together with post-combustion capture, this should ensure that the definition of abatement includes all Scope 1, 2 and 3 emissions from fossil fuels.[5]

4. **Monitoring, reporting and verification:** To ensure that these standards are met, there needs to be rigorous monitoring of all facilities and infrastructure along the fossil fuel supply chain. This data should be publicly reported, and verified by third parties where possible.

Since the term 'unabated' has become central to international climate negotiations, it is vital that countries agree on a rigorous science-based definition of the term. If there is no agreement on what unabated fossil fuels are, then any agreement to phase them out is arguably meaningless, as each country could impose their own interpretation. It could lead to countries and companies implementing policies that are interpreted as being in line with a phase out of unabated fossil fuels, but that undermine progress towards the Paris Agreement goal of limiting warming to 1.5°C.

The need to rapidly and substantially reduce the use of unabated fossil fuels to limit warming to 1.5°C is clear. In the IEA's Net Zero Emissions scenario, total use of coal, oil and natural gas falls by 87% by 2050, while the IPCC makes clear that reaching net-zero energy emissions will require "minimal" use of unabated fossil fuels.

[4] Methane intensity refers to the amount of methane that is leaked or released into the atmosphere as a percentage of the total amount of gas sold.
[5] Scope 1 emissions are direct emissions from sources owned or controlled by a company, Scope 2 are indirect emissions from the energy it uses, and Scope 3 includes emissions the company is indirectly responsible for in its value chain, including from the use of the products it sells.