

Measuring well-being and sustainability: A special issue of the Revue de l'OFCE

By [Eloi Laurent](#)

This issue of the [Revue de l'OFCE \(no. 145, February 2016\)](#) presents some of the best works that are being produced at a rapid clip on indicators of well-being and sustainability.

Why want to measure well-being? Because the idea that economic growth represents human development, in the sense that growth represents a good summary of its various dimensions, is simply false. GDP growth is not a prerequisite for human development; on the contrary, it is now often an impediment (as is illustrated by the exorbitant health costs of air pollution in India and China, two countries that concentrate one-third of the human population).

Achieving growth is not therefore sufficient in itself for human development; there is a need for specific policies that deal directly with education, health, environmental conditions and democratic quality. If the multiple dimensions of well-being are not taken into account, one dimension, typically the economic dimension, is imposed on and crushes the others, mutilating the human development of both individuals and groups (the example of health in the United States is particularly striking in this regard).

Why want to measure sustainability? Because today's global growth rate of 5% is of little importance if the climate, the ecosystems, the water and air that underpin our well-being have irrevocably deteriorated in two or three decades due to the means deployed to achieve that growth. Or to put it in the words of the Chinese Minister of the Environment, Zhou Shengxian, in 2011: "If our land is ravaged and our health

destroyed, what benefit does our growth bring?" We need to update our understanding of well-being so that it is not a mirage. Our economic and political systems exist only because they are underpinned by a set of resources that make up the biosphere, whose vitality is the condition for the perpetuation of these systems. To put it bluntly, if ecological crises are not measured and controlled, they will eventually do away with human welfare.

Indicators of well-being and sustainability must therefore enter a new, performative age: after measuring in order to understand, we now need to measure in order to make change – to evaluate in order to evolve. Because the change called for by these new visions of the global economy is considerable. This time of action invariably involves choices and trade-offs that are far from simple. This underscores the dual purpose of this issue of the *Revue de l'OFCE*: to show that indicators of well-being and sustainability have reached maturity and that they now can change not only our vision of the economic world but also the economic world itself; they can make clear the types of choices available to public and private decision-makers so as to carry out the change needed. In this respect the two sections of this special issue clearly highlight the issue of the relevant scale for measuring well-being and sustainability.

The first part of this issue is devoted to the relatively new topic of measuring regional well-being in France. Measuring well-being where it is actually lived presupposes moving down the scale to the local level: the need to measure and improve human well-being as close as possible to people's lived reality, along with the scale of spatial inequalities in contemporary France, demands a territorial perspective. There are at least two good reasons why territories (regions, cities, *départements*, towns), more than nation-states, are the vectors of choice for the transition towards well-being and sustainability. The first is that they have grown in

importance due to the impact of globalization and urbanization. The second is their capacity for social innovation. Following on from the late Elinor Ostrom, we talk about a “polycentric transition” to mean that each level of government can seize on the well-being and sustainability transition without waiting for a push from the top.

Monica Brezzi Luiz de Mello and Eloi Laurent (“Beyond GDP, beneath GDP: Measuring regional well-being in the OECD” – *all OFCE Revue articles in French*) gives the initial results of the theoretical and empirical work currently underway in the OECD framework (interactive access on the site <http://www.oecdregionalwellbeing.org/>) that measures certain dimensions of well-being at the regional level and applies these new indicators to the French case in order to draw useful lessons for public policy.

Robert Reynard (“Quality of life in the French regions”) provides an overview of recent findings by the INSEE using regional quality-of-life indicators. These can be used to develop a new typology of French spaces, highlighting eight major types of territories, which are distinguished both by the living conditions of their inhabitants (employment, income, health, education, etc.) and the amenities that these areas provide for their people (living environment, access to services, transport, etc.). The new representation of France that emerges constitutes a valuable decision-making tool for those in charge of policies aimed at promoting equality between the regions.

Kim Antunez, Louise Haran and Vivien Roussez (“Diagnoses of quality of life: Taking into account people’s preferences”) looks back at the approach developed by France’s regional monitoring body (*Observatoire des territoires*) and highlights indicators, offered at appropriate geographical scales, that can be used to account for the multidimensional character of quality of life in France. Here too, regional typologies explore the link between the diverse amenities in people’s

environments and the diverse aspirations of the people who live in them, so as to highlight the imbalances that exist and the public policy levers that can be used to reduce these.

Finally, Florence Jany-Catrice (“Measuring regional well-being: Working *on* or *with* the regions?”) discusses a fundamental aspect of the debate about measuring well-being in the French regions: the participation of citizens in defining their own well-being. She shows in particular that the impact of the indicators depends on whether those who develop them work on the regions or with them – it is only in the latter case that the region and its inhabitants become active players in the development of a common vision.

But, in contrast to these localized approaches, the measurement of sustainability requires moving up the geographical scale to the national or even global level. This is the subject of the articles in the second part of this issue, which deal with a subject whose importance has been emphasized by the recent law on the energy transition: the circular economy. Here there is a crucial difference to be made between a seemingly circular economy, which concerns a product or business, and genuine economic circularity, which can be understood only by enlarging the loop to develop a systemic vision.

This is what Christian Arnsperger and Dominique Bourg aim to demonstrate (“Towards a truly circular economy: Reflections on the foundations of an indicator of circularity”) by examining the main issues and questions that designers of an indicator of a truly circular economy would need to take into account, if it were ever to be developed formally and technically. They conclude in particular that without a systemic vision oriented towards the reduction, rationing and stationarity intrinsic to the permaculture approach, the notion of the circular economy will forever remain vulnerable to misuse that, however well intentioned, is ultimately short-sighted.

Vincent Aurez and Laurent Georgeault (“Indicators of the circular economy in China”) attempt to assess the relevance and the actual scope of the assessment tools developed in recent years by China to flesh out an integrated circular economy policy that aims at ensuring the transition to a low-carbon model with a restrained use of resources. These instruments, which in many respects are unique, but still inadequate, are distinguished by their systemic and multidimensional character, and therefore constitute an original contribution to the field of sustainability indicators.

Finally, Stephan Kampelmann (“Measuring the circular economy at the regional level: A systemic analysis of the management of organic matter in Brussels”) draws on the theory of social-ecological systems to carry out a particularly innovative exercise. He uses a battery of indicators to compare the economic, social and environmental impact of two possible pathways for the municipal management of flows of organic matter in Brussels: a centralized treatment using anaerobic digestion, and a process based on decentralized composting.

Thus while well-being is best measured at the local level, to assess sustainability properly, including at the regional level, the impact felt beyond local and national borders has to be taken into account. The trade-offs between these dimensions, including the exploration and possible transformation into synergies at regional and national levels, then turn out to be the most promising projects opened up by the welfare and sustainability transition.

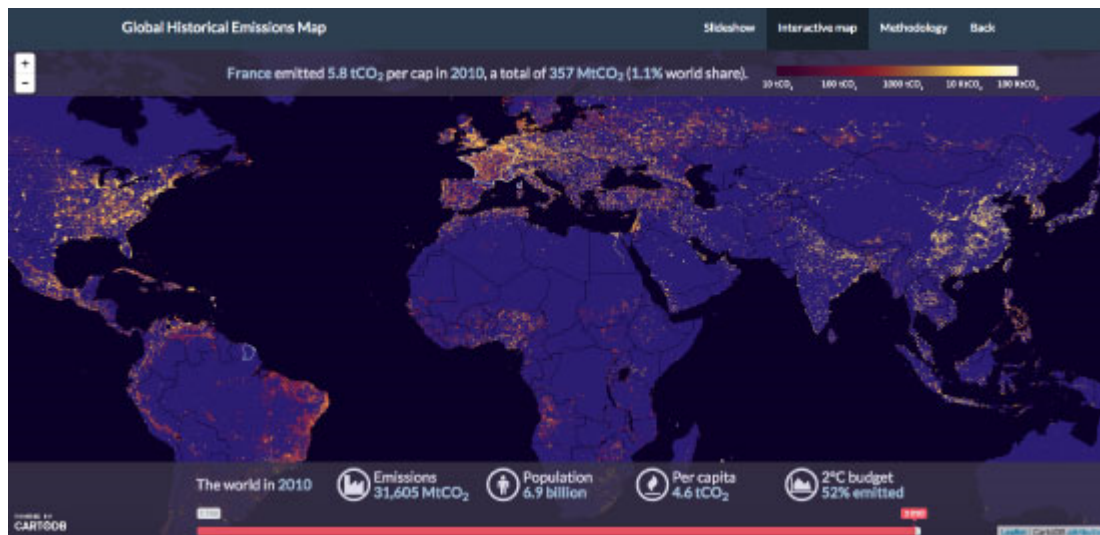
From the suburbs of London to global conflagration: a brief history of emissions

By [Aurélien Saussay](#)

A [new interactive map](#) of global CO2 emissions from 1750 to 2010 is helpful in understanding the historical responsibilities of the world's different regions for the climate crisis.

The 21st Conference of Parties (COP 21) ended on 12 December 2015 with a historic agreement. As 195 countries come to an accord on the need to limit global warming to 2 degrees by the end of the century, it is a good time to review the history of CO2 emissions since the beginning of the Industrial Revolution. Right to the end of the negotiations, the question of the historical responsibility of the different countries has remained one of the main obstacles blocking the path to a global climate agreement. The recently industrialized emerging countries and the developing countries that are just beginning their economic take-off rightly refuse to provide efforts comparable to those of the developed countries.

This feeling is confirmed by a [new interactive map](#) retracing 260 years of CO2 emissions from fossil fuel combustion and cement production on the surface of the planet^[1]. This map can be used interactively to explore the emissions of each country and their distribution in space over the last two centuries, both in their entirety and per capita. It can also be used to follow trends in global emissions and the gradual consumption of the total carbon budget for holding global warming to below 2 degrees.



By combining historical data on emissions per country issued by the [CDIAC](#) (from 1750-2010) with decadal data on population density produced by the European [HYDE](#) project (also 1750-2010), it is possible to estimate the distribution of emissions over space and time around the planet's surface – on a grid with a resolution of 5' of arc (5' being equal to 1/12th of a degree, i.e. about 10 km by 10 km at the equator).

This interactive map shows the contribution of each of the world's regions since the mid-18th century – while at the same time offering a gripping account of the gradual spread of the industrial revolution over the last two centuries.

These data illustrate several key points that help to understand the debate about differentiated historical responsibilities:

- Up to the mid-20th century, only Europe and the United States (and to a lesser extent Japan) contributed significantly to global emissions.
- It was only in the last 30 years that, led by China, the rest of the world “turned on”.
- Driven by rapid economic growth in the emerging countries, emissions have taken off in the last fifteen years.
- When weighted by distribution of the world population, emissions are highly concentrated spatially. This conclusion

is bolstered when using even finer data, notably the location of power stations and the most energy-consuming manufacturing plants (cement, aluminium, and paper, for example).

This brief history of CO₂ emissions across the globe reminds us of the West's special responsibility in the fight against global warming. The precocity of the Industrial Revolution in the West allowed the economy to take-off much earlier than in the rest of the world, but it also led to the emission of a disproportionate share of the total emissions budget that we are entitled to if we are not to exceed the target of two degrees of warming.

This differentiated historical responsibility, which was recognized by the Paris Agreement, requires Western countries to make a special effort in the fight against global warming. This responsibility must thus be reflected in a greater effort in terms of financial and technological transfers so as to ensure that the emergence of the developing countries minimizes the use of fossil fuels, without hindering their economic take-off.

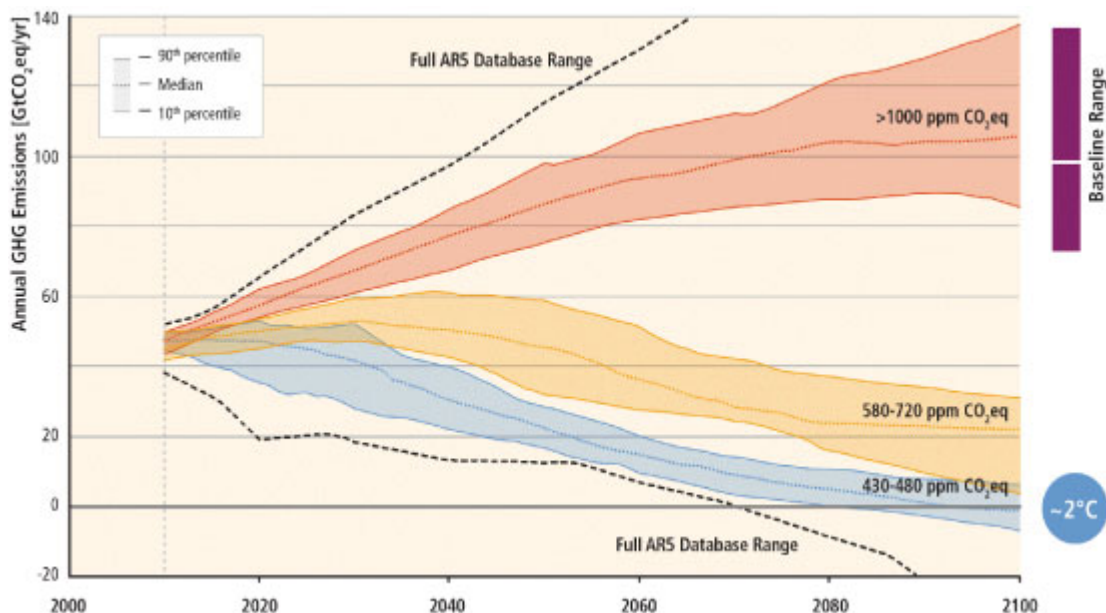
[\[1\]](#) These emissions do not include emissions from changes in land use (LUCLUF) or fertilizer use. Unfortunately, it is very difficult to reconstruct these emissions for the period under consideration.

The end of oil and coal

By [Xavier Timbeau](#)

The idea that we must put an end to the use of oil and coal is not new. It has been pushed for a long time by NGOs like [350.org](#) and its [gofossilfree](#) campaign. What is more striking is that the Democratic primary candidate Senator Bernie Sanders has put [the proposal](#) at the heart of the US presidential election debate. Institutional investors and large fund holders have also announced their intention to limit or terminate their investments in coal (for example, Allianz and ING) and oil (the Dutch pension fund ABP). The urban development policies of some large cities are also leaning in that direction. Asked about this option, the head of the US Environmental Protection Agency (EPA), Gina McCarthy, noted (cautiously) that this [option](#) was not irrational.

Figure: Scenarios of CO₂ emissions



Source: Figure SMP 11, AR5, IPCC, p. 21.

That said, [Figure SPM 11 of the 5th IPCC report](#) says much the same thing. If global warming is to be kept to 2 degrees, our

carbon budget since 1870 amounts to 2900 ± 250 GtCO₂e; we have consumed around 1900 GtCO₂e up to now. So staying below the 2°C level (relative to pre-industrial times) with a probability of 66% leaves about 1000 GtCO₂e. Given an annual flow of emissions of about 50 GtCO₂e, a simple rule of three give us 40 years of linearly decreasing emissions. The inclusion of carbon sinks, climate inertia and negative [radiative forcings](#) on the climate extends the time horizon to 2090 ± 10 years, but it would be prudent to get down to zero emissions earlier. For the record, there are still about 5000 ± 1400 GtCO₂ of recoverable reserves in coal alone, enough to greatly exceed our current carbon budget. Note that stopping the use of fossil fuels does not solve everything. A portion of current greenhouse gas emissions (of CO₂, but also of methane and other gases) is not linked to fossil fuels but to farming, deforestation and industrial processes. In the case of a nearly 100% system of renewable energy, the gas would be necessary during consumption peaks. These non-fossil emissions can be cut down, but not eliminated. It is possible to have negative emissions, but the only “technology” available today is reforestation, which can help lower emissions by only 2 GtCO₂ annually. Carbon capture and storage is also a way to conserve the use of fossil fuels provided that it works and that it has enough storage capacity (once the storage capacity is depleted, the problem remains).

The principle of “common but differentiated responsibility” would lead the developed countries to apply constraints more quickly (by say around 2050). Some see this prospect as the explanation for the fall in oil prices. Since not all fossil fuel reserves will be burned, the only ones worth anything are those that will be exploited before 2050, meaning that this price is lower than what would result from rising demand. Saudi Arabia therefore has an interest in increasing production rather than keeping worthless reserves. Mark Carney, Governor of the Bank of England and Chairman of the Financial Stability Board, has [evoked “stranded reserves”](#) in

the same way that a coal plant is a “stranded asset”, i.e. a blocked asset that has to be depreciated prematurely.

The end of oil and coal is no longer just a fad of a handful of green activists. This is also seen in the [**persistent and nearly convergent calls of many economists about a carbon price**](#). A high and rising price of carbon would force economic agents to disinvest in the capital that emits carbon or even to prematurely depreciate existing facilities. When a high carbon price is demanded (say between 50 and 100 € / tCO₂, with the price of carbon steadily increasing over time as the carbon budget runs out), the point is that this sends a strong price signal to economic agents, with the consequence of this price being that emissions are reduced in an amount consistent with warming of less than 2°C compared to pre-industrial times. So, from this viewpoint, saying that “the price of carbon should be 50 € / tCO₂ or more” is equivalent to saying “everything must be done so that we stop using coal and oil within the next half century”. The price of carbon thus gives us valuable information about the cost of the transition. It will be on the order of (a few) 1000 billion euros per year (on the scale of the global economy). Proposing a price means proposing the “polluter pays” principle (carbon emitters must pay), even though it is not clear exactly whom the polluters must pay. Hence the debate on the Green Fund and climate justice that is at the centre of COP21.

It would be a shame to focus on the carbon price and make it the central issue of COP21. A zero-carbon economy is our future, and we will have no excuses if we continue to burn fossil fuels. As Oscar Wilde remarked: “Nowadays people know the price of everything and the value of nothing.”

The COP 21 conference: the necessity of compromise

By [Aurélien Saussay](#)

On Tuesday, 6 October 2015, the United Nations Framework Convention on Climate Change (UNFCCC) released a preliminary version of the draft agreement that will form the basis for negotiations at the Paris Conference in December. Six years after the Copenhagen agreement, widely described as a failure, the French Secretariat is making every effort to ensure the success of COP 21 – at the cost of a certain number of compromises. Although the text's ambitiousness has been cut down, the strategy of taking "small steps" is what can make an agreement possible.

The project has renounced a binding approach, where each country's contributions were negotiated simultaneously, and replaced that with a call for voluntary contributions, where each country makes its commitments separately. This step was essential: the Kyoto Protocol, though ambitious, was never ratified by the United States, the world's principal emitter of carbon at the time – and it was the attempt to build a successor on that same model which resulted in the lack of agreement at Copenhagen.

The countries' commitments, called Intended Nationally Determined Contributions (INDC), fall into three broad categories: a reduction in emissions from the level of a given base year – generally used by the developed countries; a reduction in the intensity of emissions relative to GDP (the amount of GHGs emitted per unit of GDP produced); and finally, the relative reduction in emissions compared to a baseline

scenario, called “business-as-usual”, which represents the projected trajectory of emissions in the absence of specific measures.

Most emerging countries have chosen to express their targets in terms of intensity (China and India in particular) or relative to a baseline trajectory (Brazil, Mexico and Indonesia). This type of definition has the advantage of not penalizing their economic development – at the price, of course, of uncertainty about the level of the target: if economic growth exceeds the projections used, the target could be met even while the reduction in emissions achieved would be lower than expected. Moreover, part of the target is often indexed on the availability of financing and of technology transfers from developed countries – once again, a perfectly legitimate condition. Due to the contribution that having a plurality of targets makes to a fair distribution of efforts between developed, long-standing emitters and countries that have been developing recently, this represents an essential source of compromise.

With regards to the level of emissions targets set for 2030, while some are trivial – note the case of Australia, which is proposing to *increase* its emissions over 1990 levels – many involve accelerating existing efforts. To meet its commitments, Europe must reduce its emissions twice as rapidly from 2020 to 2030 as it does in the previous decade, and the United States one-and-a-half times; China will need to reduce its carbon intensity three times faster than it has in the last five years, and India two-and-a-half times faster.

As a guide, if the INDCs made public to date were fully realized, then according to the research consortium Climate Action Tracker [\[1\]](#), global temperatures would rise 2.7 °C above pre-industrial levels by the end of the century. This simple calculation must, however, be qualified, since the plan is for commitments to be revised every five years, and they can only be tightened. This system of iterative negotiations

should make it possible to move steadily closer to the goal of 2°C that is still being upheld officially.

To be effective, it is necessary to check on whether these commitments are actually met, which requires independent monitoring. In this respect, while guidelines have been highlighted in the current version of the draft agreement, the final negotiations will need to clarify the mechanisms actually used. In the absence of an effective verification procedure, successive revaluations of commitments could turn into a global game of liar's poker, and ultimately undermine the fight against climate change.

Moreover, the existence of relatively ambitious commitments should certainly not delay the implementation of the necessary adaptation measures, which are at present the subject of a single article in the provisional draft, with no reference to the funding that will be devoted to this. This is one of the project's main weaknesses, as the question of funding is barely mentioned – the Green Climate Fund, which was to be endowed with 100 billion dollars by 2010, has received only 10.2 billion to date.

In turning the page on Copenhagen, the draft agreement for Paris could constitute a real step forward for climate protection. It is the result of a change in method and a series of compromises which, though scaling down ambitions, are absolutely necessary to the very existence of an agreement. Demanding greater requirements for the proposal's targets could lead to the failure of the negotiations, which would be far more damaging. In its current version, the draft agreement provides a robust foundation for the future coordination of efforts against climate change.

[\[1\]](#) The Consortium of the following research organizations: Climate Analytics, Ecofys, NewClimate Institute, and Potsdam

Let's negotiate a global carbon price signal – quickly!

By Stéphane Dion [\[1\]](#) and [Éloi Laurent](#)

Two decades after the Rio Conference, and just as a new climate conference is opening in Bonn on Monday 14 May 2012, we must admit to collective failure in combating human-induced climate change. We cannot escape serious climate disruption if we continue down this same path. We must change direction, and we must do it quickly.

The International Energy Agency forecasts warming of over 3.5°C by the end of the 21st century if all countries respect their commitments, and by more than 6°C if they content themselves with their present policies. At that level of warming, climate science warns us that our planet will become much less hospitable for humans and all other forms of life.

At the Durban Conference in December 2011, the countries expressed their grave concern about the gap between their commitments and achieving the objective of a 2°C limit on increased global warming (relative to the pre-industrial era). They promised to re-double their efforts to bridge this gap. But they failed to make any commitment to achieve more stringent targets. We are thus facing an increasingly untenable gap between the urgent need for action and the

inertia of international negotiations.

The developed countries are refusing to strengthen their climate policies so long as the other major emitters don't do the same. But the emerging economies, particularly China and India, with annual GDP growth rates of 8 to 10%, will not accept in the foreseeable future targets for the reduction of the volume of their greenhouse gas (GHG) emissions. On the other hand, these countries might be more open to the idea of setting a price per ton of CO₂ that was standardized at the global level, from which they would derive revenue, and which their economic competitors would also be required to levy.

We believe that the best instrument for the international coordination needed to combat climate change is a global carbon price signal. This is why we are proposing that the forthcoming negotiations focus on this crucial goal.

Here is what we are proposing (for more detail, see, in French, <http://www.ofce.sciences-po.fr/pdf/dtravail/WP2012-15.pdf> and, in English): every country would make a commitment to introduce, in their respective jurisdictions, a carbon price aligned with a scientifically validated international standard, in order for the world to achieve or at least come as close as possible to the objective of keeping global warming below 2°C. Each country would decide whether to extract this levy through taxation or through a system of ceilings and trading in emissions permits (a "carbon market").

Governments would be free to invest, as they see fit, revenues from the carbon emission levy and from the corresponding elimination of fossil fuel subsidies. They could, for example, invest in research and development in clean energy and public transportation, etc. They could also choose to address social inequalities with respect to access to energy.

Developed countries would be required to set aside part of

their revenues to help developing countries introduce policies to mitigate emissions, to adapt facilities and to create carbon sinks (by means of reforestation, for example). The contributions of each country would be based on what their respective GHG emissions represent relative to the total emissions of all the developed countries.

Under this international agreement, countries would have the right to levy border taxes on products from countries that have not established a carbon price in accordance with the international standard. The message would be clear to all large emitters: if you do not levy a carbon tax on your products before you export them, the other countries will do so in your place, and it is they who will collect the revenues. Each country will understand that it is in its own commercial interests to comply with the international agreement, to tax its own emissions and to use the corresponding revenues as it sees fit.

In this way, the world would have available an instrument that is vital to its sustainable development. At last, carbon emitters would be required to pay the environmental price for their actions. Consumers and manufacturers would have an incentive to choose lower-carbon-content goods and services and to invest in new emission-reducing forms of technology.

We need to negotiate a global carbon price signal, and quickly. What better place to do this than at Rio, where the problem of climate change was first recognized by the international community 20 years ago?

[\[1\]](#) Stéphane Dion is a Member of the House of Commons of Canada; as Canada's then Minister of the Environment, he chaired the 11th Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Montréal in 2005 (COP 11).