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Gabriel Wedy

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## Climate Change and Sustainable Development in Brazilian Law

By Gabriel Wedy<sup>†</sup>

March 2016

### Introduction

This article aims to explain briefly how the National Policy for Climate Change (NPCC) in Brazil - established by Act 12.107/2009 - is structured. This Act will be critically analyzed according to what is being currently discussed on Climate Change Law, both globally and within the United States.

It will also seek to demonstrate the importance of the constitutional principle of sustainable development provided for in the Brazilian Federal Constitution in order to correct omissions and imperfections of the National Policy for Climate Change, whenever it is subject to interpretation and implementation by the Judiciary branch, the Executive branch and regulatory agencies.

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<sup>†</sup> Gabriel Wedy is a Federal Judge in Brazil, an Environmental Law Professor at ESMAFE/RS (the Brazilian Federal Judiciary Superior School), and an invited Environmental Law Professor at AJURIS (the Judiciary Superior School for the State of Rio Grande do Sul) and Unisinos University. He is also a Ph.D. candidate at Pontifícia Universidade Católica do Rio Grande do Sul (PUC/RS) and a Visiting Scholar at Columbia Law School. He can be reached at [gtwedy@gmail.com](mailto:gtwedy@gmail.com).

## 1. Climate change: a threat to humanity

The average temperature on Earth has increased by 0.74% since the end of the 1800s. According to research conducted by the National Oceanic Atmospheric Administration in the United States, the average temperature of the past 370 months leading up to the year 2015 was higher than the average of the twentieth century. The fact is that 2015 was the hottest year since such records began to be kept in the 1880s, surpassing 2014, which had so far recorded the highest temperatures of the past 135 years. It is important to highlight that the ten hottest years happened in the period following the year 1997. NASA drew the same conclusion in an independent study<sup>1</sup>.

Scientists predict temperatures will increase between 1.8°C and 4°C by 2100. Even if though these temperatures will have increased only by 1.8°C, this will exceed any positive variation throughout the last 10,000 years. The average sea level has risen by 10-20 centimeters during the twentieth century and an additional increase of 18-59 centimeters (possibly even more) is expected to happen by the year 2100<sup>2</sup>.

Industrialization since the post-industrial revolution, dependent on fossil fuels for energy, deforestation and unsustainable production processes in agriculture - such as monoculture - are the main sources of anthropogenic greenhouse gases.

Climate change caused by the retention of these gases in the atmosphere causes negative impacts on human health, infrastructure, water resources, ecosystems and oceans<sup>3</sup>.

Evident adverse impacts to humans are: an increase in the frequency and intensity of heat waves causing deaths and illnesses; drought and fire hazards; intensification of air pollution; increased rainfall and flooding, causing property damage and diseases; and the rising sea level

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<sup>1</sup> See Gabriel Wedy, *Signals of Weather and Climate Change*, *Jornal Zero Hora*. (Feb. 14, 2015): 19; NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION, Maps and time series. Source: <https://www.ncdc.noaa.gov/sotc/global/201506>. Last accessed in: 01.02.2016; NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. Source: <http://www.nasa.gov/press/2016/january/nasa-determines-2015-warmest-year-in-modern-record>. Last accessed in: 02. 02.2016.

<sup>2</sup> See Albert Gore, *An inconvenient Truth* (Emmaus: Rodale Press, 2006) and Jeffrey Sachs, *The Age of Sustainable Development* (New York: Columbia University Press, 2015).

<sup>3</sup> Michael Gerrard, Introduction and Overview, in Michael, Gerrard and Jody Freeman (Editors), *Global Climate Change and U.S. Law*. Second Edition (Chicago: American Bar Association, 2014) : 15-16.

and intensity of coastal flooding<sup>4</sup>, claiming victims and material damage estimated in billion of dollars.

At COP 21, held in 2015 in Paris, had countries decided to set stricter targets for cutting emissions of greenhouse gases when compared to the targets adopted at Kyoto in 1997. In addition, they called for new measures of adaptation and resilience and urged the transference of financial resources from rich nations to poor nations so as to fight climate change and its effects.<sup>5</sup>

Encyclical *Laudato Si*, announced by Pope Francis and advocating an *Integral Ecology*, also brought important arguments to promote sustainable development and to fight the causes and effects of climate change<sup>6</sup>. The message of the Catholic Church, based on moral, ethical, religious and scientific principles was that it is urgent for humanity to seek sustainable development and to fight the human causes of climate change.

## **2. The principle of sustainable development within the international scenario and in Brazil**

The concept of right to sustainable development was established jointly by the Stockholm Declaration [1972], the World Conservation Strategy [1980], the World Charter for Nature [1982]<sup>7</sup> and, finally, the Brundtland Report<sup>8</sup> [1987].

The Brundtland Commission released a report called "Our Common Future", conceptualizing the basis for sustainable development as "[...] the ability to meet the needs of the

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<sup>4</sup> See Naomi Oreskes and Erik Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2011).

<sup>5</sup> The main COP 21 result was an agreement to set a goal of limiting global warming to less than 2 degrees Celsius (°C) compared to pre-industrial levels. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century. In the adopted version of the Paris Agreement, the parties will also "pursue efforts to" limit the temperature increase to 1.5 °C. See UNITED NATIONS. Source: [http://unfccc.int/meetings/paris\\_dec\\_2015/session/9057.php](http://unfccc.int/meetings/paris_dec_2015/session/9057.php). Last accessed in: 20.12.2015.

<sup>6</sup> See *Laudato Si*. Source: [w2.vatican.va](http://w2.vatican.va). Last accessed in: 09/22/15.

<sup>7</sup> Klaus Bosselmann, *The Principle of Sustainability: Transforming Law and Governance* (Farnham: Ashgate, 2009): 40.

<sup>8</sup> The United Nations General Assembly through A/RES/38/61 in 1983 appointed a committee to report on issues relating to the environment [World Commission on Environment and Development], including development without the depletion of natural resources. This was the origin of the Brundtland Report.

present without compromising the ability of future generations to meet their own needs"<sup>9</sup>. Two ethical elements that are essential to the idea of sustainable development can be extracted from that: concern about the present [justice or intra-generational equity] and concern about the future [justice and intergenerational equity]<sup>10</sup>. The 17 objectives and 169 goals of sustainable development - inserted into the document *Transforming Our World: Agenda 2030 for Sustainable Development* by the United Nations General Assembly in 2015 - also need to be included in this concept of sustainability.

In Brazil, the principle of sustainable development is provided for in the joint interpretation of the preamble and Articles 3, 170 and 225 of the 1988 Constitution. In accordance with Article 225 of the Federal Constitution "the environment must be protected for the interest of present and future generations". Therefore, the human causes of climate change need to be addressed so that Brazilians can enjoy a healthy and inhabitable environment, not only for the present but also for their future generations.

### 3. Climate Change and Sustainable Development in Brazilian Law

Brazil's role is undoubtedly fundamental within the global context of concern with sustainability and global warming. It is important to note that the country is in the 77th position in the world rankings of overall sustainability and in the 115th position regarding deforestation and forest protection. Between August 2014 and July 2015, for example, deforestation in the Amazon rainforest increased by 215%<sup>11</sup> according to Imazon Research Institute.<sup>12</sup> Contrarily, according to Brazil Government, the increase was only 16%.<sup>13</sup>

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<sup>9</sup> UNITED NATIONS, World Commission on Environment and Development, *Our Common Future*, Brundtland Report. (Oxford and New York: Oxford University Press, 1987) :13.

<sup>10</sup> Klaus Bosselmann, *The Principle of Sustainability: Transforming Law and Governance*. Farnham (Farnham: Ashgate, 2009): 97.

<sup>11</sup> *Jornal O Globo*, Desmatamento na Amazônia cresce 215% em um ano, 05.12.2015. Source:<http://g1.globo.com/jornal-nacional/noticia/2015/03/desmatamento-na-amazonia-cresce-215-em-um-ano-segundo-o-imazon.html>. Last accessed in:05.12.2015.

<sup>12</sup> See about Imazon Institute in <http://imazon.org.br/institucional/>. Last accessed in: 01.05.2016.

<sup>13</sup> According with Brazil's Government data, 5.831 square kilometers of land was cut down or burned in the Brazilian Amazon one year before to August 2015. In other words, trees covering an area more than seven times the territory of New York City have been cleared in the Brazilian Amazon over the past year. See Amazon Deforestation Report Brazil Paris Climate Talks, *The Guardian*, Source: <http://www.theguardian.com/world/2015/nov/27/amazon-deforestation-report-brazil-paris-climate-talks>. Last accessed in: 01.05.2016.

In terms of government protection of the environment, the Brazilian scenario is one of great concern, as demonstrated by the recent environmental catastrophe in the city of Mariana/MG, which shocked the world in November 2015.<sup>14</sup>

In Brazil there is a specific Act on climate change that needs to be enforced and interpreted in accordance with the constitutional principle of sustainable development so as to be effective. The principle of sustainable development is provided for by Act 12.187/2009, which established the National Policy for Climate Change -NPCC. The Act - although imperfect and lacking in some respects - is a breakthrough and a milestone in the fight against climate change and global warming. It has clearly incorporated concepts of international instruments that protect the environment.

The Act 12.187 is regulated by Executive Order 7.390/2010, which, among other important points, states that greenhouse gas emissions should be reduced from 36.1% to 38.9% by the year 2020. However, before the United Nations Conference on the Post-2015 Development Agenda, held in New York in September 2015, Brazil promised that the reduction would be of 37% by 2025 and 43% by 2030<sup>15</sup>, exceeding the goals established in the Executive Order. The big question is whether Brazil will have the structure, technical capacity and political will to seriously achieve these goals. The shortage of structure to monitor sources that emit greenhouse gases; the increasing deforestation of the Amazon rainforest; transport dependent on fossil fuels<sup>16</sup>; and the

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<sup>14</sup> Illegal levels of arsenic and mercury polluted a river in the days after a dam burst at an iron ore mine in Brazil's worst environmental disaster, according to tests by a state water agency, the Institute for Water Management in Minas Gerais. The agency found arsenic levels more than 10 times above the legal limit in one place along the river, the Rio Doce, after the dam burst on Nov. 5, killing at least 19 people. See *The New York Times*, Brazil river polluted after dam burst, 11/27/2015. Source: [http://www.nytimes.com/2015/11/27/world/americas/brazil-river-polluted-after-dam-burst.html?\\_r=0](http://www.nytimes.com/2015/11/27/world/americas/brazil-river-polluted-after-dam-burst.html?_r=0). Last accessed in:12.30.2015.

<sup>15</sup> *The Guardian*. Brazil pledges to cut carbon emissions 37% by 2025 and 43% by 2030. Source: [www.theguardian.com/environment/2015/sep/28/brazil-pledges-to-cut-carbon-emissions-37-by-2025](http://www.theguardian.com/environment/2015/sep/28/brazil-pledges-to-cut-carbon-emissions-37-by-2025). Last accessed in:10.30.2015.

<sup>16</sup> On the use of fossil fuels, transport and alternatives, see Brent Yacobucci, *Transportation Fuels*, in Michael Gerrard and Jody Freeman (Editors), *Global Climate Change and U.S. Law*. Second Edition. (Chicago: American Bar Association, 2014.): 543-580. On transport powered by fossil fuels and land use, see John Nolon, *Transportation and Land Use* in Michael Gerrard and Jody Freeman (Editors), *Global Climate Change and U.S. Law*. Second Edition. (Chicago: American Bar Association, 2014.): 505-542.

lack of environmental education in schools and corruption<sup>17</sup> are serious obstacles to be fought against so that this goal can be achieved.

The Act provides the principles, goals, guidelines and instruments of NPCC [Art. 1]. Important technical concepts were created for the Brazilian Law, such as the concepts of adaptation; of adverse effects of climate change; of emissions; of emission source; of greenhouse gases; of impact; of mitigation; of climate change; of GHG sink and of vulnerability [Art. 2, inc. I, II, III, IV, V, VI, VIII, IX and X]. These technical definitions needed to be clearly spelled out and translated into legal jargon, since they must be employed in the formulation and implementation of public policies as well as judicial and administrative decisions with the greatest possible care and accuracy.

Among other things the Act provides that there must be compatibility between economic and social development with the protection of the climate system [Art. 4, inc I]. There is a clear fundamental link between economy, the human being and the environment in terms of development, which should always be planned and implemented with reduced carbon emissions.

The NPCC establishes that all commitments made by Brazil to the United Nations Framework Convention on Climate Change and other international documents on climate change which the country will eventually sign must be complied with promptly [Art. 5. inc. I]. Therefore, the Brazilian Government needs to abide by the provisions of COP 21. Once new international documents on climate change are approved, it is essential that Brazil immediately adopt them as guidelines, especially when they provide resilience and adaptation measures compatible with the fundamental duty of environmental protection, provided for in Art. 225 of the Federal Constitution.

The Act provides for tools under the NPCC tools, including the *National Plan on Climate Change*, the *National Fund on Climate Change* and, in particular, *the assessment of environmental impacts on the microclimate and the macroclimate* [Art. 6, items I to XVIII]. Among the institutional instruments for the work of the *National Climate Change Policy* are the *Interministerial Committee on*

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<sup>17</sup> Unfortunately corruption scandals in Brazil has occurred often, how the diversion of money from the state-owned Oil - Petrobras. See *The New York Times*. A corruption scandal at Petrobras threatens Brazil's bond Market and economy. 02.11.2015. Source: [http://dealbook.nytimes.com/2015/02/11/a-corruption-scandal-at-petrobras-threatens-brazils-bond-market-and-economy/?\\_r=0](http://dealbook.nytimes.com/2015/02/11/a-corruption-scandal-at-petrobras-threatens-brazils-bond-market-and-economy/?_r=0). Last accessed in: 01.12.2015.

*Climate Change*, the *Brazilian Research Network on Climate Change* and the *Coordination Committee of Activities in Meteorology, Climatology and Hydrology*.

An important measure was the provision in Art. 8 that official financial institutions will make available credit and financing lines in order to produce and encourage clean energy.

Principles, goals, guidelines, public policies and government programs must be compatible with the principles, objectives, guidelines and instruments of the *National Policy for Climate Change* [Art. 10]. The Act provides that the Executive Order, in accordance with the *National Policy for Climate Change*, must set sectoral plans for the mitigation and adaptation to climate change in order to create a low-carbon economy in the generation and distribution of electricity; in urban public transportation; in the interstate transportation systems of cargo and passengers; in the durable consumer goods manufacturing industry; in chemical industries; in pulp and paper industry; in mining; in the construction industry; in health services and in agriculture. The goal is to meet gradual emission reduction targets, considering the particularities of each sector.

The Act binds NPCC to the principle of sustainable development. Measures to implement the NPCC should consider "sustainable development as a condition to fight climate change and to match compliance to the common and particular needs of people and communities" living in the national territory [Art. 3, inc. IV].

The Act repeatedly mentions sustainable development in its text, such as the acknowledgement of the *principle of law*. The NPCC determines that the State and its enforcing agents comply with "the principles of precaution, prevention, citizen participation, *sustainable development* and common but distinguished responsibilities" [Art. 3].

It was positive to include in the Act the principle of sustainable development as a mandatory observance for the government and its entities. However, the legislation failed to mention that companies and private corporations should also abide by this principle.

It would have been even better had the Congress expressly included private companies in this article at the time the bill was passed. These companies generate negative externalities such as deforestation, pollution of air, soil, and water and, in particular, greenhouse gas emissions, which cause global warming.

Another point that deserves criticism is that the "principle of common but differentiated responsibility" adopted by the Brazilian Congress was created under international law due to pressure from developing nations. For many years, it was an obstacle to a global agreement on



climate issues. There is no doubt that all developed and developing nations today should contribute equally and promptly for cutting emissions of greenhouse gases, for both technical and political reasons<sup>18</sup>.

In order to fight inequality between richer and poorer countries, the developed countries might provide the poorer ones with the technical, scientific and financial support so as to cut emissions and implement resilience and climate adaptation policies. Recently, this point was recognized by COP 21.<sup>19</sup>

Measures to be implemented within the national climate policy should note that "sustainable development is the condition to fight climate change and to comply with the common and particular needs of people and communities living in the national territory" [Art. 3, inc. IV], i. e. for the Brazilian law the principle of sustainable development has utmost importance in the fight against global warming and its often catastrophic effects.

The NPCC goals should be in accordance with "sustainable development in order to seek economic growth, poverty eradication and the reduction of social inequalities" [Art. 4].

The term economic *development* - instead of *growth* - would be a better word choice for the Act because economic growth does not necessarily mean development: it could mean growth which is uneven; polluting; disordered and income concentrating, which only benefits the rich and the biggest polluters<sup>20</sup>, incompatible with the principle of sustainable development provided for in the Constitution of Brazil.

The Congress failed to add one objective to the Act: governance<sup>21</sup>. Brazil faces high levels of Government inefficiency in the implementation of public policies because of lack of technical expertise, transparency and democracy in the decision-making process and, particularly, because of the high levels of corruption, which is unfortunately ingrained in sectors of public administration. Corruption undermines the credibility of democratic institutions before citizens

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<sup>18</sup> See Eric Posner and David Weisbach, *Climate Change Justice* (Princeton: Princeton University Press, 2010).

<sup>19</sup> See United Nations. Source: <http://newsroom.unfccc.int/paris>. Last accessed in: 01.12.2015.

<sup>20</sup> See Joseph Stiglitz, *The Great Divide, Unequal Societies and What We Can do About Them* (New York: W.W. Norton & Company, 2015) and Amartya Sen, *Development as freedom* (New York: Random House Inc., 1999).

<sup>21</sup> Sachs acknowledges that in the process of sustainable development, in order to achieve environmental, social and economic goals, governance is paramount. See Jeffrey Sachs, *The Age of Sustainable Development* (New York: Columbia University Press, 2015): 3.

and harms the image of Brazil within the international community, inhibiting foreign investment in clean energy.<sup>22</sup>

The NPCC plans to adopt sustainability indicators, among other instruments. It would be of utmost importance for the Congress to define which sustainability indicators should be used in order to better guide policy makers and whoever must observe these indicators in their activities on a daily basis. An indication of the sustainability indicators by the Act would bring legal certainty and avoid misinterpretations or interpretations made to prevent the application of the NPCC.

Among the instruments of national climate policy, there could also be an expected request to implement a cost-benefit analysis of the measures to be implemented, as an imperative of governance. Fighting climate change has a cost that needs to be evaluated in times of scarce resources of the Brazilian State. Resources must also be well allocated and cannot be wasted with wrong and biased decisions. It is clear that fundamental rights, such as the right to a balanced environment, to health and to life should have their dimension added to this analysis because there are values that money cannot buy and evaluate<sup>23</sup>.

In the Act there is a brief mention to what resembles a cost-benefit analysis when it comes to its guidelines. The Act which guides the NPCC provides "actions to mitigate climate change in line with sustainable development, which are, whenever possible, measurable for their proper quantification and later testing" [art. 5.inc. II]. The Act shows concern with the measurement and quantification of climate change mitigation measures, but does not mention a cost-benefit analysis. Brazil needs to adopt a procedure of cost-benefit analysis, with a humanitarian and sustainable

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<sup>22</sup> See Overseas Business Risk- Brazil. *United Kingdom Government Publications*, 07.17.2015. Source:<https://www.gov.uk/government/publications/overseas-business-risk-brazil/overseas-business-risk-brazil>. Last accessed: 01.08.2016 and Gaurav Sharma, Ripple Effect of Petrobras Scandal on Brazilian Investment, *Forbes*, 03.20.2015. Source: <http://www.forbes.com/sites/gauravsharma/2015/03/20/ripple-effect-of-petrobras-scandal-on-brazilian-investment/>. Last accessed in: 01.10.2016.

<sup>23</sup> See Michael Sandel, *What's money can't buy? The moral limits of Market* (New York: Farrar, Straus and Giroux, 2012).

perspective, through a new Act or even constitutional amendment to Art. 37 of the Constitution so that it becomes one of the principles to bind the not-always-efficient Brazilian Government.

The procedure of a cost-benefit analysis is likely to inform the decision-making process, bringing efficiency, transparency and sustainability to the public policy. It is important for Brazil to overcome the *age of beautiful Laws*, which compile principles of international law, yet are unable to provide effective mechanisms for the realization of rights. The adoption of modern legislation that allows such environmentally responsible cost-benefit analysis may well be an important instrument of implementation of fundamental rights.

The Congress failed to mention geoengineering<sup>24</sup> and its regulations. This palliative technique, unlike adaptation - which refers to human efforts to deal with the expected effects of climatic changes -, seeks to deliberately intervene with the climate system by using chemical and physical processes. Geoengineering proposals are limited to two main categories: carbon dioxide removal from the atmosphere; and management of solar radiation. The latter is not intended to reduce the concentration of greenhouse gases, but to make use of techniques to treat the symptoms of global warming linked to solar radiation, such as the artificial creation of clouds. Both proposals were ignored by the Brazilian Legislative Branch.

With the development of a stand-alone article, for instance, the Act could have prioritized the two mechanisms globally regarded as the most effective in fighting greenhouse gases: carbon tax<sup>25</sup> and cap-and-trade.

Carbon tax has the clear advantage of making emissions more expensive for everyone, making it difficult for the polluter not to be taxed. The cap-and-trade, in turn, as in any market, has its flaws and imperfections. In addition, carbon tax can reach the entire society, whereas the cap-and-trade system affects directly only the productive sector. Ideally, there should be a conjoined implementation of these measures.

The Congress did include similar mechanisms in the Act, but very subtly, for example, when it provides in Art. 9 that the Brazilian Market for Emission Reduction (BMER) "will be operationalized in futures and commodities exchanges, stock exchanges and other entities,

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<sup>24</sup> See Philip Rasch et AL, *Geoengineering by Cloud Seeding: Influence on Sea Ice and Climate System*, 4 *Envtl. Res. Letters* 045112, at (2009).

<sup>25</sup> See Jody Freeman and Kate Konschnik, U.S. Climate Change Law and Policy: Possible Paths Forward, in Michael Gerrard and Jody Freeman (Editors), *Global Climate Change and U.S. Law*. Second Edition (Chicago: American Bar Association, 2014) : 795-840.

authorized by the Brazilian Securities Commission - CVM, where the negotiation of securities representative of certified greenhouse gas emissions will take place". Even after years from passing the Act, this market in Brazil is non-existent: we are out of the cap-and-trade markets which are in full operation in the European Union and part of the United States and Canada<sup>26</sup>.

The great advantage of this market is that when in full operation it encourages companies to cut back emissions in order to lower costs. The lower emissions and the higher the clean energy jobs, the greater are corporate profits in this market. On the other hand, in the event of an increase in emissions, companies will have to resort to the market to buy more emission permits, increasing their costs and reducing their profits.

There is a strong moral objection to the carbon emission trading. Price is set on something that cannot be bought or sold: pollution. People stop polluting because they are acting not with moral virtue, but in order to increase profits. According to this, Kant's categorical imperative should be followed<sup>27</sup>, which says that the right thing to do is not to pollute, because it harms other people and environmental goods. This maxim should be adopted as a moral principle and not as the utilitarian view that it is more profitable not to pollute. In other words, the right thing is done - fighting pollution - for the wrong reason - the pursuit of profit. This utilitarian reasoning may have as a harmful result the violation of the maxim of social solidarity and the moral principle of not polluting at all. Carbon emissions trading would therefore be contaminated by efficiency in contempt to moral principles.

However, under a pragmatic view, the carbon emission trading has worked - even though with imperfections - in Europe, the United States and Canada. It is an alternative to be considered when fighting climate change in a society based by constitutional provision on respect to free enterprise as the principle of economic order (Art. 170) as well as on private property as a fundamental right (Art. 5).

With regard to carbon tax - the most effective means of fighting climate change - nothing was mentioned in the Act. On the use of tax to fight emissions the Act mentioned *environment tax measures* "to stimulate emission reduction and removal of greenhouse gases, to be established by a

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<sup>26</sup> Lesley Mcallister, Cap-and-Trade in Michael Gerrard and Jody Freeman (Editors), *Global Climate Change and U.S. Law*. Second Edition (Chicago: American Bar Association, 2014) : 341.

<sup>27</sup> On the categorical imperative and metaphysics of moral see Immanuel Kant, *Grounding for the Metaphysics of Morals: with On a Supposed Right to Lie because of Philanthropic Concerns*, Third Edition, James W. Ellington (Translator) (Indianapolis : Hackett Publishing Company inc., 1992)

*specific law*". However, the Congress missed the opportunity to create the tax on carbon in 2009, but chose to defer this responsibility to the moment of creation of a new Act, which has not been done after more than six years.

### **Conclusion**

Brazil must promote sustainable development and take forward the fight against the causes of climate change. It is important to stimulate an economy powered by renewable energy - especially wind and solar - that can meet the needs of present and future generations. Both the government and Brazilian society have the *fundamental constitutional duty* to protect the environment, provided for in art. 225 of the 1988 Constitution.

The constitutional principle of sustainable development must be applied in decisions of the Executive and Judicial branches and regulatory agencies at the time of interpretation of Act 12.187/2009, suppressing their gaps and omissions, in order to give this Act a broader sense for an effective cut in emissions of greenhouse gases, as well as for the creation and expansion of adaptive and resilience measures, which have been increasingly necessary in this age of climate change and global warming.