



World Climate Policy: Convergence and Transition

Fulvio Attinà

Climate change, the perfect collective problem.

Multilateral policymaking, the good method.

De-carbon & Energy transition, the wise policy.

Order transition, the good time?

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Abstract

The study of climate change by political scientists, though small but slowly growing, is of great help to know the crucial aspects of such pending problem. The agreement on de-carbonization as the only way out from temperature warming has been reached by applying multilateral policymaking to climate change. The core sections of the present paper account for the main steps of the climate policymaking process and the chief goals that the countries pledged to achieve, namely stopping the world temperature warming and turning off the use of fossil fuels. The response of the major greenhouse gas emitting countries is spotlighted. They have in their hand much of the power on de-carbonization. Accordingly, the issue is framed within the order transition context of the present world politics.

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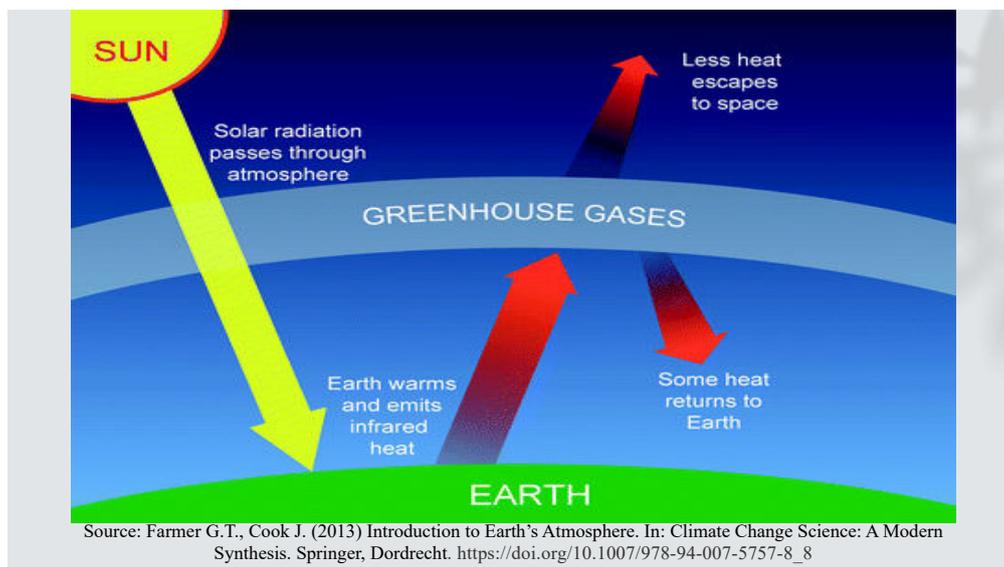


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Climate change binds all the states to decarbonize industrial production, transport, house-heating, air-conditioning, and whatever is to decarbonize. Since it is world-scale problem, the world political institutions have to produce the policy response and the state governments have to produce legislation consistent with the world policy. Multilateral policymaking stands as the legitimate way of making the world policy response because all the countries are actors on equal basis of the multilateral policymaking process.

In 1992, the United Nations Convention on Climate Change (UNFCCC) was approved and opened for signature and ratification by the states. Today, 196 States and 1 regional economic integration organization, the European Union, are parties of the Convention¹. In 1995, with the recognition of the Convention Secretariat as permanent body of the United Nations, the [UNFCCC](#) became the policymaking institution of the worldwide response to climate change². Since the outset, the UNFCCC has been working hard. Two game-change agreements have been signed, the first in Kyoto in 1997, the second in Paris in 2015. The annual general meetings, known as COPs (Conference of the Parties), work out the ground principles of the world policy towards climate change. Since the Paris Agreement has been approved and ratified, two principles are of primary importance, the nationally determined contributions and the target and timing of the decarbonization goal. Leading and operational bodies as well as policy regulations and mechanisms have been put on ground. Briefly, the climate policymaking is and can only be a work in progress. As a matter of fact, the responsible engagement of key players of the decarbonization policy, has not been steady and firm until the very recent years. Why? The response of the political science community to such issue is still in the blue. Actor-based research has been the preferred approach of the political scientists towards studying such question. Knowledge has been generated about the interest, objectives, and negotiation conduct of governments and non-government actors, taken either as single actors or as groups. But the hot question, why the policymaking is still in progress 25 years since the outset, continues to be lacking established and consensual responses.

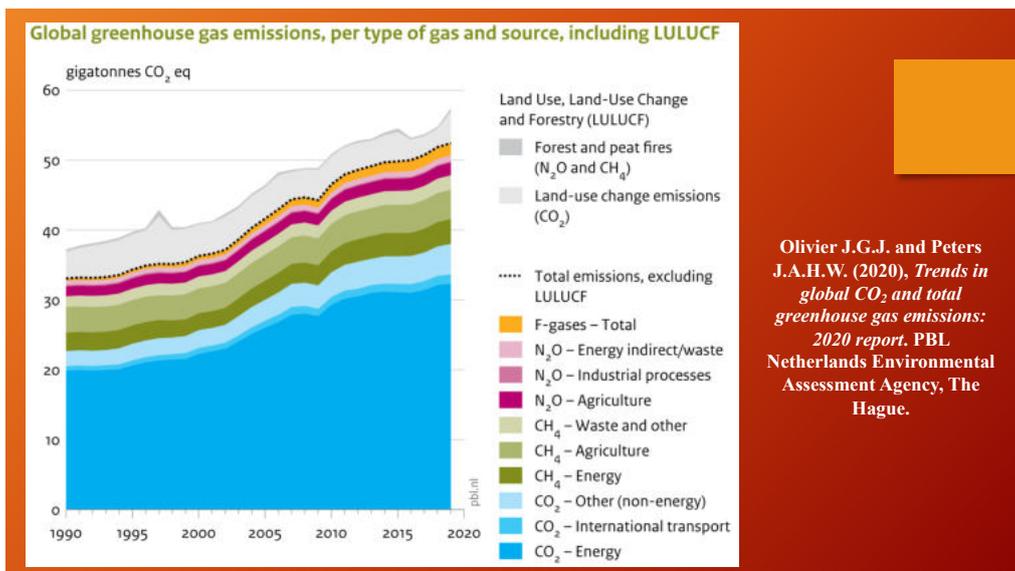


¹ In the present paper, the EU countries are taken as a unit. The data and statistics are relative to the 28 countries, the United Kingdom included, that were EU members until December 2020.

² See the UNFCCC institutional arrangement at <https://unfccc.int/process-and-meetings/bodies/the-big-picture/what-are-governing-process-management-subsiary-constituted-and-concluded-bodies>.

From the environment scientists, everybody has been informed that the earth is liveable because earth’s atmosphere gases retain some of the heat emitted by the sun. This phenomenon is called the greenhouse gases (GHGs) effect. The greenhouse gases are released by natural systems and human activities. As these gases increase, the climate changes and the temperatures rise. Forest fires, earthquakes, oceans, permafrost, wetlands, volcanoes, and mud volcanoes are natural events and systems realising GHGs in quantities that can be considered as self-balancing. Human activities such as energy production, industrial activities, and forestry and land use emit high quantity of GHGs adding extra pressure to the earth and impacting on the level of the sea, the intensity of rainfall, the frequency of flooding, the life of animals, the extinction of plants, and food production (Fawzy et als., 2020).

The major expert organisations have certified that in the past 140-year on record, the year 2016 is the warmest year with global land and ocean surface water temperatures of +0.99 °C higher than average. The year 2019 was the second warmest year with +0.95 °C. The 5 warmest years since 1880 have all occurred since 2015, and 9 of the 10 warmest years have occurred since 2005 (Olivier and Peters, 2020: 5). Temperatures in 2020 were between 1.2 °C and 1.3 °C, depending on the temperature record chosen, warmer than temperatures in the 19th century. It is likely that temperatures will reach 1.5 °C increase between 2030 and 2052 if the current emission rates of human activity gases persist ([Carbonbrief](#)).



Since carbon dioxide (CO₂) is the most common greenhouse gas in the earth’s atmosphere, the global warming potential (GWP) of all greenhouse gases is translated to the equivalent amount of warming caused by CO₂. The other GHGs are methane (CH₄)³, nitrous oxide (N₂O)⁴, and the fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) that are widely used as refrigerants (Fawzy et als., 2020). In 2018, the total greenhouse gas emissions amounted to 55.3 GtCO₂e⁵, of which 37.5 GtCO₂ are attributed to fossil CO₂ emissions ([UNEP](#)). Olivier and Peters (2020: 21) remark that in the 1970–2003

³ The CH₄ sources are agriculture (ruminant livestock, particularly cattle, and rice production), fossil-fuel production and waste/waste water.

⁴ The animal droppings are the largest source of nitrous oxide.

⁵ GtCO₂e is an abbreviation for gigatonnes of equivalent carbon dioxide. 1 gigaton equals 1 billion or 1,000,000,000 metric tons (a metric ton is 1000 kilograms).

period, CO₂ emissions increased by 1.6% per year, on average. From 2003 to 2011, the growth in emissions accelerated to 3.2% per year, on average, driven by China's fast industrialisation since 2002. Since 2012, the annual growth slowed down to about 1.5% per year and, in 2015 and 2016, CO₂ emissions remained flat. In 2017, emissions increased again by 1.6%; in 2018, by 1.8%, and in 2019 by 1.3%.

The present analysis of the world-level policymaking to respond to such GHG emission growth and climate warming is grounded on the system approach rather than on the state-centric approach that overwhelmingly political scientists apply to the analysis of environment issues and policymaking. In particular, the present research is based on the knowledge built by the students of the world political system as the system in which politics and policies are grounded on the legitimate world order that has been created by the coalition of countries that won the confrontation over the pre-existing delegitimated order (Attinà, 2021a). Accordingly, such analysis generates knowledge about the UNFCCC process of policymaking by relying on the general view of world politics as the politics for producing policies applying to all the states for the sake of responding to collective problems. Last, the present paper accounts also for world order transition and multilateralism as the hallmark of the first phase of the American world order that persists in the following phases though increasingly de-legitimised by revisionist countries.

The present paper is organized as it follows. The study of climate change by political scientists is briefly discussed in section one. Section two informs about the present state of the art of climate policy, that is the agreement on de-carbonization as the only way out from temperature warming. Section three explains that such policy objective has been agreed by applying multilateral policymaking to climate change. Section four and five accounts respectively for the main steps of the climate policymaking process and the chief goals that the countries pledged to achieve, namely stopping the world temperature warming and turning off fossil fuel use. Section six spotlights the response of the major GHG emitting countries. Section seven deals with such issue by framing the world climate policy in the order transition context of the present world politics. The Conclusions section summarizes the analysis and design the lines of the future research on climate policy.

Political science and climate change

The interest of political scientists in the impact of climate warming on human and social life has been increasing since the 1970s, the years environment broke into the political debate of many states and international organizations and into the world political agenda. Since that time, a growing number of researchers have studied the response of individual states to environmental issues, the United Nations conferences on environmental issues, and the involvement of non-governmental organisations in the environmental policymaking at the state and world level.

A good number of studies and publications constituted a homogeneous body of political science knowledge about the international negotiation for the making of the world response to environment problems and, from the 1990s, to the climate change problem. The most popular object was the study of the attitude, strategy, and behaviour of individual countries and groups of countries at the negotiation table and the action of the non-governmental actors and business associations for influencing conference resolutions. Political research on environmental issues was extremely actor centred. Hence, knowledge about the interests determining the strategy of individual states in environmental negotiation is huge and extensive. A good deal of it is about the great powers mostly because they are great polluters and GHG emitters, possess problem-specific technology and large finance resources, have influence on other countries, and may

have the role of leaders of the negotiation process should the conditions at the negotiation table and in the domestic set of the great power advise for playing the leadership role (Eckersley, 2020).

The connection between environmental negotiation, great powers politics, and world order is almost strange to the analyst of environment policy. I will argue, instead, that the systemic perspective is of great help to explain the climate change policymaking and cannot be taken aside especially when the research comes to the phase of the world order transition.

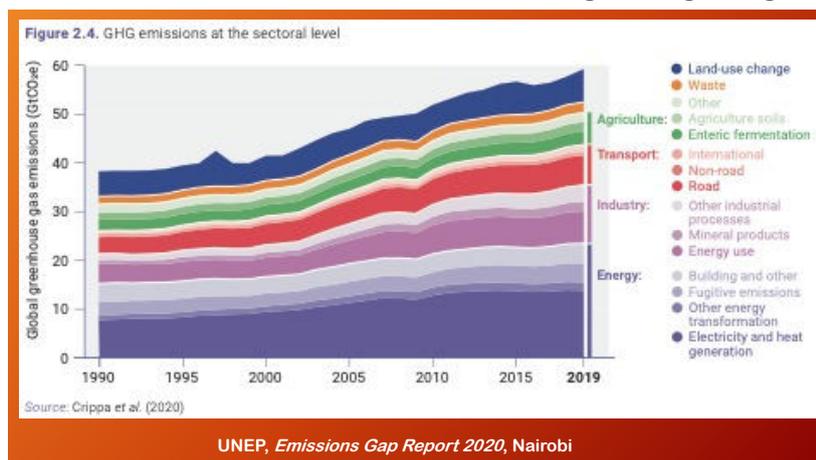
In the past twenty years, the relations between the United States and the countries with potentials for taking up the role of the leader of the world order have been increasingly influencing the operation of the policies towards finance, trade, and security that in the post-world war years have constituted the present world order (Attinà, 2021a). These relations are influencing heavily also the process for making and implementing the policies towards world-scale problems such as the health, mass movement, cybersecurity, human rights, and environment problems. The making of the policy response to the climate change is one of such *collective* problems that enclose all the states within the unique world political space and are tackled by binding all the states to converge with the policy response formulated by world policymaking institutions.

The strategy of the great powers to cope with the hardship of the world order transition time influences their approach towards responding to environment issues and the climate change. Such connection is acknowledged by Steven Bernstein (2020). His article is a notable exception to the missing regard by political scientists for the relations between climate change politics and world order politics. Bernstein reviews three explanations of why the great powers do not care about taking the lead of the policymaking towards climate change. The first one is the lack of congruence between systemic great powers and environmental great polluters. This is only partially true because the group of the great GHG emitters consists of the systemic great powers, i.e., United States, China, and Russia, as well as of non-systemic great powers like India, Japan, and Brazil. The second explanation is the existing weak link between engagement in environment issues and action in world order politics. In other terms, taking the lead on pressing environmental concerns does not turn into status growth in the world order. Such reason has been true in the past, but it is not in front of the current concern for the impact of the climate change on the way of life of many countries. The third explanation is the absence of special rights given to any great power in exchange for engaging into the policymaking responding to the climate change problem. The parties of the climate change negotiation are in fact alien to giving special rights to any country apart from exempting the less developed countries from some duties and burdens. On the contrary, the countries of the Western coalition that reconstructed the world order after World War Two created institutions that gave to the great powers special rights in exchange for their responsibility to support world policies. This is the case of the world policymaking institutions that were created to make the finance and the state security policy (Attinà, 2021a). The world finance policymaking of the Bretton Woods institutions gives special voting rights to the great powers according to their contributions to the resources of the International Monetary Fund. The policy for the security of the states against armed aggression is administered by the Security Council according to Chapter 7 of the UN Charter. Therefore, the five permanent members of the Security Council have special rights on the world security policy. They rule such policy since their positive vote is condition to the collective action against the aggressor state. The making of the world trade policy, instead, is fully multilateral in nature. It does not give any rights to the great powers. The last section of the present paper draws attention to the similarity of the world climate policymaking and the world trade policymaking.

The climate change problem is the problem of de-carbonization

In 1972, the United Nations Environment Programme ([UNEP](#)) came into existence in connection with the UN-convened Stockholm Conference on the Human Environment that called on the states to undertake actions for the protection of the environment. In 1979, the World Meteorological Organization ([WMO](#)) convened the first world climate conference. In 1988, UNEP in collaboration with WMO, set up the Intergovernmental Panel on Climate Change ([IPCC](#)). In June 1992, the UN Conference on Environment and Development, held in Rio de Janeiro, approved the Framework Convention on Climate Change recognizing the

world-scale warming effect of the increased presence of greenhouse gases in the earth's atmosphere due mostly to energy production and industrial activities (Fawzy et al., 2020). In the following years, scientists gave evidence of the high percentage of carbon dioxide emission from fossil fuels such as coal, crude oil, and natural gas. In



2019, CO₂ accounted for about 80% of all GHGs ([Christensen and Olhoff, 2019](#)). Therefore, de-carbonising whatever is to be decarbonised worldwide turned to be the founding principle of the prospective policy response to the climate change problem. Finally, in 2015, the most advanced document on the climate change policy, the Paris Agreement, has been approved by the UNFCCC Conference of the Parties in the French capital. As of January 30, 2021, the number of the parties to the Paris Agreements is 190⁶. Most of them underline their will to make national policies consistent with the Agreement goals but climate scientists claim that the de-carbonization efforts do not keep the pace of the deteriorating climate change.

In an opinion survey, experts working for the IPCC and the UNFCCC consider interest groups as the most important obstacle to climate warming mitigation while technological R&D is the most important condition facilitating mitigation (Kornek et al., 2020). They are referring to abating the costs of reducing gas emissions. Camuzeaux, Sterner, and Wagner (2020) remark that the climate is affected by absolute emissions, but the burden of emissions adjustments is borne by individual countries. All the countries have to make significant domestic adjustments (Genovese, 2020) but not all of them to the same extent. Who abates how much, and who pays are the crucial points of abating carbon emission and bringing climate warming to an end.

Climate change is a complex problem. Carr and Lesniewska (2020) call it *wicked* problem. The different, sometimes not immediately obvious aspects of the complex problems have multiple consequences and variously affect the actors. The response time to such problems is rather short. But discount benefits push some stakeholders to delay response opting for mitigating the effects rather than getting to effective solving. Solving complex problems by the individual actor approach, especially by using the existing tools and mechanisms, can be ineffective or

⁶ The United States ratified the agreement on 3 September 2019. Two months later, the Government of the United States notified the decision to withdraw from the Agreement which took effect on 4 November 2020. On January 21, 2021, the new American President Joseph Biden reinstated the United States signature and acceptance of the Agreement.

have unanticipated perverse outcomes. Actors should be able to approach such problems from multiple perspectives and apply multi-function solutions. For such reasons, the complex problems are also high politicized problems. They rise to the top of the political agenda, concern all political actors for being on the front of the policymaking process, and generate opposite, hard-line groups. Briefly, high salience, large mobilization, and extreme polarization are the features of the *wicked* climate warming problem. No surprise that it undergoes a long policymaking process that the world order transition process may not help to make shorter.

Briefly, climate change is *the perfect* collective problem because it hits all the states and can be met only by all states sharing the same policy principles, goals and standards. In other terms, the response to climate warming is reached through a short circular process. The state governments give to the world institution, of which all of them are members, the primary responsibility of forming the *text* of the world climate policy by using the multilateral policymaking method. Thereafter, each government will take the world policy into effect by approving and implementing consistent national climate policy. Last, the designated institution monitors the implementation by the states, and updates the policy whenever it is needed.

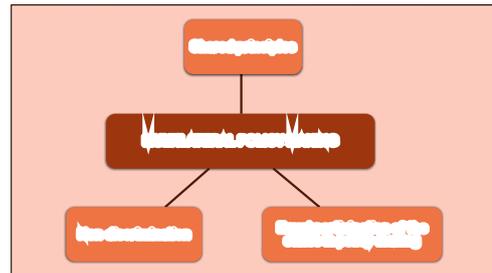
Policy convergence and multilateral policymaking

Busch and Jorgens (2005) studied the diffusion of environmental legislation among states. In the last quarter of the past century, three mechanisms have been in place. Initially, two policy convergence mechanisms entered into use, *diffusion* among the industrialized countries, and *imposition* applied by international organisations. In the 1980s, the diffusion of environment protection measures took place within the group of the industrialized countries as effect of regulatory competition and imitation among these countries. In the early 1990s, the World Bank sought to impose environment protection measures on countries asking for financial assistance. The preparation of National Environmental Action Plans (NEAPs) was one of the conditions for receiving the World Bank loans. The European Community followed suit and put environmental measures in the conditionality clauses of cooperation agreements with third countries. Last, Busch and Jorgens call *harmonization* the third mechanism of environmental policy convergence that was sought by the UNFCCC in the late 1990s. It consists in engaging state governments on implementing the rules and programs of the agreements that are made at the intergovernmental conferences organised by the UNFCCC. Busch and Jorgens emphasise that the building of policy convergence through such intergovernmental and supranational process legitimizes each government to defending the national interests within the policymaking process run by the institution, the UNFCCC, that possesses the specific, legitimate political authority. By pointing to the dual, inter-governmental and supranational, nature of the decision-making process of the UNFCCC conferences, the Busch and Jorgens's analysis implies connecting the study of the climate policy convergence of the UNFCCC countries to the scholarship on multilateralism and multilateral policymaking. Indeed, one of the features of multilateralism applied to policymaking is the equal decision-making rights all the governments have (intergovernmentalism) within the institution that makes the public policy (supranationalism).

The UNFCCC policymaking process is *triggered by a cascade of decision-making* across international, national and subnational policy-making levels that involves state governments and intergovernmental organizations as well as various types of stakeholders such as environmental organizations, business groups, local governments, indigenous peoples, research associations, trade unions, youth-related and gender-related movements, farmer organizations, and several UN bodies (Michaelowa, Castro, Bagchi, 2013; Stavins, and Stowe, 2020).

The multilateral process resulting in world public policies and in the policy updating if necessary is different from the usual negotiation process resulting in inter-governmental agreements. The latter is the *exchange of concessions and compensations in a framework of international order* between sovereign states that are *tied to the intra-state processes in which the national positions are determined* (Meerts, 2015: 11). Such negotiation reaches the goal of making out the agreement as the negotiators create the conditions for exchanging concessions and compensations. Normally, the more powerful party or parties in the negotiation exploit to their profit the structural and issue-specific resources they have at hand. When that happens, the expectations of the less powerful parties that are unable to defend the national positions are frustrated pushing them to undermine the agreement or circumvent the implementation (Meerts, 2015).

In the 1990s and 2000s, multilateralism and multilateral policymaking was the research interest of political scientists involved in the lively debate about the nature and true novelty of multilateralism (see Ruggie, 1993; Newman, Thakur, and Tirman, 2006). The debate was ignited by the Ruggie's essay *Multilateralism: the anatomy of an institution* (in Ruggie, 1993) that emphasized the way the finance and the trade institutions, the IMF and the GATT, and as well the UN Security Council for the peace and security affairs, gave life to the world political order led by the United States and the major Western countries. Taking into account such experience, Ruggie, in contrast to the meaning multilateralism has in the ordinary language as the unspecified way of doing or deciding something within a group of states, argued for the meaning multilateralism had when it entered into use at the post-world war conferences. Accordingly, Ruggie made explicit that multilateralism is the way of making world public policies in an international conference or institution under three conditions: (a) the prior selection of the policy principles that are shared by all the states involved in the policymaking; (b) the equal rights of the states in the decision-making process of the policy rules and programs consistent with the selected principles; and (c) the non-discrimination of the parties in the policy application.



The prior choice of the policy principles implies that each state recognizes the legitimacy of the institution designed to make the world policy towards the collective problem and accepts to adapt the connected domestic policies to the world policy multilaterally agreed and decided. Though such condition does not shield the multilateral policy against the opposition of states that feel to be harmed by the policy terms, it makes the multilateral agreements more robust than the agreements reached by the usual inter-governmental negotiation. Consent to the shared principles is given by the governments within the equalitarian and rule-based setting of the world institution. But, as the world order becomes weaker and the world politics goes across order transition, the growing opposition to world order principles could affect also the legitimacy and effectiveness of the policy.

When it comes to the second condition of multilateral policymaking, the equal rights of the states in the decision-making process, the procedural rules and the internal practice of the policymaking institution are crucial to assess the true compliance with the equal rights of the member states condition. The decision-making rules and practice of the world trade institution, the GATT and later the WTO, are highly consistent with the equal rights condition. The finance and security policymaking institutions, the IMF and the UN Security Council, exemplify the opposite case of unequal rights (Attinà, 2021b). The world trade policy agreements are

approved by consensus and enter into force after the ratification of the member states. The decisions of the finance and the state security policy, instead, are approved with special majority rules. In the IMF Board of Governors, the voting majority is counted on the quota of the funds provided by the states. In the UN Security Council, the five permanent states have special rights on the resolution approval and rejection. Though the equal rights of the states are of great value for the legitimacy of the institution and the policies it makes, both the equalitarian and the non-equalitarian decision-making procedure have flaws, though they could be received as legitimate for their positive outcome, so-called output legitimacy. The equalitarian decision-making process is burdensome because it implies finding the response that matches to the interest of all the states. It is likely also that the equalitarian decision-making process increases the *wickedness* of the problem at hand. This becomes true as the process involves also non-governmental stakeholders. The UNFCCC conferences are the very case in point because of the participation of many and varied stakeholders. On the positive side, the widening of the number of the participants brings more experience and support to the decision-making process but it does also raise the number of the potential spoilers that prefer to derail the process if their interest is at risk. With the non-equalitarian decision-making procedure, instead, the great powers are willing to contribute the resources necessary to overcome the obstacle of the hesitant and resistant states but, on the negative side, they could exploit their special rights to protect their egoistic interest. In such a case, the great powers special rights reduce the flexibility and adaptability of the policy and generate the de-legitimizing protest of those who feel their interest are exceedingly harmed by the policy.

The third condition of multilateral policymaking, non-discrimination with regard to the application of the policy, does not meet with important problems. It is worth recalling the presence of policy rules giving special status to the states having certain characteristics. Such rules of differentiated treatment are provided for developing countries by the GATT/WTO trade policy and the UNFCCC as well.

Summarizing so far, all countries care for the climate change problem and accept that it is a world-scale problem that is faced properly should the governments converge on making the national policies consistent with one policy design that is made at the world level by a legitimate institution working with the multilateral method. To achieve such objective, in 1992, the agreement known as the UNFCCC was signed in New York by the representatives of 154 states and the European Union. In 1995, the establishment of the Secretariat institutionalised the UNFCCC as the agency of the world political order for policymaking towards abating the effects of the climate change. Since the UNFCCC started operating, it applied the multilateral policymaking mode similar to that of the GATT/WTO.

The UNFCCC and GATT/WTO multilateral policymaking (principles, decision-making rights, and non-discrimination) and application mechanism

	UNFCCC	GATT/WTO
Principles	<p><i>Art.3:</i></p> <p><i>1. The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. ...</i></p> <p><i>2. The specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that</i></p>	<p>GATT, 1947, Preamble:</p> <p><i>... relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, developing the full use of the resources of the world and</i></p>

	<p>would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration.</p> <p>3. The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. ...</p> <p>4. The Parties have a right to, and should, promote sustainable development. ...</p> <p>5. The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.</p>	<p>expanding the production and exchange of goods, ... contributing to these objectives by entering into reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and other barriers to trade and to the elimination of discriminatory treatment in international commerce,</p>
Decision-making rights	<p>Art. 18:</p> <p>1. Each Party to the Convention shall have one vote, except as provided for in paragraph 2 below.</p> <p>2. <i>Regional economic integration organizations, in matters within their competence, shall exercise their right to vote with a number of votes equal to the number of their member States that are Parties to the Convention. Such an organization shall not exercise its right to vote if any of its member States exercises its right, and vice versa.</i></p>	<p>Decisions through the various councils and committees, whose membership consists of all WTO members, are normally taken by consensus.</p>
Non-discrimination	<p>Preamble:</p> <p><i>Recognizing the special difficulties of those countries, especially developing countries, ...</i></p> <p><i>Affirming that responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter, ...</i></p> <p>The Convention distinguishes the countries of Annex 1, Annex 2, and the remaining ones that are classified as developing countries. The Annex 1 countries are the members of the OECD (Organisation for Economic Co-operation and Development) in 1992 and the so-called economies in transition including the Russian Federation, the Baltic States, and several Central and Eastern European States. The Annex 2 countries, instead, are only the members of the OECD in 1992.</p>	<p>The GATT/WTO distinguishes the ‘Developing countries’ and the ‘Least developed countries’ from the other members. Such status brings certain rights to the countries. Since there are no official definitions, the country announces for itself whether it is developed or developing country while other members can challenge the decision</p> <p>https://www.wto.org/english/tratop_e/devel_e/dlwho_e.htm</p>
Mechanism	Biannual conference of the signatory parties, COPs .	Negotiation rounds

The convergence of the policy response of all the states is the sought outcome of the UNFCCC action or better to say the expected outcome of the series of agreements approved at the biannual conference of the signatory parties, the [COPs](#), and as well of the [UNFCCC bodies](#) action. The function of the conferences is similar to that of the negotiation rounds of the GATT/WTO. They are policymaking mechanisms consistent with the view of multilateralism that generated the main world policies of the present world order. Accordingly, the present analysis aims to build knowledge about the world-scale public policy towards climate change as well as about multilateral policymaking in the present and possible future of the world political order. Since order transition is in progress (Attinà, 2021a), the state of the [climate change policymaking process](#) is one of the signals of the fortune of multilateralism at the time of order transition.

The world policy towards climate change: overview

On 11 December 1997, the third COP added the [Kyoto Protocol](#) to the Convention but the Protocol entered into force eight years later, in February 2005, due to a complex ratification process. In February 2001, the new president of the United States, George W. Bush Jr., refused to ratify the protocol that his predecessor, Bill Clinton, had signed but had not submitted to the Senate for ratification. The reason was that the Protocol put only on the developed countries the burden of reducing the level of the GHG emissions (Hovi, Sprinz, and Bang, 2010). Canada, after the signature and ratification, in 2011 refused to comply with the commitment, and in 2013 withdrew.

The Protocol placed on 37 countries and the European Union the burden of adopting, and reporting periodically on, the mitigation policies and measures of the Protocol. The countries, which are listed in [Annex B](#) of the Kyoto Protocol, are the industrialized and economy in transition countries of the Annex I of the Convention. Placing such burden on those countries was in line with the principle of *common but differentiated responsibilities and respective capabilities* (CBDRRC) that is expressed by the Convention. The principle that recognized the advanced industrial countries as the largest emitters of GHGs turned deeply controversial over the years. The developed countries *were reluctant, with their faltering economies, to finance global efforts to combat climate change. Developing countries, for their part, were loath to relinquish the differential treatment that had benefitted them* (Rajamani, 2016: 494) even though the principle did not fit to the circumstance of the skyrocketing GHG emission levels of industrialising countries like Brazil, China, and India that are not in the Annex lists.

Under the Protocol, the 37 countries that had to meet the reduction targets through national measures were admitted to international emissions trading consisting in buying spared emission units from developing countries or in implementing emission-reduction projects in other developed countries. In brief, the Kyoto Protocol was an attempt to give effect to a policy founded on the legally enforceable emission reduction of the industrialized countries, including carbon emission market regulations. In the first period of the Protocol (2008-12), the emission reduction target was set at an average of 5% below 1990 levels. Only the European Union countries reached a higher reduction target. The global emission level, instead, increased. Rayner's comment is that the Protocol architects *underestimated the institutional complexities of making markets, while overestimating the ability of politicians to prioritize climate to citizens concerned with more immediate welfare issues such as employment and competitiveness* (2010: 616). In December 2012, the 18th Doha COP approved the emission-reduction targets valid for the 2012–2020 period and as well agreed on the need for a new climate change policy. Effectively, three years later, the Paris Agreement replaced the Kyoto Protocol.

The [Paris Agreement](#) was approved by the COP 21, on December 2015, and entered into force on November 2016. Articles 2 and 4 set the long-term goal of global average temperature increase well below 2° C above the pre-industrial levels, and as well the mid-term goal of a climate neutral world by the second half of the present century. But on December 2020, the [UNEP Emissions Gap Report 2020](#) revealed that, despite a brief dip in carbon dioxide emissions caused by the COVID-19 pandemic, the world is still heading for a temperature rise in excess of 3 °C this century, far beyond the Agreement goals.

The Agreement does not refer to categories of countries like in the Annexes to the UNFCCC and cites the principle of the common but differentiated responsibilities and respective capabilities of all the signatory countries in the light of different national circumstances (Art.2.2). It recognizes the need to support developing countries with finance and technology

resources and reaffirms in mandatory terms that developed countries have to provide financial assistance and capacity-building to countries that are less endowed and more vulnerable. It imposes on all the signatory countries to undertake and communicate ambitious efforts about the nationally determined contributions to the global response to climate change (Art.3). By 2020 and successively every 5 years, all the countries have to submit their plans of action, known as nationally determined contributions (NDCs), for mitigation and adaptation, i.e. for reducing their GHG emissions and building their resilience to the impact of climate change. The Agreement also invites the countries to formulate and submit long-term low greenhouse gas emission development strategies (LT-LEDS).

In contrast with the Kyoto climate policy, the Paris Agreement emphasizes the ‘*direction of travel*’ over targets and timetables (Rayner, 2010: 617). More important, it opts for ‘bottom up’ actions mainly originating from the institutional, technological, economic and political capacities of the states in the expectation that cumulatively such actions will lead to de-carbonization by a shift in the global patterns of energy and land use. Such approach emerged from the two decades of struggle among various groups of

From Kyoto to Paris	
Away from	Towards
1. global concern and responsibility of the major countries	1. responsibility of all country governments and local stakeholders as well
2. structural and institutional change in all over the world	2. country ownership (National Determined Contributions, NDCs)
3. top-down approach through imposed targets and timetables	3. soft governance (best practices, standards, benchmarks, and goal-based strategies)
4. mitigation first	4. adaptation first
Actions taken to eradicate the causes of climate change	Actions taken to reduce vulnerability to climate change

countries and between developed and developing states over what constituted fair and equitable approach towards mitigating against and adapting to climate change (Carr & Lesniewska, 2020: 401). The Agreement entrusts the task of responding to the climate change problems to the lowest feasible level of organization without the need to fit actions into a formal world program. Even cities and local authorities together with local stakeholders can advance strategies to reduce GHG emissions. Second, the Agreement rebalances the importance of mitigation, i.e. attending to the causes of climate change and modifying the practices leading to climate change, over that of adaptation, i.e. addressing the impacts of the change and reducing the vulnerability of societies to the effects of the climate change (Alves et als., 2020).

The change of approach has been represented by Bäckstrand and Lövbrand (2019) as the remarkable shift from the ecological modernization discourse to the green governmentality discourse. A third discourse, the climate justice discourse, mostly under-represented at the UNFCCC conferences, claims climate mitigation is a structural problem tied to capitalism and neo-colonialism that demands global resource redistribution and compensation. The ecological modernization discourse claims that climate change mitigation is a global concern. In agreement with the UNFCCC Art. 4 charging the states with monitoring the sources and sinks of the GHG emissions and reporting data to the UN, the Kyoto Protocol centralized climate policy by establishing a *techno-scientific infrastructure for carbon monitoring, reporting and management* that allocated to the industrialized states the targets and timetables for the emission cuts. The green governmentality discourse, which pervades the Paris Agreement, instead, puts climate change adaptation and mitigation on the responsibility of the individual government and stakeholder by replacing the Kyoto Protocol targets and timetables of emission cuts with the National Determined Contributions (NDCs), namely with national mitigation and adaptation actions the states have to decide and implement. In other terms, the policy convergence model is the model of the Paris Agreement for responding to the collective climate problem. Action consistent with the objectives and standards of the Agreement is expected to emerge bottom-up by giving to state governments in collaboration with municipal, regional,

civil, corporate and multi-stakeholder partners the responsibility of responding to the climate change causes according to the local conditions. Accordingly, the UNFCCC role as the center of the world climate policy is reconfigured as *a forum for consensus-building and a platform for facilitating domestic or local low carbon development, knowledge exchange, showcasing best-practice, enabling low carbon growth and monitoring and review* (Bäckstrand and Lövbrand, 2019: 525).

The political scientists' assessment of the shift of the world climate policy from Kyoto Protocol to the Paris Agreement is positive. Turning from the full responsibility of the major economic powers to the responsibility of the individual state and increasing country ownership and soft governance is valued as a step in the right direction (Bernstein, 2020: 25-26). Carr and Lesniewska praise the Paris Agreement as *an early model of a consensual rules-based approach within the existing international order that provides space for advancing agility, flexibility, and polycentrism to meet the demands that wicked problems present* (2020: 393). Parker and Karlsson argue that the Agreement created *a hybrid system that would balance the flexibility of bottom-up pledges with top-down accountability* (2018: 527). They share with Busch and Jorgens (2005) the view that the UNFCCC is driving a harmonization process that aims to the convergence of the national policies towards the climate change problems. In contrast, Dimitrov remarks that the Paris Agreement relies on a complex mix of legally binding obligations and voluntary provisions that give full discretion to governments. He warns that *this treaty is actually an elaborate decoy institution that allows reluctant governments to hide behind a weak international arrangement* (2020: 647).

In short, political scientists are willing to admit that the UNFCCC has impact on the policymaking of the states towards the climate change problems, and that it brings about convergence through harmonization. Climate warming is the collective problem that brings all the states within one worldwide political space. Therefore, the response that has the highest probability of dealing effectively with that problem is to make out the world climate policy by multilateral policymaking. The UNFCCC COPs are such multilateral policymaking events that give to all the governments the right to have their values and interests taken into the world policy and as well provide the policymaking institution with the instruments and resources necessary to generate appropriate policy actions.

On the whole, the UNFCCC has gone the right direction though not in the straight way. The Paris Agreement put an end to controversial aspects of the Kyoto Protocol such as the burden of decarbonization only on the old-industrialized countries and the international emissions trading. In addition to signalling the target of the maximum level of average temperature increase, the Agreement extensively deals with the necessity of organizing, and providing to all the countries, the resources to reach to such target, namely financial resources, technology, and capacity-building means. Although the Agreement is silent on the link between de-carbonization and renewable energy sources, it is clear to all that this is the true target of the climate change policy. Carbon-neutral energy research and development and a world strategy of energy modernization are urgently required. Since this is the nature of the problem and the stakes of the game, it is not a surprise that the political scientists praise the United States and European Union (Parker and Karlsson, 2018) and the United States and China (Eckersley, 2020) for making out the negotiation of the Paris Agreement. They are on the top of technology and research and are as well great industrial and trade powers and great consumers of energy. Only one is a big fossil fuel producer, the United States, but all of them are desperately concerned with the future sources of energy.

Temperature increase avoidance and carbon-neutral energy

The growing number of countries pledging to the zero net emissions goal, i.e. to balancing CO₂ emissions with its removal or by eliminating emissions altogether, by the middle of the century is positive indicator of the growing recognition of the world climate policy by national governments. It also points to the positive reception of the multilateral mode of building the climate policy under the UNFCCC institutional lead.

COUNTRIES COMMITTING TO NET-ZERO EMISSIONS GOALS BY AROUND MID-CENTURY
December 2020 (UNEP *Emissions Gap Report 2020*)

126 countries covering 51 per cent of global GHG emissions have net-zero goals that are formally adopted, announced or under consideration. If the United States adopts a net-zero GHG target by 2050, the share will increase to 63 per cent.

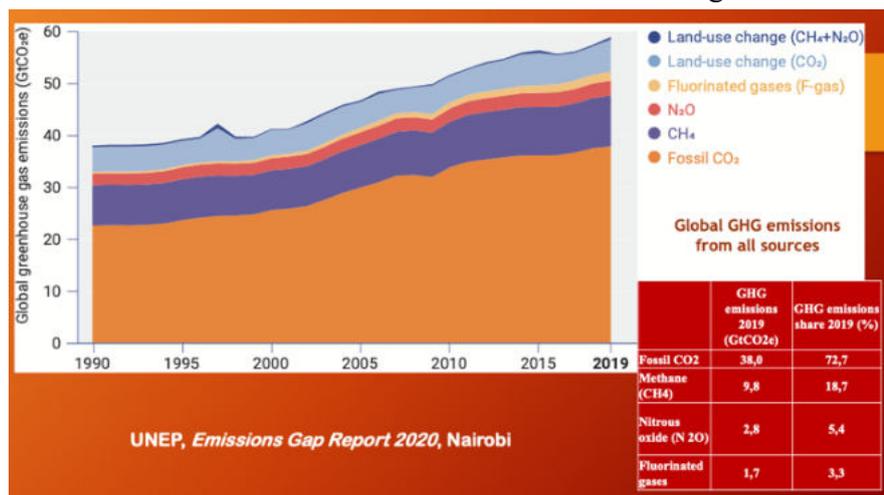
The following G20 members have net-zero emissions goals to achieve by 2050: Argentina, Canada, European Union, France, Japan, Mexico, Republic of Korea, South Africa, United Kingdom. China announced to achieve carbon neutrality before 2060.

There is discrepancy between the ambitiousness of these goals and the inadequate level of ambition in the NDCs for 2030.

There is inconsistency between the emission levels implied by current policies and those projected under current NDCs by 2030.

Nine of the 16 G20 members (Argentina, China, EU27+UK, India, Japan, Mexico, the Russian Federation, South Africa and Turkey) are on track to achieve their unconditional NDC commitments. Five G20 members are projected to fall short and therefore require further action (Australia, Brazil, Canada, the Republic of Korea and the United States of America).
Projections for Indonesia and Saudi Arabia are inconclusive

The UNEP, many IGOs, NGOs, and scientific groups monitor and disseminate information about the national policies convergence in the world climate policy. The UNEP’s [Emissions Gap Report 2020](#) notifies of the difference between “*where we are likely to be and where we need to be*” on the way towards the Paris Agreement goals. Two disappointing, conceivably not unexpected, news of the Report are the global temperature rising in excess of 3° C this century, and the permanent dominance of the fossil carbon dioxide emissions growth on the total of the GHG emissions. Countries should collectively increase their NDC ambitions threefold to get on track to the 2° C goal and more than fivefold to get on track to the 1.5° C goal. The CO₂ share is by far the largest GHG share (72,7%). CO₂ is emitted also by the human-made Land-

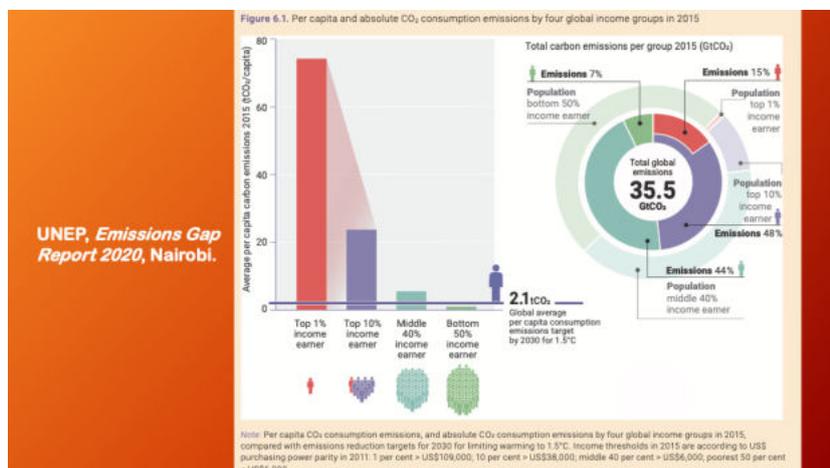
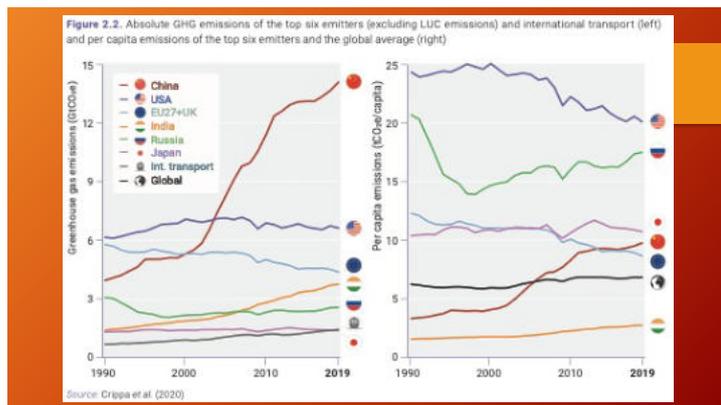
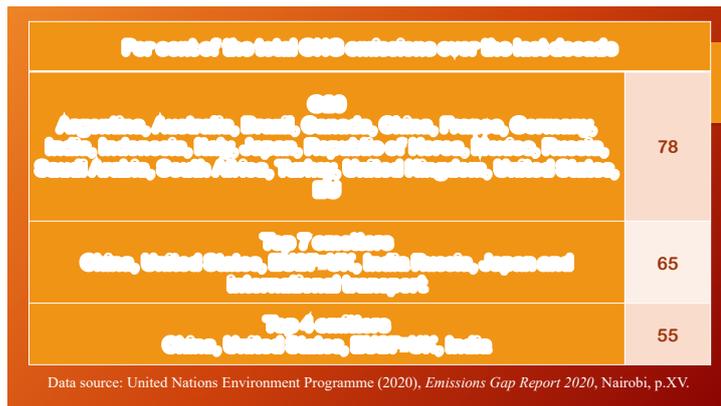


Use Change (LUC) such as building settlements and managing fields and woods for commercial use. Methane CH₄ is the second GHG source. It contributes also to LUC emissions in association with nitrous oxide N₂O as well as with CO₂. Last, N₂O and F-gas (Fluorinated Gas) are the remaining major sources of GHG emission in steady growth. COVID-19 caused a small drop of the 2019 CO₂ emissions, but the world temperature remains far beyond the Paris Agreement goals of 2 °C and preferably 1.5 °C above the pre-industrial level.

A small number of countries mostly industrialized, developed or fast developing, large, and highly populated are the largest GHG emitters. China is very much ahead of all the others in absolute emissions, but the United States and Russia jump on top the list measuring per capita emissions. International transport is listed in the absolute emissions ranking because shipping and aviation emissions outside the national sea and air space are not covered by the states. In the per capita emissions ranking the entire rest of the world is the sixth large emitter.

The Report remarks the decline of the GHG emissions of the OECD, Organization of Economic Cooperation and Development, countries, especially of the European ones, and attributes the decline to efficiency improvements and to growth in low-carbon energy sources. On the whole, the rich OECD countries have higher consumption-based emissions than territorial-based emissions over the last decade. The rest of the world economies, especially those with strong growth in energy use to meet development needs, are increasing their level of GHG emissions. Accordingly, the Report points to the association of consumption-based emissions and high-carbon energy sources as key to responding to the climate change problem.

In such a perspective, reducing global temperature warming entails changing the ways of life that are based on consuming products and services that demand large use of carbon-energy, and using non-carbon energy instead of carbon energy. Lifestyle change must be priority concern of governments and citizens. Around two thirds of GHG emissions are charged to consumption relative to private household activity. The governments have to set the systemic conditions for change while the citizens have to participate actively in the change of their country social, cultural, political and economic system. Delving further into the correlation between income and emissions, the Report estimates the distribution of the life-style change costs among countries with different levels of income. It distinguishes four groups of countries by per cent ratio of total world



emissions and by income levels – the top 1% and top 10% income earner, the middle 40% income earner, and the bottom 50% income earner. The Report estimates that to reach to the Paris Agreement temperature reduction goals *the richest 1 per cent would need to reduce their current emissions by at least a factor of 30, while per capita emissions of the poorest 50 per cent could increase by around three times their current levels on average.*

When it comes to the change of energy sources, the question is about whether renewable energy sources (RES) can provide opportunities for energy supply as much as the fossil fuels, Non-Renewable Energy (NRES) sources. Transition pathways of energy systems to respond to the climate change problem are under study everywhere (Kang et al., 2020). Additional reductions may be achieved through energy-efficiency improvements and the carbon capture utilization, or CCU, and carbon capture and storage, or CCS. In 2009, the [International Renewable Energy Agency](#) came into existence to develop such technology after being proposed in 1981 at the UN Conference on New and Renewable Sources of Energy where it met the opposition of the United States (Grigorescu and Baser, 2019: 94).

Fawzy and the associates (2020: 2073) review the main approaches towards climate change

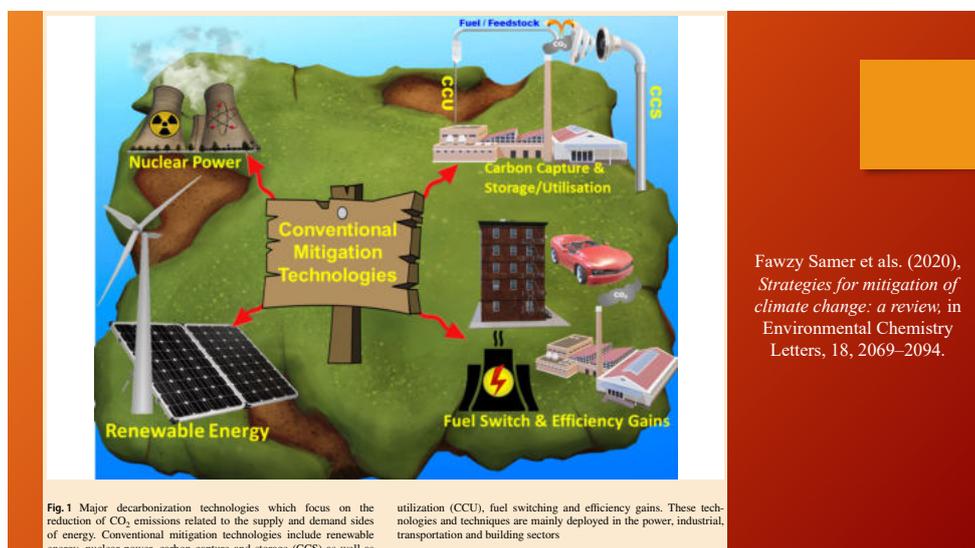


Fig. 1 Major decarbonization technologies which focus on the reduction of CO₂ emissions related to the supply and demand sides of energy. Conventional mitigation technologies include renewable energy, nuclear power, carbon capture and storage (CCS) as well as utilization (CCU), fuel switching and efficiency gains. These technologies and techniques are mainly deployed in the power, industrial, transportation and buildings sectors

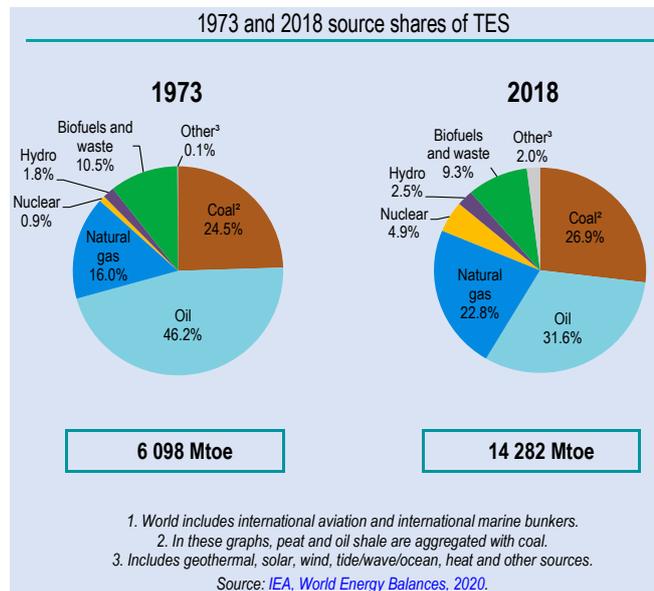
mitigation. The decarbonization technologies and techniques that reduce CO₂ emissions are the renewable energy sources, fuel switching, efficiency gains, nuclear power, and carbon capture storage and utilization. The other approaches are the negative emissions technologies, also referred to as carbon dioxide removal methods, and the radiative forcing geoengineering technologies that alter the earth's radiation balance through the management of solar and terrestrial radiation.

All technologies and techniques are deployed in the power sector on the supply side of energy, and in the industry, transportation and buildings sectors in the demand side. Within the power sector, decarbonization can be achieved through the introduction of renewable energy, nuclear power, carbon capture and storage as well as supply-side fuel switch to low-carbon fuels such as natural gas and renewable fuels. The most prominent renewable energy technologies include photovoltaic solar power, concentrated solar power, solar thermal power for heating and cooling applications, onshore and offshore wind power, hydropower, marine power, geothermal power, biomass power and biofuels. In the industry, transportation and buildings sectors on the demand side of energy, mitigation efforts include the efficiency gains achieved through the deployment of energy-efficient processes and sector-specific technologies that reduce energy consumption, as well as



end-use fuel switch from fossil-based fuels to renewable fuels, and, moreover, the integration of renewable power technologies within the energy matrix of such sectors.

The expansion of capacity scale enables renewable energy sources to become more economically competitive and to reverse the GHG emissions trends in all economic sectors. In almost fifty years, from 1973 to 2018, the source share of the Total Energy Supply (TES) changed in the right direction. The [International Energy Agency](#) (IEA) remarks that NRES (coal, oil and natural gas) gave up to RES more than the 5% of the world TES. In 2018, renewable energy accounted for approximately 26.2% of electricity production worldwide. Hydropower accounted for 15.8%, while wind power's share was 5.5%, photovoltaic solar power 2.4%, biopower 2.2% and geothermal, concentrated solar power and marine power accounted for 0.46% of the generated electricity (Fawzy et als., 2020: 2074).



Fossil fuels and nuclear power are projected to peak in production by mid-century to meet the emission limit goal. The impact on the economy of the unused oil, natural gas and coal reserves will be important and put the markets under stress while the renewable energy sources will have a rapid expansion to meet the growth of the population and/or the economy (Jones and Warner, 2016). Appropriate policy measures are necessary to spur and help the energy business and all the GHG emitting industries to find cost-effective ways to adapt their investment strategy towards the emission reduction goal.

To meet the challenge of shifting energy sources, the Kyoto Protocol created three market mechanisms still in place, the emissions trading, the Clean Development Mechanism (CDM) and the Joint Implementation (JI). Emissions trading is of direct interest to the private energy market. The Protocol Annex B Parties accepted levels of allowed emissions, which were divided into assigned amount units (AAUs) for the 2008-2012 commitment period. Article 17 of the Kyoto Protocol allows countries that have not "used" emission units to sell the excess capacity to countries that are over their targets. Thus, carbon became a commodity, tradable at carbon markets. Since emissions projections are hugely uncertain (Camuzeaux, Sterner, and Wagner, 2020), the Paris Agreement did not make any change to the Kyoto Protocol market mechanisms. It only recognized the benefits of creating cooperation schemes among the member parties. However, individual governments, substate governments, and regional groups of states are using emissions trading or cap and trade as instruments of their climate policy. [EU ETS](#), the emissions trading scheme of the European Union, is the largest carbon market in operation (Elkerbout, 2020). Then, the countries or companies that spare emission rights by reducing emissions below their limit or tonnes of CO₂ equivalent units have the opportunity to sell the unused units to the countries or companies in need of making up the shortfall.

Very large-scale investments are required to significantly reduce emissions as well as improve adaptation capabilities. Therefore, the UNFCCC, the Kyoto Protocol and the Paris Agreement call for financial assistance from rich countries to the less endowed and more vulnerable and

as well ask for private and alternative sources of financing. The Global Environment Facility (GEF), into force since 1994, and the Green Climate Fund (GCF), established in 2010, are operating entities of the UNFCCC financial mechanism and account to the COP. The world institution climate finance can count also on the Special Climate Change Fund (SCCF), the Least Developed Countries Fund (LDCF), and the Adaptation Fund (AF). Since finance plays an increasingly important role in responding to climate change, it is essential that governments agree on such form of international transfers for achieving emissions reduction. Accordingly, Kotchen (2020), remarking that *the most common arguments in support of international climate finance typically appeal to different rationales: compensation for foregone economic growth, compensation for climate damages (i.e., “loss and damage”), or both*, demonstrates that incentive compatible, financial transfers facilitate a globally efficient agreement if they are bounded by the net benefits of avoided climate damages and forgone economic growth.

Summing up so far, the world policy towards climate change emerges from the universal recognition of the nature of the policy object as collective problem. Collective problems are the problems that are not solved or put under control by the individual units, but by the whole group or society. No country government will deny that the climate problem unites all the countries within the same political space and, consequently, will concede that it binds all the states to the same policy response. In the 1970s and 1980s, the shared resolve to build the world policy response resulted in negotiating and signing the international law treaty that brought into existence the designated policymaking institution. As it is normal, also for climate, the policymaking process goes through slow or fast phases of update and change. At the present time, *early 2021*, the world climate change policy has the objective of the gradual reduction of the presence of CO₂ and other noxious gases in the atmosphere and of the total elimination of such gases by the end of the century. The way for reaching to the policy objective is the substitution of the noxious NRES by clean RES. The two main instruments to reach the policy objective are the world institution supervision of the national climate policies convergence in the world climate policy, and the technical and finance assistance to governments and stakeholders, especially of weak and vulnerable countries, to comply with the policy and end with using NRES.

Climate policy convergence: the state of affairs

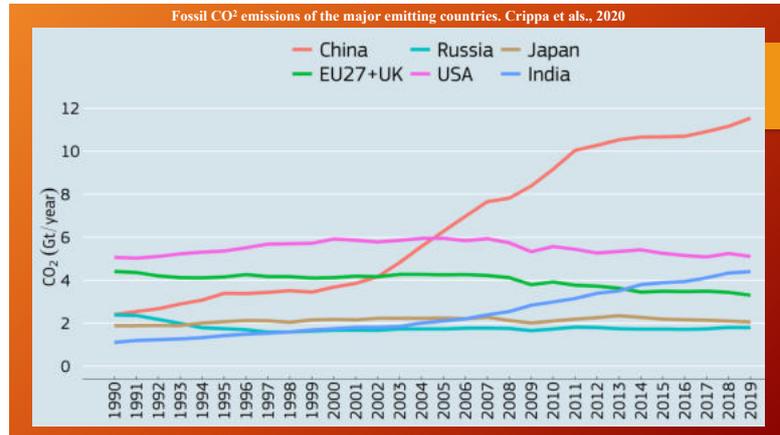
The largest amount of climate warming GHGs is the result of human activities in China, the United States, the European Union, India, Russia, and Japan on top of all the countries. In 2019, these countries GHGs share has been 66.9% of the total emissions varying from Japan’s 3.0% share to China’s 30.3 % share. A group

of 10 countries complete the ranking of the countries guilty of emitting more than 1% of the total fossil CO₂ emissions in 2019. Together, the 16 countries account for 81.2% of world emissions. Achieving the goals of the world climate policy is primarily the responsibility of the governments of these countries, especially of those on top the rank. In world politics, the governments that weight the most on world order and influence the most the world policymaking institutions, the UNFCCC included, have more responsibility than others on producing and implementing the policy response.

Global share in 2019 and change in fossil CO ₂ emissions for countries contributing more than 1%. Crippa et al., 2020			
Top emitting countries	Global share	Change between 2018 and 2019	Average annual % change since 2015
China	30.3%	3.4%	2.0%
United States	13.4%	-2.6%	-0.7%
EU27+UK	8.7%	-3.8%	-1.4%
India	6.8%	1.6%	3.2%
Russia	4.7%	-0.8%	0.9%
Japan	3.0%	-2.1%	-1.5%
Iran	1.8%	3.4%	3.0%
South Korea	1.7%	-3.2%	0.5%
Indonesia	1.6%	8.0%	6.2%
Saudi Arabia	1.6%	1.5%	0.4%
Canada	1.5%	-1.4%	-0.1%
South Africa	1.3%	1.5%	0.9%
Mexico	1.3%	-1.6%	-0.3%
Brazil	1.3%	-0.4%	-2.1%
Australia	1.1%	4.2%	1.8%
Turkey	1.1%	-1.5%	3.5%

The present section reviews data for assessing the convergence of the climate policy of the largest GHG emitting countries in the chief goal of the Paris Agreement, the emissions reduction and de-carbonization goal. The assessment puts together a review of data provided by experts (Crippa M. et als., 2020⁷; Olivier and Peters, 2020) and a glance to the NDCs the governments of those countries have submitted to the UNFCCC Secretariat in abidance to Paris Agreement provisions.

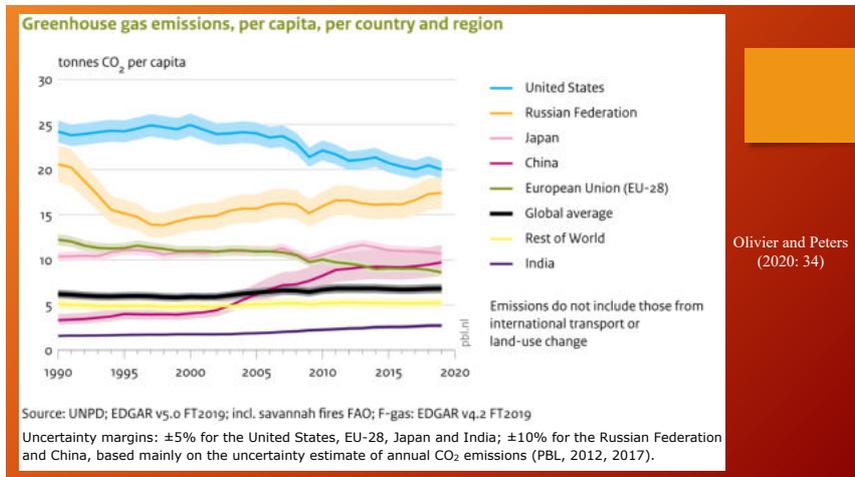
In the past thirty years, the GHG emissions of China and India grew up considerably. Those of the United States, the European Union, Japan, and Russia, instead, slightly decreased. In 2002, China's accession to the World Trade Organization sped up the industrialisation of the country with the connected effect of the steep and steady rising of CO₂ emissions. Since 2005, China overrode by far the United States as the world's largest emitting country.



Olivier and Peters remark the correctness of examining the CO₂ emissions of the past thirty years because *the emissions in 1990 are relevant as it is the default base year for the UN Climate Convention, 2005 is the base year for some national targets (such as for the European Union), further 2010 (more precisely the average of 2008-2012) was the target year for the first commitment period of the Kyoto Protocol* (2020: 17). In addition to stressing the right choice of the time period under observation, Olivier and Peters (2020: 34-25) remark that for the correct comparison of the CO₂ emissions level of different countries it is worth taking into account conditions such as the size of the population and the strength of the economy. These are proxies for the determinant variables of the CO₂ emissions of a country. In 2019, the five largest CO₂ emitters together emitted 66.9% of the total fossil CO₂ and accounted for 51% of the world population and 62.5% of the world Gross Domestic Product (World Bank, 2020). This means that the remaining countries with half the world population and almost 38% of the world GDP emitted 30% of the world fossil CO₂. Taking into account the population size, the state GDP ratio on the world GDP, and the same ratio of the CO₂ emission, the difference is not impressive. One could conclude that, since neither different is the effect of climate warming on the living conditions of the two halves of the population of the world, achieving the world climate policy goals is impelling to all the state governments. But the failure to act of one or few of the largest GHG emitters will hit much more than that of few non large emitters.

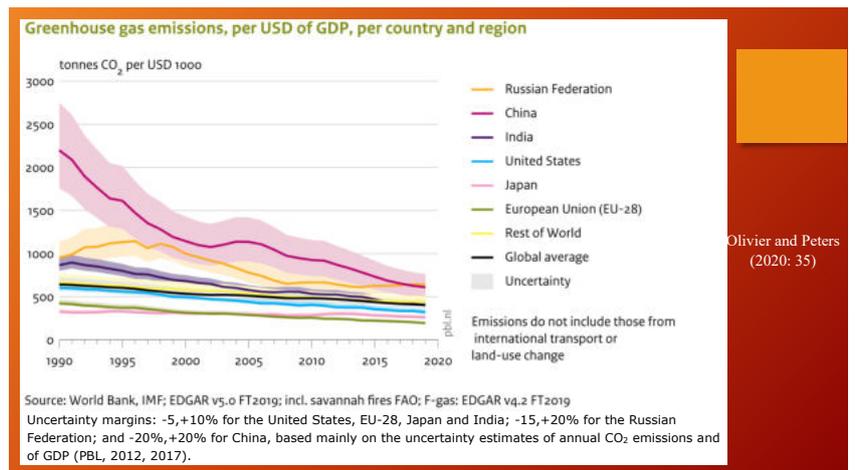
⁷ It analyzes the EDGARv5.0_FT2019 database that contains estimates of fossil CO₂ emissions from 1970 to 2019 for all countries. Fossil CO₂ emissions include emissions from fossil fuel combustion (coal, oil and gas), from fossil fuel use (combustion, flaring), industrial processes (cement, steel, chemicals and urea) and product use. The EDGAR database is based at the JCR, Joint Research Centre, of the European Commission.

With regard to the country’s population and GHG emissions, the United States and Russia are well above the world level or global average of per capita emissions. The United States CO₂ emissions per capita are the highest of the top 6 countries. In 2019, three G20 countries not of the top GHG emitters, Australia, Canada, and Saudi Arabia, surpassed the United States per capita emissions level. Since 2000, the United States per capita emissions level have been decreasing while those of Russia have been increasing. Heavily populated India shifted from the third to the sixth place in the per capita ranking and was the only great GHG emitting country having lower per capita emission levels than the rest of the world and the world average. The per capita emission level of Japan, China, and the European Union were close to one another and above the rest of the world.



Olivier and Peters (2020: 34)

When it comes to the emissions per USD of GDP (in 2011 prices and corrected for Purchasing Power Parity, PPP), the trend for all countries has been downward, including for the world average, except for Russia, whose emissions per USD have been remaining flat since 2012. Russia and China have been above the rest of the world and the world average level. The United States, Japan, and the European Union have been below such levels. India virtually equalled the rest of the world and the world average.



Olivier and Peters (2020: 35)

The Paris Agreement Article 3 requires all signatory countries by 2020 and every five years thereafter, submit *nationally determined contributions to the global response to climate change*⁸. In the NDCs document, each country reports its past efforts and future plans for reducing emissions and adapting to the effects of climate change. The NDCs are recorded in the [NDC registry](#) which is maintained by the UNFCCC Secretariat. The NDCs are *dependent on the separate reporting processes of over 190 countries, have data gaps for specific sectors,*

⁸ Article 3: *As nationally determined contributions to the global response to climate change, all Parties are to undertake and communicate ambitious efforts as defined in Articles 4, 7, 9, 10, 11 and 13 with the view to achieving the purpose of this Agreement as set out in Article 2. The efforts of all Parties will represent a progression over time, while recognizing the need to support developing country Parties for the effective implementation of this Agreement.*

and are not requested to produce decades-long time series and emissions up to the most recent year (Crippa et als., 2020: 6). However, the NDCs are a valuable hint to how near the world is to the long-term goals of the Paris Agreement and whether reaching the peaking of GHG emissions in 2030, as called for, is possible.

The remaining part of the present section appraises the state of the emissions of the 16 largest GHG emitting countries over the past 30 years and takes stock of the claims and plans of these countries in the first set of the NDCs handed to the UNFCCC Secretariat.

There are two ways in use to set the reduction target of the GHG emissions. The most used reduction target is the *absolute emissions* target, that is reductions are measured in metric tons, relative only to a historical baseline. Another way with many variants of measuring emissions reduction and setting targets is based on measuring *emission intensity* as the aggregate GHG emissions in carbon dioxide equivalent (CO₂eq.) divided by the GDP (Haberl et als., 2020). The climate policy based on emission intensity measures sets the GHG emissions reduction targets relative to the productivity or economic output, for instance, tons CO₂/million dollars GDP of the country. The Paris Agreement does not make any reference to different types of emissions target. Article 4 of the Agreement states that *In order to achieve the long-term temperature goal set out in Article 2* [Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change], *Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty*. In brief, the Agreement calls for limiting the global average temperature rise in this century to well below 2 degrees Celsius, while pursuing efforts to limit the temperature rise to 1.5 degrees. It also asks countries to work to achieve a leveling off of global greenhouse gas emissions as soon as possible and to become greenhouse gas emissions neutral in the second half of this century. Article 3 charge the countries with communicating their efforts and plans, the NDCs, but there are no specific requirements about emissions reduction except to taking into account the latest science. Therefore, the NDCs reflect the capabilities and level of development of each country and vary in scope and ambition.

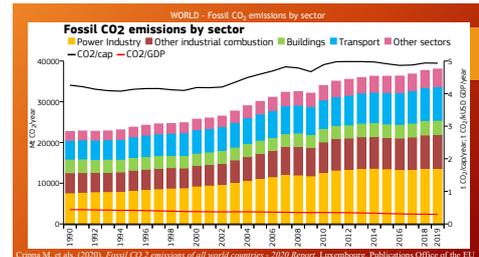
The data for assessing the convergence of the largest GHG emitting countries in the chief goals of the Paris Agreement are the data of the time series of fossil CO₂ emissions from anthropogenic activities, excluding biomass burning and the land use, land-use change, and forestry sector, that have been collected and organized by Crippa et als. (2020: Annexes) for all the countries of the world. The fact sheet visualizes separately the 30 years' time series data of each country and the change of the country CO₂ emissions by sector in 2019 compared to the emissions in 1990 (base year for national GHG inventory), 2005 (the year the Kyoto Protocol came into effect) and the previous year, 2018, levels. The sectors of emission are Power industry (power and heat generation plants), Other industrial combustion (industrial manufacturing and fuel production), Buildings (small scale non-industrial stationary combustion), Transport (road, rail, ship, and aviation combustion), and Other sectors (industrial process emissions, agriculture, and waste). The change for the year 2019 is expressed in term of % change with respect to 1990 and 2005. The green arrow shows a downward change above 5%. The red arrow shows an upward change above 5%. The orange arrow shows a change within a corridor of +/- 5% with respect to the reference year.

The overview of the world CO₂ emissions is a little encouraging. Though emissions increased between 1990 and 2019, they remained almost unchanged between 2018 and 2019. Hopefully, future data will confirm the trend reversal of the last two years. Furthermore, the trend breakdown takes place in spite of the emissions increase of large emitting countries such as China, India, Iran, Indonesia, Saudi Arabia, South Africa, and Australia. It is encouraging also the slowdown of the growth of the emissions of the Other sectors, i.e. the release of CO₂ as a by-product of cement production and the use of fossil fuel in ammonia and fertilizers production.

The Top Six

In 2019, **China's** share of CO₂ was about 10 percentage points higher than the world average. The 2019 increase in Chinese emissions is mainly due to increases in oil and gas consumption (Olivier and Peters, 2020: 34). From 2012 to 2019, China's official annual growth in GDP has been decreasing from 10% to 6%. The GHG emissions annual growth, instead, decreased remarkably from 8% average in the decade 2001-2011 to 1% average from 2012 to 2016 but increased again from 1% to 3% in the next three years (Olivier and Peters, 2020: 36). The Power industry and Other industrial combustion sectors are the sectors of the Chinese economy with the largest emissions of fossil CO₂ (Crippa et al., 2020: 12). The June 2016 China's NDCs document pledges to achieve the peaking of carbon dioxide emissions around 2030 and to make the best efforts to peak early. It pledges also to lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level. With regard to energy transition, China claims to increasing the share of non-fossil fuels in primary energy consumption to around 20%. To increase sink CO₂ capabilities, China aims to increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.

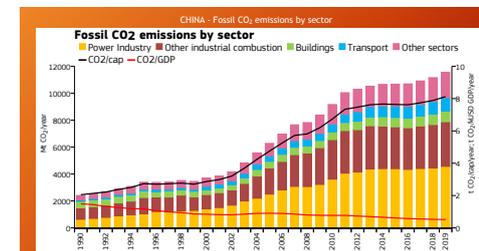
In the 1990s, the **United States** CO₂ emissions have been increasing and have been gradually decreasing in the present century. In the whole period, the ratio of the CO₂ emissions on the GDP level remained flat. Olivier and Peters underline (2020: 39) that such trend is the result of the country GDP increase while CO₂ emissions have been decreasing in the present century, except in 2018. The trend has been replicated by the CO₂/population ratio. The sectors of the United States economy with the worst performance in CO₂ emissions are the Transport sector and Other sectors. But on the 30-year time period, the trend of All sectors is reassuring. In the Power industry sector, emissions reduction is remarkable. The reason for CO₂ emissions reduction in the power industry, as Crippa et



Crippa M. et al. (2020), Fossil CO₂ emissions of all world countries - 2020 Report, Luxembourg, Publications Office of the EU



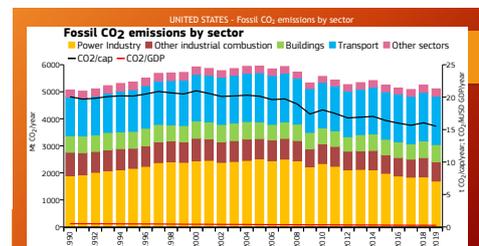
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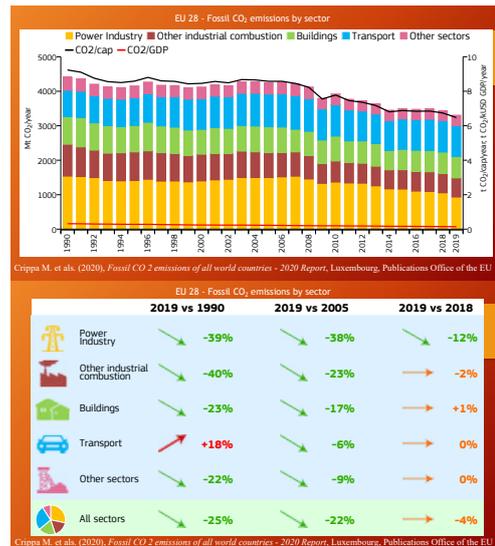
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Crippa M. et al. (2020), Fossil CO₂ emissions of all world countries - 2020 Report, Luxembourg, Publications Office of the EU

als. (2020: 12) remark, is the substantial decrease in coal consumption and the shift from coal to non-fossil energy sources. The United States NDCs document dates September 2016. It pledges to reducing GHG emissions by 26%-28% below its 2005 level in 2025.

The **European Union** emissions reduction trend is notably good. In 2019, the EU total fossil CO₂ emissions were 25.1% lower than in 1990 and 22.2% lower than in 2005. The EU country with the largest CO₂ emissions has been Germany with 21.3%, followed by the United Kingdom (11.0%), Italy (10.0%), Poland (9.6%), France (9.5%) and Spain (7.8%) (Crippa et als., 2020:11). It is remarkable also that the EU emissions decrease continued in this century, except in 2017, while the GDP saw an average annual growth rate of 2.3% (Olivier and Peters, 2002: 45). With regard to the economy sectors, the EU, like the United States, has the worst performance in the Transport sector and the best one in Power industry for the same reason as the United States, that is the decrease in coal consumption and shift to less carbon intense energy sources. It is no surprise, then, that the EU’s NDCs document sets the ambitious target of a net domestic reduction of at least 55% in GHG emissions by 2030 compared to 1990. The NDCs pledges as well to achieve a climate-neutral EU by 2050. In December 2019, the Commission launched the *The European Green Deal*, the programme for tackling climate and environment-related challenges and enhancing sustainable development. In January 2021, the Council of the EU Conclusions on ‘*Climate and Energy Diplomacy. Delivering on the external dimension of the European Green Deal*’ claim that the EU will discourage further investments into fossil-fuel-based infrastructure projects in third countries, unless they are aligned with an ambitious climate neutrality pathway. Such claim brings to mind the imposition method of policy convergence the World Bank and the EU adopted in the 1980s with poor results and later abandoned.



In the past thirty years, **India**’s CO₂ emissions have been steadily rising like the China’s ones. In 2019, India was the fourth largest CO₂ emitting country but, due to its population of 1.366 billion people, India’s per capita emissions of 1.9 t CO₂ /cap/yr are about eight times lower than those of the United States, with a population of 328.239 milions, and about four times lower than those of China, with a comparable population of 1.397 billion, and four times lower also than those of the EU, with a population of 447.512 milions. India’s per capita emissions are even below the per capita emissions of many developing countries (Crippa et als., 2020:12). In the past 20 years, India’s GDP annual growth rate has been between 7% in 2001 and 5% in 2019, a little lower than the China’s rate. With regard to economy sectors, there was no emissions downward change but a stabilization in the very short-term, between 2018 and 2019. India’s NDCs makes the following cautionary assertion about the primary goals the country has to face, *India accounts for 2.4% of the world surface area,*

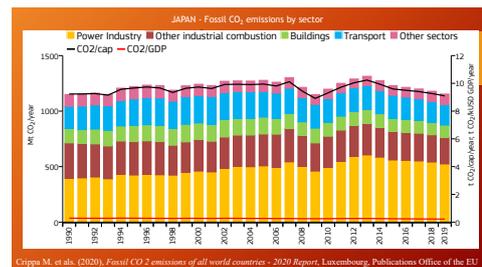


but supports around 17.5% of the world population. It houses the largest proportion of global poor (30%), around 24% of the global population without access to electricity (304 million), about 30% of the global population relying on solid biomass for cooking and 92 million without access to safe drinking water. ... Around 363 million people (30% of the population) live in poverty, about 1.77 million people are houseless and 4.9% of the population (aged 15 years and above) are unemployed. Taking such conditions into account, the government of India set the country's reduction target in strict relation to its economic development goals, that is reduction of the emissions intensity of country's GDP. The 2016 NDCs commits the country to a voluntary goal of reducing the emissions intensity of its GDP by 20–25%, over 2005 levels, by 2020, despite having no binding mitigation obligations as per the Convention, and reminds that the emission intensity of the country's GDP has decreased by 12% between 2005 and 2010. Furthermore, the NDCs communicates the determination to reduce the emissions intensity of the GDP by 33 to 35 percent by 2030 from 2005 level; to achieve about 40 percent cumulative electric power installed capacity from nonfossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF); and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.

Russia's fossil CO₂ emissions decreased largely and regularly between 1990 and 1998 because of the economic crisis associated with the political crisis and regime change. In the present century, instead, emissions have been increasing but slightly and irregularly. Russia ranks the fifth in the world share of emissions and the second in per capita emissions with a population of 144.373 millions, behind the United States with a population of 328.239 millions. The country GDP grew from the early 1990s, the time of the regime change, but has been falling again since 1998 because of the financial crisis caused by the devaluation of the ruble, the fall of the oil price, and international economic sanctions imposed on Russia. Accordingly, also the CO₂/GDP ratio decreased. But in 2017 and 2018 the emissions grew again more than the GDP. With regard to the Russian economy sectors, the downward long-term trend, between 1990 and 2019, is not confirmed in the short term, since 2005. In the past fifteen years, the emissions of all the sectors but that of the Power industry sector have been increasing. Only between 2018 and 2019, emissions remained stable. In the NDCs document, the Russian government pledges to reducing GHG emissions by 2030 of an ambitious 70 percent relative to the 1990 level.



Japan's share of GHG emissions in 2019 is the lowest of the top six emitting countries but Olivier and Peters (2020: 60) remark that the composition of the mix of greenhouse gases is in Japan much different not only from the other top-6 emitting countries but from all top-30 emitting countries. Moreover, the Japan's share of CO₂ is the highest among the top-6 and more than 10 percentage points higher than the global



average. From 2001 to 2017, Japan's annual economic growth has been increasing at a low average year rate, i.e. below 2%. In 2018, it fell to 0,3% and in 2019 to 0,7% year rate. However, the year rate of the GHG emissions has been decreasing. In 2019, Japan ranks third in the per capita CO₂ emissions, at 9,1%, with a population of 126,264 millions. On the whole, the record of the Japan's GHG emissions



reduction is good. The reduction trend of the sectors, except the Power industry, is represented by the downward green arrow though by low percentage points. But in the very short term, 2019 vs. 2018, the arrow is horizontal orange, same as all the top emitting countries. Japan's NDCs document pledges to reducing GHG emission of 26.0% by 2030 compared to 2013 (25.4% reduction compared to 2005). Japan claims also that it will strive to become a "decarbonized society" as close as possible to 2050.

Summing up, in the past thirty years, the European Union countries reduced the GHG emissions. Russia reduced until 1996 and later froze the level of the emission. Japan and the United States kept emissions on a steady state. China's emissions went up but in the past eight years the growth rate slowed down. India's emissions went up steadily. Both China and India are doing like the whole world with regard to the whole CO₂ emissions size and the trend of the single sectors. EU and Japan have the largest green trend across the economy sectors. The Transport sector is, except in Japan, the less submitted to reduction efforts and the most resistant to adapt to energy transition.

The Following Ten

The present section extends the analysis of the national climate policy convergence in the world climate policy to the remaining 10 states that in 2019 emitted more than the 1% of the world total GHG emissions.

The review of the NDCs documents recorded at the UNFCCC Secretariat is the ground for assessing the political will of the national governments to get close to the world climate policy that has been created by the UNFCCC and, in particular, by the Paris Agreement. The deadline of the submission of the first NDCs was the year 2020. Preparing the NDC is a meaningful act. It demonstrates the will to direct the national climate policy convergence in the world climate policy.

The review of the NDCs prepared by the largest GHG emitting countries shows that the EU and Japan are the countries receiving unreservedly the Paris Agreement reduction goals. They pledge to achieve the 2030 reduction target and as well the zero carbon target in around the mid century. China and India claim their good will to come close to the Paris Agreement reduction targets, and charge their own duties for development and improving the life conditions of their large population as the reason for failing to reach the targets in time. Furthermore, they want to reach the emissions intensity of the GDP goals reduction rather than the absolute reduction targets. Last, the United States and Russia do not pledge to fully meet the Paris Agreement goals but to get close to that.

All the 10 countries of the lower GHG emitters group have a record of growing emissions from 1990 to 2019 (see data and graphs in Crippa et al., 2020). Two of them, Iran and Turkey, have not ratified the Paris Agreement till present time, February 2021, and have not uploaded the NDCs plan to the UNFCCC site. The remaining eight countries – South Korea, Indonesia, Saudi Arabia, Canada, Brazil, Mexico, South Africa, and Australia - pledge to reach by 2030 or around such year the GHG emissions reduction targets. They have set their own targets.

However, all the targets are between the 22% and 30% reduction of the emissions above 2005. Indonesia and Mexico set also an higher reduction target that would be reached if the country receive international financial and technical support or if other conditions are met. In other terms, opposite to the normal or unconditional reduction target that a country has to reach with its own resources and capabilities, they have set also a ‘conditional’ target. In addition, the NDCs of the two countries link the unconditional and conditional reduction targets to the starting point of emissions reduction the government chooses as the business-as-usual (BAU) scenario. Such a scenario is obviously the one that allows to fulfil the policy-makers aspiration and could be a scenario of few or no steps to limit GHG emissions. The Saudi Arabia’s NDC links the reduction plan to the goal of diversifying the national economy and moving away from the present heavy reliance on income generated from a single resource, oil. The Saudis leaders’ concern with the impact of energy transition on the national economy draws attention to the domestic conditions constraining the national climate policy convergence in the world climate policy.

NDCs and reduction targets of the large GHG emitting countries

Country	CO ₂ share, 2019, %	NDC date. Last version	NDC and reduction targets
China	30,3	03.06.16	To peak CO ₂ emissions around 2030 and make best efforts to peak early; to lower CO ₂ emissions per unit of GDP by 60% to 65% from the 2005 level.
United States	13,4	03.09.16	To reduce GHG emissions by 26-28 % below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%. To reduce, economy-wide emission of 80% or more by 2050.
European Union	8,7	17.12.20	To reduce at least 55% in greenhouse gas emissions by 2030 compared to 1990. To achieve a climate-neutral EU by 2050.
India	6,8	02.10.16	To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level. To achieve about 40 percent cumulative electric power installed capacity from nonfossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO ₂ equivalent through additional forest and tree cover by 2030.
Russia	4,7	25.11.20	To reduce greenhouse gas emissions by 2030 to 70 percent relative to the 1990 level.
Japan	3,0	31.03.20	To reduce to 26.0% by 2030 compared to 2013 (25.4% reduction compared to 2005). To achieve the goal of developed countries reducing GHG emissions in aggregate by 80% or more by 2050.
Iran	1,8		<i>No ratification of the Paris Agreement</i>
South Korea	1,7	30.12.20	To reduce one-fourth of the total national GHG emissions within approximately 10 years from the base year 2017.
Indonesia	1,6	06.01.16	Unconditional reduction target of 29% and conditional reduction target up to 41 % of the business as usual scenario by 2030.

Saudi Arabia	1,6	03.11.16	To achieve significant annual mitigation co-benefits up to 130 million tons of CO ₂ eq by 2030. To implement measures to diversify the economy away from heavy reliance on income generated from a single resource.
Canada	1,5	11.15.17	To reduce GHG emissions by 30 percent below 2005 levels by 2030.
Brazil	1,3	09.12.20	To reduce GHG emissions in 2025 by 37%, compared with 2005, and in 2030 by 43%, compared with 2005. To reach climate neutrality in 2060 depending on the proper functioning of the market mechanisms provided for in the Paris Agreement.
Mexico	1,3	30.12.20	Unconditional reduction of GHG emissions by 22% and of black carbon emissions by 51% by 2030 compared to a baseline under a business-as-usual (BAU) scenario. In addition, conditional commitments to reach up to 36% reduction of GHG emissions and 70% of black carbon emissions by 2030 compared to the BAU.
South Africa	1,3	01.01.16	Within 2025 and 2030, emissions will be in a range between 398 and 614 Mt CO ₂ -eq.
Australia	1,1	30.12.20	To reduce GHG emissions by 26 to 28 % below 2005 levels by 2030.
Turkey	1,1		<i>No ratification of the Paris Agreement</i>

The table is a synopsis prepared by the Author from the [UNFCCC NDC Registry](#).

Domestic constraints on the policy convergence with world public policies are hard obstacles to the efficacious response of the world institutions to world-scale problems. Even though state governments agree on the necessity of giving to world policymaking institutions the power to respond to worldwide collective problems, and the world institution accomplishes the mandate by applying multilateral policymaking so that the world policy is agreed with the consent of all participating governments, the implementation and the results of the policy depend on the domestic politics of the states. The more the domestic environment is open to receive and comply with the world policy standards and rules the more the world policy achieves the wanted goals. It must be taken into account that the favorable domestic reception of the countries that have structural power in the policy field impacts the most on the diffusion of the world policy.

In the past thirty years, state governments and international organizations received the demand of concerned social actors to respond to climate warming. They put the problem on the world policy agenda and created the UNFCCC as the institution designated to make the policy and oversee the implementation. The percent variation of the number of megatons (MT) of CO₂ emitted by a country in 2019 compared to the number of CO₂ megatons emitted thirty years ago, in 1990, is an indicator of the responsiveness of the country to the collective goal of reducing the world CO₂ stock.

Of the six largest emitting countries in 2019, China and India increased the emissions the most compared with the level of emissions of thirty year ago. United States, Japan, and the European Union, instead, reduced their CO₂ emissions. The United States and Japan went back to almost the same level of thirty years ago. The European Union went down much below the level of 1990. Russia's 2019 emissions are 16% higher than the emissions in 1998, this year is taken as the base of the comparison because of the political and economic crisis of the country in the previous decade (Makarov et al., 2020).

Country	CO2 emissions world share, 2019, %	1990 Mt CO2 /yr (Russia, yr 1998)	2019 Mt CO2 /yr	2019 vs 1990 Mt CO2 /yr % change
China	30,3	2404	11535	79,16
India	6,8	599	2597	76,93
Indonesia	1,6	163	625	73,92
Saudi Arabia	1,6	173	614	71,82
Iran	1,8	204	701	70,90
Turkey	1,1	150	415	63,86
South Korea	1,7	270	651	58,53
Brazil	1,3	228	478	52,30
Mexico	1,3	290	485	40,21
South Africa	1,3	312	494	36,84
Australia	1,1	277	433	36,03
Canada	1,5	453	584	22,43
Russia	4,7	1495	1792	16,57
United States	13,4	5065	5107	0,82
Japan	3,0	1149	1153	0,35
European Union	8,7	4408	3303	-33,45

Data Source: Crippa M. et als. (2020), Fossil CO₂ emissions of all world countries - 2020 Report, Luxembourg, Publications Office of the EU. Russia, CO₂ year 1998: <https://www.macrotrends.net/countries/RUS/russia/carbon-co2-emissions>

The countries with a percentage between 1 and 2 of emissions on the world total show different inclination to reducing CO₂ emissions. Indonesia, Saudi Arabia, and Iran are above the 70% increase. The emissions of the remaining seven countries in 2019 are considerably higher than in the 1990.

All the 16 countries except Iran are members of the G20, the forum of the governments of the large economies with the self-assigned mission of driving the world economy and promoting sustainable development. Being of such syndicate, however, does not urge all the members to share the mission of promoting convergence in the world climate policy. To compare the propensity to climate policy convergence of the 16 countries, attention is drawn to two domestic conditions, the per capita GDP and the production of fossil fuels.

The eight countries - China, India, Indonesia, Saudi Arabia, Iran, Turkey, South Korea, Brazil - with the highest absolute percentage increase of CO₂ emissions from 1990 – 2019 are also the countries with the highest per capita increase of CO₂ emissions but are not the most populous countries.

Country	CO2 emissions world share, 2019, %	1990 tCO2/cap/yr (Russia, yr 1998)	2019 tCO2/cap/yr	2019 vs 1990 tCO2/cap/yr % change	2019 Population (thousand)
China	30,3	2,00	8,10	75,31	1420000
India	6,8	0,6	1,8	66,67	1369000
Indonesia	1,6	0,9	2,3	60,87	269536
Iran	1,8	3,6	8,4	57,14	82821
South Korea	1,7	6,3	12,7	50,39	51339
Turkey	1,1	2,8	5,0	44,00	82962
Saudi Arabia	1,6	10,5	18,0	41,67	34141
Brazil	1,3	1,5	2,2	31,82	212393
Russia	4,7	10,1	12,4	18,31	143896
Australia	1,1	16,3	17,3	5,78	25089
Mexico	1,3	3,4	3,6	5,56	132328
South Africa	1,3	8,3	8,5	2,35	58065
Japan	3,0	9,2	9,0	-2,22	126855
Canada	1,5	16,4	15,7	-4,46	37280
United States	13,4	20,0	15,5	-29,03	329093
European Union	8,7	9,2	6,4	-43,75	510381

Data Source: Crippa M. et als. (2020), Fossil CO₂ emissions of all world countries - 2020 Report, Luxembourg, Publications Office of the EU. Russia, CO₂ year 1998: <https://www.macrotrends.net/countries/RUS/russia/carbon-co2-emissions>

The ranking changes considerably by measuring the change of the percentage of CO₂ emissions per GDP (Gross Domestic Product in US Dollar expressed in 2017 Purchasing Power Parity). The ratio of the CO₂ emissions per GDP of the whole world has a declining trend from 1990 to 2019 and almost all countries have the same trend (Olivier and Peters, 2020: 75). The ratio of the CO₂ emissions per GDP of Turkey, Mexico, and Indonesia did not change from 1990 to 2019. In other terms, the growth rate of their emissions and the growth rate of their economy have been quite alike to one another. This is not the case with Saudi Arabia and Iran whose ratios increased remarkably between 1990 and 2019. A small increase occurred also to Brazil. The remaining

ten countries have been able to lower the ratio. In other terms, they have been able to contain the emissions while improving the output of their economy. This is particularly the case of the European Union (Burns, Eckersley and Tobin, 2020), and China (Finamore, 2020; Hurri, 2020; Lee, 2019).

Country	CO2 emissions world share 2019, %	tCO2 per GDP (in US Dollar expressed in 2017 PPP)		
		1990 (Russia, 1998)	2019	2019 vs 1990 % change
Saudi Arabia	1,6	0,2	0,4	50,00
Iran	1,8	0,4	0,7	42,86
Brazil	1,3	1,4	1,5	6,67
Turkey	1,1	0,2	0,2	0,00
Mexico	1,3	0,2	0,2	0,00
Indonesia	1,6	0,2	0,2	0,00
South Africa	1,3	0,8	0,7	-14,29
India	6,8	0,4	0,3	-33,33
Japan	3,0	0,3	0,2	-50,00
Canada	1,5	0,5	0,3	-66,67
South Korea	1,7	0,5	0,3	-66,67
Australia	1,1	0,5	0,3	-66,67
Russia	4,7	0,8	0,4	-100,00
United States	13,4	0,5	0,2	-150,00
European Union	8,7	0,3	0,1	-200,00
China	30,3	1,5	0,5	-200,00

Data Sources: Crippa M. et al. (2020), Fossil CO₂ emissions of all world countries - 2020 Report, Luxembourg, Publications Office of the EU. Russia CO₂, year 1998, <https://www.eurostat.ec.europa.eu/indicators/carbon-co2-emissions>.

Summing up, the largest CO₂ emitting countries are inclined and able to lower

CO₂ emissions and to raise their GDP. Among the less large CO₂ emitting countries, this is the case only of Canada, South Korea, and Australia.

The Paris Agreement world climate policy is based on reducing GHG emissions by energy transition, i.e., replacing carbon emitting NRES with carbon-clean RES. Accordingly, the governments of the states producing and exporting oil, coal, and gas, the fossil fuels emitting CO₂, should have small or no propensity to move towards setting the national climate policy legislation converging in the world climate policy because of the negative effect on the national economy and the GDP. Accordingly, the countries with the largest reduction of CO₂ per GDP between 1990 and 2019 should be the producers of low or zero fossil fuels. The picture is very different. Some of the countries with largest reduction are the largest fossil fuel producers, namely China, the United States, Russia, Canada, and Australia. But Saudi Arabia and Iran, the two countries with the highest ratio of CO₂ per GDP are high in the ranking of the fossil fuel producers. Turkey is a small producer of fossil fuels and is positioned in the high ranks of the CO₂ per GDP ranking. The present government of Turkey is

also engaged in the search and exploitation of fossil fuel fields in the Eastern Mediterranean Sea. Moreover, Turkey has not filed the NDCs to the UNFCCC. India and the European Union are near to one another in the rank of the large CO₂ emitters and of the fossil fuels, though they produce different quotas of the three fossil fuels, but they are not near to one another in the CO₂ per GDP ranking. Briefly, the association of high fossil fuel production with low convergence in the world climate policy is not strong. It has to be studied and qualified appropriately.

Country	CO2 emissions world share, 2019, %	Oil, TWh, 2019	Coal, TWh, 2019	Gas, TWh, 2019	Oil, Coal, Gas, TWh
China	30,3	2810	2271	1770	2849
United States	13,4	507	2072	2220	1499
Russia	4,7	2220	2220	670	2220
Saudi Arabia	1,6	6462		1136	7598
Australia	1,1	239	3652	1535	5426
Canada	1,5	3191	310	1731	5232
Iran	1,8	1867	2	2442	4311
India	6,8	425	2220	220	424
European Union	8,7	222	122	1222	2442
Brazil	1,3	1751	34	258	2043
South Africa	1,3		1672		1672
Indonesia	1,6	443	418	675	1536
Mexico	1,3	1102	73	340	1515
Turkey	1,1	11	193	0	204
Japan	3,0	0	0	24	24
South Korea	1,7		6		6

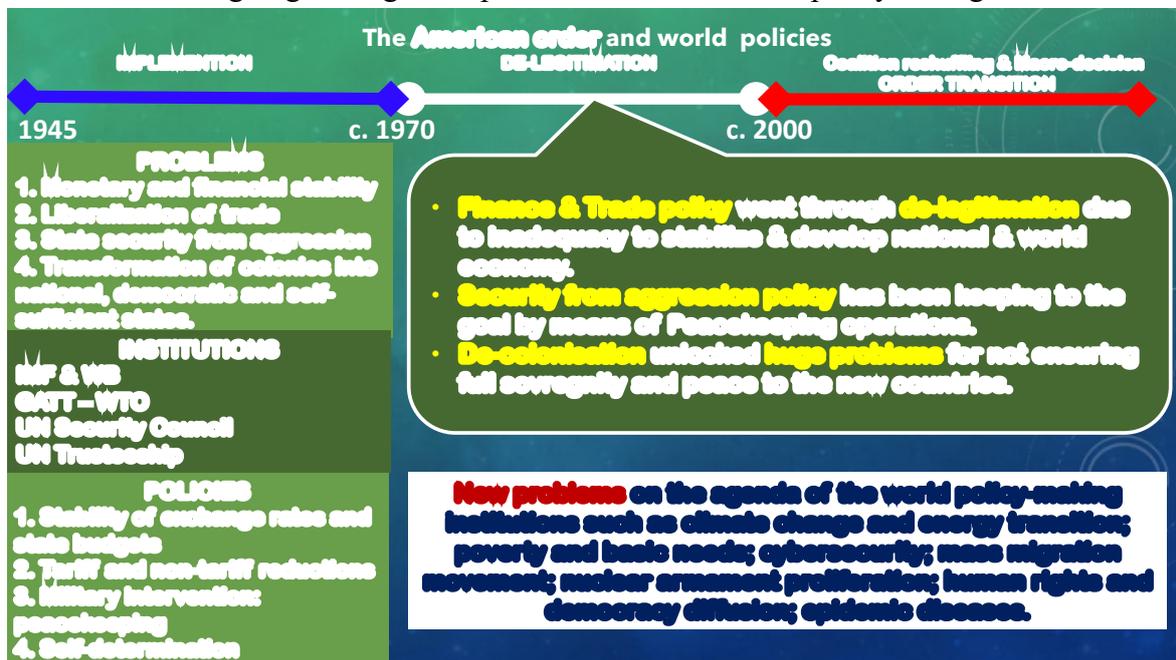
Data Source: <https://ourworldindata.org/fossil-fuels>
TWh is terawatt hour, 1 TWh = 1 trillion watt hours.

Policy convergence and world order transition

In the past thirty years, the climate warming problem has gone through the policymaking *pipeline* of the world political system. In the 1970s and 1980s, environmental issues came into the world political debate, and climate change emerged as a collective problem calling the attention of the world policymaking institutions. From the early 1990s to the 2015, the year of the signature of the Paris Agreement, the world policy response has been put in place thanks to the synergy of many state and non-state actors within the UNFCCC. The policy implementation is entering into effect. Further change and upgrades are expected.

The first section of the present study underlined two features of the policy response to world-scale problems. The first feature is the set of institutions that after World War Two was created to make world policies by employing the multilateral method. The second is the voluntary convergence of the domestic policies of the states as the way for implementing the world policies. The Bretton-Woods institutions, the United Nations, and the GATT/WTO made the first world policies to respond to the finance stability, trade liberalization, state security, and the end of colonies problems. In the past seventy years, new organisations and mechanisms enriched the institutional setting to respond to new contentious issues and world problems.

The multilateral method of policymaking, that has been discussed in the third section of this paper, remained in use but has been affected by the change of the world political order. The hegemonic order created by the United States and the coalition of the Western countries has been going through the life cycle changes that the modern world systems have experienced in the past centuries. After the phase of implementation and amplification of the early institutions and policies of the American project, commonly called international liberal order, world politics has been going through the phase of institution and policy de-legitimation and in



current years is entering into a transitional period. Probably, the present order transition process, like the previous ones, will pass through two phases, coalition reconfiguration and macro-decision, that will affect differently the policymaking institutions and multilateralism (Attinà, 2021a and 2021b).

The world public policies achieve the goals they are created for in as much as the domestic policies of the states converge to such policies. Therefore, the second condition, which is the domestic policies convergence in the world policy response, is affected by the order transition

circumstances. Generally speaking, the more the states are loyal to the world policymaking institutions and to the countries in lead of the world order the more the states will make domestic policies consistent with the relevant policies of the world institutions. The legitimacy of the world order enhances the policy convergence of the states because the leading countries are willing to contribute their resources for the results of the world policies that reinforce both the stability of the existing order and their own primary role. But such condition is not a steady systemic condition. On the contrary, after the initial phase, the legitimacy of the world hegemonic order falls down for various reasons including the erosion of the resources and capabilities of the hegemonic state and coalition and the growth of the resources, capabilities and aspiration of the challenging states that foment the de-legitimation of the world institutions and policies.

In agreement with the above, knowledge about the current state of the world political order and the competition of the great powers that want to change the existing order is key to building knowledge about the world climate policy process and about the convergence of the climate policy of the states in the world climate policy. The United States, China, and Russia are on the frontline of the world power competition. They express different revisionist orientation towards the existing order and have at their hand a different extent of the coalition power that is essential at the time of order transition (Attinà, 2021a).

Order transition frontrunners: revisionism & coalition power

- **United States** Adaptive revisionism. Coalition power stress
 - Uneasy with world economic policies & institutions.
 - Economic & military power advantages on China and Russia.
 - Decreasing effective as coalition leader and builder.
- **China** Eventual revisionism. Coalition-building power not proven
 - Responsible player of the present world order.
 - Potentially revisionist (should the American order continue to weaken).
 - In command of economic and trade power convertible into coalition power.
- **Russia** Status-seeking revisionism. Small coalition power
 - Able to undermine world order for satisfying status-seeking ambition.
 - Coalition power only on America-foe countries.
 - No world-scale economic power.

Experts recognize to the United States, China, and as well the European Union the merit of exercising the leadership of the negotiation of the Paris Agreement (Bäckstrand and Lövbrand, 2019; Eckersley, 2020; and Hurri, 2020). But neither the United States nor China can boast of playing constantly the leader role of the climate policymaking. Quite the contrary. The Democratic American Presidents, especially Barak Obama and today Joseph Biden, play an active role in the UNFCCC negotiation, but the Republican presidents have not, especially Donald Trump that withdrew his country from the Paris Agreement. In the past ten years, the China leaders have been struggling to promote domestic de-carbonization and strive to achieve the 2030 temperature target and the 2060 carbon-zero target. However, in the UNFCCC COPs negotiation, the Chinese representatives do not play a primary role but defend the country leadership of the group of the developing countries.

The three leading powers are strong defenders of the rule of the national determined contributions to the reduction of the world climate temperature. Besides sharing this preference, which is worldwide the most respected rule of the Paris Agreement, the three countries go their way to determine the national contributions to the reduction of GHG emissions and the achievement of the temperature targets.

Climate policy convergence

United States	<ul style="list-style-type: none"> • Firm on convergence fully-grounded on the country circumstances and capabilities.
China	<ul style="list-style-type: none"> • Firm on convergence fully-grounded on the country circumstances and capabilities, and on keeping the developing-country status as well as on increasing RES capacities while building partnerships with oil-producing countries.
Russia	<ul style="list-style-type: none"> • Firm on convergence fully-grounded on the country circumstances and capabilities, and influenced by the large share of fossil fuels export on the national economy.

Apart from the Trump administration, the American presidents of the past twenty years have recognized the reasons for reducing CO₂ emissions and the climate warming (Parker and Karlsson, 2018). As Miao (2019) remarks, extreme weather events, economic activities in coastal regions, high levels of incomes and civic engagement, and political ideology play a critical role in civil society and as well as in subnational adaptation decision making. In April 2021, President Biden has pledged to act within the lines of the Paris Agreement and to urge the states to act accordingly. The scientific and business sectors of the American society should share such engagement.

In the past years, China has realized the importance of matching fast industrialization and rising living standard with transitioning to an economic model focused on low-carbon development and green, renewable energy (Camezeaux et al., 2020; Finamore, 2020). However, the country's traditional alignment with the developing countries that exempts China from the full responsibility of achieving the Paris Agreement targets and as well the special relations with oil-producing countries for energy supply of the Chinese economy raise the concern of the countries that blame on China the world largest GHG emissions and the domestic use of coal for more than half energy and three-quarters electricity consumption (Hurri, 2020; Lee, 2019).

Russia's climate policy is influenced by the share of fossil fuels export on the Russian economy and by the link between the oil industry and the state administration and policymakers (Korppoo, 2020). In the UNFCCC negotiations, Russia is relatively passive. Like almost all countries, it shares concern for the environmental problems and participates for safeguarding own economic and foreign policy interests (Makarov et al., 2020).

Conclusions

In 2015, almost all the states of the planet signed the Paris Agreement, the text of the world policy towards climate warming that is the only term of reference for the policies of the states towards adapting to the effects of the climate change and mitigating the causes. The UNFCCC policy, now in the early stage of implementation, will achieve its goals on condition that national policies converge into it. In other terms, the states are responsible for legislating and producing domestic policies consistent with the world climate policy.

The way ahead is not easy. The states officially share the principle of the common and differentiated convergence because they know that the responsibilities for causing climate warming are common but differentiated. Also, the financial and technological resources necessary to implement the world policy are differently distributed. In some cases, they are not as large as they should be to produce the expected results. Last, the political and economic priorities of the states influence the way and the pace each of them will adopt in the convergence process.

The approval of the Paris Agreement is universally recognized as the most important game-change event in the policymaking process towards the climate warming problem, a decade-long process involving state and non-state actors within the institutional frame and under the leadership of the UNFCCC. The states have committed to hold climate warming to well below 2 °C and have agreed to give to the UNFCCC the task of monitoring the progress of each state towards such target. Every five years, the governments deposit a file at the UNFCCC Secretariat. The file contains the 'nationally determined contributions' (NDCs) that make public what each state does in order to converge into the world policy goal and to avoid that CO₂ emissions into the atmosphere cause the raise of the world's temperature to dangerous levels.

In the [Special Report on ‘Global Warming of 1.5 °C’](#), the experts of the Intergovernmental Panel on Climate Change, IPCC, called for committing to the 1.5 °C goal rather than to 2 °C and to decarbonize the world by 2050 in order to avoid the risk of reaching 3 °C or higher warming by 2100. Many analysts and professionals share the IPCC call and claim that the 2050 goal is reachable at a low cost. Substituting renewable energy sources to carbon energy sources is feasible and affordable since these sources are abundant if policy instruments such as government regulations, carbon pricing, and public and private investments into R&D are put in place (Hafner and Tagliapietra, 2020). Briefly, the economic and technical conditions are at hand. The problem is political and mostly a world political problem.

The world has coal, oil and natural gas to last for centuries. The fossil-fuel-rich countries such as Russia, Saudi Arabia, Canada, Australia, Venezuela, Brazil, Mexico, Iran, Iraq and others dislike transition to renewable sources and zero-carbon energy. But the most politically important country rich in fossil fuels is the United States. The inconstant position of the presidents of the United States on de-carbonization is known to everybody. In January 2021, President Biden started his presidency with unreserved adhesion to the Paris Agreement policy. There is no reason to doubt about his will to keep on with such engagement. In such case, the United States leadership of the war on climate warming could have a remarkable impact on the present phase of reconfiguration of the existing world order and transition to the new order. In particular, the American leadership of the world climate policy is a powerful weapon against China whose green policy is acknowledged by all and is as well not as determined as it should be. China’s leaders have said that reducing GHG emissions within 2030 is not fully compatible with the country’s present development strategy.

Generally speaking, the fossil-fuel-rich countries will suffer big capital losses as their reserves are left unexploited for mitigating the climate change. To say the least, they will do whatever they can to slow down the implementation of the world climate policy and to gain time to adapt their economy to energy transition. Hardly they will impose on the rest of the world holding on for long the substitution of wind, solar, hydro and other zero-carbon energy sources to fossil fuels.

Energy transition creates problems to the fossil-fuel-rich countries and eases the economic problems of other countries. The production of solar panels, wind turbines and batteries will enlarge the consumption of materials and minerals such as copper, lead, lithium, nickel, and cobalt that are mined in countries today on the margins of the world markets. Financial rents will boost their economy. Change effects will be experienced in the world finance.

The impact of the world climate policy on the world political order will not be dramatic. Political scientists noted that, for various reasons, the world powers and the major world players like the European Union did not play the constant role in the climate change policymaking. In particular, the United States, China, and the European Union took the lead of the UNFCCC negotiation occasionally and with no determination. Coalitions of countries gave impulse to the negotiation, but they were not cohesive and determined enough to take resolutely the lead of the negotiation and get the final goal.

The President Biden’s determination to take the lead of the world climate change policy is in line with the environmental position of the majority of the Democratic Party and is inspired by problem-driven concern. Climate change is a collective problem at the level of every state and as well at the world level. Therefore, the state and world political institutions have the mission of responding by making the appropriate policy. By committing to de-carbonization inside the United States as well as at the world level, Biden makes a strike also in the world order transition process. Order transition is a crucial and multidimensional process. The

environmental problems are high on the agenda of the states and of the world institutions. The quality of life all around the world and the economic and technological development of the countries depend on coping with the climate change. Briefly, to the United States, pushing on the climate change agenda is a good strategy for driving world order transition towards the safe end.

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