



## PRESS RELEASE

**Embargo:** Hold for release until 12:00 noon US Eastern Time, Thursday September 29, 2016

**The Truth About Climate Change** analysis is available at: <https://feu-us.org>.

*Dr. Robert Watson is available for advance interviews by phone and in person in Washington, D.C.*

*Dr. Watson and others will also take part on a media teleconference Thursday, Sept. 29 at 12:00 noon US Eastern Time / 16:00h GMT / 17:00 British Summer Time.*

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**Video B-Roll is available at:** <http://bit.ly/2dnc1bc>

### **Global Temperature Could Reach the 2°C Threshold by 2050**

#### **Pledges by 189 nations are inadequate to slow climate change**

#### **Without additional action and advanced technologies, global emissions are expected to be 33 percent above the 2°C pathway in 2030**

A new analysis finds that the 2°C (3.6° F) temperature target, the threshold for the world to avoid the worst effects of climate change, could be reached as soon as 2050, say seven of the world's best climate scientists.

Global average temperature has already reached 1°C (1.8°F) above pre-industrial levels in 2015, according to the World Meteorological Organization. This is a significant increase in only three years, compared to the 0.85°C above pre-industrial times in 2012, as reported by the Intergovernmental Panel on Climate Change (IPCC), the premier scientific body on climate change in its **Fifth Assessment Report**.

Weather-related events –temperature, precipitation and wind conditions— have already changed everywhere due to climate change. The evidence is what most have been experiencing as unusual weather events, such as changes in average rain patterns leading to floods or droughts, more intense storms, heat waves and wildfires, among others daily examples. Since 1990, weather-related events due to climate change have doubled in number.

An increase in global average temperature of 2°C (3.6° F) above pre-industrial levels within the next couple of decades could lead to an additional doubling of the number of these weather-related events.

“Climate change is happening now and much faster than anticipated,” says Sir Robert Watson, former Chair of the IPCC. “While the Paris Agreement on Climate Change is an important step in the right direction, what is needed is a doubling or tripling of efforts.”

“Without additional efforts by all major emitters, the 2°C target could be reached even sooner.”

Even with all countries uniting and adopting the Paris Agreement with the goal of holding global temperature well below 2°C, global greenhouse gas (GHG) emissions are not expected to decrease fast enough in the next 15 years.

The assessment of current pledges to combat climate change representing 189 countries show that global GHG emissions will be 33 percent above the level of what they should be to stay below 2°C (3.6° F) above pre-industrial levels in 2030, according to the United Nation Environment Programme's **The Emissions Gap Report 2015**.

Of the 162 pledges submitted as part of the Paris Agreement, 27 (17 percent) were made without any conditions, 44 (27 percent) are conditional upon obtaining funding from donor countries for their implementation, and 91 (56 percent) combine unconditional and conditional pledges.

If those pledges without any conditions are implemented, global GHG emissions are expected to increase by six percent in 2030. If all pledges are 100 percent realized emissions will remain at the current levels in 2030.

“With the Paris Agreement, all countries are finally together in the fight against climate change,” says Carlo Carraro, Ph.D., Vice-chair of the IPCC Working Group III. “It sets the basis for all countries to take action, but its weakness is based on voluntary pledges that cannot be legally enforced.

“Political action will be also required in all countries to approve policies, regulations and incentives for the implementation of the pledges at the national level.”

The new analysis, titled **The Truth About Climate Change**, is co-authored by six top climate scientists and Liliana Hisas of the Universal Ecological Fund (FEU-US). The report summarizes and synthesizes the conclusions from the IPCC and key climate research to analyze the outcome of the December 2015 Paris Climate Conference.

Solving the GHG emissions problem driving climate change is not simple. The world's high-income countries with 18 percent of the global population are creating 37 percent of emissions. Their per capita emissions are the highest.

Secondly, middle-income countries with more than 70 percent of global population generate 54 percent of global emissions. It is in these nations where emissions have been growing the fastest.

For example, from 1990 through 2012, upper middle-income countries increased their emissions by 115 percent. That compares to a 45 percent increase by lower middle-income countries and a 29 percent increase by high-income countries.

Until the Paris Agreement, only a handful of countries, primarily countries in the European Union, implemented efforts to reduce GHG emissions. These efforts, however, were offset by increasing emissions by most countries, industrialized and developing.

The lack of collective action to combat climate change by all countries for the last 20 years has resulted in a steady increase in annual global GHG emissions: from 38 Gigatons (Gt) of carbon dioxide (CO<sub>2</sub>) equivalent (GtCO<sub>2</sub>-eq: unit to measure all GHG combined) in 1990 to the current level of 54 GtCO<sub>2</sub>-eq, a 42 percent increase.

As a consequence of GHGs that have already been emitted, an additional warming of 0.4-0.5°C is expected.

As a result, the high ambition Paris Agreement temperature target of 1.5°C above pre-industrial levels is almost certainly unobtainable and could be reached by the early 2030s.

**Why is so difficult to stay below 2°C (3.6° F)?**

The 162 pledges –the Intended Nationally Determined Contributions (INDCs)– submitted by countries as part of the Paris Agreement are evidence of a new phase in the collective efforts to tackle climate change.

Collectively, pledges by countries to be undertaken between 2020 and 2030 will only contribute to lowering the global GHG emissions trajectory compared to the current path.

If only unconditional pledges are implemented, global GHG emissions are expected to reach 56 GtCO<sub>2</sub>-eq in 2030, a six percent increase. If unconditional and conditional pledges are fully implemented, global emissions will remain at about the current level of 54 GtCO<sub>2</sub>-eq.

“About 80 percent of the pledges are subject to the condition that financial and technological support is available from developed countries,” says Dr. Watson. “These conditions may not be met, which means that these pledges may not be realized.”

Most climate experts believe that the Paris Agreement is a step forward, because without its pledges, global GHG emissions are projected to increase by about 20 percent from current levels in 2030, reaching 65 GtCO<sub>2</sub>-eq.

However, to stay below 2°C, global GHG emissions should drop to 42 GtCO<sub>2</sub>-eq in 2030.

“It is not enough to agree on a temperature target. The current pledges are only initial steps, and many more ambitious steps must follow,” says Prof. Thomas Stocker, University of Bern and former Co-chair of the IPCC Working Group I. “Substantial and sustained action is needed”.

The report urges action now, because the less that is done now, the more that will be required in the future.

“We have to wipe out the misconception that reducing emissions is incompatible with economic development,” says Ms. Liliana Hisas, Executive Director of FEU-US. “It is just a matter of developing in a different way, while combating and adapting to climate change.

“The climate is already changing. The evidence is what most have been experiencing as unusual weather events, such as floods, droughts and wildfires. Some of these impacts of climate change will be beneficial, while most will not, negatively impacting lives and livelihoods everywhere.”

Because anthropogenic (man-made) CO<sub>2</sub> emissions currently contribute 65 percent of global GHG emissions, accounting for 36 GtCO<sub>2</sub>, it is these emissions that need to be more aggressively reduced.

To stay below 2°C, global CO<sub>2</sub> emissions should be net zero by 2060-2075, according to **The Emissions Gap Report 2015**.

Trees and plants and the ocean, called carbon sinks, currently remove about half of anthropogenic CO<sub>2</sub> emissions.

“The other half concentrates in the atmosphere, where it remains for hundreds of years. It is these atmospheric concentrations that are causing the climate to change,” says Dr. Pablo Canziani, Senior Scientist at the National Scientific and Technical Research Council, Professor at the National Technological University in Argentina and former Lead Author of the IPCC Working Group I.

“As a result of the increased CO<sub>2</sub> uptake, the oceans are also warming and acidifying. If this trend continues, their capacity to retain CO<sub>2</sub> is reduced, and thus global warming would accelerate.”

## **Actions to reach net zero CO<sub>2</sub> emissions**

To reach net zero CO<sub>2</sub> emissions, the following combined and complementary measures need to be implemented:

### **1. A drastic change in the way the world produces and uses energy**

About 82 percent of the energy (electricity, fuel and natural gas) currently produced in the world is obtained by burning fossil fuels –31 percent oil, 29 percent coal and 22 percent natural gas, according to the International Energy Agency.

Because energy is used by various sectors, measures and policies should be implemented in each of these sectors. Some examples include:

- Increasing the deployment of low-carbon energy for electricity generation –currently non-fossil fuel electricity generation is 30 percent –16 percent from hydropower, 5 percent from renewables and 11 percent from nuclear power.
- Increasing the energy efficiency in the housing and industrial sector.
- Promoting the electrification of vehicles.
- Including on-site renewable energy systems in existing and new buildings.

“Actions in all sectors contribute to emission reductions,” says Nebojsa Nakicenovic, Ph.D., Deputy Director General of the International Institute for Applied Systems Analysis and Lead Author of the IPCC Working Group III. “For example, electrification of cars and buildings that rely on decarbonized electricity also means that overall emissions will decline.”

More than half of the INDCs only focus on measures in the energy sector, with some countries aiming at 100 percent renewable energy supply for the electricity sector.

“Focusing on transforming the production of electricity is a good start, but we need to address all sources of GHGs as well as sinks,” says Dr. Watson “Focusing only on electricity generation misses the emissions generated by other sectors, such as transport, industrial processes, waste management, and crop and livestock production, among others. Clearly, a much more comprehensive approach must be implemented.”

### **2. The deployment of technologies to capture CO<sub>2</sub> emissions**

Because the phase out of fossil fuels will not happen fast enough, technologies to capture CO<sub>2</sub> emissions will be required. One of these technologies is carbon capture and storage (CCS).

Large-scale industrial plants capture CO<sub>2</sub> from carbon-fueled power plants, refineries, cement plants and steel mills; the captured CO<sub>2</sub> is then injected and stored deep underground.

These CCS plants are potentially expensive, have not been tested at large-scale, and there is the possibility of leakage of CO<sub>2</sub> back into the atmosphere.

“These technologies have significant potential to contribute to achieving the 2°C (3.6° F) target, but we still need further research into their financial and environmental viability,” says Dr. Watson. “More research is needed.”

About a dozen CCS plants in the world currently capture less than 0.1 percent of CO<sub>2</sub> emissions (or about 0.036 GtCO<sub>2</sub>).

This means that thousands of CCS plants will have to be built and in full operation in the next 2-3 decades all over the world, to significantly reduce CO<sub>2</sub> emissions by 2060-2075.

### **3. Additional measures to remove CO<sub>2</sub>**

Because measures in all sectors that produce and use energy and the deployment of CCS will not be enough to stay below 2°C (3.6° F), additional measures will have to be implemented:

- Improving crop, water and livestock management and reducing deforestation.
- Reforestation and conversion of non-forested land into forest are vital. To significantly contribute to net zero CO<sub>2</sub> emissions through these activities would imply expanding the current world's forest cover, at least, twofold. Such massive expansion, though, is constrained by available land.
- Bioenergy with CCS (BECCS). The production of energy by burning biomass coupled with CCS could offer negative emissions because the CO<sub>2</sub> absorbed by trees and plants during their growth can be captured and stored deep underground.

There are significant concerns associated with BECCS, such as competition for food, land and water to grow the necessary biomass (such as fuelwood and agriculture residue) sustainably, and the potential loss of biodiversity and degradation of ecosystems and their services.

The potential of large-scale deployment of BECCS is unknown because there are currently no large-scale bioenergy-CCS plants in the world.

“The dependence on these negative emission technologies as an option to control climate change is still unproven,” says Dr. Nakicenovic. “Further delaying action to transition to a low-carbon economy and relying instead on these future technologies is not an option.”

Even if negative emission technologies are tested and deployed to remove CO<sub>2</sub> from the atmosphere, their impact in controlling climate change will not be immediate. Global temperature will continue to increase for decades, after these negative emission technologies are applied, the IPCC analysis concluded.

### **4. Adaptation**

The adverse impacts of climate change are already being felt, and additional impacts are unavoidable, according to the latest IPCC report. Thus, to complement emission reductions, adaptation measures will help prepare and manage the risks and negative impacts on key economic sectors, human health, livelihoods and ecosystems.

“Climate change is already causing harm. Although implementation of the Paris Agreement will slow the rate of change, we will still need widespread adaptation to reduce its risks,” says James J. McCarthy, Professor of Oceanography, Harvard University and former Co-chair of the IPCC Working Group II. “It is important that appropriate adaptation measures be planned and implemented with sensitivity to specific regional context.”

Some examples of adaptation measures and policies to be implemented include:

- In freshwater resources: rainwater harvesting, water reuse, desalination, and more efficient soil and irrigation water management, as well as restoring and protecting freshwater habitats, and managing natural floodplains.
- In food production systems: altering cultivation and sowing times for key crops, breeding additional drought-tolerant crop varieties, improving water management and access to irrigation, as well as using water delivery systems more efficiently.
- In urban adaptation: city-based disaster risk management such as early warning systems and infrastructure investments; ecosystem-based adaptation and green roofs; enhanced storm and wastewater management; urban and peri-urban agriculture improving food security; and good-quality, affordable, and well-located housing.

“The key issue is the scale of impacts and risks we are willing to bear and the mitigation actions we are willing to implement in order to minimize those impacts,” says Dr. Canziani.

### **Other challenges**

There are other hurdles to overcome in all countries:

1. Population increase –world population is estimated to increase by 40 percent, to 10 billion, by 2050. Such an increase in population will increase the demand for food, clean water, and other basic human needs; it will also double the demand for energy, according to the IPCC. Producing energy without burning fossil fuels (decarbonizing the production of energy) will be critically important.
2. Industrialized countries, which have the highest per capita emissions, must significantly decrease their per capita consumption patterns. Emphasis must be placed on more sustainable production and consumption.
3. Middle-income countries also need to do much more –more than 70 percent of the world population (about 5.5 billion people) live in upper and lower middle-income countries. This combined group of about 100 countries is currently responsible for 54 percent of global GHG emissions, according to the IPCC –39 percent from upper middle-income countries and 15 percent from lower middle-income countries.

The top ten largest emitters, in descending order of total emission levels, are China, the United States, the European Union, India, Russia, Indonesia, Brazil, Japan, Canada and Mexico.

Of the ten, five –China, India, Indonesia, Brazil and Mexico— are middle-income countries, albeit with relatively low per capita emissions.

“The success of the INDC approach will depend of what happens in the few countries that are responsible for the majority of the emissions,” says José Goldemberg, Professor Emeritus of the University of São Paulo, President of the São Paulo Research Foundation and former Lead Author of the IPCC Working Group III.

4. The pledges are non-binding pledges made at the international level. Policies, regulations and incentives need to be put in place and approved at the national level for their implementation in each country. Thus, pledges may be changed, raising or reducing the overall GHG emission reduction targets included in each pledge.

The implementation of commitments made should be prioritized over national political and sectoral interests.

“Country pledges are voluntary and there are few levers on enforcement,” says Professor Goldemberg.

- Public support is crucial to accelerate climate action in all countries. Accessible information, based on the conclusions by the IPCC and other climate scientists, is essential to promote pro-active public participation and engagement.

“Additional climate action is urgently needed,” says Ms. Hisas. “The public has a critical role to play to influence policy makers to do much more.”

### The path ahead

There is still time to slow down the current path towards reaching the 2°C (3.6° F) target within the next few decades.

Countries agreed to review their pledges by 2018.

“The high risks and costs of further postponing decisive climate action can be reduced by raising the ambition of the INDCs,” says Ms. Hisas.

“Taking earlier action will increase the options of feasible and more cost-effective measures to reduce emissions, as well as outweigh the risks and damage costs arising from the changing climate,” says Dr. Watson.

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### Global GHG emissions in 2030

	<b>Global GHG emissions in 2030</b>	<b>Rate of Change</b> (relative to current level of 54 GtCO <sub>2</sub> -eq)	
Without the Paris Agreement pledges	<b>65 GtCO<sub>2</sub>-eq</b> (range 60-70)	<b>+20%</b>	
What is needed to stay below 2°C	<b>42 GtCO<sub>2</sub>-eq</b> (range 31-44)	<b>-22%</b>	
With the implementation of unconditional pledges	<b>56 GtCO<sub>2</sub>-eq</b> (range 54-59)	<b>+6%</b>	<b>+33% above the 2°C pathway</b>
With the implementation of unconditional and conditional pledges	<b>54 GtCO<sub>2</sub>-eq</b> (range 52-57)	<b>0%</b>	
GHG emission gap to stay below 2°C	<b>14 GtCO<sub>2</sub>-eq</b> (range 12-17)		

Source: UNEP, The Emissions Gap Report 2015

## GHG emissions 1990-2012 by Country Groups

	GHG Emissions		Rate of Change
	1990	2012	1990-2012
<b>World Total</b>	<b>38 GtCO<sub>2</sub>-eq</b>	<b>54 GtCO<sub>2</sub>-eq</b>	<b>+42%</b>
<b>High-income countries</b> <i>(share of global GHG emissions)</i>	<b>18.4 GtCO<sub>2</sub>-eq</b> <i>(48%)</i>	<b>23.8 GtCO<sub>2</sub>-eq</b> <i>(36%)</i>	<b>+29%</b>
Antigua and Barbuda, <b>Australia</b> , <b>Austria</b> , Bahamas, Bahrain, Barbados, <b>Belgium</b> , Brunei Darussalam, <b>Canada</b> , Chile, <b>Croatia</b> , <b>Cyprus</b> , <b>Czech Republic</b> , <b>Denmark</b> , Equatorial Guinea, <b>Estonia</b> , <b>European Union (EU28)</b> , <b>Finland</b> , <b>France</b> , <b>Germany</b> , <b>Greece</b> , Guam, <b>Iceland</b> , <b>Ireland</b> , Israel, <b>Italy</b> , <b>Japan</b> , Korea (Republic of), Kuwait, <b>Latvia</b> , <b>Lithuania</b> , <b>Luxembourg</b> , <b>Malta</b> , <b>Monaco</b> , <b>Netherlands</b> , <b>New Zealand</b> , <b>Norway</b> , Oman, <b>Poland</b> , <b>Portugal</b> , Qatar, <b>Russian Federation</b> , Saint Kitts and Nevis, Saudi Arabia, Singapore, <b>Slovakia</b> , <b>Slovenia</b> , <b>Spain</b> , <b>Sweden</b> , <b>Switzerland</b> , Trinidad and Tobago, United Arab Emirates, <b>United Kingdom</b> , United States, Uruguay.			
<b>Upper middle-income countries</b> <i>(share of global GHG emissions)</i>	<b>9.8 GtCO<sub>2</sub>-eq</b> <i>(26%)</i>	<b>21 GtCO<sub>2</sub>-eq</b> <i>(39%)</i>	<b>+115%</b>
Albania, Algeria, Angola, Argentina, Azerbaijan, <b>Belarus</b> , Belize, Bosnia and Herzegovina, Botswana, Brazil, <b>Bulgaria</b> , China, Colombia, Cook Islands, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Fiji, Gabon, Grenada, <b>Hungary</b> , Iran (Islamic Republic of), Iraq, Jamaica, Jordan, <b>Kazakhstan</b> , Lebanon, Macedonia (Republic of), Malaysia, Maldives, Marshall Islands, Mauritius, Mexico, Montenegro, Namibia, Palau, Panama, Peru, <b>Romania</b> , Saint Lucia, Saint Vincent and the Grenadines, Serbia, Seychelles, South Africa, Suriname, Thailand, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Venezuela.			
<b>Lower middle-income countries</b> <i>(share of global GHG emissions)</i>	<b>5.6 GtCO<sub>2</sub>-eq</b> <i>(15%)</i>	<b>8.2 GtCO<sub>2</sub>-eq</b> <i>(15%)</i>	<b>+45%</b>
Armenia, Bhutan, Bolivia, Cabo Verde, Cameroon, Congo (Republic of), Cote d'Ivoire, Djibouti, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Kiribati, Lao People's Democratic Republic, Lesotho, Mauritania, Micronesia (Federated States of), Moldova (Republic of), Mongolia, Morocco, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, Sudan, Swaziland, <b>Ukraine</b> , Vanuatu, Viet Nam, Yemen, Zambia.			
<b>Low income-countries</b> <i>(share of global GHG emissions)</i>	<b>3.5 GtCO<sub>2</sub>-eq</b> <i>(9%)</i>	<b>3.9 GtCO<sub>2</sub>-eq</b> <i>(7%)</i>	<b>+17%</b>
Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Congo (Democratic Republic of the), Eritrea, Ethiopia, Guinea, Guinea-Bissau, Haiti, Kenya, Kyrgyz Republic, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Tajikistan, Tanzania (United Republic of), The Gambia, Togo, Uganda, Zimbabwe.			

### References:

Countries committed to GHG emission reductions **before** the Paris Agreement:

Countries committed to reduce GHG emissions by the Kyoto Protocol in its **first commitment period (CP1)** –five percent GHG emission reduction from 1990 levels in 2008-2012– and **second commitment period (CP2)** –at least 18 percent GHG emission reduction from 1990 levels in 2013-2020.

Countries committed to reduce GHG emissions by the Kyoto Protocol in its **first commitment period (CP1)**.

Countries committed to reduce GHG emissions by the Kyoto Protocol in its **second commitment period (CP2)**.

### Sources:

Countries in each group, based on the categorization used by the IPCC Fifth Assessment Report (AR5):

[https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc\\_wg3\\_ar5\\_annex-ii.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_annex-ii.pdf)

AR5, Working Group III (Chapter 1)

Emission Database for Global Atmospheric Research (EDGAR). European Commission, Joint Research Centre/PBL Netherlands Environmental Assessment Agency



## The Truth About Climate Change Report

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