Key Questions & Answers on Climate Change

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(1)
Up this point, why has so little been accomplished on climate change?

The simple answer is that climate science is complex and has been poorly explained to policy and decision makers and the public. Thus, there has been a major communication gap between the urgency of climate change and the perception of the problem.

The problem is two-sided:

There has been political resistance to change, mainly because with the new Paris Agreement on climate change all countries will have to take action to combat and adapt to climate change. For the last two decades, only a few developed countries have been required to reduce greenhouse gases (GHGs) emissions that cause climate change.

The urgency of the problem has been massively misunderstood. Reports by the Intergovernmental Panel on Climate Change (IPCC), the premier scientific body, are highly scientific, written in technical language and extremely difficult to comprehend. Policymakers don't read these reports in their entirety, but rather the Synthesis Report, which summarizes the main conclusions of three voluminous reports. Because the Synthesis Report is a summary, it only partially includes the comprehensive assessment of climate science. Thus, some have not fully understood what the options presented imply.

From following the negotiations on the 2015 Paris Agreement on climate change, we have uncovered that many of the negotiators are confused or uninformed on the science and the current situation. The result: the policies and changes that must be made will fall far short and climate change will accelerate.

(2)
Can you simply explain the climate change problem?

The climate is changing because the Earth's global temperature is increasing. Global temperature is increasing mainly because of the way energy (electricity, natural gas and fuel) is produced and used. About 85 percent of the total energy in the world is obtained by burning fossil fuels -coal, gas and oil, accounting for 29, 21 and 31 percent respectively.

The burning of fossil fuels produces carbon dioxide (CO_2), which accounts for 65 percent of total annual global greenhouse gas (GHG) emissions. Other activities, such

as deforestation, forest fires and land use changes generate 11 percent of CO2 emissions. As a result, CO2 totals 76 percent of all GHG emissions.

The problem: about half of the CO2 generated every day ends up in the atmosphere where it remains for more than 1,000 years. It is these CO2 emissions that concentrate in the atmosphere, along with those from methane, nitrous oxide and other GHGs, which are causing global temperature to increase, which is driving the climate to change.

The other half of CO2 emitted is absorbed by trees, plants and the oceans.

(3)
Is climate change accelerating?

Yes and much faster than anticipated.

Climate change is the changes in temperature, rain and wind (or the elements of weather) over a long period of time. In 2015, some changes have already been experienced as weather events, such as 50 percent of the average rainfall for an entire month recorded in a couple of hours in Calgary, Canada; a doubling of the average rainfall for an entire month in Calcutta, India; 22 flooding incidents in just 90 minutes in London, United Kingdom; a 15 percent decrease of the monthly average rain in Nagpur, India; unprecedented droughts in Brazil, South Africa, Portugal and Spain; a doubling of the number of wildfires in British Columbia, Canada and California and Alaska in the United States.

Some impacts of climate change are positive, while others are negative.

For example, about 70 percent of food production in the world depends on rain. Thus, changes in rain patterns will impact food production. Some of the impacts of climate change, such more frequent and intense droughts, will hinder the production of main food staples and drive food prices to increase. As a result, food security will be at risk.

The negative impacts of climate change will further threaten livelihoods and lives of millions.

(4)
Is a 2ºC increase in global temperature dangerous?

A 2ºC increase in global temperature was considered as the 'upper limit beyond which the risks of grave damage to ecosystems are expected to increase rapidly.' This means that the impacts of climate change will be more abrupt as global temperature increases.

By 2012, global temperature has increased by 0.85ºC from pre-industrial times, causing numerous impacts around the world. Some examples of the already observed impacts of a 0.85ºC temperature increase:
Extreme precipitation has increased in frequency and intensity.
A robust drying trend has been observed for already drought-prone regions.

Extreme heat events are occurring more frequently.

Since the Climate Change Convention was adopted in 1992, climate-related events have doubled in number.

An increase in global temperature of 2ºC implies an additional doubling the number of these impacts of climate change.

Some of the negative impacts of climate change are now unavoidable.

(5)
When will global temperature reach 2ºC?

There is a 95 percent probability of reaching 2ºC above pre-industrial times by the 2040s, under all four possible representations of the future (or scenarios) analyzed by the IPCC. This is due to the rapid increase in GHG concentrations in the atmosphere. For example, GHG concentrations increased from 375 parts per million (ppm) CO2-eq (CO2-eq or unit to measure all GHGs combined) in 2005 to 430 ppm CO2-eq in 2011, a 12 percent increase in only six years.

In the future, according to Turn Down the Heat: Why a 4°C Warmer World Must be Avoided, a report prepared for The World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics, if emission reduction pledges are not met and current trends continue, 'there is an increasing probability of reaching 4°C global mean warming by the last quarter of this century' (or in the next 60 years).

(6)
Isn't climate change going to happen only by the end of the century?

No. It is happening now.

The end of the century is the timeframe used by scientists to analyze changes in the climate, because changes in climate are assessed over a long period of time (usually, 30 years). This does not mean that the global temperature will increase by the end of the century; however, it is what some policy makers and the general public misunderstood.

Climate scientists used a target of GHG concentrations of 450 ppm CO2-eq by the end of the century to assess emission reductions required to hold global temperature below 2ºC. They also analyzed what would happen if no explicit actions were taken to reduce GHG emissions -which seems to be the trend until the Paris Agreement is adopted. They concluded that the target of 450 ppm CO2-eq could be exceeded between 2020 and 2030. However, it is impossible to project precisely when such a level will be exceeded because it depends on policies and actions taken by countries, not on science.

(7)
Is GHG concentration a better target for the climate change negotiations in Paris?

The 2°C has been adopted as the policy target by all countries.

Climate scientists also use other targets to assess the options required to tackle climate change, such as the level of GHG concentrations.

The 'stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system' is also the ultimate objective of the UN Framework Convention on Climate Change.

(8)
What is the current level of global GHG emissions and what should it be?

In 2010, global GHG emissions reached 49 Gt CO2-eq; and increased by 10 percent to 54 Gt CO2-eq in 2014.

The emission level consistent with holding temperature below 2°C should be 42 Gt CO2-eq by 2030 (or a 15 percent reduction from 2010 levels), and 22 Gt CO2-eq by 2050 (or a further 48 percent reduction from 2030 levels).

These figures are consistent with a 55 percent emission reduction (or the average between 40 and 70 percent) by 2050 from 2010 levels concluded by the IPCC.

(9)
What are Intended Nationally Determined Contributions (INDCs)?

As part of the negotiations towards the Paris Agreement, all countries were invited to submit Intended Nationally Determined Contributions (INDCs).

The INDCs include an overall GHG emission reduction target and describe how each country intends to contribute to tackling climate change through plans and strategies to reduce GHG emissions and adapt to the changing climate.

These pledges may also include the financial support needed by some countries to implement actions outlined. These INDCs, thus, are considered 'conditional', as opposed to others made on an 'unconditional' basis.

The timeframe for the implementation of the INDCs is 2020-2030.

(10)
Are the Intended Nationally Determined Contributions (INDCs) adequate?

No. Climate scientists at the UN Environment Programme and the Climate Action Tracker have done preliminary analysis of the INDCs submitted up to October 2015, from 146 countries representing 85-88 percent of global GHG emissions in 2012.

Their conclusions are in line with the Climate Change Convention Secretariat analysis of the INDCs.

If the submitted INDCs are fully implemented by countries between 2020 and 2030, global GHG emissions could increase by about 17 percent from 2010 levels in 2030 (reaching 56 Gt CO2-eq) instead of being reduced by 15 percent (to reach 42 Gt CO2-eq). The increase in GHG emission levels by 2030 is not consistent with holding global temperature below 2ºC.

In addition to inadequate emission reduction targets, there are also inadequate policies to implement those targets.

Climate scientists concluded that there is a significant gap between current policies and the pledges submitted by countries in the INDCs. Thus, global emissions under currently implemented policies are projected to be higher than the already inadequate INDC levels.

(11)
Are developed countries the greatest GHG emitters?

Not anymore. Middle income counties have taken the lead in the share of global GHG emissions, contributing 56 percent of global GHG emissions in 2014. Since these countries are considered developing countries by the 1992 Climate Change Convention, they have not been required to limit their GHG emissions. In 1990, middle income countries contributed only 40 percent of global GHG emissions.

For example, China, currently the world's largest emitter of GHGs, is considered a developing country for the 1992 Climate Change Convention but as an upper middle income country for other international organizations.

High income countries emitted 48 percent of global GHG emissions in 1990, but contributed 36 percent in 2014.

Low income countries also decreased their share of emissions, from nine percent in 1990 to six percent in 2014.

The Paris Agreement is expected to set a target for global GHG emissions reductions by all countries -not only developed countries -since all counties contribute to GHG global emissions.

(12)
Are these middle income countries that are huge emitters working on the problem?

Yes, but not enough. Some middle income countries are using their status as developing countries in the Climate Change Convention as an excuse to delay action and continue emitting. One of the reasons argued is that they also have the right to develop and that they should be able to do so in the same way developed countries did -by burning fossil fuels.

Some middle income countries are making pledges to reduce emissions, assuming that climate finance is available.

Most countries have adopted a wait-and-see strategy. While pledges have been announced (known as the Cancun pledges), countries are holding back implementation based on other countries doing the same. That is exactly what triggered the necessity for the Paris Agreement where all countries are expected to participate in emission reductions.

However, the differentiation of countries is still blocking the Paris Agreement negotiations since middle income countries are still advocating to retain their status as developing countries, based on the principle of common but differentiated responsibilities.

As a result of these deadlocked discussions and conditions, in the five years since 2010, GHG emissions increased 10 percent.

(13)
Is the deliberate removal of CO2 from the atmosphere at large scale realistic?

Some options analyzed by climate scientists use intentional measures and technologies for the deliberate removal of CO2 from the atmosphere. These 'negative emissions' technologies rely on carbon capture and storage (CCS): large-scale industrial plants that capture and store CO2 by injecting it in geological reservoirs more than 800 meters below the surface. These CCS plants are currently extremely expensive and pose significant risks, such as leakage of CO2 to water, soil or back into the atmosphere.

Two options were analyzed by the IPCC. One is bio energy with CCS: instead of burning fossil fuels, energy is produced by burning biomass -fuel wood, and agricultural residues, such as sugar cane, rice husks, and corn, among others. Through CCS, the resulting CO2 emissions from biomass burning are captured before reaching the atmosphere. The additional risks of this option include competition for food, land and water to grow the necessary biomass to produce bio energy sustainably, which can negatively impact livelihoods. The other option is CCS to capture CO2 from carbon-fueled power plants, refineries, cement plants and steel mills.

(14)
How many carbon capture and storage plants will be needed to hold temperature increase below 2ºC?

The International Energy Agency concluded that, to hold temperature increase below 2ºC, an average of more than 1,000 CCS plants would need to be built and in full operation between 2015 and 2050 to capture 3.5 Gt CO2 a year (or a cumulative 120 Gt CO2). This annual average of 3.5 Gt CO2 is comparable to one third of the current global removal of CO2 by the ocean (absorbing about 9 Gt CO2) or a similar share by terrestrial carbon sinks (trees and plants, currently removing about 10 Gt CO2).

However, these negative emission technologies are unproven and have not been tested at large-scale. Also, there is no large-scale bio energy with CCS plants in the world.

The 16 CCS plants in operation or under construction will capture less than 0.1 percent of total CO2 emissions a year by 2015.

Additionally, due to past emissions climate warming will continue for at least decades after CO2 removal methods and technologies are applied.

(15)
Why did scientists consider carbon capture and storage technologies?

Because IPCC scientists had to provide policymakers with the option that would meet the 2ºC policy target. The use of negative emission technologies was needed to compensate for delayed action to reduce emissions by countries.

Among the hundreds of very sophisticated computer models analyzed by IPCC scientists for their assessments, many models were able to hold temperature increase below 2°C only by relying on massive negative emission technologies.

Further delaying action to reduce emissions means higher costs and risks, such as much higher rates of global emission reductions and greater dependence on using all available mitigation technologies in the medium-term; greater reliance on negative emissions; and greater risks of economic disruption; and higher adaptation challenges and costs.

(16)
I heard that the cost of fighting climate change will be $100 billion a year by 2020. Where will the money come from?

Developed countries committed to mobilizing jointly $100 billion a year by 2020 from public and private donors.

The $100 billion will originate from various sources, including donor countries, the private sector, multilateral development banks (such as The World Bank, the European Investment Bank, Inter-American Development Bank, etc., which also include contributions from middle income countries) and bilateral climate-related official development assistance.

The Green Climate Fund is one of the mechanisms for climate finance. Since its establishment in 2011, it has raised $10.2 billion.

(17)
Will the private sector have a role in climate finance?

Yes. The private sector will play a critical role in climate finance. Investments from the private sector are estimated to double the contributions from donor countries and multilateral development banks, which could result in up to $155 billion in climate finance by 2020.

The private sector, however, is waiting for clear policy and decisions from the Paris Agreement to plan and guide their actions and investments.

(18)
Are there other sources of climate finance?

Yes. Subsidies to fossil fuels totaled $550 billion in 2013. This amount is more than four-times the value of subsidies to renewable energy and more than four times the amount invested globally in improving energy efficiency.

The $550 billion in fossil fuel subsidies are currently available in national budgets, mostly in middle income countries.

Shifting these subsidies away from fossil fuels could liberate national financial resources for climate finance, which in turn will attract additional public and private funds and investments.

(19)
Will a transition to 100 percent clean energy solve climate change?

Addressing climate change will only be possible if energy is used much more efficiently than today and in a different way. For example:
100 percent electricity generation from renewables,
Shifting to electrification in transport and industry.
Using bio fuels only where really necessary.
Energy efficiency to the most extent possible.

Clean or renewable energy only refers to electricity generation, which will address about 20 percent of the global problem -or about 70 percent of GHG emissions from the energy sector (from extraction and conversion to distribution).

Currently, the global share of non-fossil fuel electricity generation is 30 percent -16 percent from hydropower, 5 percent from renewables and 11 percent from nuclear power. The IPCC concluded that it should be 90 percent by 2050.

A transition to 100 percent renewable electricity generation will not address how electricity is used, how cars are fueled, how new buildings are built, or even how food is produced. The IPCC made a comprehensive analysis by sector to identify measures and policies to be implemented in the next 2-3 decades towards a complete transformation of the world as we know it today. These were the sectors analyzed: industry, transport, buildings and urban planning, and agriculture, forestry and land use.

Although a tripling of the share of renewables for electricity generation can be achieved, a significant share of fossil fuels will still be required to meet the expected doubling in energy demand due to population growth by 2050.

(20)
Why is it necessary to implement measures in all sectors?

Policies and measures will have to be implemented in all sectors by 2050 because world population is estimated to increase by 40 percent -from 7 billion in 2010 to almost 10 billion by 2050.

Population growth will, in turn, double the demand for energy in 2050 and also increase the demand for food, clean water, and other basic human needs.

Further delaying stringent measures to combat and adapt to climate change will only mean higher costs -in more expensive measures to reduce emissions and implement adaptation measures; and most importantly, in higher risks to livelihoods and ultimately, lives due to the increased impacts of the changing climate.

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Useful Links and Resources (reviewed by Henner Weithoener)

Intergovernmental Panel on Climate Change
http://www.ipcc.ch/report/ar5/
http://www.ipcc.ch/links/links.shtml

United Nations and Climate Change
http://www.un.org/climatechange/

UNFCCC Newsroom
http://newsroom.unfccc.int/

World Meteorological Organization
https://www.wmo.int/pages/index_en.html

International Institute for Environment and Development (IIED)
http://www.iied.org/cop21-publications

Friends of the Earth
http://www.foe.org/
http://www.foe.org/publications/factsheets

Climate Action Network
http://www.climatenetwork.org/

Greenpeace International
www.greenpeace.org
http://www.greenpeace.org/international/en/campaigns/climate-change/negotiations/COP21-Paris/

WWF International
http://wwf.org

International Renewable Energy Agency (IRENA)
http://www.irena.org
http://irenanewsroom.org/2015/07/15/retrack-at-cop21/

Climate News Network
http://climatenewsnetwork.net/

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