### **Carbon emissions**

4 graphics to make sense of the COP21 climate talks and of its challenges

# Thousands of world leaders are meeting in Paris for the COP21 with the aim to find an agreement to limit global warming to 2°C. Participating nations are expected to pledge to limit their carbon emissions. Here is a series of graphics with the latest climate data to help making sense of these talks and understand the challenges to find a global agreement.

The United Nations Intergovernmental Panel on Climate Change (IPCC) is the world’s top scientific authority on global warming. It says the Earth already is about 0.825 degrees Celsius hotter than in the mid-late 19th century, mainly because of the buildup of carbon dioxide and other smokestack and tailpipe gases.

More carbon emissions bring rising temperatures, changing seasons, higher sea levels and more frequent catastrophic weather events. In a [recent report by the World Bank](http://www.worldbank.org/en/news/feature/2015/11/08/rapid-climate-informed-development-needed-to-keep-climate-change-from-pushing-more-than-100-million-people-into-poverty-by-2030), it estimates that global warming will push more than 100 million people into poverty by 2030.

To limit those emissions, the IPCC recommends – and world leaders in 2009 agreed to adopt as a goal – a limit of 2ºC warming above pre-industrial levels. The IPCC “carbon budget” for achieving that goal contains an amount of allowable emissions. Climate experts estimate that we can have no more than 3,200 gigatons of carbon dioxide into the atmosphere if we want to avoid more than 2°C global warming. We already roughly loaded 2,000 gigatons of carbon dioxide into the atmosphere. At the current growth rate, we will exhaust the remaining budget of 1200 gigatons in two or three decades.

Graphic 1: CO2 emissions should remain below about 3200 gigatonnes for global warming to remain under 2° C

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Ahead of the Paris “COP21” climate talks, Switzerland was the first country to tell the UN how much it would cut emissions. Countries use a variety of ways to calculate their pledged contributions – adding to the difficulty of attaining a new international climate treaty. World leaders hope to reach agreement requiring action by all 196 nations, not just the richest ones like with the 1997 Kyoto accord.

Some difficult questions will be raised during COP21. How much global emissions should be cut? What actions should each country take? How much financial aid should wealthier nations like Switzerland offer to poorer nations to adapt to global warming?

## CO2 emissions, the blame game

Whenever global warming is discussed, a broad range of calculations about CO2 and other warming gases are never far behind. Here are the greenhouse gas emissions, listed by country.

 Graphic 2 : Greenhouse gas emissions - Switzerland last emitter per GDP

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Total emissions by China or the United States vastly eclipse those by small countries such as Switzerland. For the sake of comparison, emissions are often calculated on a per capita (person) and economic (Gross Domestic Product, or GDP) basis.

Since the majority of CO2 emissions come from developing countries, there is tension over how much historical responsibility should be taken by countries that have already benefited from fossil fuel-burning industrialisation. It is the sum of all CO2 emissions that contributes to global warming. The graphic below illustrates how much wealthy nations have historically contributed to carbon emissions since the industrial age.

Graphic 3: Total CO2 emissions 1850-2012

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Developed nations such as Europe and the United States are responsible for about half of all carbon from fossil fuels since 1850. The chart above helps explain why some nations feel they are owed financial aid to adapt. By contrast, rich nations like Switzerland emphasize rising per-capita emissions in developing countries. Rich nations have been helped by a shift to a service economy to reduce their emissions. The global financial crisis of 2008-09 also helped Europe and other countries meet their carbon targets by lowering economic output.

## Outsourcing of carbon emissions

And though Europeans have decreased their carbon emissions over the last decades, [the Global Carbon Budget 2014 report](http://www.globalcarbonproject.org/carbonbudget/) notes that virtually all the cuts made by wealthy countries like the US and Europe since 1990 were offset by "outsourced" emissions to places like China.

Another thorny issue is who is responsible for carbon emissions from consumer goods such as the ubiquitous smartphone, TVs and other household goods: the country that makes an item or the one that consumes it? That is a complicated issue, but it is possible to account for emissions from goods and services produced in one country and consumed in others. The graphic below shows "consumption carbon emissions" for selected countries next to "production emissions" per capita.

Graphic 4: Western countries have decreased their carbon emissions by outsourcing them

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Considering the consumption emissions per capita instead of production emissions produces a very different picture for wealthy nations. Figuring in the carbon “transfer” from trade, Switzerland emits more than 3 times its production emissions per capita – and ranks among the top carbon emitters per capita.

**Links**

* [United nations conference on climate change (COP21)](http://www.cop21.gouv.fr/en/)
* [CAIT Paris Contributions Map](http://cait.wri.org/indc/)
* [Intergovernmental Panel on Climate Change](http://www.ipcc.ch/)
* [CAIT Climate Data Explorer](http://cait.wri.org/historical/Country%20GHG%20Emissions?indicator%5B%5D=Total%20GHG%20Emissions%20Excluding%20Land-Use%20Change%20and%20Forestry&indicator%5B%5D=Total%20GHG%20Emissions%20Including%20Land-Use%20Change%20and%20Forestry&year%5B%5D=2012&sortIdx=NaN&chartType=geo)
* [The Global Carbon Atlas](http://www.globalcarbonatlas.org/?q=en/emissions)

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INFOBOX

Greenhouse gas

Gases that trap heat in the atmosphere like a greenhouse are called greenhouse gases. Some occur naturally, like carbon dioxide, methane (CH4), nitrous oxide (N2O) and water vapor. Others are man-made, such as chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF6). CO2 is by far the most prevalent. Along with CH4 and N2O, it accounts for 98% of all greenhouse gas emissions. CO2 is measured by the ton, which would fill a small house with about 116 square meters in floor space and 4 meters high.