

# PATHWAYS TO THE FUTURE WE WANT >>

## **GREEN FINANCING: INTERNATIONAL PANORAMA**

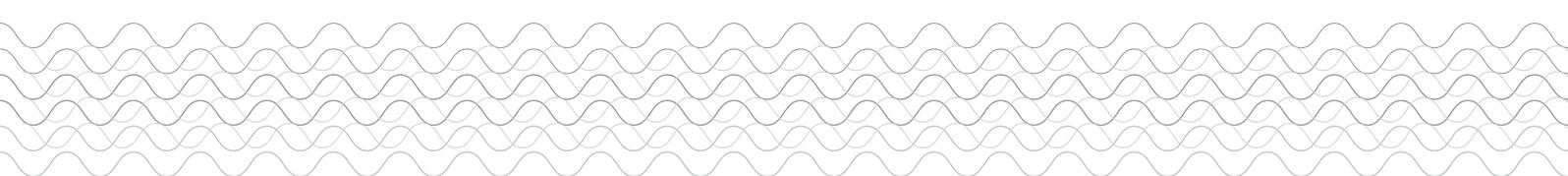
Helena Gonçalves

2014 • volume 1



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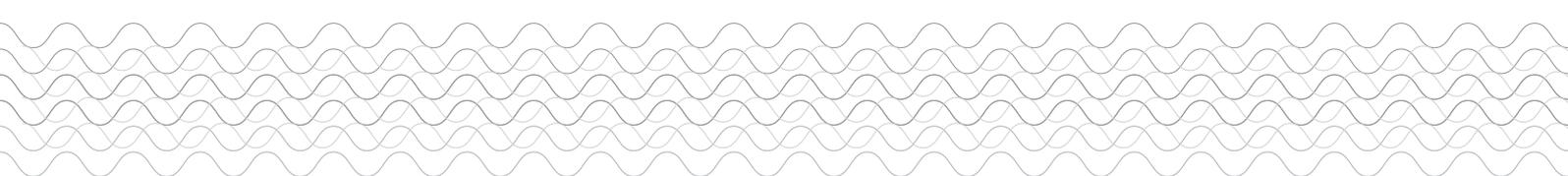
## About the author

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## Keywords

Economic Instruments; Financial Incentives; Sustainable Development; Green Economy; Market.



## Presentation

In the last decades, scientific knowledge of environmental issues has improved substantially. Faced with the reality of climate change and the realization that human activity is responsible for this transformation, many countries, international agencies, and corporations have been proposing actions to avoid potentially catastrophic scenarios on a global scale.

Measures developed to both decrease the rate at which the climate has been changing and contribute to the dynamics of sustainable development have been studied and debated as part of initiatives jointly carried out by the Brazilian Center for International Relationships (CEBRI) and the Konrad Adenauer Foundation (KAS). This five-year-long partnership entered a new phase in 2013, when we decided to house future initiatives under an umbrella project called "Pathways to 'The future we want'."

In 2014, building off of past endeavors, we addressed the debate on green financing by applying economic tools capable of overcoming environmental issues on local, national, regional, and global levels. By analyzing the functioning and application of these tools, we intend to map some strategies that aim to improve environmental management and promote sustainable production and consumption patterns.

In order to do that, CEBRI has conducted a study group on this subject over the course of the year. This group is divided in two branches: an international one and a national one, which focuses on Brazil. This study gave rise to two publications introduced in two roundtable discussions in Rio de Janeiro and São Paulo. In addition to these, a workshop also took place in which we suggested the initiation of a horizontal dialogue between politicians, activists and experts. Our goal is to exchange experiences and expectations around this issue.

In this article, Helena Gonçalves presents some of the main economic instruments and financial incentives in effect today, emphasizing some examples of good international practices in applying these mechanisms. The author highlights the cross-cutting nature between social and environmental problems, as well as the necessary complementarity between society, market and State in order to solve this crisis.

We hope the following sections will facilitate the exchange of ideas and strengthen Brazil's role in the post-2015 environmental agenda.

**Roberto Fendt**

Chief Executive

**Tatiana Oliveira**

Project Coordinator



## Introduction

Until the first half of the 20th century, the idea of development was intimately related to industrialization. However, since then, decreasing rates of education and health, growing inequality, and signs of collapse of the world economic system and the environment, with effects on the climate and the availability of fuel, food, and water, have shattered this connection.

Especially after the United Nations Conference on the Human Environment, in 1972, the world began to look for models that would combine economic growth, social justice, and the conservation of natural resources. Governments took on the role of regulators of the development process through command and control strategies related to the impact of production activities and, later, through economic instruments and incentives to regulate pollution sources (GVces, 2013), considering environmental and social externalities of economic activities (UNEP, 2011). It thus consolidated an inclination to develop a new global economic paradigm, in which wealth would not be necessarily achieved through environmental harm, a shortage of resources, and social inequality: the green economy.

The United Nations Environment Programme defines “green economy” as one that would improve human welfare and social equity and reduce environmental risks and ecological shortage to a significant extent (UNEP, 2010 apud UNEP 2011). Therefore, the change in this economic model and the introduction of this new economy are part of the strategy that intends to make sustainable development possible. Sustainable development is determined as one that would cater to the needs of present generations with no loss for future ones in terms of resources to satisfy their needs (WCED, 1987).

In a green economy, economic growth and private and public investments work together to reduce pollution, improve efficiency in energy and resource use, and prevent the loss of biodiversity and environmental services. This process involves governmental efforts to establish public policies, incentive instruments, and regulations following environmental and social criteria that can steer private investments towards adopting sustainable production and consumption patterns. It is estimated that the amount of annual funding necessary to accomplish that is between US\$ 1.05 and US\$ 2.59 trillion (UNEP, 2011).

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Within this line of thinking, proposals arise to introduce mechanisms geared towards sustainable development that are based on the belief that the market and the economy have greater transformative power than public policies and legislation (BORN & TALOCCHI, 2002). These initiatives have been employed in several ways and in various places around the world. In this article, we will address some of the most widely disseminated and important economic and financial instruments in the

international<sup>1</sup> arena, examining their functioning, operation, prerogatives, controversies, and main lessons.

This paper is divided into the following broad sections:

- >> emissions trading;
- >> taxes and fees;
- >> aids and incentives.

## Emissions Trading

The emissions trading approach was first implemented in the United States in the 1970's, when the Environmental Protection Agency authorized the negotiation of pollutant emissions to reduce sulfur dioxide (SO<sub>2</sub>) emissions to combat acid rain (GREENHALGH & SELMAN, 2012). It is a mechanism known today as "cap and trade", a system that defines limits that may be emitted by way of trading and negotiating emission permissions.

The emission trading system has been used to deal with different pollution sources. Their basic concept is that the development of a market offers flexibility to companies so that they may create lower-costing strategies to reduce their pollutant emissions. This emission trading mechanism is commonly associated with carbon and greenhouse gases (GHG) but is not restricted to them.

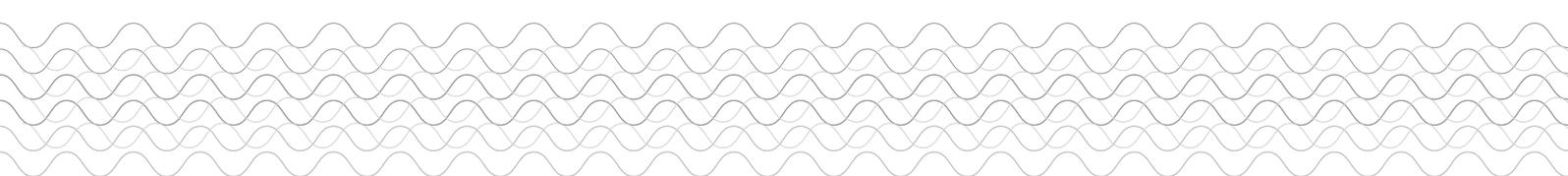
### Mandatory Carbon Market

The most important incentives for the creation of carbon markets were initially the publication of the first report of the Intergovernmental Panel on Climate Change in 1990 and the establishment of the United Nations Framework Convention on Climate Change (UNFCCC) during the Earth Summit. In this 1992 conference, the UNFCCC set the goal of maintaining GHG atmospheric concentrations at safe levels. It was also agreed that all countries should commit to mitigate climate changes and adapt to their impacts. The convention divided countries into two groups: the ones included in Annex I (industrialized countries that have historically affected climate change in an intensive way) and the others (mainly developing countries). The nations were classified according to the principle of common but differentiated responsibilities. It was determined that parties included in Annex I should reduce their GHG emissions to their 1990 levels by the year 2000 (FENHANN & HINOSTROZA, 2011).

In 1997, in the third Conference of the Parties<sup>2</sup> (COP 3), in Kyoto, Japan, 38 industrialized countries and 11 Central and Eastern Europe nations signed an agreement which committed its parties to fulfill legal obligations. It determined that these countries were to reduce their GHG emissions to an average rate of 5.2% compared to 1990 levels between 2008 and 2012 (first compliance period) (HINOSTROZA, 2011).

<sup>1</sup> Examples of existing mechanisms that we do not address in this paper are: sustainable purchasing and bidding, penalties, environmental valuation, green funds, etc.

<sup>2</sup> The Conference of the Parties (COP) is the supreme decision-making body of the UNFCCC and is responsible for ensuring that the Convention's objectives are being met (FENHANN & HINOSTROZA, 2011).



This document, called the Kyoto Protocol, defined three market-based mechanisms to help countries included in Annex I meet their target reduction levels (FENHANN & HINOSTROZA, 2011).

- >> **Emission trading:** it allows countries that have agreed on emission reduction goals (from Annex I) to negotiate an allowance for their emissions in excess of their reduction quotas in the international market, buying and selling according to their needs.
- >> **Joint implementation:** nations acquire emission reduction credits by investing and transferring technology to other industrialized countries where reduction costs are lower.
- >> **Clean Development Mechanism (CDM):** it seeks to steer investments from developed countries towards projects that facilitate emission reduction in developing nations. CDMs may be enforced in the energy, transportation, and forest sectors.

## Box 1: Clean Development Mechanism

The Clean Development Mechanism (CDM) is intended to assist developing nations in reducing or preventing GHG emissions through investments from industrialized countries trying to meet goals set out for them by the Kyoto Protocol.

These investments must promote projects that reduce GHG emissions, contribute to local sustainable development (including social, economic, and environmental aspects) and meet additionality requirements.

The creation of the CDM under the Kyoto Protocol bolstered a series of reduction emission projects in developing countries. It is estimated that over seven thousand projects have been submitted for validation between 2003 and 2011 (HINOSTROZA, 2011). With that, CDM credit offers exceeded the demand. Initially, only the European Union had established its carbon market within the scope of the Kyoto Protocol. Nevertheless, with the growth of this market, the price of a ton of CO<sub>2</sub> fell substantially. Potential projects were not commercially feasible anymore, causing sponsors and executors to abandon this market.

This mechanism came about as the main attraction of the Kyoto Protocol. However, the haziness of the eligibility criteria, the use of the concept of sustainable development with no quantification, and the lack of guaranteed results generated strong debate on its ability to stimulate significant emission reductions and the possibility of CDM-approved initiatives bringing other social and environmental impacts (FURTADO, 2012). This affected its functioning, operation, and credibility (MARCUS, 2013). Moreover, costs and bureaucratic impediments for project approvals within the context of the CDM also hindered investments, which many times ended up being driven to the voluntary market. The uncertainty about the direction that the mandatory market is going to take in the next few years and about the next set of reduction target levels also interfered with the projects' continuity (FENHANN & HINOSTROZA, 2011).

## Box 2: The concept of additionality

The concept of additionality was defined by the UNFCCC as the ability of a CDM project to reduce GHG emissions below those that would have occurred had the CDM project not been implemented. That is, after the establishment of a CDM project, GHG emission levels must be lower than those that would have come about in the most plausible alternative scenario (with gradual reductions or no emission reductions). Nowadays, the concept is applied to the conservation of environmental services initiatives in general. The unit used to verify emission reduction levels is the “Certified Emission Reduction”, measured in tons of CO<sub>2</sub> equivalent that are not released into the atmosphere or that are removed from it through these projects.

Liabilities and mechanisms set in this agreement, put into effect in 2005, gave birth to the mandatory carbon market. This market was created to meet goals and liabilities determined in the Protocol, thus enacting it through its mechanisms and methodologies.

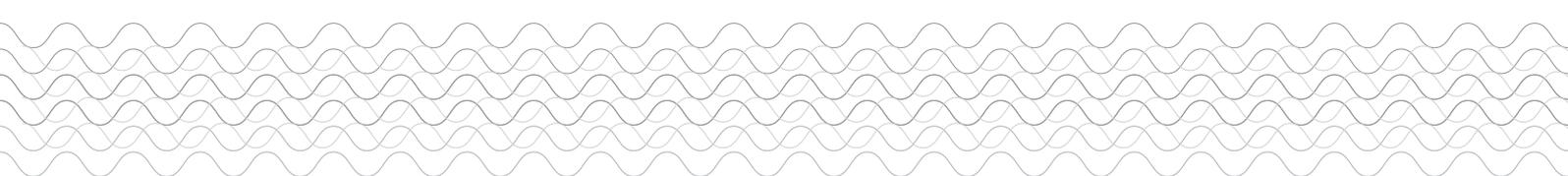
In the past ten years, most activities in the mandatory carbon market were associated with the European Union Emissions Trading System – EU ETS (MARCUS, 2013). This system, created in 2005, is a cornerstone in the mandatory carbon market. It covers 45% of GHG emissions from the European Union, including airline companies and over 11,000 energy facilities and industrial plants in 31 countries (EUROPEAN COMMISSION, 2014).

The EU ETS is operated by allocating and auctioning emission permissions that may be traded and setting an emissions limit for countries that are committed to reducing their emission levels. In time, limits are reduced and a lower number of emission allowances are distributed, compelling nations and companies to define strategies to achieve their goals, invest in reductions in different countries, or acquire permissions from those that reduced their emission levels, making up for their excess emissions. The implementation of projects under the Clean Development Mechanism may also generate compensation credits (offsets) for countries that have no liabilities within the Kyoto Protocol.

Nonetheless, the EU ETS has been strongly criticized due to its makeup and operation. Two of those issues are the quantity of allowances and the feeble condition of emission reduction targets. Experts criticize the excessive amount of emission allowances that, with the European economic crisis and the consequent reduction of industrial activities, caused the price per ton of CO<sub>2</sub> to vary greatly and almost hit zero. This fluctuation in short periods of time shows how difficult it is for the system to provide stable incentives to emitters. Such instability would be reduced if the system defined minimum and maximum prices and created allowance banks to be used in the future.

In regards to reduction targets, they were considered to be too modest in their initial stage. Some claimed that this first phase would be a learning period with the purpose of establishing price baselines and creating infrastructure for the carbon market with no real ambition to see significant reductions (ELLERMAN & JOSKOW, 2008).

In this light, the system has undergone transformations in order to repair some problems. Some of them are: the incorporation of different sectors and greenhouse gases,



the introduction of a single emission limit for the entire European Union, the use of auctions for 40% of allocated allowances as a way of ensuring a minimum price, and the creation of rigorous rules and goals for allocating the rest of the allowances (EUROPEAN COMMISSION, 2013).

Within the scope of debates on the mandatory carbon market, experts wonder if there is any possibility of an intensification of carbon leakage. This process occurs when industrial plants within countries included in Annex I, committed to reducing emissions, migrate to those that do not fall under reduction requirements or do not have restrictive environmental laws. Countries that receive the plants end up showing higher emission levels. This would be furthered by the loss of competitive edge in the nations where restrictions are strongly felt and, consequently, increase of costs. The European system tried to mitigate this issue by freely allocating allowances for industries regarded as high-risk sectors (EUROPEAN COMMISSION, 2013).

Another vehement criticism is that the mandatory carbon market has failed to achieve its objectives. The lack of a new emission limit after 2012 and unproductive debates at the last COPs inhibited initiatives and the mandatory market itself. On the other hand, European emission reductions since the creation of the EU ETS (WRI/CAIT, 2014) reveal that its goals were at least partly reached.

In short, from a market operation point of view, the system seemed to work well. However, it is up for debate whether or not it has truly contributed to mitigation and adaptation efforts (MARCU, 2013), since the majority of recent emission reductions are products of the economic slowdown resulting from the 2008 international crisis. Yet these reduction levels were not enough to prevent pollution sources and intensity from growing, which only increased global emissions by the end of the first compliance period of the Kyoto Protocol (1997-2012).

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### **Box 3: New international agreement for GHG emission reduction**

The first compliance period of the Kyoto Protocol began in 1997 and ended in 2012. However, today, we see a very different scenario from the one the world used to have when the Protocol was first put into effect. Global emissions have drastically increased and science has been warning humanity about impending gloomy consequences related to global warming. Although the COP 18 has determined a second compliance period that continues until 2020 – which again was only agreed on by few countries –, it is extremely important to come up with a new agreement that considers lessons learned and changes that were brought up since then. The COP 17 (2011) and COP 18 (2012) showed how essential it is to settle on a new agreement, which will probably have to be negotiated in two different stages: the first stage at the COP 20, which is going to take place in Lima, Peru, in December 2014; and the second one at the COP 21, scheduled for 2015, in Paris, France. It is expected that the results of these conventions will be put into effect in 2020.

The interpretation of the principle of common but differentiated responsibilities is one of the issues that divide negotiators and nations. According to developed countries, responsibilities and abilities evolve with time. This way, the division of nations in the Kyoto protocol would end up becoming outdated. A new agreement should be based on a dynamic perspective, including commitments for the most important economies in the world in a flexible, programmatic way that considers the fact that economic realities and national contexts are changing. However, most developing nations are against reinterpreting this principle and reclassifying countries among the annexes, highlighting the historical responsibility of developed countries for global warming.

In this light, some authors emphasize that regulated markets with clear objectives would have an important role in the makeup of a new agreement. They also suggest this new agreement should include commitments related to the REDD+ and comment on the importance of assisting the implementation of Measurement, Reporting, and Verification (MRV) programs and private participation in financing mitigation and adaptation to climate change (OLSEN, FENHANN & LÜTKEN, 2013).

The MRV of GHG emissions consists of a series of procedures to estimate, measure, and disclose information with the purpose of determining emitting countries, GHGs emitted, emission sources, and the way the parties bore their responsibilities (FUNDAÇÃO GETÚLIO VARGAS, 2011, p.1).

## Voluntary Carbon Market

The debates at the Conferences of the Parties (COPs), the failure to find common ground between parties involved in international negotiations concerning the climate, and the end of the first compliance period of the Kyoto Protocol in 2012 have stimulated domestic initiatives similar to those of the European Union that were distinct from the liabilities set in the Protocol. The so-called “voluntary carbon market” encompasses carbon credits negotiations that take place apart from the regulations of the United Nations Framework Convention on Climate Change (UNFCCC). It is guided by regular market rules and direct negotiations among interested parties or indirect ones, through mechanisms such as emission register platforms, carbon stock exchanges, and public or private brokers, which define criteria, methodologies, and means of inspecting the generation and negotiation of carbon credits.

These projects are based on initiatives from states, countries, companies and individuals that are not committed to an international agreement and intend to meet private objectives and national commitments when acquiring credits to compensate their GHG emissions (MARCU, 2013; PETERS-STANLEY & GONZALEZ, 2014).

For example, the state of California’s program began in 2012 and seeks to reduce its GHG emissions to its 1990 levels by the year 2020 and to 80% of 1990 levels by 2050 (CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, 2014). This initiative is part of the Western Climate Initiative, a regional cap-and-trade program that promotes alternative methods for reducing GHG emissions. It is made up of individual programs conducted by provinces and states in Canada and the United States of America. Each of them issue emission allowances to reach its specific targets. The sum of allowances forms the general emission limit (WESTERN CLIMATE INITIATIVE, 2014).

As in the mandatory market, it is believed that this emission trading reduces costs, since it provides flexibility so that reductions may occur in a way and on a timeline that emitters deem appropriate. In addition to that, it also stimulates the development of clean renewable energies. The combination of different political units and sectors and agreements and partnerships with other countries allows these parties to help each other satisfy their liabilities (MARCU, 2013)<sup>3</sup>. The same approach that takes place in the CDM - compensation for emissions from sources that are not included in the program (in different places and sectors) - may be used to a limited extent along with emission allowances (WESTERN CLIMATE INITIATIVE, 2014). In this context, agreements with developing nations for elaborating and executing the so-called REDD+ projects are a cause for concern in relation to their social impact on local communities and soil use, such as community displacement and abandonment of traditionally developed activities. Protections included in REDD+ programs are attempts to avoid these consequences.

This mechanism has been considered one of the fastest and cheapest options for mitigating global warming. Since REDD+ deals with emissions resulting from deforestation processes, it is important to highlight its role and relevance in mitigating emissions from developing countries, preserving biodiversity, and creating income alternatives for local populations. Brazil and Indonesia are the two countries most deeply involved in these initiatives.

<sup>3</sup> We can also observe the similarity of initiatives in the mandatory and voluntary markets to execute credit transactions amongst themselves, such as Australia and the European Union (FUNDAÇÃO GETÚLIO VARGAS, 2011; MARCU, 2013).

#### Box 4: REDD+

REDD+ is an incentive mechanism for local, subnational, national, and global initiatives with the purpose of reducing emissions from deforestation and forest degradation and undertaking activities for forest conservation, sustainable management, and enhancement of forest carbon stocks in developing countries (CIFOR, 2013; IDESAM, 2014).

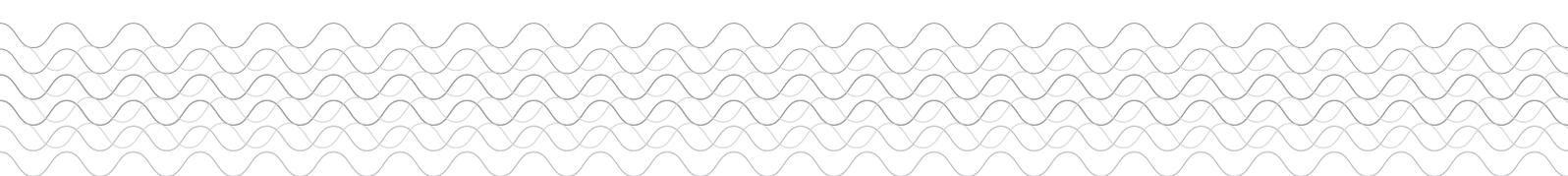
Most initiatives are designed to compensate populations for their environmental services, such as preserving and restoring forest land (see Payment for Environmental Services), providing resources for setting programs that combine economic development with forest conservation (IDESAM, 2014). Therefore, they are not only conducted in areas that are already experiencing significant strain due to deforestation processes.

Although REDD+ has not been officially adopted by the UNFCCC yet this mechanism is a topic under discussion within the CDM to be included in the next international agreement on climate change. This absence limits the scope of a potentially great long-term financing source for REDD+ projects. Today, two thirds of international funding initiatives for these projects come from budgets for development assistance (CIFOR, 2013).

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Nonetheless, specialists worry that these projects may end up affecting and violating the rights of traditional and indigenous people (BONFANTE et al, 2010) by threatening their land tenure, cultural survival, and autonomy to use the area (CARBON TRADE WATCH, 2011). Due to this situation, the UNFCCC set up a series of socio-environmental protections for REDD+ projects during the COP 16 in Cancun (2010), with the intention to ensure that they do not cause negative impacts for local populations. However, the enforcement of these protections is being threatened by a new round of negotiations that may end up removing them from the mechanism. In the COP 19 (2013), the Warsaw Framework for REDD+ defined rules and methodologies for carrying out these projects in order to acknowledge and compensate efforts made by developing countries to reduce forest emissions, in addition to providing further legal security for financial support for REDD+ projects.

Another controversial issue related to the REDD+ concerns the project's real effectiveness in providing additional emission reductions that would not have occurred had the project not been created. For that, some interventions are directed to areas that present high deforestation and forest degradation rates (CIFOR, 2013).



There is yet another much-debated issue: the fact that the CDM and the REDD+ reward polluters with carbon credits. This allows them to partly ignore their GHG emission reduction liabilities, transferring this responsibility to those (such as developing countries) that have never been historically accountable for high pollution levels (CARBON TRADE WATCH, 2011). Also, the concept of additionality is beneficial to polluting nations, since they have the opportunity to purchase credits from countries that have successfully reduced their emissions so that they may maintain their polluting practices. On one hand, defining limits for compensations in different sectors and countries is a way of promoting local reductions. On the other hand, it is believed that these instruments may be a feasible way of protecting forests and reducing carbon emissions from deforestation through financing from developed nations.

## Water Quality Trading

In addition to climate changes, water has also become a great source of concern due to the current production model. Thus, there are some initiatives that count on economic instruments and financial incentives to guarantee its availability and quality: nutrient loading or water quality trading. This market has similar practices to those adopted in carbon markets, though related to the pollutant and effluent loads discharged into the water.

However, water quality trading is very fragmented and does not make up a cohesive market as carbon does. This is due to the fact that every city, watershed, and state sets its own operation rules and policies (STANTON et al, 2010). The element that usually boosts this market is the implementation or the projected implementation of nutrient limits and quality criteria for different sources within watersheds<sup>4</sup>. An example of this reality is the Clean Water Act passed by the United States in 1972 (STANTON et al, 2010).

The number of water quality trading markets have been growing. There are over seventy existing initiatives, mostly in the United States, but also in Canada, Australia, and New Zealand. They are usually related to nutrients such as phosphorus and nitrogen, but some also deal with salinity and temperature, for instance the Hunter River Salinity Trading Scheme in Australia (GREENHALGH & SELMAN, 2012). The main premise of these markets is that the cost for reducing generated nutrient loads varies from source to source according to their measure, location, management, and efficiency.

These systems involve the regulation and setting of limits for water pollution sources. They would allow interested parties to purchase nutrient reduction credits in economically viable places. This scheme encourages parties that can reduce their emissions for a low cost to do so, selling their excess allowance to those that would have to spend higher amounts to treat or adopt nutrient loading reduction practices. Usually, nonpoint source pollution (such as agricultural areas and urban storm drainage) present lower costs than those of point source pollution (such as water treatment system and sewage disposal). Therefore, credit sales to these sources turn into an incentive and a source of funding for the adoption of these practices (STANTON et al, 2010; GREENHALGH & SELMAN, 2012).

<sup>4</sup> Brazil opted for an economic instrument for water quality that is different from emissions trading systems, charging parties for their use of water resources. The income produced by this charging is used to finance studies, programs, projects and work sites to restore and preserve water resources in the watershed related to those charges.

Current initiatives involve different parties. In general, purchasers are industrial and municipal sources of pollution. Sellers are non-regulated nonpoint sources (usually rural properties) and point sources that were able to generate excess credits or had already changed their practices before any regulation was passed. Regulators are those bodies that set forth and enforce the rules and emission limits of the market. When no rules are defined, these bodies are responsible for approving individual transactions, monitoring, and evaluating parties involved (STANTON et al, 2010). It is important that the limits are very strict so that negotiations may occur, since poorly projected limits do not spur immediate reductions, thus not resulting in credit trading demand.

There are different kinds of established markets, which may sometimes be jointly used: netting policies (the same emission source may increase discharges in one place if they are reduced in another place); direct negotiations; clearinghouses; stock exchanges; and third-party brokers. However, transaction costs and deadlines for the parties to meet and settle on the details are frequently mentioned as elements that hinder participation in the programs. In order to solve this issue, clearinghouses and negotiation platforms are used to reduce costs, in addition to providing advice to owners of rural properties and other parties in the negotiation process (GREENHALGH & SELMAN, 2012). Most initiatives also make use of internal data banks and accounting tools, doing without commercial or external registers for transactions. Other parties are also involved in the identification and development of trading opportunities, such as sponsors (usually government ones), consultants, and universities (STANTON et al, 2010).

The combination of incentives in some countries (such as emission taxation, aid for energy efficiency, and the markets previously mentioned) represented a successful strategy. In Denmark, for example, carbon emissions experienced a 25% rate of reduction between 1993 and 2000.

In some cases, emitters may purchase credits to be used in the future. This allows them to plan a long-term reduction process, starting from the moment limits are defined, and mitigate risks associated with the proposal. On the other hand, this model may end up curbing incentives that intend to change practices in a short period of time.

Doubts and suspicions concerning the market operation premises hamper negotiations. For this reason, it is essential that stakeholders are engaged and participate in the process from the beginning through meetings and discussions. Similarly, if one of the parties involved in the negotiations were successful, it would stimulate other interested parties to take part in the procedures and contribute to the promotion of the programs. Due to this exemplary effect, many organizations of rural property owners, such as associations and cooperatives, are invited to participate as a way of engaging target populations.

Finally, it is worth noting that governments play an important role in establishing water quality trading systems by supporting and creating specific legal rules. In general, they also provide financial support and are inclined to collaborate with engaging parties (GREENHALGH & SELMAN, 2012).

## Taxes and Fees

Since the 1990's, taxes for polluting activities and products and the use of energy and natural resources have been internationally imposed, particularly in the European Union. The introduction of these green taxes allows market agents to react freely, incorporating environmental costs for production processes, in addition to encouraging practices that stimulate the rational use of natural resources to fulfill legal requirements (GVces, 2013). These instruments are not as unstable as emissions trading systems, since they have fixed values and are not subject to market fluctuation. Taxes and fees are of a restrictive nature, that is, they burden activities that affect the environment and are commonly related to the production of residue and wastewater, resources usage, use of fertilizers and pesticides, and GHG emissions.

For the strategy to be effective and work within the economic, social, and political context of a nation, it is imperative to evaluate its impact on tax collection policies and public accounts, particularly on taxation principles such as the non-confiscation, the ability-to-pay, and the non-sanctioning nature of the tax, in addition to ensuring that taxpayers in similar situations are treated equally (GVces, 2013). It is also important to assess the influence of taxes and fees on product and service costs and their impact on a country's economic growth, especially if there are no viable alternatives or instruments that stimulate real changes in production processes.

Taxation on GHG and carbon emissions are widely imposed. Usually, countries set prices based on tons of CO<sub>2</sub> equivalent released into the atmosphere. A World Bank study (WORLD BANK GROUP CLIMATE CHANGE, 2014) examined carbon taxation practices in Japan, Mexico, South Africa, Australia, and several European countries. In Europe, the introduction of the EU ETS gave rise to a variation on GHG taxation. The combination of incentives in some countries (such as emission taxation, aid for energy efficiency, and the markets previously mentioned) represented a successful strategy. In Denmark, for example, carbon emissions experienced a 25% rate of reduction between 1993 and 2000.

In 2001, the United Kingdom created a tax related to energy usage for several sectors, along with some exemptions, such as for renewable energy production. It also created a fund with the purpose of financing the introduction of low-carbon technologies. In an attempt to ease the impact on the major consumers of energy, there is a 80% discount of the rate if taxable companies adopt programs and goals to reduce their energy

5 Criado em 2012, o mecanismo de precificação do carbono na Austrália compôs-se, tecnicamente, como um mercado de carbono, mas, como operaria com um preço fixo (aumentado gradualmente até 2015, quando teria início um esquema de negociações sem definição de preços), atuava como uma taxa (WORLD BANK GROUP CLIMATE CHANGE, 2014). Contudo, no final de 2013 o governo australiano revogou a taxa sobre carbono, visando "reduzir os custos de vida através da redução dos custos da energia elétrica e do gás e impulsionar o crescimento econômico, a geração de empregos e a competitividade do país" (DEPARTMENT OF ENVIRONMENT/AUSTRALIA GOVERNMENT, 2014).

consumption and carbon emissions (GVces, 2013). Discounts and similar strategies were also adopted in Denmark and Switzerland (WORLD BANK GROUP CLIMATE CHANGE, 2014).

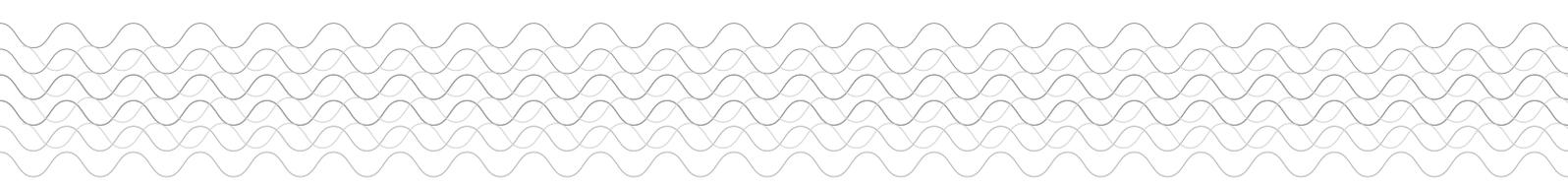
In Mexico and South Africa, current programs allow for the use of offsets that allow taxes related to sustainability to be paid with credits acquired through local CDM projects (WORLD BANK GROUP CLIMATE CHANGE, 2014).

In developing countries, one of the main obstacles for collecting these taxes is the lack of sanitation infrastructure, that is, the fact that a huge amount of users who do not have access to drinkable water through formal services and thus end up getting their water supply in an illicit and unprofessional way. Another relevant aspect is the federal government's difficulty in inspecting and monitoring these demands and activities.

One of the positive effects arising from taxes on environmental pollutants is the decrease of energy demand, which, in some cases, begins with the announcement of its impending implementation. In such instances, there is a resultant GHG emission reduction and incentives for renewable energy production. Yet, one of the negative aspects is the fact that these taxes are not always part of a broad strategy for environmental tax reform.

There is also taxation on the use of natural resources, such as water consumption charges that are imposed in countries like Germany, France, Brazil, Scotland, Mexico, Colombia, and the Netherlands. This charge acknowledges the economic value of water and intends to raise funds to finance improvements and monitoring of water quality and quantity by financing projects from NGOs or public agencies or through actions carried out by the institutions themselves that impose and manage these resources.

These taxes usually incur on the collection and consumption of surface and groundwater, wastewater discharges, and, in some cases, impoundment and treatment of rainwater. The methodology to determine taxation varies greatly and, most of the time, is related to the volume of used water and/or sewage discharge (considering nutrients concentration), but, in some other cases, it is calculated according to sewage treatment costs. Such taxes are usually bound to environmental standards. Pollutant emissions and water use that exceeds standards and volumes set forth by law or permitted by environmental authorities are not allowed (MAGALHÃES FILHO et al, 2013). The instrument that levies taxes on water use may be combined with other management tools. In Brazil and in France, it is conducted in a decentralized way. It also defines social participation mechanisms for co-determining its management practices with the populace by means of Watershed Agencies and Committees.



In developing countries, one of the main obstacles for collecting these taxes is the lack of sanitation infrastructure, that is, the fact that a huge amount of users who do not have access to drinkable water through formal services and thus end up getting their water supply in an illicit and unprofessional way. Another relevant aspect is the federal government's difficulty in inspecting and monitoring these demands and activities.

Other measures being taken to mitigate environmental impacts are the taxes levied with intent to reduce waste generation and stimulate repurposing and recycling. Some examples of these actions are fees for waste collection (combined with exemptions for recyclable and organic waste), such as those charged in South Korea, or charging programs based on the amount of waste that is produced ("pay-as-you-throw"). In this system, citizens are responsible for the costs of their participation in the value chain of each unit of disposed waste. For that, it is important to carry out inspections to guarantee that there is no increase in illegal waste disposal. Charging for packaging materials, such as plastic bags, is another interesting initiative, as observed in Nagoya, Japan (UNEP, 2011).

However, it should be noticed that it is necessary to take precautions to avoid overtaxing sustainable practices, such as the current double taxation on package recycling: first, on its manufacturing with virgin raw material; again, as a recycled good.

## Government aids and incentives

Strategies directed to create green tax policies are not restricted to the imposition of new duties based on the Polluter Pays Principle and the User Pays Principle. They include tax reforms concerning exemptions, donations, and loans for activities that are considered less impactful, public investment in infrastructure, financial aids and incentives to stimulate the development of sustainable activities, and payments for environmental services (UNEP, 2011).

Among these instruments are the incentives to reduce pollution, improve waste disposal conditions, use public transportation, and develop clean technologies.

For solid waste, aid is directed at compensating for regulation, adequacy, and remedy costs for landfills and disposal sites, such as the system in the state of New York, USA. There are also examples of microcredit programs for recycling cooperatives (Brazil) and landfill management cooperatives (Philippines), as well as for joint financing between municipalities to optimize investments in modern technologies for waste disposal and recycling.

Aid for improving public transportation and its usage intend to reduce the traffic of private vehicles. Still, they must be combined with actions that discourage vehicle purchases and the use of highways, fuels, and parking lots (UNEP, 2011).

Aid and incentives to introduce and develop clean production technologies must be highlighted. They provide opportunities for practices that make use of a limited amount of inputs and raw materials, encourage industrial activities that use water in an efficient way, promote water reuse systems (including rainwater), wastewater treatment processes, efficient recycling, etc.

Improvements in the energy area and the use of renewable energies are also encouraged. For example, in Northern Ireland and Scotland, companies that opt for

equipment that make an effective use of energy are eligible to receive tax reliefs to compensate for their investments. In the United States, governments offer tax deductions and credits for sustainable constructions that opt for an efficient energy system, as well as tax reductions for those who install solar power heating systems or purchase hybrid vehicles (UNEP, 2011). Tunisia and Colombia have funds to finance energy efficiency improvements and encourage investments in renewable energies. In Bangladesh, there is a microcredit program for installing domestic solar thermal collector systems, efficient stoves, and biogas plants.

Such incentives allow countries to use certain types of energy that often times are regarded as expensive alternatives, particularly during the transformation process of energy sources. It is very important to encourage initiatives right in the beginning, when systems are still being built and distribution lines adapted (UNEP, 2011). After this initial stage, energy generation costs become more reasonable. Incentives must be promoted by the transference of technology to countries that have no means available to “clean” their energy sources.

In the context of solar and wind power, it is essential to consider their intensity and availability variations. These variations require a larger storage capacity from the system or negotiations established among countries and regions. It is also necessary to direct investments towards adapting power transmission and distribution lines.

These incentives may be provided as tax reliefs and credits and represent potential instruments to change production, consumption, and waste disposal patterns. However, they would not be enough if unsustainable activities were also being encouraged, the so-called “perverse incentives” (i.e., incentives that are detrimental to the environment). For example, this is what happens when tax reliefs are provided to activities that emit high GHG levels, aids to the fossil fuels and automotive industries, users that consume great volumes of water, activities that strongly rely on farm inputs, and overfishing (Valsecchi et al, 2009). According to a study conducted by the International Energy Agency, in 2011 alone, governments worldwide spent around US\$ 500 billion in aid related to the fossil fuel industry, an amount that is six times higher than that granted for renewable energies (INTERNATIONAL ENERGY AGENCY, 2013). The UNEP suggests that this kind of aid be eliminated and that the budget once assigned to those incentives be invested in encouraging a gradual behavioral change in order to redefine the goals and indicators that regulate the process. According to the agency, it is also essential to protect low-income populations from the impact that a reform might bring about (UNEP, 2011). It is estimated that only 8% of this aid is designated for poor communities (INTERNATIONAL ENERGY AGENCY, 2013).

Such incentives allow countries to use certain types of energy that often times are regarded as expensive alternatives, particularly during the transformation process of energy sources. It is very important to encourage initiatives right in the beginning, when systems are still being built and distribution lines adapted (UNEP, 2011). After this initial stage, energy generation costs become more reasonable.

## Payments for Environmental Services

Payments for environmental services (PES) refers to financial compensation to those that adopt environmental conservation and restoration practices. PES intend to make these actions more appealing, pushing those who benefit from environmental services to pay for them. In general, the value is based on the opportunity cost of changes in land use. In this context, experts concluded that the amount paid must be higher than the cost incurred by not enjoying the benefit that would be had had providers not changed their practices (PAGIOLA et al., 2004; FAO, 2007).

Systems for PES focus on four environmental services: carbon sink and emission reduction, conservation of biodiversity, conservation of water resources, and conservation of scenic beauty (WUNDER, 2005; SEEHUSEN; PREM, 2011).

Initiatives dealing with these issues are spreading in countries such as the United States, China, and Vietnam, but particularly around Latin American nations, such as Costa Rica, Mexico, Brazil, Colombia, Nicaragua, Guatemala, Ecuador, and Peru (STANTON et al, 2010). Costa Rica is home to one of the oldest initiatives for PES. It began in 1997 with a national law based on previous experience attempting to reduce deforestation rates in the country. The project allots payments to landowners who decide to adopt practices for the sustainable management of forests, conservation of forests, and wood plantations. The main resources for this program come from voluntary agreements with environmental services users (power companies, water supply, watering and irrigation, and hotels), taxation on water usage, financial support from international institutions, and a 3.5% rate from all taxes collected related to the use of fossil fuels (PAGIOLA, 2008).

Nonetheless, there are variations concerning the source of resources for PES projects and their governance structure. Drivers for these systems may be: i. voluntary interests, which are related to the defense of public interest by nonprofit organizations; ii. private interests or compensations for environmental impacts; iii. government-mediated payments, in which certain agencies purchase environmental services on behalf of society, deemed as the great recipient of such services, and develop and manage programs, usually protected by specific legislation; iv. and environmental regulations, which set flexibility mechanisms and limits, stimulating supply and demand processes for environmental services (SEEHUSEN; PREM, 2011).

Initially, many PES programs find it difficult to lure potential environmental services providers, since landowners are not acquainted with these instruments and are often reluctant to embrace them (PAGIOLA, 2008). Moreover, the amounts paid may have a strong influence on the likelihood of expanding and attracting supporters to programs if their opportunity costs are lower than the value of forgoing land use.

Many times, these programs focus on reducing poverty, integrating social and environmental policies. In developing nations, the impact of PES programs on poverty is more relevant, even if that is not an explicit objective. However, programs for PES that do not incorporate social and economic criteria may produce negative impacts for the target population, such as rural flight, interference in cultural habits of traditional people, and intensification of inequality. That is why it is important to include socio-economic criteria to attract parties to the programs.

The programs for PES must also consider other incentives for providers of environmental services, such as rural credit programs, technical assistance, and land protection to land tenure, once exclusively financial incentives have shown limited impact (PATTANAIK et al, 2010; SEEHUSEN & PREM, 2011). In the same way, PES may discourage sustainable practices by binding them strictly to payments. Hence, they should represent only one of the instruments used to preserve environmental services, being associated with structural measures and other public politics, in order to not interfere in this effort.

Finally, it is crucial to compare benefits resulting from PES programs in providing and preserving environmental services to their introduction and management costs to ensure an adequate choice of such an instrument, taking into account local particularities and the characteristics of the projected program (SEEHUSEN & PREM, 2011).

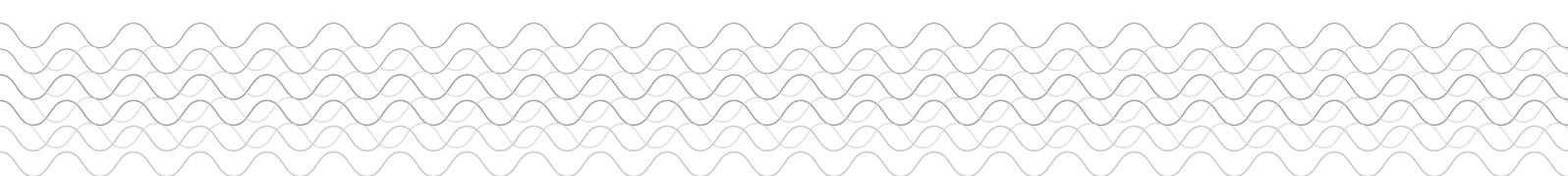
## Conclusions

As seen in the previous sections, the use of economic instruments related to the conservation of natural resources and the promotion of a sustainable development model have been consolidated as a global trend. Nevertheless, economic instruments are not limited to those discussed in this article. Different and original methodologies arise every day, ones that take advantage of this economic logic to solve environmental issues.

These instruments appear as great solutions for the socio-environmental crisis and, therefore, sometimes are not properly evaluated and criticized. However, since they affect all aspects related to sustainability, the local social, environmental, and economic contexts must be analyzed, as well as the arguments for each instrument, so that it is possible to make the best choice among existing options before parties decide to bet all their chips on any of the instruments.

One would be remiss not to highlight that the processes of environmental commercial exploitation have been heavily criticized. In light of this scenario, the socio-environmental crisis would have been generated by the current economic paradigm itself and by the same capitalist production logic on which instruments are based. This approach seeks to shed light on the discussion about development models and show how crucial it is for the environment (FURTADO, 2012).

In general, it is easy to spot the obstacles encountered in the monitoring and assessment of results of the instruments analyzed here. Passing through such stages should be part of any public policy. They are also necessary for the enforcement of economic instruments in order to check if the incentive model is, in fact, bringing the results expected in regards to conservation and restoration, as well as stimulating additionality. To any extent, the lack of proper registry and publication of consolidated and uniform foundations and data hampers the monitoring of this kind of policy, especially in developing nations, due to institutional and governance challenges (PATTANAIK et al, 2010). In this sense, the use of the Measurement, Reporting and Verification (MRV) tool may help to eliminate these problems, both for carbon and other types of markets.



Parties may embrace the solutions addressed in this article in an exclusive or complementary way, depending on the chosen instrument. For instance, emissions trading is seen as an alternative to the taxation of the use of natural resources and pollution. On the other hand, these taxes may generate revenue to be used in PES programs, like the Costa Rica example. Aid and incentives, unlike taxes, fees, and fines, may promote a proactive change, not a punishing one. Unfortunately, they are not enough to stimulate short-term adaptations and innovations. Nevertheless, even if instruments are complementary, it is important to take precautions to avoid overtaxing certain sectors. In addition to that, instruments mentioned in the previous sections should be enhanced by policies that aim to promote technological advancement. However, none of this rescinds the power of command and control strategies, which can promote the development and adoption of sustainable production and consumption patterns (TRAN & LEY, 2012).

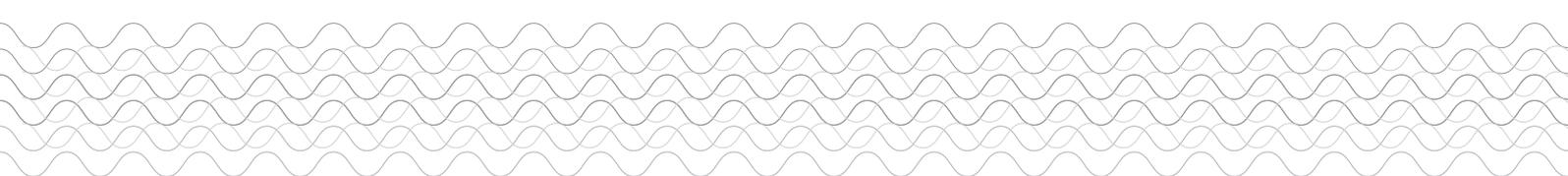
Another important piece is the methodologies used to set values for allowances and permissions. Even for emissions trading, determining minimum prices may be a smart move to make its operation possible. In relation to incentives and impediments, it is important to use and develop valuation methods for environmental services, natural resources, and pollution impacts that allow for estimating environmental externalities and activities' additionality (TRAN & LEY, 2012).

In view of these circumstances, it is clear that the change to a global green economy will demand a significant contribution from investments made by financial institutions, banks, and insurance companies. Still, governments may also play an important role in promoting sustainable development by creating public policies, regulations, and incentives so that companies may adopt new strategies. This should be a joint effort spanning all nations. Brazil may have an essential part in this process due to its economic relevance, ability to generate renewable energy, and biodiversity (UNEP, 2011; GVces, 2013). South-South cooperation initiatives, national development banks, and the recent foundation of the BRICS New Development Bank<sup>6</sup> present other great opportunities for financing activities that do not result in strong social and environmental impacts for developing countries.

6 BRICS is the acronym for a group of five countries: Brazil, Russia, India, China and South Africa. In July 2014, during the 6<sup>th</sup> BRICS Summit, the leaders of these nations signed an agreement for the official foundation of the New Development Bank with the purpose of financing infrastructure projects in emerging countries.

## Key Element

1. Until the first half of the 20th century, the idea of development was intimately related to industrialization. However, since then, growing inequality and the signs of collapse of the world economic system and the environment, affecting the climate, and the availability of fuel, food, and water, have shattered this connection.
2. The United Nations Environment Programme defines “green economy” as one that would improve human welfare and social equity and reduce environmental risks and ecological shortage to a significant extent. During the Earth Summit 92, a socio-environmental concern had already emerged from the concept of “sustainable development”. In this context, the Agenda 21 determines three key objectives: social responsibility, environmental conservation, and economic prosperity.
3. The emissions trading approach is a group of market mechanisms that offer a friendly business environment for pollution and conservation agents to negotiate pollution credits, sharing costs and liabilities on environmental impacts of pollutant emissions and waste generation.
4. The Clean Development Mechanism (CDM) is an instrument created by the Kyoto Protocol to reduce GHG emissions and facilitate carbon sink by countries included in Annex I. The CDM is a means by which developed nations promote sustainability actions in developing countries.
5. REDD+ is an incentive mechanism for local, subnational, national, and global initiatives with the purpose of reducing emissions from deforestation and forest degradation and undertaking activities for forest conservation, sustainable management, and enhancement of forest carbon stocks in developing countries
6. The taxation on polluting activities intends to try to prevent their continuation, encourage practices that stimulate the rational use of natural resources, and allow market agents to react freely, incorporating environmental costs for production processes. These instruments are not as unstable as emissions trading systems, since they have fixed values and are not subject to market fluctuation.
7. Payments for environmental services (PES) refers to financial compensation to those that adopt environmental conservation and restoration practices. PES intend to make these actions more appealing, pushing those who benefit from environmental services to pay for them. In general, the value is based on the opportunity cost of changes in land use.



## Recommendations

1. There are new challenges for the introduction of sustainable economic instruments. One of them is the definition of a new emission limit after 2012, so that gains resulting from climate policies are not lost.
2. Protections included in REDD+ programs must be maintained so that this mechanism continues to be one of the fastest and cheapest options for mitigating global warming. In the realm of PES, it is important to adopt social criteria to avoid negative impacts for local populations.
3. Clear rules for mandatory or voluntary emissions trading are a way of providing legal security to contracting parties and ensuring that environmental concerns are a priority, rather than the market interest to profit from situations.
4. Strengthening Measurement, Reporting, and Verification (MRV) mechanisms to estimate, measure, and get to know the biggest polluting parties, polluting sources, and advancements and delays in meeting liabilities determined in international meetings. It is an important tool to guarantee that responsibilities for pollution are fairly attributed.
5. The enforcement of market instruments directed towards sustainable development should not rescind government command and control strategies.
6. South-South cooperation initiatives and the founding of regional banks, such as the BRICS New Development Bank, present opportunities for financing sustainability.

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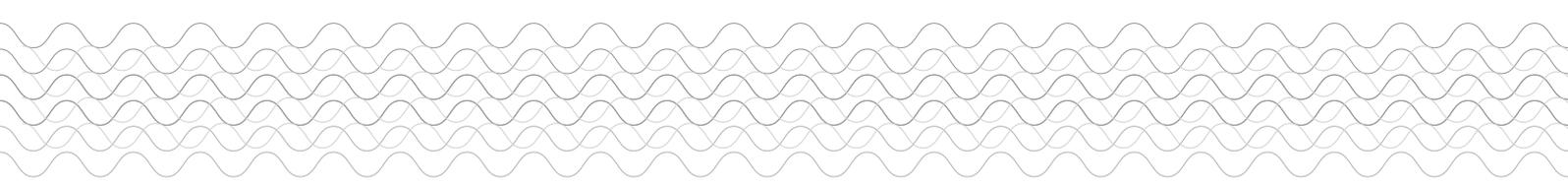
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# PATHWAYS TO THE FUTURE WE WANT >>

The Project “Pathways to the Future We Want” represents the continuance of efforts promoted by CEBRI with the intention to improve knowledge of the international agenda for sustainable development. The main objective of this initiative is to contribute for the public debate, seeking to provide innovative ideas that help implementing the decisions settled by countries in multilateral agreements.

The international experience related to the employment of economic instruments and financial incentives that can strengthen sustainable development constitutes the main topic of this article.

