What kind of governance in a world profoundly affected by climate change?

The international climate change conference held in Paris (COP 21) ended in December 2015 with the approval of the Paris Agreement. This agreement constituted a historic stage in climate geopolitics because a broad consensus was formed on the reality of climate disruption, the part played by human activity, and the necessity for fast action to avoid global warming of over +2°C (while staying as close as possible to the threshold of +1.5°C).

But the decision of US President Donald Trump to leave the Paris Agreement – in a grand gesture of distrust with regard to multilateralism – has instilled doubt (euphemism) on the scope of this new strategy, raising the spectre of another failure in the extension of the Kyoto protocol (one too many, this time). This defection is particularly shocking because numerous studies have confirmed the urgency of action since the agreement became effective in 2016 (including the UN 2017 *Emissions Gap Report* and the IEA's 2017 *World Energy Outlook*). This led to 15,000 scientists from 185 countries, who met together alongside COP 23 in Bonn, to issue a warning both categorical and alarming on the accelerated effects of disruption (*BioScience, 2017*).

America's decision just as the agreement comes into force is a genuine stress test for international governance in the face of the climate threat. Can the Agreement's dynamic be maintained through the leadership of other States (China, Europe, etc.)? Will non-State players (NGOs, cities, regions, businesses, and so on), present in force in the last few COPs (including players from North America), play a decisive role, or are they only back-up troops for the States? Beyond that, in an environment of ever-growing national self-interest, what is the answer to climate-driven migrations, which even in the event of the Paris Agreement's success (unknown at this stage) look set to increase massively as the century wears on?

Commenté [SH1]: Corriger le source, « pour sur » ?

The climate situation since COP 21: the rebound after the calm…

2017, an energetic year, was less "heroic" than some of its predecessors, marked, like 2014, by the sudden collapse of oil prices, or 2016 with the combined efforts of Saudi Arabia and Russia to rebuild a regulated oil market. Nothing as spectacular occurred in 2017. But this period of relative calm is precisely conducive to examining the powers concerned, both in the hydrocarbon markets and in moving forward the fight against climate change, without perceptions being clouded by a major shock. Especially since, from a macro-economic point of view, the global economic situation is showing fewer scars from the financial crisis, and the International Monetary Fund is forecasting growth of 3-4% in 2018 and 2019, meaning that the energy demand is no longer depressed by the global context or regional preoccupations (as was the case at the height of the eurozone crisis).

Global energy demand rose in 2017 at double the average rate of the previous five years (2.1% compared with 0.9%[1]), 40% of this growth being due to the dynamic of China and India, according to the International Energy Agency.[2] Nearly three-quarters of this rise was covered by fossil

[1] *Global demand exceeded 14,000 million metric tons of oil equivalent (MTOE) in 2017. For the record, the 10,000 threshold was passed in 2000.*

[2] *International Energy Agency, Global Energy & CO_2 Status Report 2017, 2018.*

energies (oil,[3] gas[4] and also coal[5]), the rest mainly by renewable energies, and very marginally nuclear energy: 2%. Global electricity consumption rose at a still higher rate, 3.1%, over two-thirds of this growth being due to China and India, with a total electricity mix relying nearly 40% on coal.

At a global level, the proportion of the electricity mix covered by fossil fuels has remained stable, at around 80%, confirming remarkable – and worrying – stability for the last three decades (which fundamentally reflects an inertia linked with the nature of production, transport and energy consumption equipment). And yet renewable energies rose at the most sustained rate of all the energy industries in 2017 (nearly +7%, one-third due to the increasing number of wind turbines), particularly in China and the USA (united in this respect, despite their disagreement over combating climate change).

… highlighting the vital need to reduce emissions

In mechanical terms, global CO_2 emissions from the energy industries have risen by 1.4% after three years of stabilisation, resulting in a historic record of 32.5 metric gigatons (mGt), increasing doubts about our ability to rapidly invert the curve through the implementation of the Paris Agreement. This increase in emissions arises from a combination of factors that could persist in this latter part of the decade: solid global growth, more affordable fossil fuel prices than earlier in the decade (but threatened by geopolitical tensions, particularly involving Iran), and less intensive efforts to promote energy efficiency. In 2017, energy intensity only dropped by 1.7%, considerably less than the 2.3% observed in the average of the last few years. But achieving the goal of 2°C (as regards global warming by the end of the century) implies a reduction at a rate higher than 3%.

Not without a certain irony, the US is the main country to record a drop in its emissions (-0.5%, i.e. -25 Mt) through the development of renewable energies. Even if such progress is mainly the result of public policies initiated in the Obama era, this result has a singular resonance at the beginning of his successor's term of office, especially as it depends more on the development of renewable energies than the continued replacement of coal with gas in electricity production (which significantly contributed to reducing America's emissions with the "advent" of shale gas in the late 2000s). America's reduction is certainly far from offsetting China's 1.7% rise in emissions (i.e. +150 Mt), although this growth remains considerably lower than that of the GDP (+7%), confirming the acceleration of a decoupling process, mainly through the promotion of natural gas.

The consequences of this global upsurge in emissions are inevitable: at the end of COP 21, a 2.9% drop in emissions was needed to achieve the Paris Agreement objectives; now we need to post a drop of 3.5% a year until 2050.

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[3] Demand rose by 1.5 million barrels of oil per day, prolonging a sustained trend since the price break in 2014, mainly driven by growth in transport, particularly in the US, whose fleet introduced considerably more large vehicles. This development is not offset by the take-off of the electric vehicle market (particularly in China, where mobility based on natural gas is also developing). This demand for oil is also fostered by petrochemicals companies, once again in the US.

[4] Gas reached a world record of 22% in the global energy mix.

[5] Coal demand rose slightly, with growth of around 1%, because of increased electricity production with this fuel, mainly in Asia.

The resilience of the Paris Agreement threatened by the US… and many others

Despite this significant drop in the US in 2017, in contrast with the global trend, its decision to withdraw from the Paris Agreement is obviously a severe blow:

- Because the agreement – forged, it is true, in Paris and relying on the strong commitment of the Europeans – could only be envisaged with joint progress in the USA and China (a point agreed in late 2014). And now, without the American federal state, the balance in climate geopolitics is now largely uncertain, if not disrupted.
- Because several reticent States (particularly hydrocarbon-rich countries) see America's decision as a further reason to procrastinate.

And above all, because apart from this rejection of the Agreement, Donald Trump was elected on a political message intensely focused on carbon, and since his election, has steadily developed his vision of "energy domination", fossil fuels being in a way the spearhead of "America First". This fossil-fuels race has reshuffled the cards – with the US shaking up the historical operators in the oil and gas markets – leading to highly unstable price regimes, and, in any event, discouraging temperance in the exploitation of these resources (coal included) in other parts of the world.

Commenté [SH2]: Corriger source « parce » par « Parce que »

However, the uncertainties weighing on the rollout of the Agreement cannot all be attributed to the US. In 2009, at the COP held in Copenhagen, the compensation principle was established, involving $100 billion per year, essentially designed for the countries of the South. This commitment, supposed to come into force in 2020, is the "keystone" revealing the reality of the Northern countries' commitment (as those massively responsible for missions in the past) and thus the credibility of the Paris Agreement.

It is true that a few billion in terms of American federal money will be missed, but the financial gap is far greater than the sum estimated by the Oxfam report published in spring 2018:[6] the declared public aid plateaued at $48 billion for the period of 2015-2016, with only $11 to $13 billion in the form of subsidies (and incidentally through the massive use of loans). These figures should be viewed with caution, because the framework for counting these funds is not well established: this is part of the problem in making the commitment up to 2020 credible (and because private financing will enter the picture). But whatever counting method is finally used, the observation at this stage is undeniable: financing flows are still vastly below the objective, and here responsibility does not lie solely with the USA.

Another of Oxfam's observations is equally important: less than 20% of public financing benefits one of the 48 least developed countries, even though the long-term success of the Paris Agreement will mostly be played out in Africa. Energy demands in sub-Saharan Africa have risen by over 50% since 2000; although only representing 5% of the worldwide total, this zone represents 15% of the Earth's population. The problem of accessing energy is crucial for Africa to develop, and raises a dilemma: sub-Saharan economies could directly adopt "low-carbon" strategies (renewable, gains in energy efficiency, storage, microgrids, etc.) reproducing the "skip-generation" process achieved in telecommunications by directly adopting mobile telephony services without the stage of introducing landlines. But these economies could also adopt a highly intensive model in terms of carbon (particularly coal and fuel oil), like that of emerging countries during the last few decades: a model enabling rapid growth but with often tragic environmental consequences in local terms (deterioration in air and water quality, loss of biodiversity, etc.) and on a global scale (the effect on climate change). This choice is a major issue for the international

[6] *Oxfam's Climate Finance Shadow Report 2018 on progress in the $100 billion goal, 2018*

community, in that the Paris Agreement goals are not compatible with the adoption by Africa – which will have 2 billion inhabitants by 2050 – of the same energy catch-up strategy used by China and India in the recent past.

The true nature of the Paris Agreement now revealed?

America's withdrawal has not broken the Paris Agreement, but shored up a conviction rapidly acquired after the euphoric conclusion of COP 21: the moment where Laurent Fabius, the COP President at the time, brought down his hammer on an entrance into an "airlock" rather than the advent of a new era. In this "airlock", current negotiations on the conditions for implementing the Paris Agreement will largely determine the pace and reality of change and the division of the effort required.

But once again, "thanks" to Donald Trump, this turbulence has also revealed that the Agreement was not designed to express the commitment of States alone. During the last international climate conferences – COP 21 in Paris, COP 22 in Marrakesh (2016) and COP 23 in Bonn (2017) – non-State players (NGOs, cities, regions, businesses, etc.) have been particularly present and involved (grouped together in the "NAZCA" platform), claiming a role as a driving force. During COP 23 in Bonn, many businesses, cities and American states proclaimed loud and clear that President Trump did not decide on the action to be taken on his own, and that commitment was alive and well, as they joined forces on the platform "We are still in: US action on climate change is irreversible".[7]

For example, California and the city of New York have announced in no uncertain terms that they are taking up the combat standard dropped by Trump. This shift confirms that the speed of the energy transition also depends on citizens becoming aware of the gravity of the danger, getting involved and putting pressure on national and regional governments, cities, territories and companies to accelerate the fight against global warming. What seemed like angelism a few years ago is now taking more tangible form, particularly in the USA's internal guerrilla forces.

This new model has also led heterogeneous groups of players (State and non-State) to form thematic coalitions (International Solar Alliance, African Renewable Energy Initiative, etc.) or think up ways in which various innovations could accelerate the deployment of low-carbon technologies (e.g. the Climate Chain Coalition,[8] which coordinates blockchain experiments in this field).

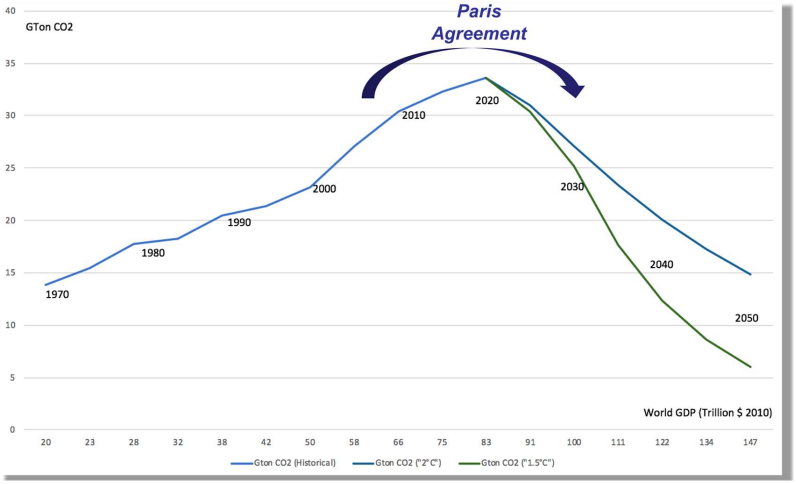
[7] Without forgetting the "US Climate Alliance", a grouping of 17 American states created the day of the president's decision, and the "US Climate Mayors" grouping together 406 American cities (i.e. 70 million inhabitants)

[8] https://unfccc.int/news/un-supports-blockchain-technology-for-climate-action

Considerable instability… on the edge of overbalancing?

By way of a conclusion, economists probably have valuable light to shed on the (possible) revolution represented by the implementation of the Paris Agreement. The graph below shows that this Agreement basically means breaking the growth model that has held good since the beginning of the industrial era, where the imperative is now to produce wealth by emitting a little and then considerably less carbon in a world with high demographic growth, involving the need to provide universal access to modern forms of energy.

What the Paris Agreement changes/would change in the historical relationship between global GDP and carbon



Source: calculated using data from UNFCCC, IEA and the World Bank

This graph brings three observations to light:

- "There is a long way to go"… Changing a macro-economic model in a decade (i.e. the global business model, so to speak) is far more than a challenge: it is a Copernican revolution (and nothing indicates at this stage that this revolution is under way).
- At the start of the turning point, turbulence is and will be inevitable, because this dramatic shift does not only mean a change in the energy system, but profound modifications in all sectors of activity (transport, urban planning and housing, heavy industry, tourism, and so on).
- And obviously, investing according to the rules of the "previous world" (the turning point), means having to confront "stranded costs",[9] when investors' anticipations converge and we begin to move into "the next world".

We can only hope that the turning point will not be too distant compared with its representation on the graph; otherwise the move into the "next world" will involve an even more dizzying drop to maintain the Agreement's commitments; or, far more certainly, put its goals beyond our grasp.

[9] *The famous stranded asset: assets that lose their value because of this changeover.*