

Cop 26 -The Road to Where?

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Abstract

Who would have thought that after almost 30 years since the UN Convention on Climate Change, the gap between goals and delivery on them remains so wide, and that consequently global warming continues unabated? Clearly, the current approach to the issue has one major flaw: it doesn't work. At this rate, the goals of the international agreements cannot be met. The recent COP meeting (which annually monitors progress), represented for the first time a welcome (albeit timid) dose of realism. Gone were the all-too-frequent rhetorical pronouncements about the dangers to humanity, and the self-congratulatory declarations celebrating the new promises to avert such a disaster. There was moderate recognition that the world was on the way to a dangerous rise of 2.7°C towards global warming, while experts estimate that the outlined plans could produce a somewhat lower trajectory. Consequently, the target in the original agreements of 1.5°C is still in force, but barely, and it has therefore been agreed to review the commitments by the end of 2022 to steer plans to meet the agreed targets. **Keywords:** climate change conference of the parties (COP); carbon dioxide emissions (CO₂); energy consumption; organization for economic cooperation and development (OECD); emerging economies; energy efficiency, security and coverage; pricing and taxing externalities; renewables; load factors and reserve capacity; transition and adaptation arrangements; economic adjustment.

Index terms— climate change conference of the parties (COP); carbon dioxide emissions (CO₂). since the UN Convention on Climate Change, the gap between goals and delivery on them remains so wide, and that consequently global warming continues unabated? Clearly, the current approach to the issue has one major flaw: it doesn't work. At this rate, the goals of the international agreements cannot be met.

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An effort of this dimension requires a change of historical proportions for energy policies and an unprecedented level of investment calling for a profound transformation in production and transportation practices, investments in renewable energy, new technologies, efficiency, as well as carbon capture and storage.

It will have to be recognized that most of the energy demand (and CO₂ emissions) will be generated by the associated economic growth in emerging economies (especially in Asia), and that the early stages of economic development tend to be energy intensive. Hydrocarbons (which replace human and animal toil by internal combustion engine). Thus, most of the attention will have to be focused outside the OECD, which will constitute the largest share of energy growth.

This will require better attention in (i) the institutional and economic policy implications, given the less developed organizational and governance capacities in these regions; (ii) a sharper focus on economy, efficiency, effectiveness, and simplicity, in view of the limited human and financial resources in those countries; and (iii)

the mobilization of knowledge and inventiveness of the private sector to develop new technologies and more commercial approaches than those existing to date, to respond effectively and with results on the ground.

To "level the playing field" between traditional and renewable energy sources, the cost of emissions will have to be recognized, subsidies to traditional sources discontinued, and the multiplicity of allocated funds that distort and unnecessarily complicate the allocation of resources will have to be avoided.

Whatever the formula to establish carbon prices (from taxes or Carbon Frontier Adjustment Mechanisms proposed by the European Union), until a free and a functioning carbon market can operate, a more forceful and rapid change of the energy matrix can take place, with the necessary slack to have solutions that will take time, without negatively affecting societies that cannot face the changes with the speed and cost that arise in the short term.

1 The Issue

The UN Climate Change Conference of the Parties (better known as COP) has been bringing together the leadership of countries to promote and accelerate action to combat global warming, by meeting the goals of the UN Framework Convention on Climate Change and the associated Paris Agreement. 1 The various COP meetings and their respective goal setting approach could test the validity of at least their major projections, either supporting or tarnishing the underlying "business model" being used. The outcome of 26 COP meetings could be summarized by pointing at the widening gap between words and deeds -particularly when they are defined for the distant future.

The framework for dealing with the issue has one major flaw -it doesn't work, in terms of achieving agreed targets.

The latest report of the Intergovernmental Panel on Climate Change concludes that: i) the global average temperature has increased by 1.1° C, something unprecedented in hundreds of thousands of years; ii) human influence is the dominant cause of global warming and iii) despite the decline of CO2 emissions in 2020, resulting from recent economic downturn (and the nearly stagnant levels for the previous 20+ years), by year-end emissions will remain at the same levels prevailing in pre-pandemic time; 2 A change of this magnitude requires an overhaul of historic proportions for energy policies, and iv) unless there are immediate and large-scale emission reductions in the coming decades, they will exceed 1.5°C and 2°C over pre-industrial levels that had been agreed during the 21st century. investment of \$16.5 trillion upwards. Such outlays will require profound transformation in production and transportation practices, and spending on renewables and efficiency, as well as carbon capture and storage through 2030. With almost 30 years since the original UN Convention, there is little tangible evidence of progress in the climate change agenda. 3 Deciphering the recent COP proceedings, while more than 100 countries pledged to reduce methane emissions, and another 100 committed to ending deforestation. A few major countries outlined plans to accelerate their shift to renewables, the bottom line is that numerous G20 countries, where volume counts, are not yet on a trajectory to reach their stated net-zero goals. This can be seen in the depiction below showing the difference between projected emission trajectories with current policies and those to achieve the 1.5 °C goals:

At this rate, it is doubtful that COP26 will achieve sufficient emission reduction commitments to keep the temperature rise below the thresholds of the Paris Agreement. In the absence of the heads of state of China and Russia -two of the largest emitters in the world -have as in previous COPs gatherings have formulated their pledges in cautious terms. Cop 26 -The Road to Where? concerns in the policy framework, particularly for energy (the main source of CO2 emissions). Pushing harder, having good intentions, throwing money or new pledges at the problem for ever more ambitious and distant goals won't do.

Having big summitries and elaborate pageantry, as COP meetings have become, may easily lull observers into thinking that trust is building up, while in fact distrust is being brewed. Participants in such gatherings tend to shape their postures based on the audience in front of them, while worried about the perceptions of stakeholders back home. Meanwhile, hordes of reporters descend on the summit and are on the lookout for those who could give them any quote or off-the-record statement. The COP meetings and the statements thus become goals in themselves, detracting attention from much needed results on the ground.

But this is the 26th yearly COP meeting. What they have consistently shown over the years is how easy it is to establish new and more ambitious goals (preferably distant ones), pledge resources, and (conversely) how difficult it is to move and focus on actions. As long as discussions remain at such stratospheric levels, and feeling-good statements or pious talks on the risks of crumbling environments, not much can be expected.

2 II.

3 Focusing on Within-Reach Approaches

At the bottom of it all, to meet global climate targets, the world needs to phase out fossil fuels, particularly coal. This will call for meaningful dialogue on a global coal phase out, particularly clear explanations on how to transition in that direction, what appropriate technical and financial assistance will be provided to support the energy security needs of coal-dependent countries like India and South Africa -the two most coal-dependent economies out of the G20 countries with 71 and 86% of their electricity, respectively coming from coal, and what future can be provided to former coal producers There are other issues (just as urgent and hard) that also

need to be addressed. First; as a result of economic as well as population growth, in all likelihood global energy consumption is likely going to increase, and short of a major and unforeseen technological breakthrough, so is global energy-related CO2 emissions through 2050. Second; most of the energy demand (and CO2 emission) and associated economic growth will concentrate on emerging economies, as early stages of economic development tend to be hydrocarbons-intensive (to replace human and animal toil for small combustions engine equipment -pumps, motorbikes, and the like), 4 and as can be seen in the graph below, non-OECD energy consumption will constitute the largest share, in both relative and absolute growth rates:Year 2021 ()

4 G

Cop 26 -The Road to Where?

5 Figure 2

Accordingly, it is in non-OECD countries where attention needs to be focused –as it is there where human, technical, organizational resources are also the weakest, and where the greatest support will be required to achieve and effective transition.

? First; focus on the demand and timely feedback.

Setting strategy and following effective implementation ultimately boils down to how policy and actions respond to clients (industrial, mining, households) -and the reasons for progress or lack thereof. Inevitably, setting an effective direction entails arduous probing, research and bonewearing meetings with affected parties.

Seemingly absent though from proceedings are the different demands users, thereby giving an excessively aggregate view of the issues to be faced, and an inability to anticipate emerging issues (such as responses to limited reserve capacity, and weaker energy security) stemming from renewable technologies or unexpected cost overruns of emerging technologies, as being faced in some of early adopter countries. An overly macro, without on-the-ground view misses an essential feature of successful technological and policy response. Ultimately, focus on timely feedback to understand, learn, adapt investment is essential to shape actions for successful decarbonization and associated experimentation. Complacency and disconnect from on-the-ground feedback can be fatal, as can ignoring and misunderstanding of sources of weaknesses as much as successes of approaches being implemented.

? Second; focus on institutional and policy implications. The goal setting approach seems to imply a command-and-control approach to planning and execution. This may look quite an appropriate approach -on paper, but in practice requires strong institutional and governance capabilities. In Germany it has produced a disciplined and effective approach to decommissioning power plants with significant carbon emissions and replacing them with newer ones. In others, with weak institutional capabilities, public sector clearance arrangements produced major delays if not downright prohibitively expensive investment stagnation, and were ultimately counterproductive. In the latter case, greater reliance on pricing or taxation arrangements (to reflect costs of externalities) are on the whole more effective to entice lower-emitting investments. This requires a broader review of subsidies to hydrocarbon-based products, as well as the elimination of various earmarked funds and expenses that tend to produce distortions that need to be phased out. COP proceedings would do well to focus on such issues, rather than aiming at target-setting that are difficult if not impossible by many countries to enforce. 5 ? Third; focus on economy, efficiency and simplicity.

There has been excessive predilection of vaguely defined actions towards lowering emissions, no matter at what costs -for tracking arrangements, approval and clearance arrangements, complex and difficult to manage new investment ideas, etc. Greater cost sensitivity, scale requirements and ease of management are key ingredients for viability and ensuing progress. Similarly, the virtues of simplicity and tractability, on the one hand, and the requirements for comprehensiveness, on the other, all too often escapes attention, with consequent priority being given to over-designed and impractical solutions that all-too-often are difficult to operate effectively. With approaches properly designed to fit the capabilities of the institutions concerned, one can expect to set incentives so that investment and operation actions are paid close and continual attention to meet proper efficiency improvements and concentrate attention on center-of-the-line activities, with attendant attention on effectiveness to achieve lower emissions. 6 ? Fourth; focus on greater granularity and integration. By focusing on broad aggregates, COP proceedings miss specificities and, in the process, does not contribute or help countries approach the different issues they face or assist in fostering global synergy needed to learn from different experiences and address emerging concerns, particularly those relating to changing technologies. At the same time, climate concerns need to be mainstreamed in energy sector planning to assure proper balance between energy security, affordability, and societal implications like environmental access to lower income population. 7 Ultimately, all countries are the same: they are all different from each other. Unless one understands the issues (institutionally, policy-wise, etc.) it is difficult to have an effective strategy that produces the desired effect.

It is one thing to deal with countries with institutional capabilities to decommission facilities to replace them by others that reduce global emissions, it is quite another to approach the issue in smaller economies with constrained institutional capabilities that respond better to price and tax incentives. Chile, for instance, is a small country with almost no contribution to global Greenhouse Gas emissions. However, it is highly vulnerable to climate change and instituted a pricing and taxation regime to allow operators to respond on their own to

more efficient equipment, thereby allowing focus more effectively on adaptation measures to climate change. It is these distinctions that must be made to optimize diverse actions and achieve proper global impact.

6 III. Attention to Over-The-Horizon Inputs

The COP approach (like many UN proceedings) is trying to artfully lock horns between two seemingly contradictory aims. It aims at setting ambitious objectives that are plausible, but does so by seeking commitments to achieve results in the distant future that are difficult to track, particularly in the absence of reasonable transitional arrangements and specific actions that can assure its viability. While netzero pledges are becoming commonplace, plans still have a long way to go to be credible and reliable. Both at the macro and enterprise levels, they lack short-term targets, and fail to have incentive structures such as proper pricing policies that embed sustainability strategies that help internalize negative externalities and make businesses more resilient. In many countries requiring major emissions reductions, the implied decommissioning of important share of their power generation facilities to replace them by carbon neutral facilities, together with the closing of coal, petroleum or gas production is a recipe for conflict, if not inaction.

While the immediate goals, which are the 2030 targets, are still such that one can get away with not talking about coal just yet, it is not unreasonable to expect that this could afford the time to generate pressures by the affected hydrocarbons producers to challenge the decarbonization effort. Until then, renewable energy can grow, but coal will still be needed as countries will transition. As the world moves closer to the net-zero target, that is when coal will have to be discussed seriously, as its use will peak and eventually decline. For that, one hopes to see a clear pathway (for countries like India, South Africa, or other coal producers) on how to reach this state of carbon neutrality-what will the shift mean for each of the sectors that depend on coal and what sort of policy environment will be created, including the prospects of carbon sequestration, alternative carbon use, etc. While setting an ambitious target, it will be meaningless without a detailed trajectory explaining how to achieve it.

Moreover, phasing out coal demands that renewable sources of energy should be able to compete with it in the energy market is not a foregone conclusion with cost structures being what they are at present. Yet, while the renewable sector is receiving an encouraging push from both the government and private sector, these methods of power generation are still not cheaper than coal (and by a wide margin given how these sources are being priced). It will thus be risky at this stage to announce any coal phase-outs immediately, without a clear policy framework on how to manage the transition, seek alternative productive use of carbonproducing areas, management of transitions through lower emitting hydrocarbons to minimize repurposing investments, and ultimately the practical viability from plans to reality.

More fundamentally, while it would be nice to laser the focus from talk and plans to specific near-term action, and move from words to deeds, today the world lacks the solutions that will be needed to achieve global net-zero carbon emissions at reasonable economic and social cost later this century. Nor are the solutions in hand to adapt equitably and efficiently to the climaterelated risks that will occur even if that mitigation goal is met. These problems are among the most urgent facing humankind.

Much can be achieved with existing technologies and policy approaches. However, without game-changing advances in multiple fields of science, technology and policy, efforts to address the climate challenge are unlikely to succeed. This may require a sharper focus on the underlying obstacles -scientific, technological, economic, societal -that may need to be overcome to accomplish the task through solutions at a scale commensurate with the size of the problem.

The above discussion has been focused deliberately on approaches that can be instituted with existing technologies, including solar and wind-based facilities being developed at present, as well as upscaled run-of-river hydro developments. In contrast with traditional facilities, the latter depend on luminosity and wind regimes, or seasonal hydro flows, which limit the reliability and levels of operation during significant time periods (i.e., in evenings, unfavorable weather conditions, periods of poor wind regimes or dry seasons), thereby representing valid through locationspecific solutions, with no effective reserve capacity, and thus low load factors. 8

7 ? Enhancing reserve capacity of new technologies

with batteries or other energy storage facilities that are for the time being rather costly. There is still room for significant further improvements in costcompetitive long-term storage systems (advanced batteries, fuel cells, thermal storage, and clean hydrogen systems requiring coordination among many actors for producing, transporting, and having the equipment to use it.); scalable low-carbon firm electricity generating technologies (including possible advanced nuclear). This will be especially important for energy-intensive activities like mining, which is the mainstay of many developing economies, and a wide range of industries, and high-density population centers that There is a hefty road ahead for research and development to accommodate emerging technologies to meet the needs of a decarbonized economy. Chief among them, are:

? Upscaling of run-of-river generating plants, which at present range from 8 to 50 MW capacity to plants over 500MW by connecting various water sources affluents, as currently is being constructed in Chile and Australia. The newness of the engineering and design approaches are generating significant cost and time overruns. In time, with greater experience associated with new design and engineering complexities could costs decrease costs over time.

? Enhancing performance of solar (and other renewable) equipment 9 ? Developing technologies aimed at lowering temperatures and improving rain conditions by sowing clouds with silver iodide to induce rain; adding iron to the ocean to increase CO₂consuming phytoplankton; or reducing solar radiation with sulfates. These options are at various experimental phases, with particular attention on their unobserved side effects in confined environments or laboratories. There are other geo engineering variants being considered with other compounds to scatter sunlight, thereby reducing global warming. with nanotechnologies or similar improvements aimed at reducing costs of solar cells and the carbon footprints of upstream production, there by bringing photovoltaic applications to competitive levels with traditional generating technologies at grid levels -currently at testing stage.

The list of areas for improvement is by no means limited to the above. Adding all up, though, it may well be that the scale of change needed to achieve the stated goals will not be feasible with the traditional technologies. In the end, a larger scale and disruptive changes will be needed, including attendant changes in their approach, organizational and financial requirements to achieve the stated goals.

This will require, however, a major and wellorganized effort in high impact research and development, particularly focused on the advancement and application of frontier knowledge in of cutting-edge technologies, with attendant mobilization of know-how, financial resources and associated risks that only exist in the scale needed in developed countries.

8 IV. Conclusion: Adding all up, Linking

Early-Wins with Longer-Term Concerns

For all the seductive talk about the new economy and technological development, one cannot easily overcome the gravitational pull of traditional technologies (including the much-maligned combustion engine), whose sunk costs make them incredibly competitive when compared with the resources and risks in new production platforms. Resistance to new approaches cannot be belittled, since their increased costs need weighing against the risks of their implications on economic development, which are particularly challenging in lower income countries. 10 By the same token, the induced obsolescence encouraged in current COP frameworks, which create their own pressures for resistance, could be overcome with new, high-value applications for hydrocarbons that are not associated with greenhouse gas emissions, and offer economic hope for fossil fuel companies and the communities that depend on them.

A change of this magnitude and complexity cannot be achieved through further yearly nudging, or unfocused efforts pointed everywhere and nowhere. It will be essential to have clarity of vision, a capacity to bring to the table relevant actors with skills and firsthand experience with what the market will demand and, above a sharp focus on responsiveness, efficiency and organization, to keep all concerned focused in an effective and results-oriented manner, which ultimately matter to consumers. 11 Similarly, the approach must be militantly practical with within-reach and over-the-horizon solutions that leverage on the comparative advantages of each technology. This is bound to involve renewables to be the primary source for new or incremental electricity generation, but natural gas, coal, and increasingly batteries to be used to help meet load and support grid reliability, which renewables are not able to provide. In this scenario oil and natural gas production will continue to grow, mainly to support increasing energy consumption in developing Asian economies 12 As carbon neutrality is ultimately a global atmospheric issue that, strictly speaking, does not talk to locally felt everyday needs, much greater attention and specificity will have to be given to managing the transition and adaptation arrangements, to respond to more pressing needs for evolution towards carbon neutral solutions. 13 In the meantime, in the absence of a broad political consensus to curb emissions, the political system will in all likelihood choose fragmented, imperfect, and likely more costly solutions that may well undershoot the target, requiring further interventions down the line.

Figure 3

In time, as so often has taken place throughout history, more fundamental solutions will be found, but they will require time and shift of thinking on underlying concerns with important scientific ramifications. This will call for a consequent increased research and development, that includes underlying basic issues such as stability of continental ice sheets, the role of the deep ocean in climate change, and specific risks to coastal regions, and to agriculture from a variety of physical, chemical, and biological hazards. By addressing here-and-now issues through known technologies and better understanding the broader geophysical phenomena, it will be possible to identify the 'tail risks' associated with extreme outcomes. These are essential to estimating the true social cost of climate change, and ultimately the fundamental manner to address them. 14 ? COP26 represented a welcome (though still timid) dose of realism. Gone were the all-too-frequent rhetoric pronouncements about the dangers adumbrating the end of humanity, and the selfcongratulatory statements celebrating new pledges to avert such disaster. There was a subdued recognition that the world was on a course for a dangerous 2.7°C increase towards global warmingwhile experts estimating that the outlined plans could produce a path to between 1.8°C and 2.4°C of warming. Accordingly, the original 1.5°C goal is alive, yet barely, and the Parties have now agreed to Seen in this light, COP26 provided an improved point of departure, though with unattended shortcomings that need to be worked on: revisit their commitments by the end of 2022 to put the plans on track for 1.5°C of warming.

8 IV. CONCLUSION: ADDING ALL UP, LINKING

? In recognition that such effort needs the skills, financial resources and wherewithal of the private sector, they were represented by a wide range of institutions. This could ultimately help shift attention towards actions that make business sense that is essential for implementation, and introduce a muchneeded dose of realism and viability. Hopefully this could overcome the implied top-down goal-setting approaches that are costly, if not impossible to manage. This should also facilitate resource allocation arrangements through alternative forms carbon pricing, such as taxes, import duties or Carbon Border Adjustment Mechanism (CBAM) as being considered in the European Union (EU), where by importers will be required to buy carbon certificates corresponding to the carbon price that would have been paid, had the goods been produced under the EU's carbon pricing rules. ? Whatever the formula (until a freely traded price and functioning carbon market is in place), a pending issue for subsequent COP meetings will be a more forceful and rapid advance in the use and levels of carbon prices. In the G20 -which is responsible for 80% of current CO₂ emissions -the application of carbon prices only reached 48% of all polluting sectors, while the average price barely touched \$ 20 per ton emitted. This is still far from the US \$ 70 that experts recommend for 2030, in order to prevent temperature from rising beyond 1.5°C.

? Politically it will not be easy to move faster -as this will inevitably increase the cost of living, and maybe economic development. The stakes, though, are sufficiently high that it will be well worth looking for alternative formulas that may in time insulate such decisions from political exposure. One approach might consist in reaching a global agreement around a carbon floor price, analogous to what was done recently for corporate taxes, involving almost 140 countries, aligning a minimum rate of 15% for corporate taxes at the global level. A similar exercise to set a minimum price for CO₂ might be feasible, but requiring resource transfers to emerging economies, where the bulk of increased energy consumption and potential CO₂ growth is bound to take place, particularly in countries that will need heavy investments to transition out of coal, while ensuring universal energy access to low income and vulnerable groups.

In the end, the transition to zero emissions by mid-century must be viable, fair, efficient and equitable, if it is going to succeed and be sustainable. ¹

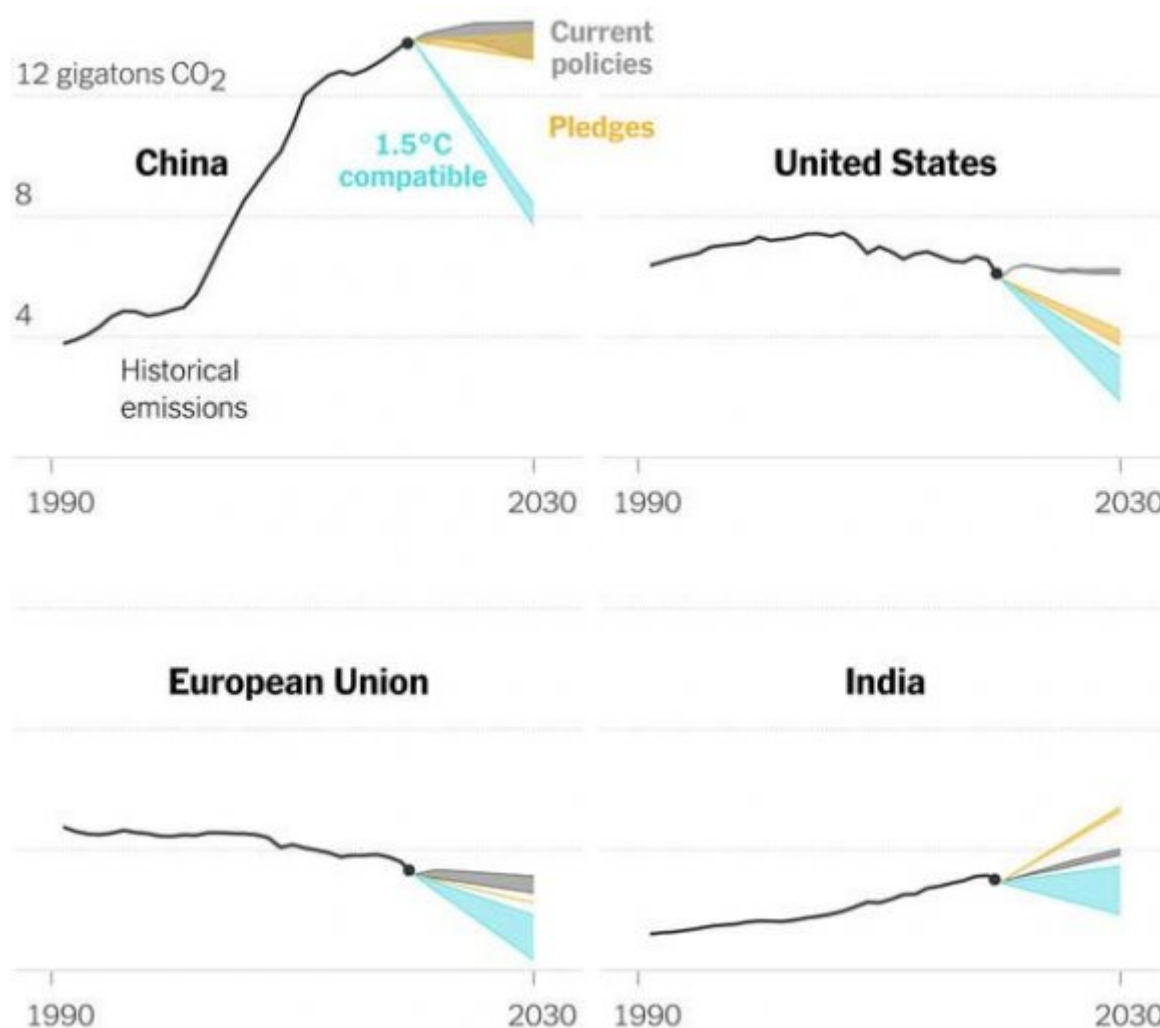


Figure 1: 2 Global

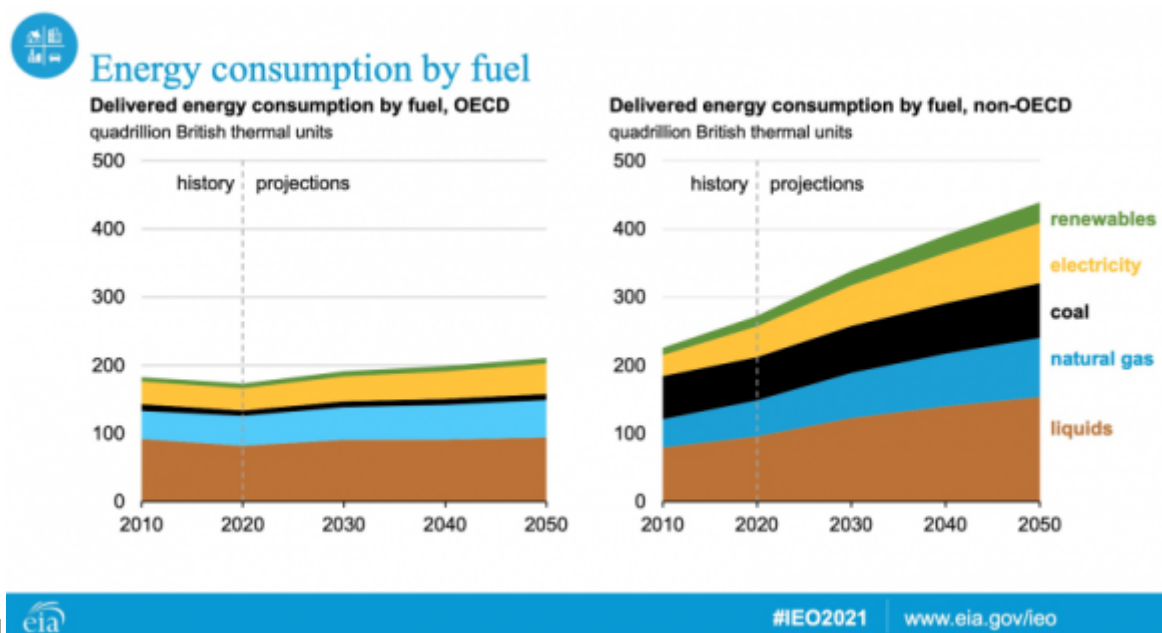


Figure 2: Fig. 1 :

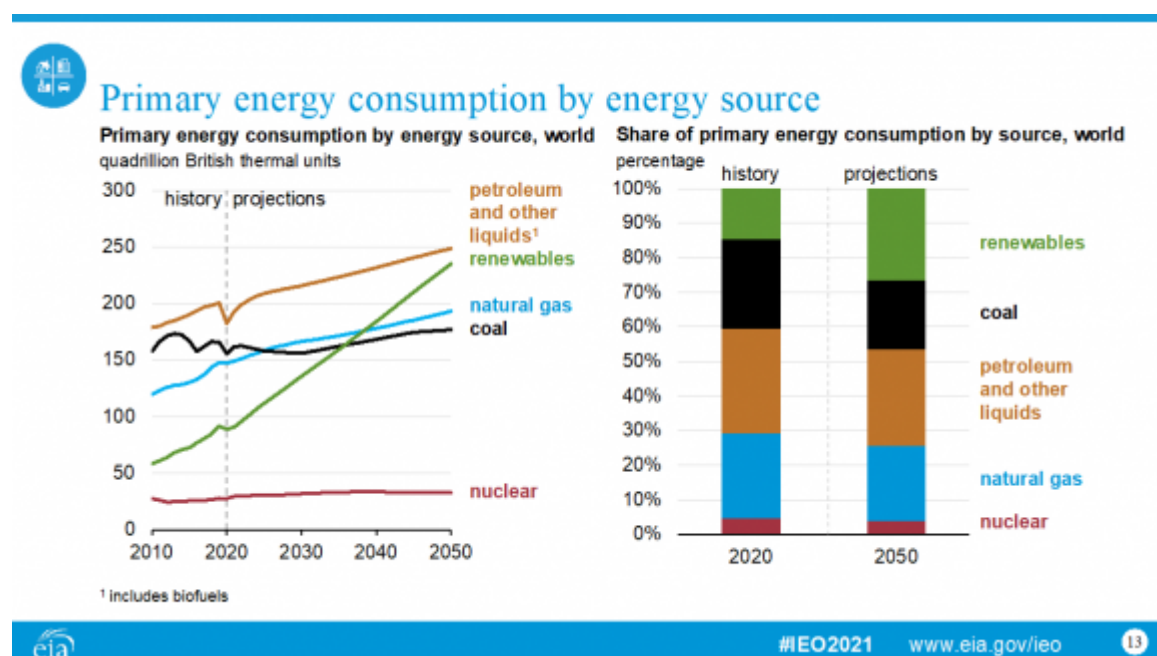


Figure 3:

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