

International Climate Change Policymaking: An Outline of the Post-Paris Framework

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Abstract

This paper focuses on some likely multilevel climate policymaking pathways outlining the scenarios for effective global climate regimes. It analyzes the trends of international diplomacy after the Paris Agreement set the goal to limit Global Mean Surface Temperature to around 1.5°C and investigates how that is going to shape the courses of policies and actions. After understanding the physical sciences as accurately as we can, some of the pressing issues of climate change rest upon mobilizing practical actions where core interests of the parties involve complex political momentum. Development, economic growth, and business-as-usual scenarios must be balanced for drastic actions needed to achieve the energy transition and sustainability goals with scientific advocacy. The post-Paris challenges would, however, be to script an appropriate action plan for reducing greenhouse gas emissions with multilateral policies like obligating the gradual phase-out of fossil fuels, tougher carbon taxing, allocating sufficient funds for the productions of zero carbon technologies. Our analysis also dissects the feasibilities and pitfalls of global climate politics and governance that might affect practical actions. Apt policies involving promotion of renewables in all levels, maneuvering supply chains, and creating a sustainable market mechanism for viability and profits will likely help achieve the targets of the Paris Agreement.

Keywords: Paris agreement; Climate policy; Climate diplomacy; Governance; Regime.

Abbreviations: BaU: Business as Usual; DAI: Dangerous Anthropogenic Interference; GCF: Green Climate Fund; REDD+: Reducing Emissions from Deforestation and Forest Degradation; CDM: Clean Development Mechanism; JI: Joint Implementation; CCS: Carbon Capture and Storage; NDC: Nationally Determined Contribution; NET: Negative Emission Technology; RCP: Representative Concentration Pathways; SSP: Shared Socioeconomic Pathways; ppm: parts per million, 1ppm=0.0001%; GMST: Global Mean Surface Temperature; GMSL: Global Mean Sea Level; ETS: Emission Trading System; COG: Coal, Oil and Gas; CTCN: Climate Technology Center and Network; LULUCF: Land Use, Land-Use Change and Forestry; BECCS: Bio-Energy with Carbon Capture and Storage; MRV: Measuring, Reporting and Verification; NAMAs: Nationally Appropriate Mitigation Actions; MEAs: Multilateral Environmental.

Introduction

With the poorest of Africa constantly being rattled and hounded by the claws of global warming [1,2], the world is now at a crucial juncture of materializing the historic Paris Climate Agreement with pledges and reviews instead of targets and timetables [3]. After entering into force on November 4, 2016, and until February 2018, 175 countries ratified it. Note that, by the end of December 2017, all the member states of the UN except the United States were with the Paris Agreement [4,5]. For some, the outcomes of this accord were even bigger than expectations [6]. Though the much hyped Article 2 declares to limit the Global Mean Surface Temperature (GMST) well below 2°C above preindustrial levels and pursue efforts to keep it to 1.5°C, alongside, it urges “to reflect equity and the principle of common but differentiated responsibilities and respective capabilities” [7,8]. But INDCs submitted by the nations fell well short of limiting 2°C, let alone 1.5°C [9-11]. The Paris Agreement culminates as a legacy of multiperspectival and concerted global efforts over decades to address global climate change. It comprises plan for peak GHG emissions as soon as possible, an economy-wide absolute emission reduction target, NDC updates from

parties every five years, a global goal for adaptive capacity, resilience, and reduction for vulnerabilities, strengthening scientific knowledge on climate, deep focus on Warsaw International Mechanism for Loss and Damage, technology development mechanisms, capacity building and a transparency framework [12]. Now, probably the most important tasks ahead are to charter a concrete global climate policy and governance mechanism, and outline the structure of an effective climate regime to make Paris successful. The success of Post-Paris Climate actions from 2020 will, to a large extent, depend on the international climate governance mechanisms and the devised policy regimes involving tortuous diplomatic maneuvering.

Global Climate Conferences, Its Regimes, and Outcomes

For the last five decades, the world has produced far more than 500 international multilateral environmental agreements (MEA), but only few of them are truly successful [13,14]. As a matter-of-fact, environmental treaties enhance the chances of global compliance, enforcement mechanisms [15,16], and Paris with an ambition of high targets is considered to be a pinnacle of global diplomatic and political success. There are significant differences between all other protocols and Paris. As Viñuales et al. [17] underscore that targeting 1.5°C might entail “dramatic socio-economic consequences”. To be able to do that, a world steeped in fossil fuels will have to write a net zero emissions

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pattern by 2060-2075 [18]. Nordhaus [19] finds 2°C target as infeasible with present accessible technologies.

Accepting unequivocally that anthropogenic climate change (ACC) is not only real but leading us toward dire consequences [20-23], we need to build an architecture of governance framework that necessarily involves the most important needs to avoid the catastrophic fallouts of ACC in the coming decades though climate change has emerged as a topic of intense politics since the 1990s [24,25]. Some of the pressing questions would be: do the basic tenets of Paris perfectly address the issues of ACC? Along with IPCC's recommendations, do we really have practical layouts of effective measures to achieve that before it is too late? How would the poorer nations who contributed least but are the worst sufferers be truly benefited from Paris? Designing that effective global governance architecture is by far the mammoth task. As for instance, bioenergy with carbon capture and storage (BECCS) has been recommended as a tool to capture carbon dioxide. Apart from geoengineering and comprehensive decarbonizing technologies, we must adopt deeper emissions cuts; launch a new and sustainable economic system.

The reluctance of executing hard with obligatory timetables on Paris came from three biggest emitters viz. the U.S, China, and India who opposed a legal binding [26]. The core ideas of policy regime also have evolved much from a classic idea of who defined regime as "sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations" [27]. Climate regimes help shape the climate governance systems emphasizing on the specific needs. As for instances, the Brundtland Commission's *Our Common Future* in 1987, Montreal Protocol (1987), and formation of the United Nations Framework Convention on Climate Change (UNFCCC) jolted our notions about sustainability and remodeled pathways of actions for climate change. Table 1 orchestrates a brief summary of the major global environmental conferences mediated by the UN and the evolution of climate policies that helped cement global actions to tackle climatic change.

Fossil Narratives, Global Climate Politics, and Diplomacy

Since 1980s, EU wanted legally binding treaties with timetables whereas the U.S voted against it and showed resistance [15,28]. Though it was well predicted that the U.S. under a Republican president would withdraw from Paris as it did from Kyoto with G.W. Bush at White House [29]. The reasons are predominantly economic, ideological, geopolitical, fossil lobby, and of personal interests than climatic and environmental. But if the biggest historic GHG emitter withdraws or antagonizes global climate accords, that invites jeopardy and vulnerability for the whole mechanism as the U.S. has big role to play for leadership. Since Kyoto, BASIC/BRICS nations always demanded some less binding prerogatives or CDM and the politics deepened to a seemingly imbroglia due to the statistics of multidimensional national interests resulting in a plethora of blowbacks that hurt equity and justice. We must ensure that post-Paris actions address climate equity and climate justice [30-34], as both of them are fundamental in designing a successful climate policy. But it seems, we are repeatedly forcing justice off the table [35]. Post-Paris actions should involve a strategy as to how it would implement carbon taxing or international emission trading (IET), JI, and CDM. In this regard, climate politics can be characterized as an investment [36,37].

In the face of overwhelming amount of empirical data, facts, and evidences from rigorous scientific experiments from past decades, yet our embroiled political wills, crooked fossil interests, market and supply

chain dynamics, lack of appropriate technologies, technological parity for multipurpose climate goals fail to necessarily address the problems. With politicization, denialism, fossil capitalism, and polarization of climate change [38,39], afflicted nations seem to be engrossed in playing dice. Figure 1 below depicts IEA's CO₂ emissions scenarios in 2017. When it comes to weighing on international climate governance and diplomacy, the White House and Red House appear to be important, for they are liable to play a leading role because they are responsible for much of this wreckage.

International climate diplomacy and policy frameworks, national and global climate governance and mobility, climate justice and equity must be translated into actionable regimes and practicable practices for most feasible shared socioeconomic pathways. Visibly, the limits to growth didn't enlighten us much though the predictions befell us. We have not been able to rein in the collective "invincible hankering" of insatiable economic growth, consumerism, and infinite scrambling to profit which are all rooted in fossil burning so far that ultimately led to climate crises. Maybe taxing and trying, the divisiveness of climate diplomacy is believed to be implanted in fossil dynamics. Copenhagen was much ado about nothing and one of the most flamboyant failures in the history of climate diplomacy, and Kyoto promised a lot but achieved much less. Rio and Kyoto hardly impacted to exert any global climate actions to thwart anthropogenic global warming (AGW) [40]. In effect, the United States and Australia did not ratify Kyoto; recently Canada and Japan withdrew from it. The failure of the developed nations including the U.S. and EU to practically make up to the levels as their pledges to legally binding Kyoto made the international climate actions to reach a concrete foothold [24,41-43].

From Montreal to Paris: Evolution of Climate Policies

The Montreal Protocol is one of the most successful climate agreements and a precedent for Paris. The factors responsible for that victory were:

It focused mainly on a single issue i.e. banning only the production of ozone depleting substances.

It did not essentially lead to a comprehensive embargo on the entire paradigm of fossil capitalism that is rooted almost inextricably in the production systems of modern civilization and call for energy transition.

The climate policies and governance at global and national levels were quite appropriate and feasible for the parties to act upon.

The United Nations was able to mobilize necessary political actions by uniting the nations in a concerted effort.

Though it was kind of "climate and sustainability over economy" agenda, yet nations took on the challenges. In contrast, for Paris, scenarios are significantly different. First, the emission reduction targets set by it are bigger and strikingly unique and demands sensible actions from all the signatories. Second, it involves an epochal transformation of energy consumption patterns that are inseparably responsible for economic production. Third, it would require gradual DE fossilization and ultimately we should be able to reach net zero carbon emissions. Fourth, one aspect of sustainability should be achieved by phasing out from fossil fuels to avoid the repercussions of soaring global warming. Fifth, equity and justice must be ensured while processing extremely sophisticated multilayered policymaking. The fossil empire is still so predominant that it is hard for the nations to break free from it immediately, for that might lead to economic downturn and dwarf growth.

Year	Name of the Agreement/Conference/Protocol	City/Country	Global Sponsor/Coordinator	Major Policy Outcomes, Recommendations, and Goal Settings
2018	(1) COP 24 Conference (2) IPCC 1.5C Special Report	Katowice, Poland	(1) UNFCCC (2) IPCC, WMO	(1) Yet to yield (2) Yet to publish
2017	COP 23 Conference	Bonn, Germany	UNFCCC	Talanoa Dialogue, Paris Implementation Guidelines.
2016	COP 22/CMP 12 Conference	Marrakesh, Morocco	UNFCCC	Water security, management, and sustainability to better address climate change.
2015	(a) Sendai Framework (b) UN Sustainable Development (c) COP21/CMP 11, Paris Agreement	(a) Sendai, Japan (b) New York, USA (c) Paris, France	(a) UNISDR (b) UNDP (c) UNFCCC	(a) After Hyogo, new guidelines for DRR. (b) After MDG, 17 overarching goals for 2015-'30. (c) The most successful climate accord so far, reinforcing to keep GMST well below 20C and pursue efforts to bind it to 1.5°C.
2014	(a) COP 20/CMP 10 Convention (b) IPCC WGII & III Reports	(a) Lima, Peru	(a) UNFCCC (b) IPCC, WMO	(a) Lima Call for Climate Actions. (b) Unequivocal climate science for climate actions to avoid disaster.
2013	(a) IPCC AR5 (b) COP 19/CMP 9	Warsaw, Poland	(a) IPCC, WMO (b) UNFCCC	(a) Reinstating the core scientific bases for ACC. (b) Reinforcing Durban Platform, GCF, REDD+.
2012	COP 18/CMP 8 Conference	Doha, Qatar	UNFCCC	The Doha Climate Gateways.
2011	COP 17/CMP 7 Conference	Durban, South Africa	UNFCCC	Durban Platform, 2 nd commitment of Kyoto etc.
2010	COP 16/CMP 6 Conference	Cancún, Mexico	UNFCCC	Hundred billion dollars annual GCF, Climate Technology Center.
2009	(a) COP 15/CMP 5 Conference (b) World Climate Conference-3	(a) Copenhagen, Denmark (b) Geneva, Switzerland	(a) UNFCCC (b) UNFCCC, UNEP, and WMO	(a) Taking collective goal to limit GMST at 2 C for the first time, but it did not work though. (b) Understanding variability, more accurate climate predictions in seasonal and multi-decadal scenarios.
2008	COP 14/CMP 4	Poznań, Poland	UNFCCC	Focusing on Loss and Damage than Adaptations (beyond Bali).
2007	(a) IPCC AR4 (b) COP 13/CMP 3	Bali, Indonesia	(a) IPCC, WMO (b) UNFCCC	(a) Mitigation, adaptation, finance, and innovation. (b) Bali Road Map.
2006	COP 12/CMP2 Meeting	Nairobi, Kenya	UNFCCC	Supporting developing nations for CDM.
2005	COP 11/CMP 1 Conference *Kyoto entered into force	Montreal, Canada	UNFCCC	Montreal Action Plans to extend Kyoto regimes and focusing on the implementation of Kyoto.
2004	COP 10 Conference	Buenos Aires	UNFCCC	Reviewing the previous COP outcomes.
2003	COP 9 Conference	Milan, Italy	UNFCCC	Using Adaptation Fund, Capacity Building.
2002	COP 8 Meeting	New Delhi, India	UNFCCC	Delhi Ministerial Declaration, technology transfer.
2001	(a) 3rd IPCC Report (TAR) (b) COP 6 Conference (c) COP 7 Conference	(b) Bonn, Germany (c) Marrakesh, Morocco	(a) IPCC, WMO (b) UNFCCC (c) UNFCCC	(a) Multidimensional physical science of CC. (b) Flexibility Mechanisms, Carbon Sinks etc. (c) Operational rules for IET, JI, and CDM.
2000	COP 6 Conference	The Hague, Holland	UNFCCC	Discussion on the reduction of GHGs.
1999	COP 5 Conference	Bonn, Germany	UNFCCC	Technical issues of climate change.
1998	COP 4 Conference	Buenos Aires	UNFCCC	A two-year "Plan of Action" to implement Kyoto.
1997	COP 3, Kyoto Protocol	Buenos Aires	UNFCCC	First important legally binding treaty to curb global GHG emissions; IET, JI, and CDM.
1996	COP 2 Conference	Geneva, Switzerland	UNFCCC	Accepted findings by IPCC SAR, called for legally binding midterm targets.
1995	(a) COP 1 Conference (b) 2 nd IPCC Report (SAR)	Berlin, Germany	(a) UNFCCC (b) IPCC, WMO, UNEP	(a) The Berlin Mandate; Joint Implementation. (b) Clarifying the scientific basis of climate change.

1994	World Conference on Natural Disaster Reduction	Yokohama, Japan	UNISDR	Yokohama Strategy and Plan of Action for a Safer World.
1992	Rio Earth Summit; Formation of UNFCCC	Reo deJaneiro, Brazil	UNCED	Establishment of UNFCCC; since then was responsible for the COP meetings.
1991	WMO Congress (11 th)	Geneva, Switzerland	WMO	Monitoring meteorological issue of climate change.
1990	(a) First IPCC Report (FAR) (b) Second World Climate Conference or WCC-2	(b) Geneva, Switzerland	(a) IPCC (b) WMO, UNESCO, UNEP, FAO, and ICSU	(a) Identifying the causes of climate change with the physical science basis. (b) Paving ways for founding the UNFCCC.
1989	Montreal entered into force	Helsinki, Norway	UN/UNEP	Reduction of ozone depleting substances.
1987	Montreal Protocol	Montreal, Canada	UNEP, WMO	Limiting the productions of ozone depleting gases (CFC).
1985	Villach Conference	Villach, Austria	UNEP, WMO and ICSU	Ozone layer protection, SCOPE Project, Ensuring periodic assessments of scientific understanding.
1982	Commemorating Stockholm Conference	Nairobi, Kenya	UNEP	Reinvigorating the Stockholm Declaration
1979	First World Climate Conference	Geneva, Switzerland	WMO, UNESCO, UNEP, ICSU	Establishment of World Climate Programme and World Climate Research Program.
1972	Stockholm Conference/First Earth Summit	Stockholm, Sweden	UN General Assembly	Twenty six principles on environment and development.

Table 1: Major global climate conferences and the policy outcomes since 1972 (adapted from author's original contribution).

From historic experiences we find that “anarchic character” of many influential actors is responsible for the lack of success of climate agreements [44] along with UNFCCC’s weak potency to propel the action mechanics [44]. The textures, perspectives and multimodality of global climate governance suggest that along with UN, G7, and G 20 can play the leading roles. The political economy of climate governance [45] and technological implications of international climate diplomacy and regime could probably be better understood if we delve sharply into the policy dynamics of environmental politics and treaties. Montreal relied mainly on a scheme of preventive measure to would-be dangers rather than a response to already deleterious losses [46]. Understanding the enigmatic phrase “common but differentiated responsibilities” and “respective capabilities” lend a sharp contrast of the responsibilities. With arguably the worst drought crisis in Cape Town in modern history which scientists attributed to the complex effects of climate change, the 2018 Talanoa Dialogue has fixed three vital questions for the world: Where are we? Where do we want to go? How do we get there? [47]. A priori ideas of ecological modernization, green governmentality, and civic environmentalism would only be justified by the body of evidences of climate actions expected to be resulted from a successful international diplomacy. Copenhagen failure in 2009 should be seen as an evolutionary trial for Paris [48]. After Paris, the 2050 Pathway Platform launched at the end of COP22 in Marrakesh outlining a clear goal to find “a way to backcast and extrapolate from the long-term goal of reaching the balance between the sources and sinks of GHG emissions” [12].

The COP23 summit in 2017 in Bonn was a post-Paris routine work, did not entail much of any momentum. By recognizing and accepting the nature of global climate regime and subsequent paraphernalia as inexorably multilateral, multidirectional, and multipolar which are inextricably multifaceted too, the world essentially needs to take on this mammoth challenges for an equitable and just negotiation framework which is appropriately effective. Gravitating toward a set of catalytic and facilitative provisions [49], the existing state and nonstate stakeholders with their “hybrid multilateralism” sketch out a hybrid policy architecture and an underlying dynamism of multilevel and transnational climate actions [50,51] with UNFCCC’s orchestration that worked really well [8]. In spite of having a goal for a colossal paradigmatic

transformation, the Paris agreement does not have a solid measure of invention, innovation, and implementation of mitigation tools, lacks a concrete means of enforcement [52], falls short of a comprehensive framework [53], and does not have a blueprint for the much-sought stabilization process [54]. Climate regime has, to a great extent, now been neoliberalized [55] and post-Paris international regime and governance is likely to be affected by that. The action dynamics and momentum of post-Paris energy transition, intergovernmental climate governance, and international policy regimes will inevitably depend on the real nature of the cores of Paris. Making a constructive compliance not only among the diverse global parties with different interests but between the domestic climate administrations with the transnational climate governance will likely to produce better results and when internal governance mechanisms offer pro-climate policies, that will encourage sub-state and nonstate entities to work better [56-59].

Post-Paris Global Policy Dynamics with Equity and Justice

Morgan holds that Paris Agreement lacked to mention the accurate causation for GHG emissions. The post-Paris policy and diplomacy frameworks must build on multicomponent facets viz. global, regional, national, zonal, city-level, and above all addressing individual carbon footprints. Whether it would be a bottom-up or a top-down, or a mixed approach-must be scrutinized well. Methane emissions policy must, however, be strengthened as permafrost thawing is hideously increasing [60] which has several times more global warming potential; in the next 5-7 decades, world’s population will most likely reach the 10 billion mark, that will lead to increased GHG emissions. The hard truth is, in real-world climate policymaking-talks, negotiations, decisions, and actions do not always occur on agreed descriptions and comprehensive rationality, also they are pretty complex [61].

With the most recent verifiable and empirical scientific data, facts, and evidences-physical science is virtually certain and settled [62]. Germany, once a climate leader has fallen short of the Paris pledges [63] and is grappling with its coal-fired power plants. Now effective climate communication, making ways to cut collective and individual carbon footprints, and scaling climate leadership to implement Paris need to be orchestrated overcoming diplomatic-political imbroglios

and insufficient political mobility. From the UN or international level of understanding and shared common platforms, national governments are expected to devise suitable policies, which sometimes are driven or mired by multilateral national and international political interests [64,65]. We now need global stocktaking and a truly efficient boost in climate action [66] and efficacious climate regime to make Paris successful. Carbon cobenefit and landscape centered REDD+ attracted criticism as it proved to be inefficient [67]. Science and research based climate policies nestled with prior experiences that address justice, equity, and sustainability issues are by far the most suggested solutions. The problem is not only colossal, global, and multilateral, but it is unbelievably sophisticated. It is a huge task to chart a rulebook for Paris where the LDCs, G77, G20, BRICS, and G7 would come to a shared consensus and act accordingly when everyone has its own calculation of economic and environmental interests.

An effective global climate coalition and coordination among nations, groups, cities, businesses for deep decarbonization of the energy intensive industries is necessary than ever before to keep GMST to 2°C by 2060-2080 [68]. But the international climate diplomacy and negotiations that the world is following after Paris, are seemingly based solely on nations' self-interests, economic, and geopolitical benefits where energy supremacy would most likely figure prominently; it might be proved to be miserably suicidal and self-destructive. The biggest emitters of the world, almost all of them are seen to have bifurcated and showed some kind of double standards with energy transitions. IPCC AR5 or Paris Agreement is not an alarm factory. However, if in 2018, we accept climate change as a burning crisis required to be urgently solved, the nations must sacrifice vented tradeoffs, self-centric diplomatic complications, fossil lust, and suicidal inactions; the degree of climate communication acceptance is extremely crucial here. The following scenarios might be conceptualized as evolutionary processes:

Equating Economy, Production, Growth, Industrialization, Business, and Development (EPGIBD) with fossils.

EPGIBD and Business-as-Usual (BaU) with fossils.

EPGIBD and BaU with predominantly fossils and partly renewables.

EPGIBD and BaU with lesser fossils toward gradually Net Zero Carbon (NZC).

EPGIBD and Comprehensive Sustainable Pathway (CSP) with renewables.

EPGIBD and CSP with reins and limits to economy and business.

Agreements

Paris could turn out to be only a plethora of lofty promises like Copenhagen. The outcomes of Rio, Kyoto, and Copenhagen must be dissected well and the success rests more on global climate diplomacy, political mobility, and international governance mechanism. Figure 2 outlines post-Paris vignettes of climate policymaking with likely temperature rise, atmospheric carbon dioxide concentration, and other related scenarios. Even inordinate EPGIBD with renewables is not sustainable, hence undesirable. Analyzing the global trends since the inception of IPCC's science-based policy advocacies, we find that most of the nations and nonstate stakeholders talk about scenario (3), but actually practice (1). By 2017, renewables growth in China and India is remarkable, but coal is rising too. Norwegian energy supermajor Statoil's policy is worth noticing. Apart from being one of the big fossil firms, it also spends a lot in renewables and recently gained huge success in implementing world's first floating wind turbines off Scotland.

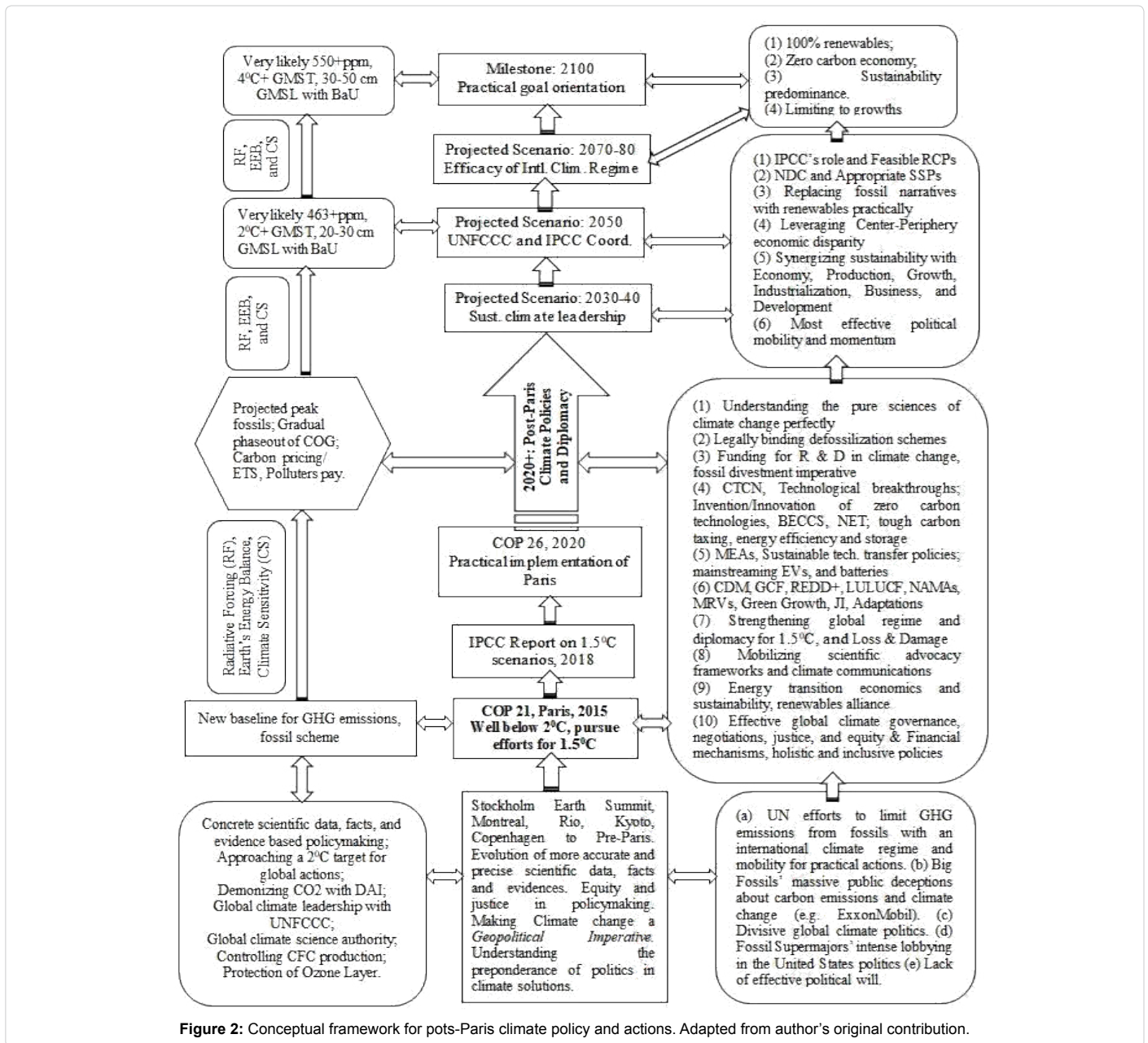
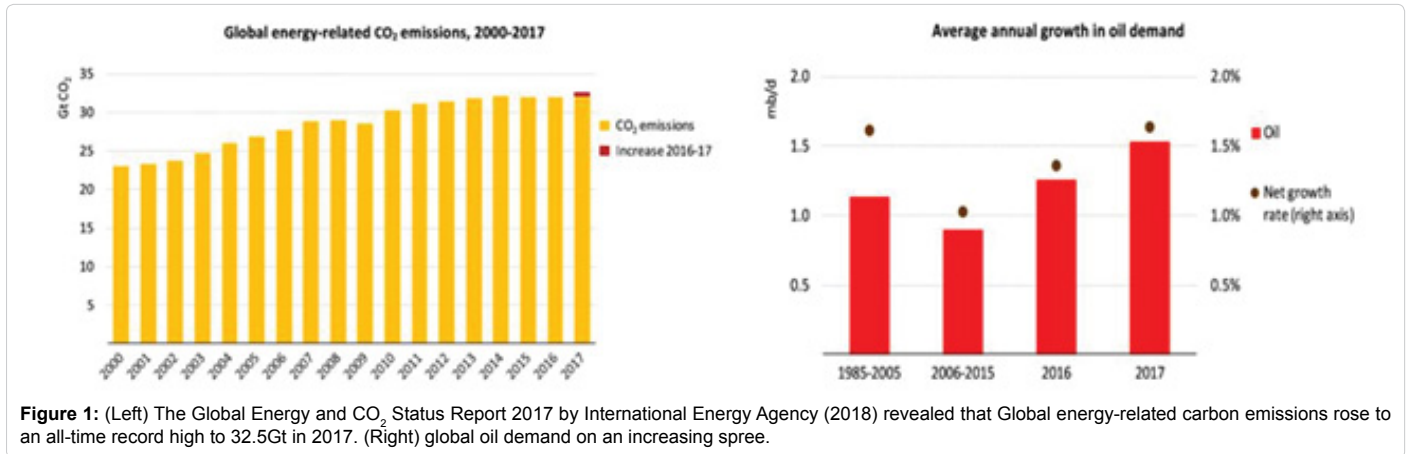
Fossil fuels will likely have a peak by 2035-2040. The dubious roles of the parties having highest per capita fossil consumption patterns still remain the biggest challenge for Paris to be fully successful. For an appropriate international diplomacy and designing a universally applicable climate regime, the issues with gradually poignant vulnerability and adaptations with IPCC's science-based policies gained prominence [69]. The present weak activities of REDD+ [70] must be resuscitated with post-Paris action plans. Copenhagen failed, and Kyoto was "somewhere between troubled and terminal" [71]. No doubt, the polycentric governance of climate geopolitics [72,73] in the post-Paris era will take a new shape. The bottom-up approach of local, regional, national, and global must be monitored so that it could produce desired results in harmony with the prime targets. We must figure out how we would ascertain Article 4's clarity and transparency deep insights about why Copenhagen even after trying so hard with unusual international politics and negotiating efforts failed, will most likely pave ways for successful post-Paris climate agendas [74]. The Green Climate Fund was an outcome of Cancun's efforts. The recent economic meltdown arose in 2008 and the consequences which led to rapid CO₂ emissions [75] can be considered a reason for both the United States and China. The ice sheets are melting at the fastest rate in both Arctic and Antarctica, GMST is increasing and that is highest in modern record-keeping history, sea-level rise is alarming; with all this litany of caveats and warming scenarios, we must build post-Paris action plans that reflect them.

Apart from the UN climate leadership, no individual country so far appeared to be the spearheading leader; G7, the biggest emitters, lag far behind contributing to the GCF. To delineate the frameworks of post-Paris action plans, insights since Montreal would help, though it would be characteristically different. The consistent decoupling of global climate agreement and actual national strategies is ubiquitously evident [76,77]. Political economy of climate change based greatly upon the energy economics has led China to become a climate leader in Paris and then on it has been a "new normal" for China [78].

Shared Appropriate Communication and Climate Action Imperatives

Comparative new approaches like orchestration has been put forward as a solution approach [79]. The international regimes that dealt the cases of DDT, smoking and cancer, CFC, and other pre-Paris climate agreements-their organizations and evolutions might allow us to have the insights to deal with Paris promises. Another staggering question that would inflict us whether the architecture of the regimes are practical enough to address the real problems of climate crises. We would like to emphasize on these two ideas a new that might be significant to the understanding of the post-Paris regime.

Beginning with climate communication: ranging from scientists, researchers, policymakers, statesmen, politicians, from collective to the individual, if the message is perfectly conveyed and transferred and clear, the climate actions will be easier and more practical. Shared appropriate communication is urgency. Next comes climate action imperative. Besides, a legal binding e.g. a tough carbon taxing could be implemented in the national and international actions framework. For instance, Scotland is one of the pioneering nations that in 2009 made a law named Climate Change Act and have a government plan to reduce the GHG emissions by 66% within 2032 [80]. China's inland coal production rises in 2017, and China is investing billions to fossilize Africa. The global greenhouse governance patterns will inevitably involve fossil preponderance, as market analysts argue that it would



gradually wane, but still reign with robust economic muscle, therefore, divestment from fossils is a necessity. Apart from the Big Fossils, the masses are derailed with a fear that Katharine Hayhoe, the eminent climate scientist translates as "...taxes, government legislation, loss of personal liberty" [81,82]. Only targeting a GSMT to 1.5°C focusing on energy transitions with technological miracles by replacing fossils with renewables might sound good, but in reality, it is harder than perceived. The dynamics of implementation efficiency of global negotiations patterns and committed goals by UNFCCC must also be strengthened.

The Mitigation and Adaptation Paradoxes

The biggest emitters who have almost singlehandedly perpetrated "fossil anarchy" in the name of development are reluctant to take responsibilities. The paradoxes among Global North vs. Global South, West vs. East, and Center vs. Periphery swirl around the very controversial issues like whether it would be a low-carbon or zero carbon industrial revolution or zero carbon energy revolution. If we attempt to keep up with the present rate of production and consumption even with 100 percent renewables, that would not be sustainable, for we have limited natural resources. Based on breakthrough carbon accounting [83], it has been found that some ninety major big fossils are responsible for fueling majority of the climate crises [84]. In a similar study, CDP with assistance from Climate Accountability Institute revealed that around 100 corporations are responsible for 71% of the global GHG emissions that account for almost 1.1 trillion CO₂e. The highest emitting companies since 1988 are: ExxonMobil (USA), CNPC (China), Saudi Aramco (Saudi Arabia), Shell (The Netherlands), BP (UK), Chevron (USA), Peabody (USA), Total (France), and BHP Billiton (Anglo-Australian), Gazprom (Russia) etc. (Griffin, 2017, p.8). Holding these biggest emitters accountable for most effective and feasible transition toward a future of net zero emission would be one of the greatest challenges for the international climate diplomacy and crafting a multilateral climate regime as they involve so many issues of fossils interests that are steeped in the supply-demand chain management. EU ETS since 2005 is trying to make a feasible carbon pricing system, but cap-and-trade has its internal flaws too.

The European Union's landmark Emission Trading System (ETS) which has, in many ways, however, shown the world a unique way of cap-and-trade mechanism since 2005 targeted to reduce GHG emissions 20% by 2020 and at least 40% by 2030 compared to 1990 levels (European Commission, 2016). The global diplomacy with climate change has so far been largely centered on national economic interests; it did not adequately address the severity of the climate conditions and associated sustainability. Figure 3 depicts the global influence of fossil capitalism and dynamics of climate policies that inevitably involve political and economic interest. The amount of flexibilities offered in Paris as a legally nonbinding treaty could slow down the DE carbonization and emissions reductions procedures as study shows that market-based carbon mechanisms with an inflexible agreement could be a good help 77 [85,86]. With serious development and environmental issues [87], global climate change diplomacy was centered on continuous negotiations. Alongside, we also need to understand the limits of intergovernmentalism [88]. The pro-climate policies are sometimes burdened with heavy "ruinous financial liabilities" [89]. A big concern remains unaddressed as to how the least and net emitters who happen to be the poorer nations like Bangladesh would be benefitted from this MEA when unimpressive economic backbone and lack of negotiating skills dwarf their potentials [90,91]. Due to the incapability to produce technologies, for developing nations, instead of mitigation, adaptation is an issue of grave concern [92,93]. Forcing the polluters to pay within

a mandatory legal framework accompanied by climate litigation might foster mitigation; but divergent political interests have helped worsen the mitigation processes [94,95]. Form binding to nonbinding, compliance, enforcement to flexibility mechanisms-mitigation measure depends on the geographic availability. Three mitigation commitments viz. JI, CDM, and ETS came out as a result of much diplomatic policy innovations [96]. Therefore, for experiences and insights, with the outright changes of energy production systems, we should also transform our production-consumption patterns as well. Focusing solely on either of the two factors: mitigating technologies or the adaptation process would not suffice. Studies suggest that mere social adaptation processes do not erode vulnerability. After realizing the realities of existing and imminent climate crises-engineering the most appropriate solutions in perfect sync with the UN SDGs, individual and collective development goals, economic momentum, and propelling the wheels of technological and civilizational progresses has appeared to be one of the most difficult tasks too. Here are some of the considerations, need to be addressed for probable multidimensional solutions:

Make a definite framework to limit GHG emissions specifically CO₂, CH₄, N₂O, SF₆ (having higher global warming potentials) as much as we can by 2050 to keep GMST at 1.5°C.

Proper climate and science communications are of absolute importance now than ever before to spread the messages to the masses, for every individual's carbon footprint matters. Creating massive awareness would help in many ways.

Designing a minimum band for carbon tax (or cap-and-trade) as Singapore and Canada adopted. Implementing the carbon tax holding the historically biggest emitters accountable, making them pay could be good options.

Enacting necessary stringent international laws to bind every signatory or Party and nonparty stakeholder of the Paris Agreement up to certain regulations and hold them accountable.

Advancing cutting edge STEM and economic researches for better precision, deeper articulation, and further perfection in basic physical sciences with appropriate research, innovation, sustainability, and excellence with a holistic global, national, and regional outlook.

Marrying STEM advocacy-policymaking as perfectly as we can to harvest a better architecture for all post-Paris 1.5°C scenarios.

Ensuring sustainability-centric development agendas than mere development-centric sustainability and practical climate-conscious economic and industrial productions paradigms. Unless we change the modes of energy-consumption-capitalism paradigms, sustainability could remain as a mirage.

Production of appropriate technologies, mediating market and commercialization processes, and ensuring the shares of the most vulnerable.

Molding the global climate diplomacy and politics with a more practicable vision and host of workable solutions with the stewardship of the IPCC and UN.

Driving constant inventions and innovations for sustainability, resilience, and renewables with proper and generous funding for a more inclusive equitable and just world.

But keeping the right momentum will be a crucial policy issue for the parties. Renewables, particularly solar and wind governance needs to be emphasized a lot as they figure more prominently in the renewable

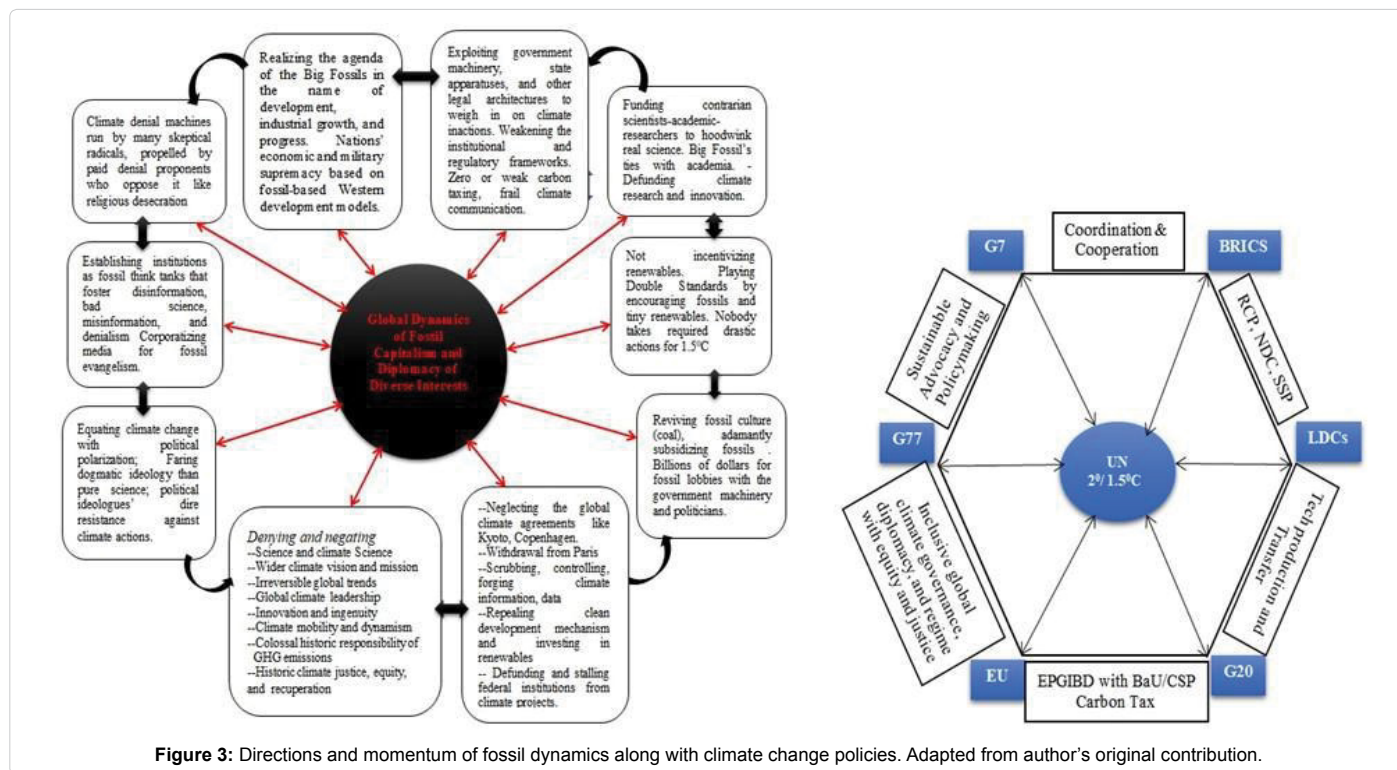


Figure 3: Directions and momentum of fossil dynamics along with climate change policies. Adapted from author's original contribution.

mix than others. International Solar Alliance (ISA) is a good example for a better solar diffusion mechanism. Renewables is the fastest growing energy source in the world right now [10] and by 2040, it will define the mainstream energy mix. A global consensus for intensive concerted climate actions has, notwithstanding the fortified efforts of most of the nations, however, largely been obstructed as the United States decided to withdraw from Paris. In 2017, the US EPA allowed “49 percent less in penalties than the averages during the same period under the Obama, Bush, and Clinton administrations” [97].

Conclusion

No doubt, signing the Paris Agreement was another landmark towards engineering a revolutionary practical climate action plan necessary to tackle the global warming crises. But the colossal responsibilities are left ahead to be able to deploy the international diplomacy for executing a global policy with scientific advocacies expected from the IPCC and ensuring everybody's active participation in that processes. Paris is no magic bullet, and it might succumb to be another Kyoto Protocol or Copenhagen if we fail to actuate a concrete policy and mobilize appropriate actions. As James Hansen, the former NASA GISS Director, arguably the father of climate change awareness warned about Paris: “It's a fraud really, a fake. As long as fossil fuels appear to be the cheapest fuels out there, they will be continued to be burned” [98,99]. We need to remember that policymaking and implementation is not always associated with scientific rationality [100]. It is also timely to ponder over the roles of IPCC and scrutinize its functions in an articulate way [101]. Many feasible shared socioeconomic pathways for post-Paris policies and actions have been proposed. Recent studies also show a global impact on biodiversity [102]. Faring climate denialism and mongering despair or hoodwinking the caveats due to vested monetary and fossil interests and failure to shore up an effective global climate governance system would plague the post-Paris ambitions and thereby plunge our climate hopes. We might need to potently discard

any antagonistic nations' fossil supremacy to foil the global efforts. We also should remember that if we fail to land a litany of effective policies, we have almost certain chances to be locked in a GMST of 3°C-5°C by 2100. The aftermaths of Rio, Kyoto, and Copenhagen are not praiseworthy in hard terms, and Paris could be proved unsubstantial unless we maneuver practical actions to lower GHG emissions at any costs. The present policy frameworks after Paris falls much short of the urgency it necessarily demands if we seriously consider the results of thousands of scientific studies carried out for the last many decades. The best possible solutions can be achieved through inclusive and holistic multilevel, multilateral, and multipolar negotiations, policies, pathways, and cooperation prioritizing equity and justice. Even the probabilities that BECCS, CCS, and NET will work perfectly are pretty slim, for scientists are still not quite sure about them. They require extensive trial and error processes. We must reconsider these schemes while designing post-Paris climate actions.

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