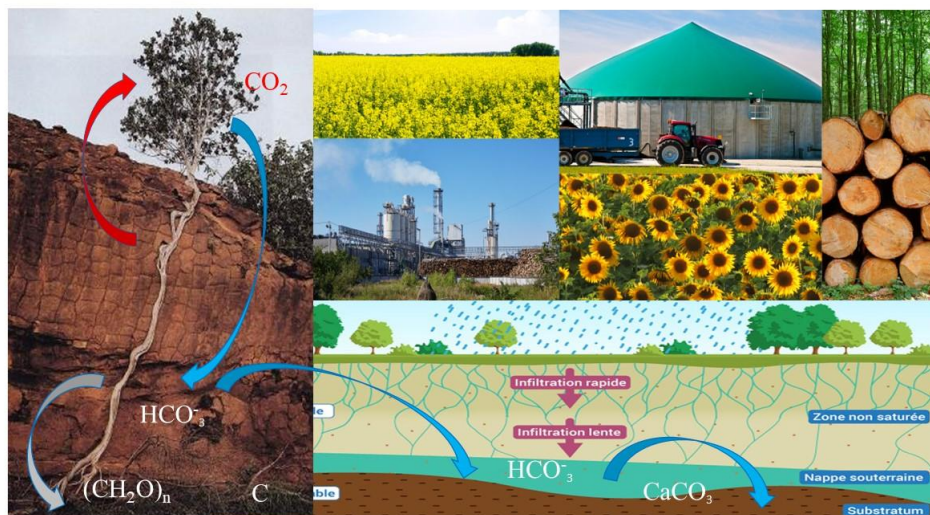




Decarbonization and the Fossil Carbon Complex

Three proposals for COP28

ACP Energies Forum on October, 20th 2023 at the Hôtel de l'Industrie, Paris



20 Octobre 2023

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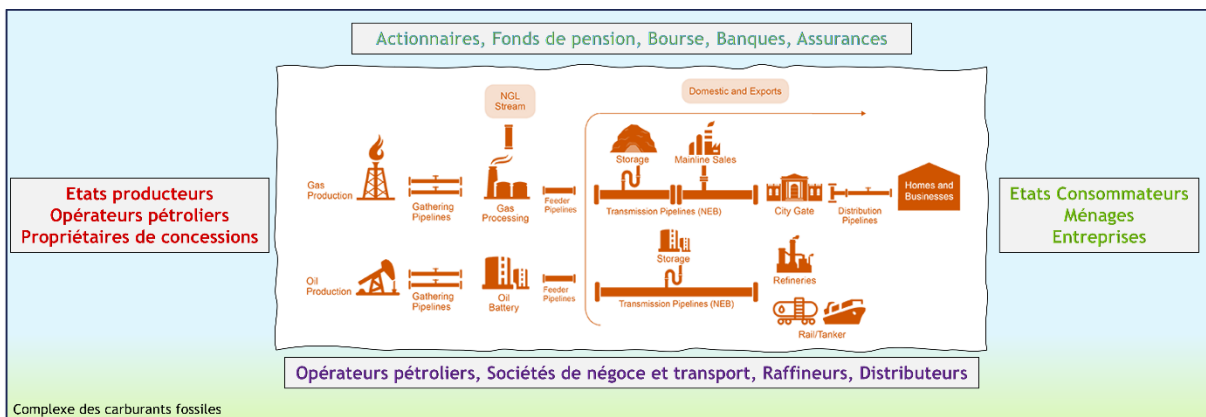
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Foreword

During its annual Forum held on October 20th, 2023 at the Hôtel de l'Industrie in Paris, the ACP Energies Association, which brings together professionals from the hydrocarbon and energy industries, examined the actions that could be taken without delay by the actors of the "Fossil Carbon Complex" to decarbonize the atmosphere.

The Fossil Carbon Complex is made up of all industries and consumers of carbon-based fossil fuels or producers of building materials or carbon-based ores, as well as all intermediate levels, financiers, and regulators of these activities. It includes the fossil fuel complex.



Its actors emit most of the greenhouse gases that are currently aggravating the climate crisis and they are therefore in fact the only ones able to control them. It should be remembered that 91% of primary energies are carbon-based: 10% are renewable bio energies, which recycles atmospheric carbon over short cycles, and 81% are fossil fuels (coal, oil and gas) which emit carbon into the atmosphere that was previously sequestered deep underground in geological formations.

The prevailing media discourse suggests that it may be possible to get out of this situation in less than 30 years by replacing a large part of carbon-based energy with non-carbon-based energy. This does not appear to be a realistic solution to the professionals of the ACP Energies association who recall the key role of bio energies, which are currently in the blind spot of the debates.

Recalling the importance of energy sobriety and the urgent need to make more efficient the energy chains that dissipate 2/3 of primary energies in heat or into the atmosphere before they are delivered to end users, the **ACP Energy experts make the following recommendations, in anticipation of the discussions that will take place at COP28*¹:**

¹ * Refers to the glossary at the end of the document



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1. Empower all stakeholders within the Fossil Carbon Complex to halt the worsening climate situation.

ACP Energy Proposal/COP28 n°1

Each actor in the "Fossil Carbon Complex*" (administrations, fossil fuel supply chain actors, manufacturers, distributors, consumers of fossil fuels) must take responsibility and get involved in the management of the fossil carbon they extract, emit or from which they derive income.

The measures currently put in place by the authorities to manage carbon emissions in economic and industrial circuits have not been able to reduce the carbon dioxide or methane content of the atmosphere by a single ppb (parts per billion). To get out of this impasse without delay, ACP Energies recommends that each player in each energy chain* or mineral substance transformation chain* that makes up the Fossil Carbon Complex* be directly involved in a Geological Carbon Neutrality* approach at his level. The actors concerned are national and international authorities as well as gas, oil or coal operators, as well as factories producing construction materials (cement, lime) or steel, as well as consumers or end users of these products and as well as the bodies that finance or insure all these actors.

Getting involved in a Geological Carbon Neutrality* approach consists of each actor to:

- Geologically* sequester* itself a stream equivalent to the stream of fossil carbon it produces, acquires, or derives revenue from
- Or pay/ask third parties to do it for them.
- Or pass this involvement on to the downstream link if they can't manage it themselves.
- Or pay the state or a supervisory body a penalty that frees it from that involvement.

National or supranational supervisory authorities for Geological Carbon Neutrality could be set up to:

- Quantitatively track fossil carbon flows from production points (wells, mines, quarries, factories) to emission points (factories, processes, engines, industrial leaks).
- Ensure that carbon capture and sequestration (CCS*) or atmospheric carbon removal (CDR*) operations allow for the geological sequestration of fossil carbon flows equivalent to the fluxes extracted by the actors of the Fossil Carbon Complex.
- Penalize energy actors or chains that do not comply with the principle of geological carbon neutrality.

The practical implementation of this process can be initiated today by any actor or group of actors in the Fossil Carbon Complex, regardless of its position, upstream or downstream, in the chains of the Fossil Carbon Complex.

Geological carbon capture and sequestration (CCS)* now plays a critical role in giving fossil fuel producers a "social license" to operate, even though this is contested by many organizations. It is therefore surprising that fossil fuel producers are not asking themselves more about how to recover the CO₂ they should inject.



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To keep this "license", if they cannot or do not want to develop CCS massively right away, they have no choice but to invest in atmospheric carbon removal (CDR)*, and to develop solutions where biomass would play the role of vector to geological carbon sinks. One way for them to make the most of this effort is to convert some of this biomass into bio energies, which would reduce the need for fossil fuels. In doing so, they are gradually substituting low-value-added organic products for high-value-added fossil products in their own markets, while lowering the technological thresholds for competitors to enter their markets.

It is understandable that, caught between the hammer of the CDR and the anvil of the CCS, fossil fuel producers are not particularly enthusiastic about embarking on either of these paths.

Hence the need for measures to be taken within the framework of collective commitments at the level of governments or trade associations.



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2. Developing bio energies to decarbonize the atmosphere.

ACP Energy Proposal/COP28 n°2

Strongly develop the use of bio energies to:

- 1/ Accelerate the removal of atmospheric carbon by natural pathways.
- 2/ Reduce fossil carbon emissions by consumers

- **Reminder: what we are trying to decarbonize is neither energy nor the economy, it is the atmosphere!**

To decarbonize the atmosphere, we need carbon pumps. The only ones that work and will work at the scale and in the time needed involve the capture of atmospheric carbon* by photosynthetic biomass* to store it in soils, oceans, aquifers, and sedimentary layers, while emitting the oxygen necessary for the life of species like ours: these are mainly vegetation on continents and algae and microalgae (phytoplankton) at sea. The carbon dioxide fluxes removed from the atmosphere by these carbon pumps are more than ten times greater than the carbon dioxide and methane emissions flows resulting directly or indirectly from human activities.

It can be seen that industrial means of atmospheric carbon removal (industrial CDR)* offer only a small prospect of significantly acting on a reduction in atmospheric carbon content by 2050.

On the other hand, appropriate management of existing photosynthetic production* and its development could offer opportunities for atmospheric carbon removal (natural CDR)* on the scale recommended by the IPCC* to limit global warming. This would feed into the biological carbon sinks that mediate the geological carbon sinks.

- **Increasing and maintaining the volume of photosynthetic biomass for the purpose of increasing carbon capture would allow the production of bio energies that would be a direct substitute for fossil fuels: developing inland and marine photosynthetic biomass is a priority.**

There is a vast potential for biomass that can be developed and exploited for bio energies purposes:

- In the heart of agricultural, forest or fallow continental areas, thanks to a better use by Earthlings* of the biomass currently spoilt or unused, through the introduction and generalization of agroecological practices* that the European Union is now advocating.
- In coastal areas and oceans through the production of algae and microalgae
- Underground or under the oceans through the development of primary chemotrophic biomass production* or increased capture of primary biomass decomposition products.

Harnessing some of this potential would be enough to meet our current carbon-based energy needs, while stimulating the additional carbon sink capacity needed to decarbonize the atmosphere.

A significant fraction of fossil carbon energies could thus be replaced by renewable carbon energies (bio energies) obtained from wood, plants or algae and their derivatives: charcoal, alcohols (methanol, ethanol), oils (diesel), gas (methane, butane, propane) or hydrogen, to name but a few.

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This would be done without increasing the rate of human removal from primary biomass production*. The intelligent and synergetic integration of carbon-free renewable energies (solar, wind, hydro, geothermal) into the territorial network of development of these bioenergies would even make it possible to reduce this rate.

- **Bioenergy can and must play a pivotal role in moving away from an extractive world dominated by fossil fuels to a regenerative world dominated by renewable energies.**

Using bioenergies instead of fossil fuels not only makes it possible to decarbonize the atmosphere, if done appropriately, but also brings Earthlings' energy cycles back into line with the major biological and geochemical cycles of life, which guarantee the integrity of the biosphere.

Consumers of fossil fuels could then use them as a substitute and without massive investment in new engines, processes, or energy distribution systems. It is economically preferable from the point of view of end-users who have limited investment budgets to act on their existing vehicle fleet and machinery by adapting them to biofuels rather than wanting to replace them too quickly with electric or hydrogen.

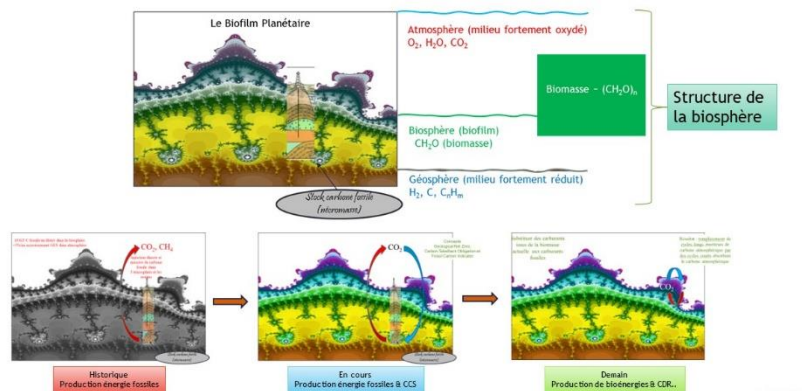
The restoration and development of natural carbon pumps, discussed above, could be financed without having to imagine convoluted carbon tax or carbon market systems.

The substitution of bio energies for fossil fuels would thus be a factor in accelerating the energy transition: it would free up significant investment flows outside the fossil fuel sector. These could be affected:

- On the one hand, changes in practices and agroecological redevelopment of agro-forestry and marine areas, allowing the ramp-up of the production of alternative bio energies.
- On the other hand, the heavy financing of energy systems based on geothermal heat, renewable electricity, and carbon-free hydrogen.

Until now, bio energies has remained in a blind spot in the current debate because it has the disadvantage of being carbon-intensive and the public debate focuses on the decarbonisation of economies and energies. Logically, electric energies and hydrogen, considered as their carrier, are preferred. The emphasis on the development of "green" hydrogen, obtained by electrolysis of water, obscures the fact that biomass is also a carrier of hydrogen and that the latter, under the name "biohydrogen", can be extracted from it at an energy cost 5 to 7 times lower and in equal quantities.

Développer les bioénergies pour décarboniser l'atmosphère



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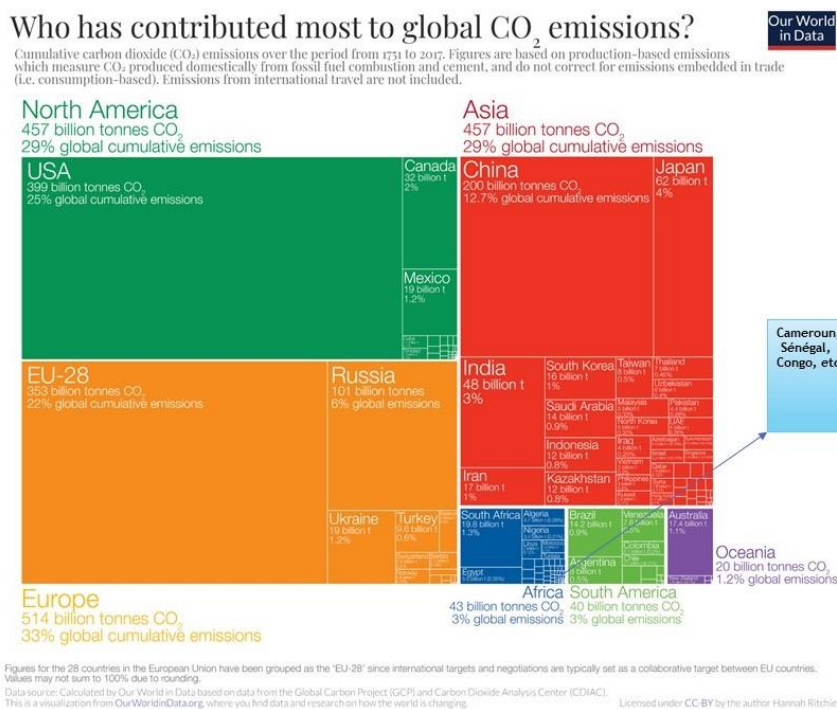
3. Adapting measures to the reality of emerging or less developed countries

ACP Energy Proposal/COP28 n°3

Adapting energy financing for emerging countries with low carbon liabilities to their specific situation.

It is proposed that the financing of energy development in emerging countries characterized by a low historical fossil carbon liability should no longer be closed to fossil fuels. In return, the latter could be incentivized to implement geological carbon neutrality solutions (see proposal 1). Funding from the Green Climate Fund* could be mobilized for this purpose.

Financing energy development in emerging countries has become a real concern since international finance agencies have become increasingly reluctant to support fossil fuel development projects. Many of these countries do not have the resources or infrastructure to develop an electric or hydrogen infrastructure that would meet their needs. For many, developing their fossil fuels remains the most economical way to industrialize, especially since it also allows them to benefit from export resources to finance their development.





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Actions driven by ACP Energies

- **Establishment of close links between ACP Energies and professionals in the agricultural, algaco, forestry and waste management sectors.**

Living organisms that produce bioenergetic materials range from a microscopic (microbes) to macroscopic (algae, forests) scale, with the macro emerging from the micro. Their management and the increase of their capacities call on all living disciplines, from biology to agronomy, including permaculture and agroecology.

The model envisaged for the development of bioenergies is based on territorial energy redevelopment according to the principles of agroecology and not on that of monocultures of agro-industry or the forestry industry - even if they can retain a place in it. In particular, it relies on a dense network of production points spread across the territories. This fabric would preserve or develop the regenerative capacity of natural environments while collecting energy resources (wood, charcoal, alcohol, oils, biofuel precursors, etc.), the surplus of which could be concentrated in industrial or urban centers. These energy resources must be short-cycle and grow in symbiosis with natural areas and their endemic vegetation*.

- **Opening up to microgeobiology specialties**

Significant bio energies supplements can be stimulated in the subsoil (deep microbial activity) and oceans (algae and phytoplankton). The links between CCS and underground in-situ regeneration of methane or other hydrocarbon products by biological processes need to be explored.

- **Adaptation and miniaturization of refining and petrochemical technologies**

The technologies of the oil and petrochemical industries can be miniaturized and implemented on a micro scale by the very people who live from agro-forestry and marine areas and who could benefit from additional sources of income through this.

- **Development of an "Energy Transition Guide for Fossil Carbon Complex Stakeholders" and associated training courses**

- **Working Group on the Economics of Decarbonizing the Atmosphere**

Proposals for an overhaul of the economic tools for managing carbon emissions and products (taxes, penalties, funds, offsets, carbon markets) to improve their effectiveness with regard to the decarbonization of the atmosphere.



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About Us

This note was written by [Patrick Portolano](#), Climate Referent and leader since 2020 of the H2-CO2 working group of the ACP Energies association and president and founder of [EOSYS](#). It is the result of a synthesis discussed within the Association and in particular during the forums held at the Hôtel de l'Industrie in Paris in September 2022 and October 2023.

ACP Energies

ACP Energies is a non-profit association that brings together specialists in the fossil and renewable energy sector. While maintaining the independence of its members, the organization promotes their cooperation through interprofessional communication and the pooling of resources on certain important issues.

ACP Energies, as an association of professionals and for professionals, also relays their skills to companies by advising them on experts adapted to their needs. Finally, the association is also committed to the ecological transition; Through its new orientation plan, it has become a forum for exchange and an important force for proposals in favor of the reduction of carbon emissions by the gas and oil industries.

ACP Energies website: <http://www.acp-france.org>

Contact: contact@acp-france.org

EOSYS

EOSYS is an independent geoscience engineering company. Created in 1993, it is headquartered in France in Aix-en-Provence.

EOSYS offers investors, local land, estate and land concession managers systemic and resilient strategies for a long-term carbon neutral or negative energy supply. It conducts research and development on these subjects as well as on the prospecting and development of natural hydrogen resources.

EOSYS has worked on more than 70 sites in Europe, Africa and America on projects for exploration, development and equity investments in mining and oil, design of underground storage facilities and structures, nuclear safety and defense, groundwater resources, geological, geophysical and geochemical measurements and modelling, and low-carbon territorial strategy on water and energy supplies.

EOSYS website: <https://eosys.fr>

Contact: patrick@eosys.fr Tel: +33 4 42 66 95 00

Convergence, an international multi-service operator

Convergence International is an organization based in Paris. Its multi-skilled experts work to help companies and organisations on their international business development in the Africa-Mediterranean-Europe (AME) region.

The services provided by Convergence are numerous:

- Highlighting & digital communication



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- Organization of events for your international development
- Search and implementation of sponsorships
- Creation and management of business relationships according to your expectations
- Support for international establishment through market access services
- Operational support for the development of your company in the AME zone after discussion of a strategy

In addition to this, Convergence also offers an online platform for pre-qualified professional meetings (talents and companies), which now has 4,500 members.

Convergence Sites: <http://convint.com>

Matchmaking platform: www.convergence.link

Contact: contact@convergence.link + 33 9 80 57 69 66



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Glossary, abbreviations, further discussions

(Click on underlined blue text to access the link)

- [Atmospheric Carbon](#)

This is all the carbon compounds present in the atmosphere: mainly carbon dioxide (CO₂) at 420 ppmv (²i.e. 0.042%), then methane (CH₄) at 1.9 ppmv. Other compounds such as carbon monoxide (CO) or dimethyl sulfide (CH₃)₂S are also present at a few ppmv fractions and have a very short lifespan. Chlorofluorocarbons (CFCs) in the ppbv range are also present.

- [Agroecology](#)

Agroecology proposes agricultural production systems based on ecosystem processes and functions, such as organic farming, permaculture, natural or conservation agriculture, or agroforestry, whereas industrial agriculture resulting from the agricultural revolution or the Green Revolution thinks about production from inputs. Agriculture could evolve in the medium or long term by moving from a logic of exploitation of soil and other natural resources to a logic of "management of cultivated ecosystems".

In Europe, agroecology could be gradually encouraged by the conditionality of CAP compensatory aid, which has evolved into "eco-conditionality", aid paid subject to compliance with good agricultural and environmental conditions.

Upcoming policies in Europe or already underway, such as in India, Brazil or Mexico, aimed at generalizing agroecological practices – initially for agricultural purposes and now for atmospheric carbon sequestration – are already helping to accelerate the development of bio energies there.

- [Biomass](#)

Biomass is the term that refers to the total mass of living organisms, whether plants, animals, fungi or microbes. Earthlings get all their food and a large part of the resources they need on a daily basis from it. Fossil **fuels** such as oil, natural gas and coal are also mainly derived from biomass.

The so-called primary biomass is made up of primary producing organisms, also known as **autotrophs**. They create the **organic matter** that makes them up through physicochemical reactions combining carbon in mineral form (CO₂³ in particular) and water as well as other minor elements. Photosynthesis, which creates all **plant cells**, is the most well-known form of photolysis of water by sunlight accompanied by a reduction in atmospheric CO₂. Primary biomass can also be created by **chemosynthesis**, especially in an underground environment under anoxic conditions (no oxygen). For example, microbes (archaea) use one of the pathways of **methanogenesis** to form cellular organic compounds by reducing CO₂ with hydrogen from chemical reduction reactions or resulting from the radiolysis of water by natural radioactivity.

² PPMV: parts per million (by volume) and ppBV parts per billion (by volume)

³ CO₂: carbon dioxide or carbon dioxide



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While the net primary photosynthetic production rate (about 50 GtC/year in the oceans and 60 GtC/year on the continents) is roughly known, the annual rate of net primary chemosynthetic biomass production is unknown.⁴

Secondary **biomass** corresponds to the production of living matter by secondary producers, also known as **heterotrophs**, which group consumers into herbivores, carnivores, detritivores and decomposers. Primary and secondary biomass can also be a source of bio energies through **fermentation**, which is a degradation of organic matter by microbes that derive their energy from the oxygen it contains, thus increasing the hydrogen content of residual organic matter. The annual rate of biomass produced by fermentation is unknown.

- [Bioenergy](#)

Bioenergy (or bio energies) is energy produced from organic resources such as wood, agricultural crops, and organic waste. It is obtained from recently produced organic matter, which is called biomass, as opposed to fossil fuels which are fossilized biomass. Depending on the source material, it will be referred to as forest biomass, biofuels, biogas, or biofuels.

Both at the global level and in most countries, especially those with little industrialization, biomass remains by far the leading source of renewable energy in the consumption of primary energy sources.

- [Carbon sinks, CCS, CDRs](#)

Natural wells

These are mainly ecosystems which, such as forests, coastal marshes, hedgerows and phytoplankton, naturally capture CO₂ by photosynthesis and store it in wood, soil and sediment. These are **biological sinks**. CO₂ also dissolves in the oceans or is absorbed by weathering rocks on the surface of continents. In the latter case, these are **geological sinks**, as are geological strata that contain hydrocarbons or coal. The natural transition from biological carbon sinks to geological carbon sinks takes place at an unknown rate, but estimated at 0.2 to 0.5 gigatons of carbon per year, i.e. 16 to 40 times slower than the destocking of geological carbon in the atmosphere, which takes place at a rate of 8 Gt/year. This carbon accumulates in the biosphere and Earthlings have no choice but to manage it themselves, either by promoting the adaptation of natural cycles to these new conditions, or by industrial methods. And this will be the case for tens or even hundreds of years after net fossil carbon emissions have ceased.

Industrial wells

Natural CDR (Carbon Dioxide Removal) consists of developing these natural sinks, whether by biological or mineral means.

An example of **industrial CDR** is "**Direct Air Capture**" (**DAC**), which consists of capturing CO₂ from the ambient air at levels of 0.04%. It is not mature, and very energy intensive. Other industrial developments, even less mature, concern the capture and mineralization of carbon underground or its dissolution or precipitation in the oceans.

Carbon Capture and Sequestration (CCS) is carried out from source points that emit effluents containing CO₂. Their initial CO₂ concentration largely determines the cost of the CCS operation. It ranges from a few percent (e.g. for post-combustion capture in coal-fired power plants) to more

⁴ GtC: gigatonne of carbon



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than 90% (e.g. in some pre-combustion capture processes or in effluents from biofuel production units). This consists of concentrating the CO₂ through industrial processes coming out of the effluents to 100% CO₂ and then injecting it into sealed geological reservoirs, at a depth of more than 1,000 m after possibly having transported it over more or less long distances by means of gas pipelines, ships and/or tanker trucks.

If it is applied to a biomass power plant or a bioethanol plant, it is referred to as bio energies with CCS (**BECCS**), the advantage being that we must initially treat flows with more than 40% CO₂.

- **COP 28**

The 2023 Dubai Climate Change Conference, or COP 28, is an international conference of the United Nations taking place from November 30 to December 12, 2023, in Dubai, United Arab Emirates.

COPs are governed by the 1992 United Nations Framework Convention on Climate Change. One of the principles of this convention, however, can be interpreted as stipulating that the protection of international trade takes precedence over that of the climate:

Article 3.5 "Measures taken to combat climate change, including unilateral measures, should not be used as a means of imposing arbitrary or unjustifiable discrimination in international trade, or disguised barriers to international trade"

This, and other articles of this convention, explain that before being a meeting of politicians, the COPs are above all a major fair of globalized international trade. Would it be necessary for international trade to be sufficiently undermined by the climate crises for this article to be reworded? As it stands, some new provisions such as the "principle of geological carbon neutrality" could see their implementation restricted by this and other articles.

- **Earthling**

Inhabitant of Planet Earth

- **Endemic vegetation**

These are local plants that grow spontaneously and are "naturally" and already adapted to the soil, geology and climate of the region. They provide the nutrients and other growth factors that are useful to plants through their ability to extract them from the soil and subsoil via root systems and microbial fungal networks. They contribute to the preservation of biodiversity and are an essential link in the ecosystem chain.

- **Fossil Carbon Complex**

This term refers to the fossil fuel complex ("**fossil fuel complex**") to which are added all industries emitting carbon compounds from the processing of mining or mineral substances: cement plants, lime, carbonate mineral processing.

The Fossil Carbon Complex is made up of all industries and consumers of carbon-based fossil fuels or producers of building materials or carbon-based ores, as well as all intermediate levels, financiers, regulators, or agents benefiting from these activities.



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Within this complex, there are **energy chains** or processing chains for mineral substances **transporting fossil carbon from production points (oil or gas wells, coal mines, limestone or carbonate ore exploitation)** to the final consumer via one or more processing/refining or metallurgy centers. These chains are made up of sequences of links. For example, in the case of the oil chain from the well to the tank of the consumer's vehicle, the links are: well, pipeline, terminal, tanker, terminal, refinery, distribution network and consumer vehicle. Fossil carbon can be physically and accountably (blockchain) tracked in these chains from the point of extraction to the point of emission.

- **Geological carbon neutrality**

This principle, set out in the article linked⁵ to in a footnote, aims to ensure that fossil carbon is tracked within the chains of the Fossil Carbon Complex and that each link in each chain of the Complex thus informed, is responsible for and involved in the management of fossil carbon that it could emit into the atmosphere or that it could sell or cede to a downstream chain.

Implementing this principle does not require a carbon price or financialization of it. In each chain, the positioning of carbon sequestration can be optimized according to geological, geographical, social and political conditions. This can be done or charged to upstream, downstream or intermediary actors. The conditions may differ from one chain to another, as may the penalties to be applied to links that do not comply with this principle.

- **Green Climate Fund**

The Green Climate Fund is a financial mechanism of the United Nations, attached to the United Nations Framework Convention on Climate Change (UNFCCC). It aims to transfer funds from the most advanced countries to the most vulnerable countries to set up projects to combat the effects of climate change or to adapt to climate change.

- **Human Removal Rate of Primary Biomass Production (HANPP)**

The Human appropriation of net photosynthetic production (HANPP) estimates the extent to which anthropogenic land conversion and extraction of biomass of all types alter the natural capacity for biomass production under the current environmental conditions of hypothetically undisturbed terrestrial ecosystems.

It is often argued that the development of bioenergies is constrained by the fact that they could compete with food production and that they would aggravate the exceedance of one of the 9 planetary boundaries that has already been largely exceeded (land use change and exploitation of photosynthetic biomass).

This argument can be easily refuted: a careful analysis of the still too rare agroforestry experiments or coastal redevelopment ("blue carbon") allows us to convince ourselves that there are many degrees of freedom to supply bio energies without having to increase the rate of use of biomass, it is all a question of social and economic organization. In addition, there is still an undeveloped potential for biomass energy recovery in coastal, oceanic and underground environments.

⁵https://www.researchgate.net/publication/355574987_Geological_Net_Zero_A_proposal_for_a_simple_and_globally_effective_international_agreement_on_fossil_carbon



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Generalizing to a global scale what would happen from local grids, those of plots or territories, managed with practices that are part of the natural carbon cycle, ("bottom-up" approach) allows us to be much more optimistic than drawing local consequences from the results of numerical simulations made on a planetary scale and using current or unsuitable forms of carbon management ("top-down approach").

- [IPCC](#)

Created in 1988 under the aegis of the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) following an international political initiative, the IPCC is open to all member countries of the United Nations. It comprises 195 states.

IPCC assessments are based on scientific and technical literature, critically synthesized by the authors. They are published in the form of summary reports or reports on a specific aspect of climate change, in assessment cycles lasting approximately seven years.

Written by hundreds of scientists from Member States, the IPCC's work also results in summaries for decision-makers, which are reviewed sentence by sentence and formally validated unanimously by the delegates of the States, with the consent of the scientific authors.