MÉXICO$_2$
Plataforma Mexicana de Carbono

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Collaborative Instruments for Ambitious Climate Action (CI-ACA) Dominican Republic

Work Package 3

Plataforma Mexicana de Carbono – MÉXICO$_2$

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Executive Summary

Putting a price on carbon based on the polluter pays principle, is one of the most important and powerful policy tools to reduce greenhouse gas (GHG) emissions in an effort to tackle climate change. A carbon price usually comes in the form of a carbon tax, an emissions trading scheme or a hybrid scheme that combines both. With a tax, the price on polluting stays constant, while an emissions trading scheme (ETS) allows prices to fluctuate based on emissions levels.

A carbon tax sends a price signal to businesses and consumers to change their behavior in a way that reduces emissions. Taxes are generally set by modeling the cost of reducing emissions to a specific target, which means that inaccuracies on the model will result in a deviation from the emission reduction target. A carbon tax may be easier and faster to implement, but the impact in emission reduction generation may be difficult to validate.

On the other hand, an ETS limits the amount of emissions through the imposition of a cap on the largest emitters. However, the scientific background and required market infrastructure is time consuming and requires ample consultations with private sector stakeholders.

The Dominican Republic is a steadily growing economy, highly dependent on fossil fuel imports and, being an island state, it is highly vulnerable to the impacts of climate change. Its government is in the process of evaluating options to set a price on carbon as a way to achieve the emission reductions in its NDCs.

This report evaluates the options of implementing a carbon tax, an ETS, a hybrid scheme, and green certificates in the Dominican Republic considering the political, social and economic context of the country. For these, both literature research studies and in-situ studies have been performed, including a series of interviews with the country's stakeholders for this project.

Whereas the country may fulfill most requirements for the development of an ETS, market infrastructure and information barriers would be difficult to surpass. Similarly, a carbon tax may seem a faster and more efficient way to send a price signal to the country's largest emitters, nonetheless the political capital and background needed for the implementation of such a tax pose barriers that are extremely difficult to clear.

Introduction

The following document corresponds to the final deliverable of the CI-ACA project for the Dominican Republic, which comprises the first, second, and third work packages of this consultancy. It involves the preparation of an introductory section with the basic aspects of carbon pricing, as well as brief case studies presenting the main lessons learned from different international experiences (with an emphasis on Latin America) such as carbon tax initiatives in Chile, Colombia, Argentina, Mexico, Jamaica, Singapore, New Zealand, Australia and South Africa. A second section of this document presents the Dominican Republic's social and economic trends, emissions, energy profile, and ongoing national and planned policies. Finally, main findings and a series of recommendations are presented regarding the possible adoption of a carbon pricing mechanism, which include insights retrieved from the visit the consultancy team conducted with the project's stakeholders.

The objective of this document is to provide the government of the Dominican Republic with a solid understanding of the theory and experience of carbon pricing worldwide, present officials with the most widely used carbon pricing market-based mechanisms, namely, carbon taxes, emissions trading schemes and hybrid schemes. Also, other instruments related to renewable energy use like green certificates are mentioned. The methodology used consists on an analysis of existing literature and the compilation and analysis of information gathered during an in-depth approach with the country's stakeholders.

The content of this report has the following structure: the first section is an introduction to the main concepts of carbon pricing and related economic instruments; a snapshot of instruments implemented worldwide will be given including prices and revenues.

The second section consists of a more detailed study of emissions trading schemes (ETS), carbon taxes and hybrid instruments. For both ETS and carbon taxes, the key theoretical components that must be considered for its implementation are studied thoroughly. Hybrid schemes are presented with a more didactic approach through the use of brief case studies. At the end of this section a series of lessons learnt, and a comparison of the mechanisms is made.

The next step is a quick revision of the Dominican Republic's social, political and economic context with the objective of analyzing the possible implementation of carbon pricing instruments, being of special interest are the country's emissions profile, its energy generation matrix, and climate related policies and targets.

Finally, the main findings, assessments of feasibility and acceptance, recommendations and general conclusions regarding the possible implementation of an emissions trading scheme, a carbon tax or a hybrid approach are displayed.

Additionally, Annex I of this document corresponds to the report of the visit to the Dominican Republic, conducted by the consulting team, and the results and comments from the interviews carried out with the country's main stakeholders.

Carbon Pricing

Reasons to put a price on carbon

Carbon pricing is an instrument that captures the external costs of GHG emissions and ties them to their sources through a price, usually in the form of a price on the carbon dioxide (CO_2) or other GHGs[1] emitted. (The World Bank, n.d.)

Carbon pricing has become widely acknowledged as a central pillar in international efforts to tackle climate change. For many years it has been argued that the problem cannot be effectively and efficiently tackled until the multiple decisions through which we emit carbon include the environmental costs involved. Furthermore, carbon pricing provides an incentive for companies to seriously invest in new technologies to remain competitive and reduce costs. (Neuhoff, 2008)

A price on carbon helps shift the burden of the damage from GHG emissions back to those who are responsible for it and can take decisions to avoid it. Instead of selecting who, where, and how should emission reductions be implemented, a carbon price provides an economic signal to emitters, and allows them to decide to either transform their activities and lower their emissions or continue emitting and paying for their emissions. In this way, the overall environmental goal is achieved in the most flexible and cheapest way to both society and the economy. (The World Bank)

According to the Carbon Pricing Leadership Coalition (2015)[2], other strong reasons to adopt carbon pricing are:

- Business and governments agree that carbon pricing is the best way to cut GHG emissions while growing the economy at the same time;
- The prices we pay for goods and services do not usually reflect the cost of the carbon pollution caused by making, distributing or consuming them. Carbon pricing helps internalize this cost;
- Carbon pricing makes good business sense: it creates new markets for low-carbon products and services;[3]
- Carbon pricing is good for the economy as it creates jobs, attracts investment and boosts innovation; and
- Carbon pricing reduces the costs that future generations would have to pay due to climate change.

[1] GHG include: methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6).

[2] Assembled in 2016, Carbon Pricing Leadership Coalition brings together leaders from across government, the private sector and civil society to share experience working on carbon pricing.

[3] Investments made on low carbon technologies have positive internal rates of return: 11% on average. (Reasons Why Carbon Pricing Is The Future, 2015)

Carbon Pricing Instruments

In general, four market-based carbon pricing approaches have been used to reduce carbon emissions globally. These are:

- Emissions taxes;
- Emissions trading schemes (ETS);
- Fuel or input taxes; and
- Hybrid instruments.

(The Climate Reality Project, 2017)

However, of these four, two are more widely used to establish a carbon price. The first occurs when a government levies a tax, duty or charge on the carbon emission (or carbon equivalent) content of fossil fuels or products. The second takes place when a government establishes a quota system in which the aggregate level of emissions covered by the quotas is set equal to the desired level of total emissions (something referred to as the "cap" on emissions) and individual quotas are tradable (emissions trading scheme). (Bowen, 2011) The key distinction being that with a carbon tax the government sets the price and allows the market to determine the resulting quantity of emissions, whereas with emissions trading the government sets the quantity of emissions and allows the market to determine the price. Additionally, in 2017 over 1,300 companies disclosed to CDP[4] that they are using an internal price on carbon (or planned to do so in the next two years), as a tool to mitigate climate-related financial risks, discover new business opportunities and prepare to transition towards a low carbon economy. (The World Bank & Ecofys, 2018)

Hybrid systems, which combine elements of both approaches, also exist in different forms, for example, an ETS with a floor and ceiling price, or tax schemes that accept emissions reduction units to lower the tax liabilities. (PMR & ICAP, 2016).

Economic instruments to fight climate change

The logic for carbon pricing rests on the economic analysis of "externalities", specifically negative externalities - a situation where the activity of an economic agent affects the activity of another agent or group of agents and where that "harm" is not compensated. The concept of "internalizing" externalities by putting a price on them is known as Pigouvian taxes.[5] The principle is to balance the harm done by the activity generating the externality with a price charged to the agent undertaking that activity, with the objective of altering the amount of the activity until a balance is reached and, at the same time, change the pattern of incentives for future investment, consumption and innovation. (Bowen, 2011)

[4] A global standardized disclosure system that enables companies, cities, states and regions to measure and manage their environmental impacts.

[5] Pigouvian taxes are taxes charged on the generator of negative externalities and are named after the economist Arthur Cecil Pigou (1877–1959).

Carbon pricing policies establish a price on GHG emissions to generate economic incentives to businesses and households for an efficient, market-based transition to a low-carbon economy. (CPLC, 2016)

Both emission trading and carbon taxes aim to internalize the costs that carbon emissions impose on society by placing a price on these emissions that can:

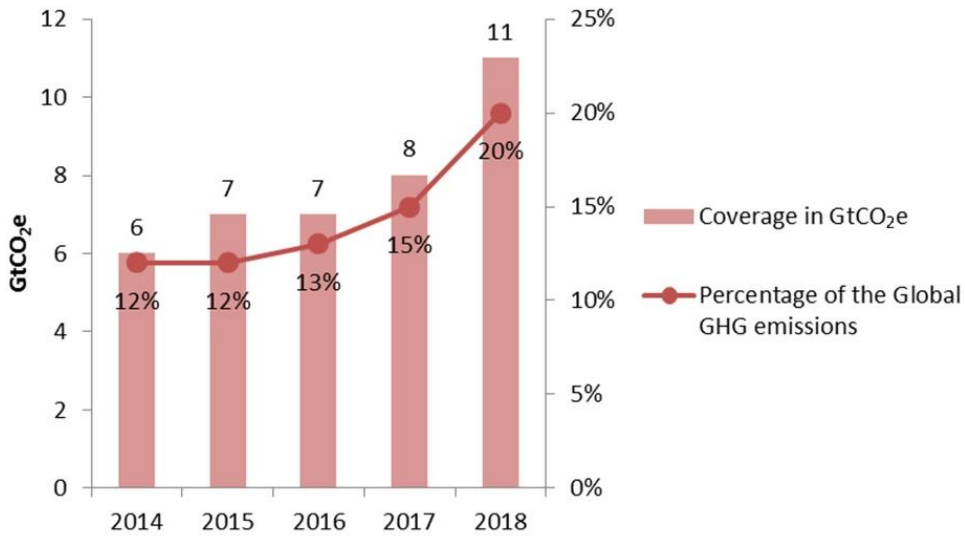
- Promote a change in the behavior of producers, consumers, and investors so as to reduce emissions, but in a way that provides flexibility to actors and decisions;
- Stimulate innovation in technology and practices;
- Generate environmental, health, economic, and social co-benefits; and
- Provide revenue to governments that could be directed to reduce other taxes or increase public spending to fight climate change, or in other areas.

(PMR & ICAP, 2016)

Carbon Pricing Worldwide

As of September 2018, 47 national and subnational jurisdictions had established a price on carbon emissions. Carbon pricing initiatives in force and scheduled for implementation in 2018 would cover 11 gigatons of carbon dioxide equivalent ($GtCO_2e$) which represent about 20% of global GHG emissions, compared to 8 $GtCO_2e$ (~ 15%) covered in 2017.

Figure 1. Global carbon pricing coverage

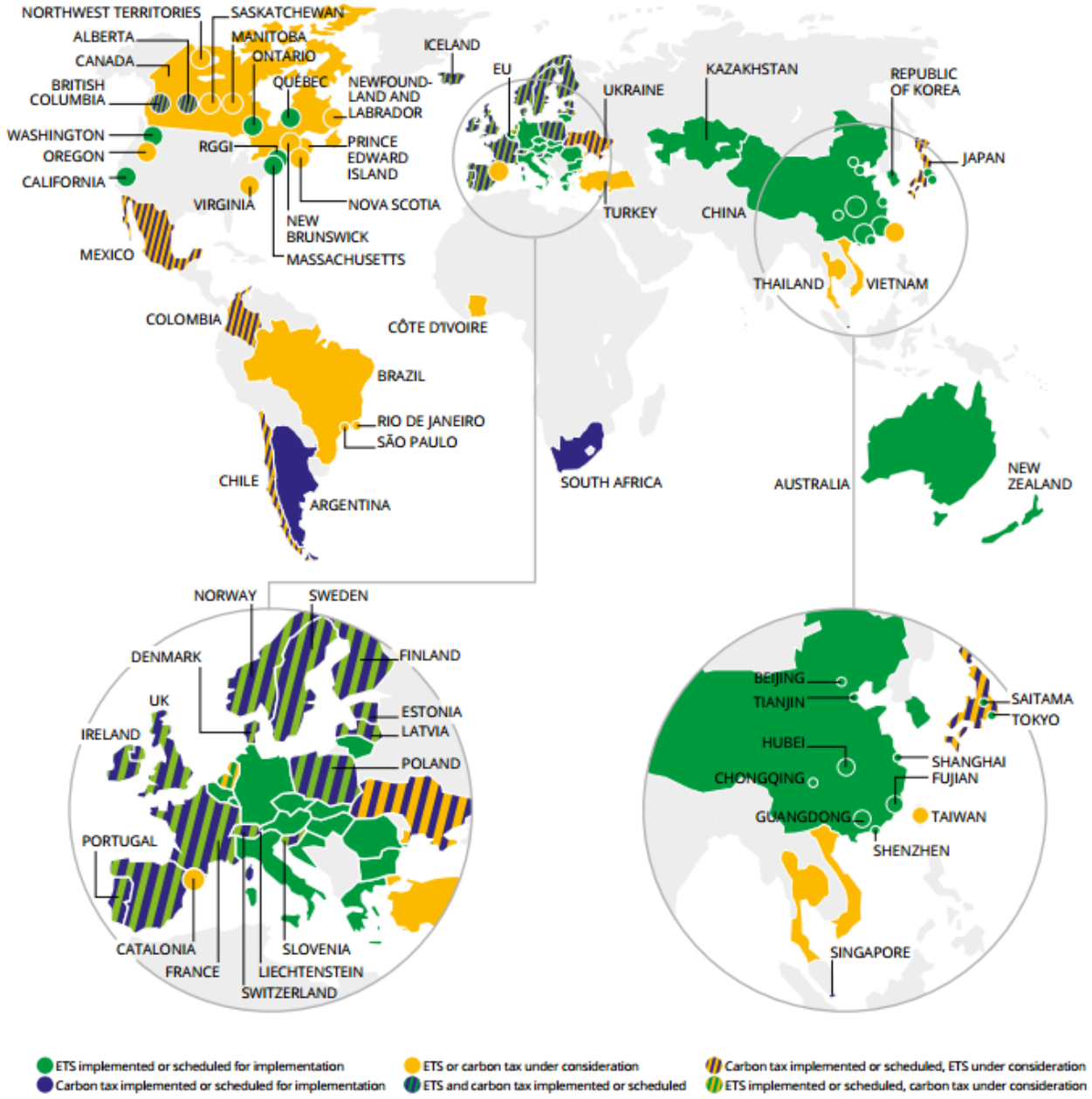


Source: MÉXICO$_2$ based on data from State and Trends of Carbon Pricing, The World Bank & Ecofys, 2018, 2017, 2016, 2015, 2014.

Due to economic and social variables, carbon prices vary substantially worldwide, from less than US\$1/tCO_2e to a maximum of \$126/tCO_2e. Due to the growth in coverage, governments raised

approximately US$33 billion in carbon pricing revenues in 2017, in comparison with US$22 billion in 2016, a yearly increase of 150%.

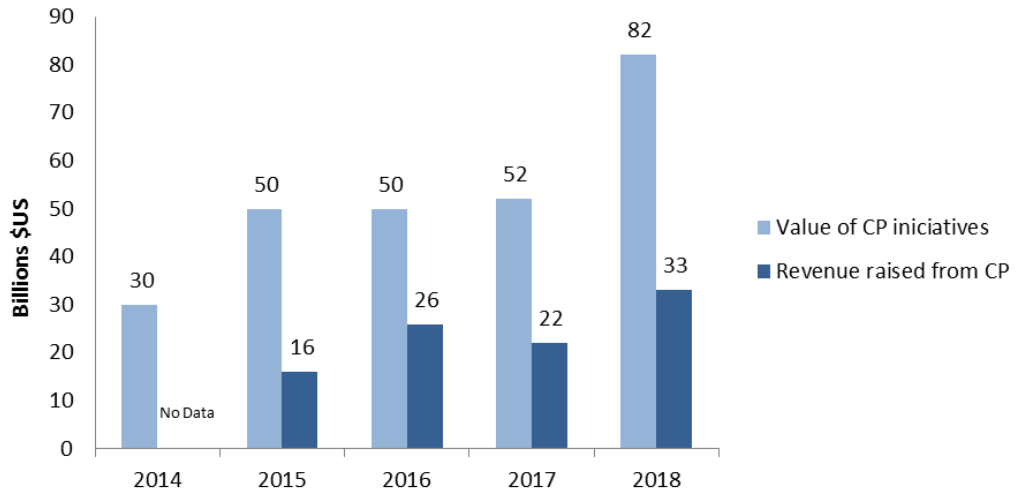
Figure 2. Map of regional, national and subnational carbon pricing initiatives (ETS and carbon tax)



Source: Reprinted from State and Trends of Carbon Pricing, The World Bank & Ecofys, 2018

The price dynamics vary substantially between emissions trading and carbon taxes, making it difficult to calculate aggregate values. However, the value carbon pricing initiatives in 2018 (ETS and carbon taxes) is estimated in US$82 billion. This estimation increased 56 percent compared to 2017. (The World Bank & Ecofys, 2018)

Figure 3. Carbon pricing initiatives value and revenue



Source: MÉXICO$_2$ based on data from State and Trends of Carbon Pricing, The World Bank & Ecofys, 2018, 2017, 2016, 2015, 2014.

Carbon Pricing Approaches

This section presents two of the most widely used carbon pricing approaches, namely, an emissions trading scheme and a carbon tax, as well as hybrid schemes derived from the combination of both. Two-thirds of all submitted Nationally Determined Contributions (NDCs) under the Paris Agreement consider the use of carbon pricing to achieve their emission reduction targets. This means over 100 countries are looking into carbon pricing as a way to achieve their NDCs through international trading of emissions, offsetting mechanisms, carbon taxes, and other approaches. According to the World Bank, using carbon pricing approaches on a large scale to meet the emission reduction targets set in NDCs could reduce the cost of climate change mitigation by 32% by 2030. (UNFCCC)

Emissions Trading Schemes

What is an Emissions Trading Scheme?

Also called "cap and trade", it is a market-based instrument for climate change mitigation. In an ETS, a regulator defines an upper limit (the "cap") of GHG emissions that may be emitted in certain sectors of the economy: it is the scope and coverage of the system. (ICAP)

Although all ETS are different and respond to different emissions, economic, social, and political contexts, they can be grouped in two main types:

- Emissions trading schemes, which apply a cap or absolute limit on the emissions within the ETS and emission allowances are distributed, for free or through auctions, for the amount of emissions equivalent to the cap.
- Baseline-and-credit systems, where baseline emissions levels are defined for individually regulated entities and credits or emission allowances (EA) are issued to entities that have reduced their emissions below this level. These EA can then be sold to other entities exceeding their baseline emission levels. (The World Bank)

How does it work?

Under an ETS, the government imposes a cap (a limit) on total emissions in one or more sectors of the economy, and issues a number of tradable emission allowances (EA) that do not exceed the level of the cap. Then, the regulated participants are required to surrender one EA for every unit of emissions (usually one ton of CO_2 or expressed as one tonne of CO_2-equivalent) for which they are accountable. By imposing a binding limit, a cap creates an allowance scarcity and a market price. Increasing the scarcity over time should generate sufficiently high and stable market prices to induce continuous and consistent carbon abatement. (Zeng, Weishaar, & Couwenberg, 2016)

Figure 4. Sector coverage in ETS initiatives worldwide

Source: Reprinted from Emissions Trading Worldwide: Status Report 2018, ICAP, 2018.

As seen in the table above, different ETS cover different sectors. This selection responds to the specific emissions of each jurisdiction, and different economic and political contexts. The most commonly sectors covered are the power sector and the industry sectors.

Monitoring, Reporting and Verification

Prior to any imposition of limits to emissions, it is necessary for all jurisdictions to analyze the quantity and location of the emissions under its control. The process by which an emitter communicates this information is called monitoring, reporting and verification (MRV).

The MRV procedure typically takes place once a year and involves a series of steps companies should undertake either at a company or facility level:

Monitoring

- The monitoring plan must consist of detailed, complete and transparent documentation of the monitoring methodology used in a specific facility or regulated entity and must contain, at least, the elements established by the regulator. (Glowacki, 2018)
- Different monitoring methodologies may apply depending on the instalation, for example: direct physical measurement of GHG emissions, estimating emissions utilizing activity data and emission factors, or calculating changes relevant to sustainable development. (WRI, 2016)

Report

- The report is the communication to the authority from a regulated entity on its emissions of GHG in a given period and under specific pre-established parameters, such as: gases to be reported, frequency of measurement, equipment calibration protocol and procedures, QA/QC and how long records should be kept.

Verification

- Verification is carried out when an independent third party reviews an emissions report and evaluates whether the information is a correct estimate based on available data. (PMR, ICAP 2016) To guarantee the quality of third-party verifiers, the system must have a third-party accreditation process.

Depending on the technical and institutional design of the MRV system, there are different ways of identifying the regulated covered entities. Among the most common are:[6]

- Individual companies;
- Specific plants or buildings; or
- Certain production lines or processes.

These entities can be determined in different two ways:

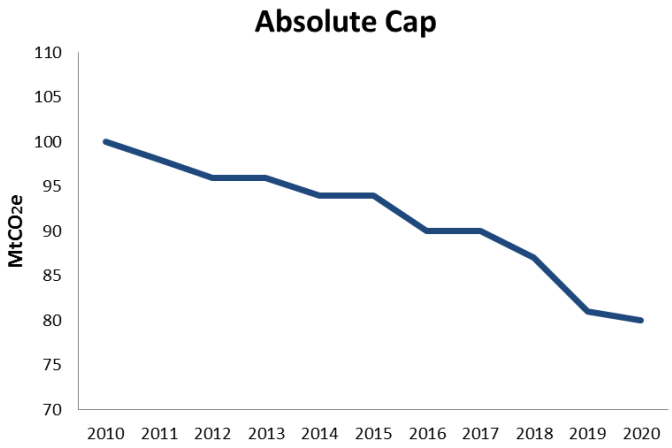
- Through self-nomination (i.e. self-reporting of the entities); or
- Regulator selection.

Cap Setting

Emissions can be limited either by an absolute cap on the quantity of emissions or by some maximum permissible intensity relative to some measure of output or input (generally GDP or energy). (Ellerman & Sue Wing, 2003) Both, absolute and intensity limits, must express a true intent of being mandatory in the sense of imposing sanctions to non-compliant entities covered under the ETS.

An absolute cap refers to the fixation of the maximum amount of emissions in the system. This creates a scarcity of emission allowances and, therefore, incentives for abatement. (Zeng, Weishaar, & Couwenberg, 2016)

Figure 5. Absolute cap



Source: MÉXICO$_2$; illustrative only.

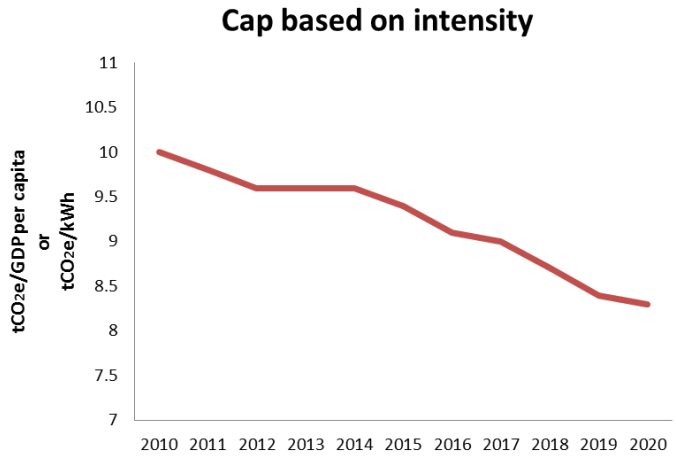
[6] (PMR & ICAP, 2016)

Intensity can be defined as the physical quantity of emissions per unit of some measure of input or output. It can be formally expressed as:

$$\gamma = \frac{Q}{E} \quad \text{Or} \quad \gamma = \frac{Q}{Y}$$

Where:
γ = Intensity
Q = Quantity of emissions
E = Energy
Y = Gross Domestic Product (GDP)

Figure 6. Cap based on intensity



Source: MÉXICO$_2$; illustrative only.

Sue Wing and Ellerman (2006) demonstrate that both, absolute and intensity limit, options are identical when there is no uncertainty about the future; for example, when GDP forecasts are known upfront with no room for miscalculations. Also, according to their studies, the limit approach implemented will also have a direct effect on the required level of abatement and its associated costs when the uncertainty factor is considered. For example, if GDP growth is greater than expected, an absolute cap will require more abatement, thus incurring in higher costs compared to an intensity cap; however, if GDP growth is lower than expected, it is the intensity cap that will require greater abatements (and higher costs).

Establishing the cap is of extreme importance to the success of an ETS program. In most systems the first compliance period is mandated with an initial cap, and over time the cap is adjusted downward to become stricter or wider to include new sectors covered. This adjusting period has a twofold intention; one is to allow regulated entities to adapt their behavior to comply, and the second is to support the creation of the often-complex regulatory apparatus that must be enacted to allow the ETS market to

function and minimize the disruptive economic effects of new regulation. (The Climate Reality Project, 2017)

Setting the cap right has often been considered as the most challenging task in establishing ETSs:

- If the cap is set too high (meaning that it is not ambitious and allows a lot of GHG emissions), the result could be that market prices for EA are too low, giving a too weak incentive to reduce emissions. In this case, the ETS may not contribute enough to curb emissions in the country and even attractive mitigation opportunities at low cost are not mobilized.
- If the cap is set too low (meaning that it is extremely ambitious would not allow a lot of GHG emissions), the result could be that market prices for EA are too high, giving a very strong incentive to reduce emissions, but causing concerns on the impact on the cost to entities covered.

The following solutions to address the difficulty of "setting the right cap" have been identified:

- Using an intensity-based cap, as this will adjust the cap in accordance to output levels
- Starting an ETS with a pilot/trial phase after which the cap is adjusted
- Starting with a fixed price, letting emission levels adjust accordingly to this price signal to then set the cap accordingly. This was in particular done in Australia for the fiscal year 2012-2013 as part of the former Australian plan to establish an ETS. Similarly, it could be used a fixed carbon tax to start and transitioning later on to an ETS.

The Registry

Within an ETS, it is necessary to keep a record of all the EA allocated as well as all transactions, thus allowing adequate monitoring and oversight. All EA are reflected at all times in a registry. Emissions trading registries are information technology databases that assign a unique serial number to each emission allowance and track those serial numbers from their issuance onward. This includes information on who has been issued allowances, who holds those allowances (as well as offsets), and when and by whom EA are surrendered or canceled. (PMR, 2017)

The establishment of a registry is a time consuming task and often demands the creation of new capacities within the regulatory body. Some of these tasks are:[7]

- The creation of a legal framework;
- Administration of the registry;
- Design and operation of technical and functional requirements of the registry; and
- Registry oversight, including fraud prevention mechanisms as well as access to market information by all participants or the general audience.

[7] (PMR & ICAP, 2016)

Some governments have decided to subcontract the design and oversight of the registry. However, a certain degree of involvement is always required.

Allocation

There are three alternative methods for allocating permits in an ETS: free allocation, an allowance auction, or a combination of both. (The Climate Reality Project, 2017) Almost all ETS have started with broad and free allocations, later transitioning to a larger amount of EA being allocated through auctions.

A **free allocation** means that government distributes allowances to regulated entities with zero cost. This effectively mean that covered entities do not have to bear the "carbon cost" for the share of emissions for which they receive free allowances. There are two allocation methods mainly used:

- *Grandfathering:* allowance allocations are determined by a historic emissions level for industry participants.
- *Benchmarking:* allowances are distributed according to an industry baseline. This method often requires more, and accurate, information from all covered sectors or industries since an emissions rate for each one must be calculated. Nevertheless, many jurisdictions have already developed such benchmarks.

Finally, it should be noted that a combination of both solutions can be used with X% of allocations distributed based on grandfathering and Y% distributed based on benchmarking.

When adopting allocation through auctions, allowances are sold through a regulated auction mechanism. The main benefit of an auction is the generation of the first price signal for tradable EA. This price functions as a benchmark to implement abatements within the covered entities. Secondly, they collect financial resources for the government, which in theory, can be used for other climate-related programs.

Table 1. Revenue use from auctions in California and the EU ETS

Jurisdiction	Revenue use from auctions[8,9]
California	Most of California's revenue from auctions goes to the Greenhouse Gas Reduction Fund. The fund invests the proceeds in projects that reduce GHG emissions, for instance, projects related to: natural resources and waste, transport and sustainable communities, clean energy and energy efficiency, and direct bill assistance. Additionally, at least 25% is used to benefit disadvantaged communities

[8] Analysis of the use of Auction Revenues by the Member States (European Commission, 2017)

[9] From Carbon Market to Climate Finance: Emissions Trading Revenue (ICAP, 2016).

European Union ETS (EU ETS)[10]	In the European Union, each member state decides how to use their auction's revenue; however, at least 50% should be used to support the achievement of specific climate and energy activities. The EU ETS Directive (Article 10) lists the climate and energy objectives and/or measures on which the money should be spent. Member States must report annually on the use of these revenues.

In a hybrid allocation scheme (which is usually the case in the existing ETS) a share of the allowances is given free of cost to the regulated entities while the rest is auctioned. The proportion of free allocation and auctioned allowances may change over time, to favor the latter.

By the end of a defined time period, each covered entity must surrender a number of allowances corresponding to their emissions during that period. Installations that have emitted less than the number of allowances they hold can sell any excess to other participants in the scheme. Entities with low abatement costs thus have an incentive to reduce their emissions, while those facing higher costs can elect to comply by purchasing EA from the market. (ICAP, n.d.) The participation of non-covered entities –typically financial institutions such as brokers– is welcomed, since it can increase transactions and price liquidity.

Price Formation under an ETS

Under an ETS, time-varying market prices provide the signals that will allow covered entities to achieve a given quantity of emissions at the lowest cost possible. (PMR & ICAP, 2016) These prices can be affected by a set of variables like: economic activity, volatility in other markets (e.g. energy), uncertainty of the emissions reductions marginal cost estimates, and possible changes in public policies.

Market intervention or safeguards becomes necessary to reduce price uncertainty in the long term and ensure the proper operability of the system. This will favor investments in mitigation initiatives, and in research and development of new technology.

There are some factors that can derive in high price volatility within an ETS and make compliance more difficult for the regulated entities. They include:

- External factors: Significant changes in the level of economic activity and associated emissions can result in large and permanent changes in prices. For example, the 2008 financial crisis and the

[10] The EU ETS is the world's first GHG ETS and represents the central pillar of the European Union's climate change policy. It is integrated by all 28 EU member states, Iceland, Liechtenstein and Norway

subsequent recession was one of the key drivers of the EU ETS falling prices between 2008 and 2017.[11] (PMR & ICAP, 2016)

- Regulatory uncertainty: Changes, or the possibility of changes, in key parameters of an ETS or in the set of public policies on climate change can cause considerable price alterations and generate uncertainty about the future of the system, therefore increasing the risks for investments in emission reductions.

- Market failures: They can lead to the formation of very high or too low prices, distorting the system and, in turn, preventing price adjustments through supply and demand. An example of this was the adoption of very high discount rates and the provision of incomplete or asymmetric information, during the first phase of the ETS in the European Union (EU ETS) from 2005 to 2007.

Price-based and quantity-based mechanisms can be used to reduce price volatility in a system. Price-based mechanisms seek to increase prices when they are below an established threshold and impose maximum limits on prices. Quantity-based mechanisms are intended to limit the number of emission allowances in circulation. For example, at a predefined price level, a reserve of emission allowances can be activated and add or subtract emission allowances from the market. In principle, these two instruments combined can create a range of minimum and maximum prices, known as a price collar.

The Regional Greenhouse Gas Initiative (RGGI)[12] program includes a reserve price for auctions that puts a lower limit on eligible bids and serves as a price floor. The program also features a price ceiling and a regulator's reserve stock of allowances that can be added to the auction quantity to prevent the auction closing price from rising above the ceiling. (Holt & Shobe, 2015)

In the European Union, the Market Stability Reserve (MRS), which is a long-term measure to tackle EA surpluses in the market and to improve the system's resilience to market shocks, will be activated when a certain level of EA are in circulation. This mechanism will come into force in January 2019 and will operate according to pre-defined rules that will leave no room for discretion on its applicability. (European Commission)

[11] It was not until recently that prices in the EU ETS scaled up to 18€ per EA.

[12] The RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO_2 emissions from the power sector. (RGGI, Inc., 2018)

Table 2. Prices under functioning ETS

Jurisdiction	Price in USD$/$tCO_2e$
European Union	24.51
Alberta	23.25
Korea	19.48
New Zealand	16.65
California	15.43
Ontario[13]	15.43
Quebec	15.43
Beijing pilot	10.19
Switzerland	8.28
Tokyo	5.86
Shenzhen pilot	5.71
Saitama	5.4
RGGI	4.56
Shanghai pilot	4.27
Hubei pilot	4.01
Fujian pilot	2.74
Guangdong pilot	1.9
Tianjin pilot	1.7
Chongqing pilot	1.14

Source: MÉXICO$_2$ with information from The World Bank as of September (2018).

Table 3. Price control mechanisms and market participants

Price-based	Minimum price for auctions.
	Price collar as a combination of market interventions when prices are low or high.
Quantity based	Controls prices by adjusting the limit of emissions compensation (offsets) allowed for compliance.
	Creation of an EA reserve that holds and releases EAs to ensure supply.
Surveillance	Market surveillance by a third party.

[13] In July 2018, the newly elected government of Ontario has announced its intention to withdraw the province from the Western Climate Initiative. (Government of Ontario, 2018)

Linkages

The concept of "linkage" refers to an ETS in which regulated entities can use the emission allowances or offsets issued in a different jurisdiction to comply within their own. Linkage is a multi-faceted policy decision that can be used by political jurisdictions to achieve a variety of objectives, and produce direct or indirect connections among regional, national, and sub-national ETS. This growing network of linkages may turn out to be a key part of future hybrid climate policy architecture. (Ranson & Stavins, 2013)
Linkage has both pros and cons:

Pros	Cons
-Decreases aggregate compliance costs. -Increases the size and liquidity of the market. -Increases robustness, price stability and predictability. -Widening the coverage reduces concerns about carbon leakage. -Increases administrative efficiency. - Larger and more attractive market which can better attract investments - Benefit for "net buyers in market" which access to mitigation opportunities at lower cost. - Benefit for "net sellers" in the market which receive investments in mitigation action. - Increase climate change cooperation among linked partners.	-Alteration in the price balance of EA. - The jurisdiction no longer controls alone the price -May import risks from another jurisdiction (price volatility, change of policies, surveillance, etc.). -Alienation must be done for the design characteristics of the participating ETS.

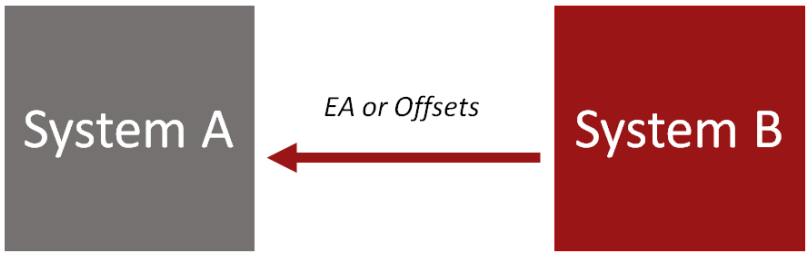
Types of linking

Empirical evidence shows there are three types of linking between ETS:

Unilateral

When an ETS accepts the emission allowances or offsets of one or more systems to fulfill compliance but not vice versa, therefore, these emission allowances flow in only one direction. An example of unilateral linking can be found in Norway which has a unidirectional agreement with the EU ETS where regulated entities in the country can buy European emission allowances, but not vice versa.

Figure 7. Unilateral linking example

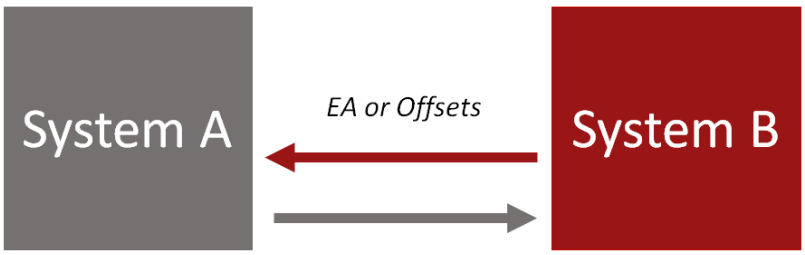


Source: MÉXICO$_2$; illustrative only.

Bilateral

Emission allowances or offsets generated in an ETS can be used without restrictions for compliance with obligations in one or more different systems and vice versa. The California – Quebec and the Switzerland - EU[14] schemes can fall into this categorization.

Figure 8. Bilateral linking example



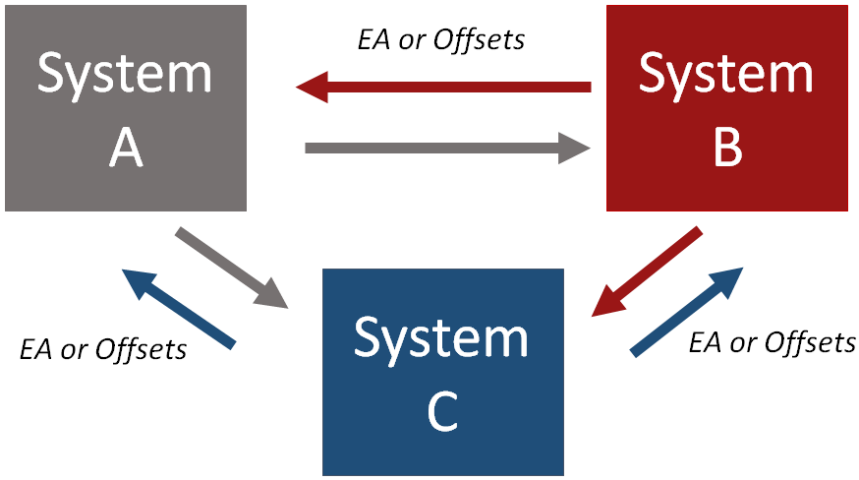
Source: MÉXICO$_2$; illustrative only.

[14] (European Commission)

Multilateral

When several bilateral systems are connected to each other, a multilateral linkage is formed. The Western Climate Initiative (WCI)[15] and the Regional Greenhouse Gas Initiative (RGGI) are systems linked multilaterally.

Figure 9. Multilateral linking example



Source: MÉXICO$_2$; illustrative only.

Indirect

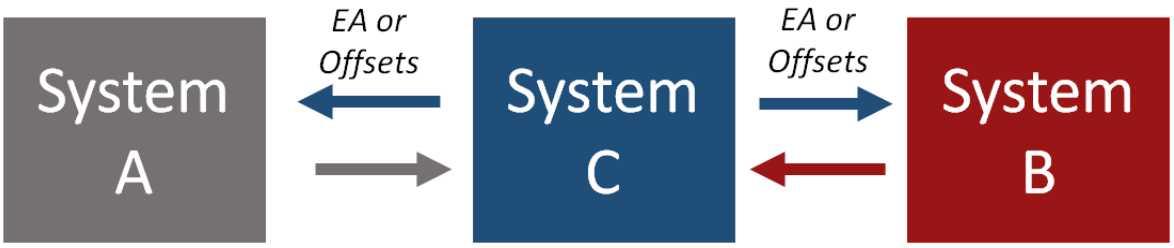
This type of linkage occurs when two systems are not directly linked to each other, but both are linked bilaterally with a third system in common. Through the Clean Development Mechanism[16] (CDM), the New Zealand ETS is linked to the European Union through the use of Certified Emission Reductions (CER).

[15] The new elected government of Ontario has announced its intention to withdraw the province from the WCI. (Government of Ontario, 2018)

[16] The Clean Development Mechanism (CDM) was introduced by the Kyoto Protocol to the UNFCCC as a flexible mechanism to help Parties cost-effectively meet their emission targets. Emission reduction projects in developing countries can generate Certified Emission Reductions (CERs) that could be traded in emissions trading schemes in developed economies.

The CDM has grown into one of the most important carbon market instruments internationally. From 2001, which was the first year CDM projects could be registered, up to mid-2012 a robust market for CERs developed. However, due to a variety of factors, the CERs market had collapsed by the end of 2012. While they fluctuate somewhat prices remain well under US$1 in 2018. The Paris Agreement establishes a new mechanism that replaces CDM after 2020, but until the market comes into force, prices may well remain quite low. How the new market after 2020 will be operationalized is not yet clear. The ongoing low prices for CERs poses a risk to the continuation of CDM and related projects, resulting in thousands of dormant or partially completed projects that do not have sufficient certainty of financing or future cost reimbursement to finish construction and/or for ongoing operation.

Figure 10. Indirect linking example



Source MÉXICO$_2$; illustrative only.

Institutional arrangements for ETS linkage

Depending on the linkage type, different agreements can be made between participant jurisdictions, for example a formal treaty, a non-binding agreement or a memorandum of understanding (MoU). Although the institutional arrangements will depend on each particular agreement, the most common characteristics are:

- Sectors and gases coverage.
- The nature of the emission limit (absolute / intensity of emissions, mandatory / voluntary).
- Rigorousness over the limit.
- Auctions and free allocations.
- EA allocation rules.
- Offsets (quantity and quality).
- Commitment periods.
- Compliance periods.
- Banking[17] and borrowing[18] of EA.
- Stability and cost containment mechanisms.
- Strength of the MRV system
- Registry and monitoring of EA.

Enforcement of an ETS

Although there is no unique roadmap for the implementation of an ETS, it is possible to identify three critical phases, which are present in most ETS worldwide:

Pre-implementation

This phase can be very useful for both the public and private sectors to prepare for the implementation of an ETS. One fundamental element of this process is the creation of a normative framework that serves as the basis for the proper functioning of the ETS. A second element is the establishment of procedures for a MRV system and data collection.

[17] Flexibility mechanism that allows regulated entities to accumulate EA that they did not use in the current period to use them in subsequent compliance periods.
[18] Flexibility mechanism that can be described as the use of EA of future years for current compliance, that is, to use the free allocated EA of future years for the current compliance period as long as there is a compromise to deliver in future an equal or greater number of EA (to pay the "loan" of EA).

Finally, the organizations to support the ETS and the development of commercial platforms to facilitate consultations and strengthening capacity building should be designated and stakeholders of all sectors identified. Additionally, the bases for the implementation of an eventual pilot program can also be established.

Pilot

Each jurisdiction may choose to include a pilot phase in the implementation of an ETS. There are several cases to illustrate this, for example, the European Union (3 years pilot phase), Kazakhstan (1 year pilot phase) and, more recently China (its 7 pilots started their first compliance period between 2013 and 2014), which had a trial period prior to the formal launch of the ETS and the launch of the national ETS in January 2018. On the other hand, California began in 2013 its first compliance period of its ETS without introducing a pilot phase.

Some of the advantages of adopting a pilot phase are:

- Test public policy, allocation methodologies and institutional framework of the ETS;
- Strengthen public and private capacities prior to the formal implementation of the ETS;
- Provide valuable information for the improvement of public policy based on the results obtained;
- Determine possible information gaps;
- Identify challenges when implementing the ETS (e.g. low level of compliance, amount of penalties, among others); and
- Complement the development of the market infrastructure necessary for the optimal operation of trading systems.

Gradual implementation

Public policy makers can also opt for a gradual implementation scheme, that is, a phased introduction of the elements that will compose the ETS within defined periods. The main difference with a pilot phase is that the latter contemplates an ETS final design from the very beginning.

Just like a pilot phase, gradual implementations have a number of advantages, including:

- Review the effectiveness of the elements composing the ETS and, where appropriate, determine the actions necessary for its improvement;
- Strengthen capacities for the effective operation of the ETS, serving as a prelude to the introduction of more complex compliance rules;
- Reduce the initial costs related to the implementation of the ETS;
- Make the necessary arrangements in the regulatory frameworks related to the ETS; and
- Provide certainty about compliance.

Participant entities in the ETS

One of the biggest challenges when designing an ETS has to do with establishing market participants. First, the number of covered entities must be enough to provide the market with sufficient liquidity reflected in healthy EA prices and financial transactions.

For an ETS to bring economic efficiency gains and to allow participants to exploit the lowest-cost mitigation options, it is imperative to have well-functioning markets with sufficient numbers of participants. If the opposite happens and there is a very limited number of buyers and sellers in the market, ETS participants can incur substantial transactions costs, limited efficiency gains, and the risk that individual firms can gain enough market power to distort the efficient use of emissions allowances. (The Climate Reality Project, 2017) Also, it is important to remember that higher numbers of covered installations means a higher number of abatement projects implemented and, in consequence, higher GHG emissions reductions.

Finally, it is of particular interest the role of the financial sector in an ETS as it will serve as an EA trading facilitator. In this sense, the financial sector should be one of the most interested actors in the implementation of this mechanism and its engagement during its design will be critical.

Table 1. Number of covered entities and sectors by jurisdiction

Jurisdiction	Type	Number of covered entities	Sectors covered
Massachusetts	Subnational	21	Energy
Switzerland	National	56	Industry
Tianjin	Subnational (pilot)	109	Energy, industry
Quebec	Subnational	60	Energy, industry, buildings and transport
RGGI	Regional	165	Energy
Kazakhstan	National	225	Energy, industry
Chongqing	Subnational (pilot)	237	Energy, industry
Fujian	Subnational (pilot)	277	Energy, industry and aviation
Guangdong	Subnational (pilot)	296	Energy, industry and aviation
Shanghai	Subnational (pilot)	298	Energy, industry, buildings and aviation
Hubei	Subnational (pilot)	344	Energy, industry
California	Subnational	450	Energy, industry, buildings and transport

Korea	National	599	Energy, industry, buildings, transport, aviation and waste
Saitama	Subnational	600	Energy and buildings
Shenzhen	Subnational (pilot)	824	Energy, industry, buildings and transport
Beijing	Subnational (pilot)	943	Energy, industry, buildings and transport
Tokyo	Subnational	1,300	Energy and buildings
China	National	1,700	Energy
New Zealand	National	2,360	Energy, industry, buildings, transport, aviation, waste and forestry
EU ETS	Supranational	11,000	Energy, industry and aviation
Total		**21,810**	
Mean		**1,150**	

Note: In Mexico, a pilot phase for the implementation of an ETS will start in January 2019 and will cover 300 facilities. Source: MÉXICO$_2$ with information from ICAP (2018) .

Direct Pricing

Carbon Tax

A **carbon tax** directly establishes a price on carbon by defining a tax rate on GHG emissions or, more commonly, on the carbon content of fossil fuels. It can be applied either upstream or downstream. (Carbon Pricing Leadership Coalition) Carbon taxes work by sending a price signal to businesses and consumers to change their behavior in a way that reduces emissions. (PMR, 2017) Taxes are generally set by modeling the cost of reducing emissions relative to a specific target, which means that inaccuracies on the model will result in a deviation from the intended emissions reductions target.

An emissions tax is generally easier to implement than other carbon-pricing instruments since it is relatively simple to administer, however, it being a tax, they traditionally have faced much greater political opposition from conservative and business communities.

In essence, with a carbon tax scheme, the price is pre-defined, but the environmental outcome (the level of emissions reductions) is not known in advance. This is just the opposite of what happens under an ETS. Emissions taxes therefore are explicitly linked to the carbon content of fuels, or other output, but do not guarantee a standard level of reduction. (The Climate Reality Project, 2017)

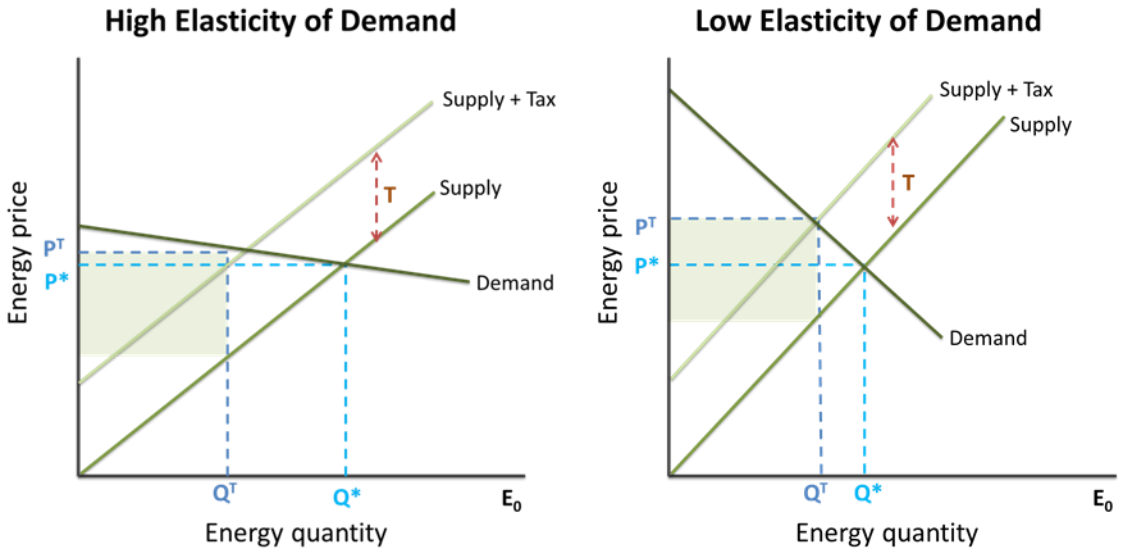
Carbon Tax Dynamics

Carbon taxes are classic market instruments and so the effects they produce depend on how the market in question responds. In general terms, the price signal provided by a carbon tax will have greater mitigation effects in liberalized markets with highly elastic demand. (PMR, 2017) It can be said that carbon taxes work better under certain conditions:

Taxes work better in market-driven economies. Emitters faced with higher prices for carbon emissions will be encouraged to decrease their GHG emissions by switching to lower emissions options, such as low-carbon fuel types or renewable energy use, or by implementing energy efficiency abatement projects if market prices signals are adequate.

Taxes are best applied in elastic markets. If the main goal of the tax is the reduction of GHG emissions, and not raising revenue, then the regulator must pay special attention to market elasticity. The price elasticity of demand can determine whether the implementation of a carbon tax will in fact reduce the level of, for example, energy demanded and thus the amounts of GHG emissions. Economies with high demand elasticity of fossil fuels can expect substantial changes in consumption (emissions), but where demand elasticity is low, the response will relatively be small. (PMR, 2017)

Figure 11. Energy demand elasticity and reductions in energy



Source: MÉXICO$_2$ based on data from Carbon Tax Guide: A Handbook for Policy Makers PMR, 2017)

As shown in Figure 11, when the price elasticity in energy demand is high, a given tax (T) on energy supply will induce a larger decrease in energy use (the difference between Q and QT). When the price elasticity is low, a higher tax is necessary to achieve the same energy use reductions.* (PMR, 2017) *It means that carbon taxes work better for emissions reductions in jurisdictions with high price elasticity in energy demand. Therefore, if the demand is inelastic, a higher tax rate would be needed, carrying out possible political obstacles and social hurdle for its implementation.*

To exemplify why taxes work better in elastic markets as well as the importance of these elasticities, the example of gasoline elasticity in Latin America will be shortly reviewed.

The evidence in some Latin American countries suggests that the income elasticity of gasoline demand is close to or even greater than 1, which is reflected in the rapid growth of gasoline consumption as income level rises (income elasticity).

This **income elasticity tends to be higher** in Latin America than in OECD countries[19], meaning that similar income growth rates in OECD and Latin American countries will lead to a sharper increase in gasoline consumption in Latin America than in the OECD. It is also known that the **price elasticity of gasoline demand is lower** in Latin America than in the OECD countries, which reflects the scarcity of suitable substitutes for private means of transportation. (ECLAC, 2015)

[19] This refers to the member countries of the Organization for Economic Co-operation and Development (OECD), an international organization whose mission is to promote policies that will improve the economic and social well-being of people around the world.

Table 4. Elasticities for Latin America and OECD countries: income and price elasticity of gasoline demand.

	OECD Countries	Latin America	Rest of the World
Income elasticity			
Long-term elasticity	**0.55**	**0.69**	**0.79**
Short term elasticity	**0.24**	**0.26**	**0.29**
Price elasticity			
Long-term elasticity	**-0.41**	**-0.31**	**-0.37**
Short –term elasticity	**-0.22**	**-0.17**	**-0.20**

Source: The economics of climate change in Latin America and the Caribbean: Paradoxes and challenges of sustainable development, 2015.

	Fuel	Price elasticity	Income elasticity
Dominican Republic	Gasoline	**-0.20**	**1.76**
	Gasoil	**-0.29**	**1.71**
	Liquefied petroleum gas	**-0.15**	**2.46**

Source: Estimation of Fuel Demand in the Dominican Republic (2006) *and Energy Demand Prospective Project* (2003)

Gasoline consumption in the Dominican Republic is not only subject to a low price elasticity of demand and a high income elasticity of demand, but it is also related to aspirational issues that must be taken into account for the design of a high-impact public policy. This low price elasticity of demand causes that an increase the price of gasoline does not affect its consumption and, a high income elasticity of demand causes that with higher income levels the demand for gasoline increases. In addition to this, the low availability of substitute goods and services is to be considered.

Besides GHG emissions reductions, carbon taxes may also provide additional benefits. When price elasticities are low, more revenue is likely to be raised, as emission levels remain constant. This revenue can be used to reduce other taxes or fund social or environmental programs. Additionally, in theory, it can also internalize the social cost of emissions, but it very much depends on what the revenue is used for.

When a carbon tax is implemented in a jurisdiction, it is most likely to be embedded within a larger fiscal reform. The interaction of the new tax with the rest of the pre-existent fiscal instruments is crucial for its effectiveness. In this context, a series of best practices can be considered for jurisdiction adopting a carbon tax:

- *To consolidate tax and regulatory instruments into a single tax.* Designating the proper governmental level (federal, state or local), which in turn will be responsible for the implementation and oversight of the carbon tax. Centralized taxes may benefit from lower administration costs thanks to economies of scale, while more local taxes allow gains from local knowledge about how best to administer the tax. (PMR, 2017)
- *To integrate the new carbon tax with a preexisting one.* For example, to unify the new carbon levy with an existing tax on fossil fuels.

Please note that it is equally important to consider how a carbon tax would, not only complement, but also conflict with other climate and energy policy instruments.

Policy objectives

An essential topic in the shaping of a carbon tax is the definition of the objectives it seeks, usually within a larger policy mix that includes climate change action. The goal can easily be linked to reduce GHG emissions, and to increase tax collection for the government expenditure, or a combination of both. However, a more detailed degree of description for both goals would also help to better design or customize the carbon tax.

If the tax is mostly directed to reduce GHG emissions, the government can link them to the Nationally Determined Contributions (NDCs), or other emission reduction commitments. This could reinforce the integration of the carbon tax with other policies or instruments in operation and contribute to the coherence of the policy mix.

As previously stated, revenue rising is one of the most appealing reasons to adopt a tax on carbon. The level of revenue-raising ambition can impact the tax rate, and the tax base (those entities or sectors covered by the tax).

Carbon taxes can support these and other policy objectives in two major ways. Firstly, they can incentivize behavioral changes or investment shifts that support policy objectives; and secondly, the collected revenue can be expended to support activities seeking the same objective.

Emissions profile

Mapping GHG emissions in the jurisdiction is central to determining where the largest amount of emissions is released, and therefore where the tax is likely to have the biggest impact on emission reduction and revenue raising. (PMR, 2017)

Understanding emission trends over time in a particular jurisdiction and its projections is also a central element to enable policy makers take a better position when designing the tax. The NDCs business as usual (BAU) scenarios could offer helpful contributions.

It was pointed before that carbon taxes are more effective in liberalized economies that provide clearer price signals for market participants. In this sense, they also work better in those sectors of the economy that are more responsive to those signals.

Political feasibility

Carbon taxes can be unpopular in jurisdictions where climate change is not well positioned in the public agenda or where the tax burden is already high. The most effective way to both assess the state of political and public receptiveness to a carbon tax and foster greater acceptance is to implement a broad and in-depth stakeholder engagement process. An example of such a process is the engagement carried out in South Africa during the design of a carbon tax in which stakeholders from business, civil society groups, labor unions, and academia were called to participate. (PMR, 2017) Further information on the South African carbon tax will be reviewed in the hybrid approaches section.

Engaging stakeholders at an early stage can help understand their concerns, identify room for improvement, and map areas of support and opposition, including the sectors and companies that are likely to be more or less resistant to the imposition of a carbon tax.

The most effective stakeholder engagement process makes use of a variety of tools, including inviting written submissions and organizing face-to-face meetings and working groups. (PMR, 2017) This process should be inclusive and transparent, and involve different political approaches, key industries, academia, media, NGOs, universities and civil society groups. It is also important to notice that stakeholder engagement through delivering comments can help to identify concerns and ways to provide clarifications and solutions, when needed, to those identified concerns.

Australian Carbon Tax

The Australian government introduced a carbon tax through the Clean Energy Act 2011, which came into effect on July 1st 2012. The carbon price of AUD 23 per ton was to apply to around 500 of the nation's biggest polluters from July 1st 2012, and would transition to an ETS on July 1st 2015, linking Australia to international carbon markets. The Act partially achieved its goals by reducing the country's greenhouse gas emissions by 1.4 percent in the second year after the carbon price introduction; however, it also caused an increase in electricity costs for households and industry. It was estimated by the Treasury that the implementation of this scheme had increased the cost of living of households by around AUD 9.90 per week on average, and increased the Consumer Price Index by 0.7 percent. Finally, the carbon tax was repealed on July 17th 2014, following a change in government. (Centre for Public Impact, 2017) (EDF, 2015)

Tax scope

One of the first aspects to consider in the design of the carbon tax is the identification of emissions to be targeted and economic sectors, facilities or specific activities covered. These decisions will have political implications and will impact the administrative costs of the tax.

The taxation scope can be addressed in various ways, but the two most widely used approaches are:

- **Tax on fossil fuels.** Applied to one or more specific fuels, primarily oil, gas, coal, and derivative products. Under this methodological approach, the CO_2 content of fossil fuels is taxed. Targeting fuels can be cost effective and attractive from an administrative perspective as fuels are typically already taxed and existing rules may be applicable.
- **Tax on direct emissions**. It involves an MRV system and applies to previously identified sectors, economic activities, specific facilities, processes or types of emissions (e.g. industrial processes or fugitive emissions). This allows the coverage of GHGs beyond CO_2.

Points of taxation

Throughout the supply chain of different industries and economies, different points of taxation can be identified. In general, they can be classified as follows:

Table 5. Points of taxation

Point of taxation	When is it applied?	Examples
Upstream	Upstream carbon taxes are applied to fuels at the point where the product associated with the emissions enters the economy.	- Oil wells - Natural gas wells - Coal mines - Importers
Midstream	A midstream carbon tax refers to a tax that is applied somewhere between the point where the product enters the economy and the point of consumption.	- Electric utilities - Fuel distributors
Downstream	A downstream carbon tax is applied at the point of consumption, whether by consumers, businesses, or industry.	- Vehicles - Households - Commercial buildings - Industry

Source: MÉXICO$_2$ with information from Partnership for Market Readiness (2017).

Tax rate

Setting the tax rate is one of the most important, and sometimes difficult, tasks during the implementation of a carbon tax. In the search of an adequate tax rate, jurisdictions need to consider their climate policy goals as well as their economic, technological, social, and political context in determining a rate that works best for them.

The majority of carbon taxes already implemented have begun at a relatively low level and gradually increased over time. This approach allows liable entities (and the economy as a whole) to adjust to the tax, and provides time to invest in mitigation strategies. At the same time, setting the rate low initially, without having a trajectory or mechanism in place for raising it in the short to medium term, creates the risk of carbon lock-in[20], thereby severely limiting the environmental effectiveness of the tax. (PMR, 2017)

The following tables show the range of implemented carbon tax rates worldwide. It is possible to observe that prices vary widely among the different jurisdictions. Prices are dramatically lower in Latin America.

Table 6. Current carbon tax rates

Jurisdiction	Price in USD$/tCO$_2$e
Ukraine	0.01
Poland	0.07
Estonia	2.33
Japan	2.6
Latvia	5.24
Portugal	7.9
Slovenia	20.16
Alberta	23.11
Ireland	23.3
Spain	23.3
United Kingdom	23.41
British Columbia	26.96
Denmark	Fossil fuels: 27.06 F-gases: 23.44
Iceland	32.67
France	51.96
Norway	Upper: 59.96 Lower: 3.48
Finland	72.24
Liechtenstein	99.35
Switzerland	99.35
Sweden	126.31

[20] Situation where industrial economies have been locked into fossil fuel-based energy systems through a process of technological and institutional co-evolution driven by path-dependent increasing returns to scale and creating persistent market and policy failures that can inhibit the diffusion of carbon-saving technologies despite their apparent environmental and economic advantages. (Unruh, 2000)

Source: MÉXICO$_2$ with information from The World Bank as of September (2018).

Table 7: Enforced carbon taxes rates in Latin America

Jurisdiction	Price in USD$/tCO$_2$e
Mexico	Upper: 2.87 Lower: 0.36
Chile	5
Colombia	5.21
Argentina[21]	10

Source: MÉXICO$_2$ with information from The World Bank as of April (2018).

Carbon Tax in Jamaica

It was implemented based on International Monetary Fund recommendations directed to transition the Jamaican fiscal system from a direct control scheme to one of indirect control, in order to increase the collection and balance the budgets. (IMF, 2016) It was implemented in 2017; however, it is not yet fully implemented. Given that half of Jamaica's CO_2 emissions come from heavy fuel and diesel, it directly impacts the national mitigation targets. (IMF, 2018)

The tax seeks to obtain certain additional benefits to the reduction of GHG: raise financial resources, reduce oil imports and improve the trade balance. The revenue raised of this tax accounts only for 6% of its fiscal resources and it comes mainly from the electricity sector. (UNFCCC, 2017)
As for October 2017, the carbon tax applied on different fossil fuels and depending on their emissions factor, ranged from J$0.43 (approximately US$0.003) to J$7.36 (approximately US$0.058). (Ministry of Finance and the Public Service, 2017)

Mexican Carbon Tax

A carbon tax in Mexico was approved within a fiscal reform in 2013 and applied since January 2014 as part of the Law on the Special Tax on Production and Services. According to the Ministry of Finance, the tax complies with the central objectives: to reduce emissions and to increase governmental revenue raise.

Natural gas and turbosine, originally contemplated in the law, were exempted from the application of the tax by request of the private sector.
Since December 2017, it is possible to pay the carbon tax in Mexico with certified emission reductions

[21] Natural gas, coal and liquefied petroleum gas will be taxed gradually starting in 2019, with a 10% increase each year until 2028.

(CERs) when they meet the following conditions:
- They come from projects developed in Mexico only;
- That they were issued after January 1st 2014; and
- That they correspond to the second commitment period of the Kyoto Protocol.
(MÉXICO2, 2018)

Revenue

If the design of a carbon tax is adequate, it would provide a powerful and efficient tool for GHG emissions reductions and would also raise substantial government revenue and help achieve a range of economic and development benefits. Carbon taxes can also be designed to generate a number of other important benefits, such as internalizing the social costs of emissions and negative externalities and increasing the efficiency of the tax system. These instruments can be molded to fit each jurisdiction's particular legal, economic, and social context, and to fulfill different roles within its overall climate, energy, and fiscal policy mix. (PMR, 2017)

Since, as mentioned before, once collected a carbon tax can generate significant revenue, it becomes imperative for policy makers to carefully design how this income will be used.

Although criteria vary in all jurisdictions, three main approaches can be identified for the use of carbon tax revenue:

- Revenue neutrality refers to a situation where the tax is collected, but not used to expand direct government spending. Revenue neutrality is generally achieved through one of two methods:
  - Redistributing revenue back to households, either on a per capita basis or directly to low-income households. It is the simplest and most transparent model of revenue neutrality; or
  - Using collected resources from the carbon tax to decrease other taxes, charges and levies (e.g. removing specific fees, reducing the personal income tax, reducing corporate tax rates or capital gain taxes, etc.).

In 2008, the Canadian province of British Columbia introduced North America's first revenue-neutral carbon tax applied to the purchase or use of fuel in British Columbia. The carbon tax has been hailed as the most comprehensive of its kind, covering approximately 70% of provincial emissions. Since the tax is revenue neutral, every dollar generated is returned to British Columbians in the form of personal and business tax measures, such as reductions in personal income tax rates, the Low Income Climate Action Tax Credit and corporate income tax reductions.

The tax was introduced at approx. US$7.7 (C$10) per ton of CO2 equivalent and increased gradually by US$3.8 (C$5) per ton annually until it reached US$23 (C$30) per ton in 2012. British Columbia has committed to keep the rate at the C$30/ton level until 2018. (UNFCCC) Canada is set to impose a national carbon price in 2018. The initial price will be a minimum of C$10 per metric ton of CO2, and it will increase annually by C$10/ton to reach C$50 (approx. US$35) in 2022. (Carbon Tax Center)

It is to notice that the implementation of this tax has brought positive impacts on the Canadian province including the drop in fossil fuel consumption, unaffected GDP growth and overall GHG emissions reductions. (Hussain, 2012)

- Expanded spending refers to using carbon tax revenues to enlarge the administration's spending and pursue its use on public policies. These policies are often climate-related, but not necessarily, as governments can also choose to fund policies related to education, social programs, and investment incentives.

In Chile, since 2017 a tax of US$5 per ton of CO_2 has been implemented. This value was determined based on the social cost of CO_2 estimated by the Ministry of Social Development. The annual tax is imposed on particulate matter (PM), nitrogen oxides (NOx), sulphur dioxide (SO_2) and carbon dioxide (CO_2), and is restricted to large industrial and power generation sources with thermal power greater than 50 megawatts. The tax also excludes fixed sources operating based on unconventional renewable generation methods that use biomass as its primary source of energy. It has been proposed that the largest share of the revenues is spent on improvements in the education system. (Chilean Ministry of Treasury, 2017)

The Colombian carbon tax came into effect in 2017, and as of April 2018 a tax rate of USD$5.67 is applied on liquid and gaseous fossil fuels used for combustion. In 2017 the tax covered 24% of the country's GHG emissions. Natural gas consumers outside the petrochemical and refinery sectors, and certified carbon neutral fossil fuels consumers are exempted from the tax. The carbon tax is expected to raise US$229 million in government revenue per year. The design of the tax allows compensating emissions using offsets. In the first semester of 2017, approximately 2MtCO_2 offsets were surrendered, compensating covered entities tax liabilities. Colombia has committed to spend the CO_2 tax revenues on environmental and rural development projects. (ICAP, 2018)

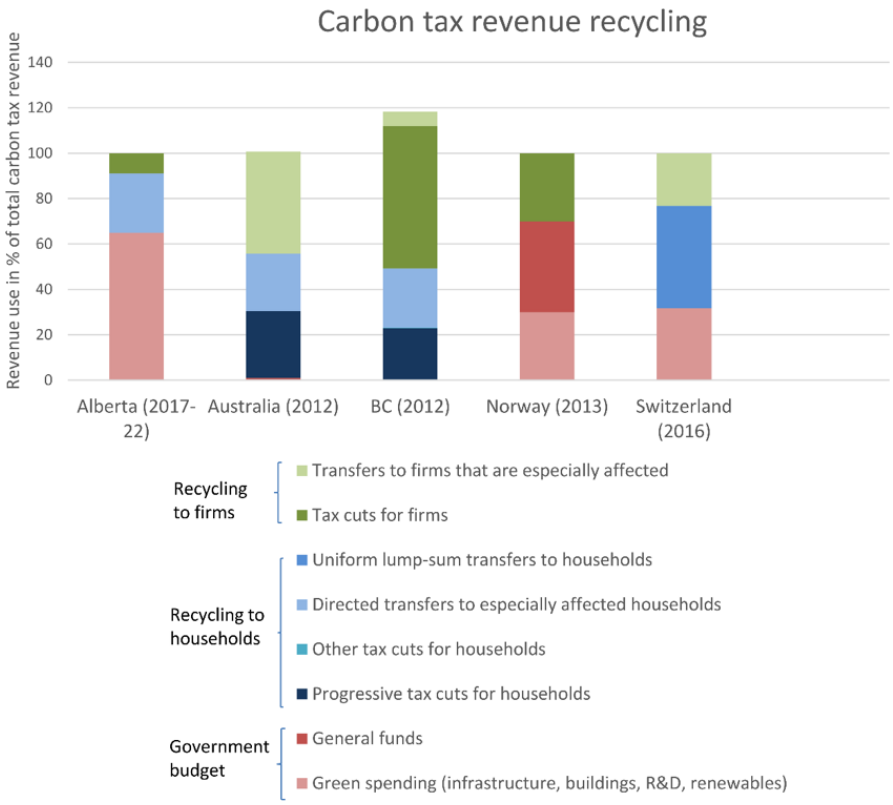
The design of carbon pricing reforms and the use of revenues could be tweaked to enhance their acceptability to the general public. It is argued that redistributing carbon pricing revenue as a regular carbon dividend is the single most promising option for enhancing political acceptability, although other ways of using the revenue can be appropriate in given circumstances. (Funke & Mattauch, 2018) To increase the acceptance of carbon-pricing reforms, a series of findings should be considered[22]:

- The willingness to pay for climate change mitigation is largely a function of political, economic, and cultural world views.
- Citizens tend to ignore or doubt corrective (Pigouvian) taxes, but can be mollified if revenue is earmarked for a specific purpose, such as green spending or transfers to disadvantaged households.

[22] *Why is carbon pricing in some countries more successful than in others?* (2018) Institute for New Economic Thinking, Oxford Martin School

- The labeling of the carbon price may alter perceptions of its desirability. Something as plain as re-labeling a carbon price as a "CO_2 levy", as done in Switzerland and Alberta, or speaking of "fee and dividend", could avoid aversion and make the measure more acceptable to citizens.
- Increasing the evidence of the benefits derived from a carbon-pricing reform enhances acceptability, so that revenue recycling may be advisable. Some recycling methods, such as transfers to households or public investment, might be more visible to the public than tax cuts, for instance.

Figure 12. Examples of carbon tax revenue recycling for different jurisdictions.



Source: Reprinted from Funke & Mattauch (2018).

Carbon leakage

Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with softer emission restraints. The risk of carbon leakage may be higher in certain energy-intensive industries. (European Comission) Carbon leakage is commonly measured as the ratio between increases of emissions in regions with no carbon pricing and decreases of emissions in regulated regions.

The carbon leakage rate is frequently expressed as a percentage of emissions reductions in regulated regions. (Vivid Economics & Ecofys, 2013). For example, if a particular climate policy is enforced and

total carbon emissions in a particular jurisdiction declines by 100 tons but foreign emissions increased by 30 tons, the leakage rate would be reported as 30% (30 divided by 100).

The nature of the carbon leakage risks is highly context-dependent, and thus, it is important to conduct specific risk assessments before deciding to act. (PMR, 2017). For example, the European Union frequently publishes a list of sectors likely to be exposed to a significant risk of carbon leakage during a specific period and, with this input, these sectors and sub-sectors receive a higher share of free allowances compared to other industrial installations in order to protect the competitiveness of industries covered by the EU ETS. (European Comission)

A large share of experiences exist for addressing carbon leakages in which the "price signal" for lowering emissions is kept but the associated cost is significantly lowered.
In carbon taxes, this can be done by only imposing the tax over a certain emission threshold (e.g. tCO_2e/t product) or by providing an overall discount (a percentage of the real emissions not being taxed).

Hybrid approaches

Hybrid carbon pricing schemes exist. These schemes combine elements of both the carbon tax and ETS approaches in different forms. While most systems in the world fall into the categories of an ETS or a carbon tax, there are a variety of carbon pricing mechanisms that combine elements of both. These new instruments respond to the specific needs and characteristics of the country's emissions profile.

Examples of these combinations could be an ETS with a price floor and ceiling, or tax schemes that accept emissions reduction units to lower the tax liabilities. The following cases are real life examples of this approach:

Singapore

In 2017 Singapore's Ministry of Finance announced their plans to introduce a carbon tax starting in 2019. The tax will be applied to facilities that emit 25,000 tCO_2e or more of GHG emissions annually and covers carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6) emissions, which are currently reported to the United Nations Framework Convention on Climate Change (UNFCCC) as part of Singapore's national GHG inventory. Based on current data, around 30-40 companies will be directly covered by the initiative. (National Climate Change Secretariat, 2018)

The tax will be introduced at an initial value of US$5/$tCO_2e$ from 2019 to 2023. This time frame is intended to give the industry time to carry out the necessary adjustments and implement energy efficiency measures. The first revenues from the carbon tax will be collected in 2020, based on 2019 emissions. The Singaporean Government will review the tax rate by 2023, and currently has plans to increase the tax to values between US$8/$tCO_2e$ and US$11/$tCO_2e$ by 2030.

It is expected that on average, the impact of the carbon tax on total electricity and gas expenses will be small, compared to historical quarterly electricity tariffs fluctuations due to changes in fuel prices. The final impact would be ranging from about US$0.22 to about US$0.80 per month. (National Climate Change Secretariat, 2018)

The government will support small and medium size enterprises as well as power generation companies through different schemes like the Productivity Grant (Energy Efficiency) and the Energy Efficiency Fund. More support will be directed to projects that achieve greater emissions abatement, beyond the basic enhancements.

Alberta

In 2007, the Government of Alberta, in Canada, introduced the province's Climate Change Strategy and committed to reduce its GHG emissions intensity by 50 million tons from business as usual by 2020 and by 200 million tons by 2050. To help achieve this target, Alberta introduced the first fully operational regulatory GHG emission reduction and trading program in North America. (IETA, 2015)

Under this program, facilities emitting more than 100,000 tons of CO_2e per year are regulated by the Alberta Environment and Sustainable Resources Development (AESRD) and are required to reduce GHG emissions intensity by 12% per production unit from an established government approved baseline. The resulting intensity based system is different than an ETS approach which sets a hard cap on emissions by allowing GHG emissions to grow in line with development as long as the emission intensity per unit decreases by 12%.

Compliance options under this program include:[23]

- Physically reduce emissions intensity per facility by 12%;
- Purchase verified Alberta offsets or use/purchase emission performance credits (EPCs) generated at facility in previous years or from other regulated facilities; or
- Purchase Technology Fund (Tech Fund) credits for each ton emitted over their target;
- Any combination of the above options in order to achieve compliance targets is allowed.

[23] (IETA, 2015)

South Africa

The only African country with a price on carbon introduced a bill to price emissions in the National Assembly and was scheduled in December 2017. This bill had been negotiated several times before and seeks to provide for the imposition of a tax on the carbon dioxide equivalent of GHG emissions. South Africa is expected to pass the bill in 2018 and implement the tax from January 2019. The pollutant substances covered by the carbon tax will be: fossil fuel combustion, carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulphur hexafluoride. (Napier & Govindsamy, 2018)

The initial marginal carbon tax rate will be set at US$8.19 per ton of CO_2e. However, taking into account a series of thresholds, the effective tax rate will be potentially much lower and ranges between US$0.41 and US$3.28 per ton.

To allow businesses to adapt and transition to low carbon alternatives, during the first phase a basic percentage based threshold of 60% will apply below which the tax is not enforceable. Likewise, the following additional tax-free allowances will be applicable:[24]

- An additional 10% for process emissions;
- An additional allowance for trade exposed sectors, to a maximum of 10%;
- An additional allowance of up to 5% based on performance against emissions intensity benchmarks. These benchmarks will be developed in due course;
- A carbon offsets allowance of 5-10%, depending on the covered sector; and
- An additional 5% tax-free allowance for companies participating in phase 1 of the carbon budgeting system.

The combined effect of all of the above tax-free thresholds will be capped at 95%.

[24] (The carbon report, 2018)

New Zealand

The New Zealand Emissions Trading Scheme (NZ ETS) began operations in 2008 and continues to serve as a principal element of New Zealand's policy response to climate change. It is the only ETS worldwide that covers all sectors of the economy. The NZ ETS establishes a price on greenhouse gases to provide an incentive to reduce emissions and encourage landowners to establish and manage forests in a way that increases carbon storage. Forest owners participate in the ETS in two ways[25]:

- Voluntarily: Owners can apply to register their post-1989 forest land into the ETS to earn NZUs[26].
- Mandatorily: Owners become participants when non-exempt pre-1990 forest land is deforested.

Obligations to both report emissions and surrender emission units apply to the following sectors: forestry, stationary energy (electricity and heat), transport, industrial processes, synthetic GHG and waste. Biological emissions from agriculture (animal production and nitrogen fertilisers) carry reporting obligations only. The system covers carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). (Motu Economic and Public Policy Research, 2018)

The NZ ETS was originally designed to be fully linked to international carbon markets under the Kyoto Protocol through the CDM. However, in June 2015, international units were no longer accepted for compliance and the NZ ETS became a domestic-only system. Currently, its interaction with international offsets is under revision.

New Zealand Units (NZUs) are the primary domestic unit of trade. An NZU represents one ton of carbon dioxide equivalent and can cover both emissions and removals. The NZ ETS currently does not have an absolute cap on units. NZUs are issued for free allocation in the industrial sector and eligible forestry and industrial removals. The system permits unlimited banking of units by participants and does not allow borrowing of NZUs from future years.

The NZ ETS operates with a price ceiling mechanism where participants can purchase unlimited NZUs from the government for immediate surrender at a fixed price of NZ$25 per unit. Any entity that fails to surrender emission units when required to, will have to surrender units and pay a penalty of NZ$30 (US$19.91) for each unit. In April 2018, the secondary market NZU price was of US$15.22. (The World Bank, 2018)

[25] (An Overview Of Forestry In The Emissions Trading Scheme, 2015)

[26] New Zealand Unit (NZU) also called a carbon credit. One NZU represents 1 ton of carbon dioxide (or the equivalent for other greenhouse gases).

Comparison of mechanisms

Table 8. Comparative table between carbon tax and an emissions trading scheme

	Emissions Trading Scheme	Carbon tax
Implementation	Implemented or scheduled for implementation in 25 jurisdictions.	Implemented or scheduled for implementation in 25 jurisdictions.
Prices	Prices between: $1.35 and $23.25 USD/tCO2e	Prices between: $0.02 and $139.11 USD/tCO2e
Difficulty	More difficult to understand.	Easy to understand.
Effectiveness	Effectiveness depends on the design of the ETS and the jurisdiction's context.	Effectiveness depends on the cost of the tax (usually it needs to be high) and the jurisdiction's context.
MRV System	Requires an MRV system.	Requires an MRV system.
Cost of implementation	High cost of implementation.	Low cost of implementation.
Revenue	Revenue source for governments.	Revenue source for governments.
Linkage	Relatively easier to link internationally.	More difficult to link internationally.
Emissions reductions	Certainty on emissions reductions.	Certainty on prices (price set by the government).
Market prices	Uncertainty on prices (based on market forces).	Uncertainty on emissions reductions (based on market forces).
Infrastructure	Usually needs additional infrastructure and administrative structures.	Can use current infrastructure and administrative structures
Offsets	Allows the use of offsets.	May allow the use of offsets (rare).
Acceptance	Usually well accepted by the private sector with less political obstacles.	Usually hard to accept by the private sector with more political obstacles.
Adaptation	Usually gives more time for business to adapt to the new scheme.	Usually gives less time for business to adapt to the new tax.
Policy overlap	The risk of conflict with other climate related policies or instruments exist.	The risk of conflict with other taxes or climate related policies exists.
Carbon leakage	Risks of carbon leakage can be managed with flexibility mechanisms.	Risks of carbon leakage are difficult to manage.

Source: Quantitative information from the World Bank.

Lessons learnt from international experiences[27]

Derived from the literature review conducted for this project and from carbon pricing international best practices the following lessons have been learnt from international experiences:

Carbon pricing

A very large set of information already exists of the experience on carbon pricing, specifically on carbon taxes and ETS. Worldwide, the number of jurisdictions using carbon pricing is steadily growing, in particular among middle income countries. There are currently about 25 new carbon pricing initiatives scheduled or under consideration, including 15 in the Americas.

The effectiveness of a carbon pricing instrument depends on stringency, a measure of the policy's ability to drive emissions reductions. More stringent policies create stronger incentives and leads to deeper emissions reductions over time. Policy-makers will have to be ready to adjust their policies and the resulting price trajectory over time as they learn about the costs of emissions reductions, the risks of climate change, and the pace of low-carbon innovation.

Carbon pricing is an opportunity to redesign fiscal policies for achieving not only climate change objectives but also poverty, social, and energy related objectives. A major challenge for policy-makers is to communicate to businesses and the public why carbon pricing is a sensible option in this sense. A growing trend is to seek the combined benefits of tradability and flexibility found in ETS and price visibility/predictability found in carbon taxes.

In addition to carbon pricing, other policies are needed too, particularly to promote innovation and appropriate infrastructure investment, but cannot be relied upon by themselves to bring about the necessary reductions in emissions.

Finally, it is important to note that companies that have shown leadership and recognized that the future is low-carbon have been rewarded with declining costs and a boost for creativity and innovation.

Carbon Tax

Countries generally find that existing levies/charges can be simply reshaped in the form of carbon pricing. On this regard, some carbon pricing instruments such as carbon taxes can be implemented relatively fast since much of the infrastructure needed already exists.

[27] *Carbon Pricing Dashboard* (2018), *Comparing Stringency of Carbon Pricing Policies* (2017), *The case of carbon pricing* (2011), *Lessons Learned from Three Decades of Experience with Cap-and-Trade* (2015), *10 years of Carbon Pricing in Europe* (2015).

Impacts of carbon taxes on the price of goods and services can be managed (to avoid income inequality and prevent carbon leakages). Actually, most carbon pricing mechanisms provide flexibility with the creation, use and trading of emissions units (even in the case of carbon tax and offsets).

Emissions Trading Schemes

ETS systems have long been proven to be environmentally effective and economically cost-effective relative to traditional command and control approaches.

A minimal threshold for an ETS to work properly depends on the national context. However, it must be stressed that both the market volume and the number of covered entities play an important role on its effective implementation. Covered entities should have a uniform distribution regarding their GHG emissions (and thus, the allocation of EA). It is crucial that all market participants operate in the market to avoid distortions and affectations on prices and the level of emissions reductions. Also, the percentage of the jurisdiction's GHG emissions is vital for the design of an ETS. Currently, where implemented, these instruments cover between 30% and 85% of GHG emissions and manage them with a price signal. Lastly, it is clear from theory and experience that a robust market requires a cap that is clearly below business-as-usual emissions.

The allocation of allowances is inevitably a major political issue, because of the large distributional impacts that can be involved. Free allowance allocation has proven to be necessary to build political support, particularly for some trade exposed sectors there is a limited annual allocation of 'free allowances' to help compensate for any competitiveness impacts of the carbon price.

In practice, the risk of carbon leakage in an ETS system can range from non-existent to potentially quite serious; however, there is currently no evidence that this risk has ever been materialized.

Provisions for banking of allowances as a flexibility mechanism in an ETS have proven to very important, while the absence of banking provisions can lead to price spikes and price collapses.

Experience has revealed that political pressures exist to use auction revenue not to cut taxes but to fund new or existing environmental programs or relieve deficits.

The presence of the ETS (and other regulations) acts to reinforce the benefits of emission reductions. Companies are saving money through greater efficiency and then getting a carbon bonus over their competitors – either by being able to sell allowances or not needing to buy them.

The Dominican Republic: Country Context

Knowing and understanding the social, economic and political context of a country where a carbon pricing approach is being considered for implementation or modification is vital for its success. This section will analyze the socioeconomic and political conditions of the Dominican Republic. Of special interest are the country's emissions profile, its energy generation matrix and climate related policies.

Social and Economic Macro Trends

The United Nations (UN) considers the Dominican Republic an upper-middle income country. In 2017 the country's GDP was US$75,932 million. This makes the Dominican Republic the second largest economy in Central America and the Caribbean region. (The World Bank)

Table 9. Comparative table of countries that have adopted carbon pricing instruments versus the Dominican Republic ranked by GDP per capita.

Country Name	GDP (current US$ billions) 2017	GDP per capita (current US$) 2017	Price in USD$/$tCO_2e$
Chile*	277	15,346.45	5
Argentina*	638	14,401.97	10**
Costa Rica	57	11,630.67	
Caribbean small states	69	9,517.93	
Mexico*	1,150	8,902.83	Upper: 3.01 Lower: 0.37
Dominican Republic	76	7,052.26	
Peru	211	6,571.93	
Colombia*	103	6,301.59	5.67
Jamaica*	15	5,109.55	Upper:0.058 Lower: 0.003

**Countries that have adopted carbon pricing initiatives.*
***Price applied progressively from 2018 to 2028, 10% each year[28].*
Source: MÉXICO$_2$ based on data from the World Bank, 2017 and 2018. Ministry of Finance and the Public Service of Jamaica, 2017.

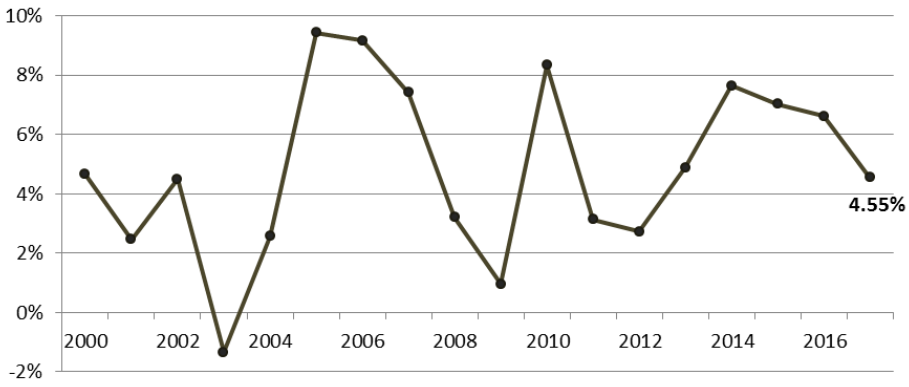
As shown in Table 7, it is not possible to appreciate a direct correlation between a country's GDP or GDP per capita and its price per tCO_2e.

Economic growth

The Dominican Republic has also presented above average growth for the last 17 years, with an average of 4.88% from 2000 to 2017, however the last 10 years have been marked by even stronger growth with an average annual growth starting in 2010 of 5.61%. (The World Bank)

[28] Technical Note: Carbon Tax in Argentina, (2018).

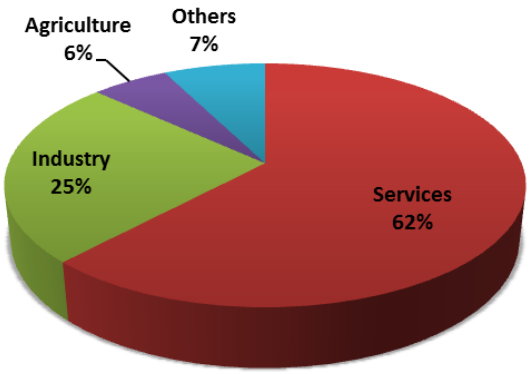
Figure 13. Dominican Republic growth rate 2000 – 2017



Source: MÉXICO$_2$ based on data from The World Bank, 2018.

The Dominican economy is highly dominated by services, representing 62% of total GDP, followed by the industrial sector (including local manufacture and mining) with 24.83% and agriculture (5.67%). It is also important to note that a big part of the Dominican Republic's economy is tied to tourism, being one of the country's largest sources of income. (Dominican Republic Central Bank)

Figure 14. GDP composition by sector



Source: MÉXICO$_2$ based on data from the Dominican Republic Central Bank

Trade

The Dominican Republic has a strong trading tradition, with international trade representing up to 26.7% of its GDP. In 2017, trade amounted for USD 28,350 million, (36% exports, 64% imports), with major exports including gold, medical instruments and electrical components; major imports include refined petroleum and gas and automobiles. Trade in agriculture amounted to USD 4,923 million (41% exports, 59% imports), with major exports including cigars, bananas and cocoa beans. Major imports include refined maize and raw tobacco. Its main trading partners include the United States (representing almost half of all imports and exports), Haiti, the European Union, India, China, Brazil and Mexico. (World Trade Organization)

Social

The Dominican Republic has a high Human Development Index (HDI) of 0.722, ranking 99 worldwide. Life expectancy is relatively high in the region at 73.7 years at birth, as are education levels (13.2 years expected years of schooling and 91.8% adult literacy rate) and unemployment rates are relatively low as well (6.2%). However, the Dominican Republic presents high inequality levels, with a Gini coefficient of 0.52. Thanks to long periods of economic growth and improved government, poverty estimations have been reduced to 37.2%[29], however, important differences exist between urban and rural areas.

Political

The Dominican Republic has achieved large success in the last two decades in democracy building and is currently considered a relatively free and resilient representative democracy. (Polity IV, 2013) The last presidential elections were held on May 15th, 2018 where the incumbent Danilo Medina of the Dominican Liberation Party (Partido de Liberación Democrática, PLD) a left-of-center party won his reelection. (Ministerio de Asuntos Exteriores y Cooperacion de España, 2018)

The Dominican Republic's president has a strong and consistent approval rating. The country's thriving economy is certainly a big factor in his popularity, but he has also lived up to his pledges to develop education, infrastructure and security. (Euromoney, 2016)

The World Bank's Political stability index (-2.5 weak; 2.5 strong), provides data for the Dominican Republic from 1996 to 2016. The average value for the country during this period was -0.03 points with a minimum of -0.42 points in 2003 and a maximum of 0.29 points in 2016; for this year the Dominican Republic was in the 78th position out of the194 analyzed. (TheGlobalEconomy.com, 2018)

[29] It was close to 51% in 2004.

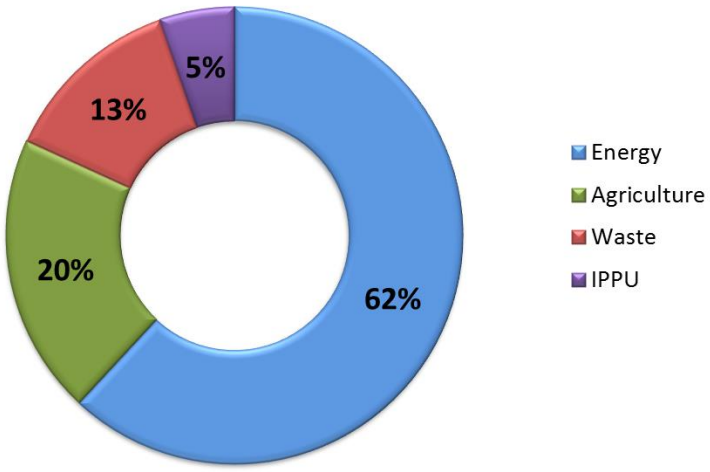
GHG and Energy Snapshot

Emissions profile

According to the Greenhouse Gas Emissions National Inventory of the Dominican Republic (INGEI, per its acronym in Spanish), six sectors are identified in which anthropogenic activities are responsible for the emission and absorption of GHG. These sectors being:

- Energy;
- Agriculture;
- Waste;
- Industrial Processes and Product Use (IPPU);
- Change in Land Use and Forestry (AFOLU); and

Figure 15. GHG emissions per sector



*AFOLU is not included since it represents GHG absorptions, not emissions.

Source: MÉXICO$_2$ based on data from Dominican Republic Third National Communication to the UNFCCC, (2017).

The same document estimates that the country's emissions per capita are 3.28 tCO_2e. (Ministerio de Medio Ambiente y Recursos Naturales, CNCCMDL, PNUD, 2015) and total emissions around 31.04 $MtCO_2e$. More recent data from the WRI estimates emissions per capita of 3.18 tCO_2e and total emissions of 33.11 $MtCO_2e$. Naturally, major focus is placed on the energy sector. The most important sources of energy for the country are:

- Liquefied petroleum gas;
- Gasoline;
- Kerosene and jet fuel;
- Diesel oil; and
- Fuel oil.

Energy Generation

In general, the Dominican Republic constitutes a net importer of energy products. There are no fuel exports or re-exports of energy products, an exception being the years of 2010 and 2011. (Ministerio de Medio Ambiente y Recursos Naturales, 2017).

The Dominican Republic has a relatively highly developed energy sector. With almost 4GW of installed capacity, (22% being renewables), (SIE, 2018) and an electrification rate of 96% it is among the most developed in Latin America. However, energy generation is still highly dependent on fossil fuels. There are plans by the government to increase renewable's share of generation and decrease oil and coal's dominance, with goals set at 25% total energy generation derived from renewable and clean sources by 2025. (CNE, 2012)

Electricity demand

Electricity demand per capita in the Dominican Republic is still below average levels in Latin American and the Caribbean, however, it has experienced an annual average growth rate of 3.62% from 2005 to 2014 (last available data from the World Bank), and this rate is not expected to decline since it is coupled with the country's growth rates (5.61% annual growth for the last ten years).

Table 10. Comparative table of electric average consumption from the Dominican Republic versus other countries of the region

Country/Region	kWh per capita
Caribbean small states	2,889*
Latin America & the Caribbean	2,129
Mexico	2,090
Dominican Republic	1,578
Cuba	1,434
Colombia	1,290

Source: MÉXICO$_2$ based on data from the World Bank, 2014.
**Data from 2012.*

Table 11. Energy distribution by sector for 2017

Sector	GWh	Percentage (%)
Municipality	258.61	2.76%
Government	1,216.29	12.99%
Industry	2,533.24	27.07%
Commercial	1,169.06	12.49%
Residential	4,182.58	44.69%
Total	9,359.78	100.00%

Source: MÉXICO$_2$ based on data from the Superintendence of Electricity, 2017.

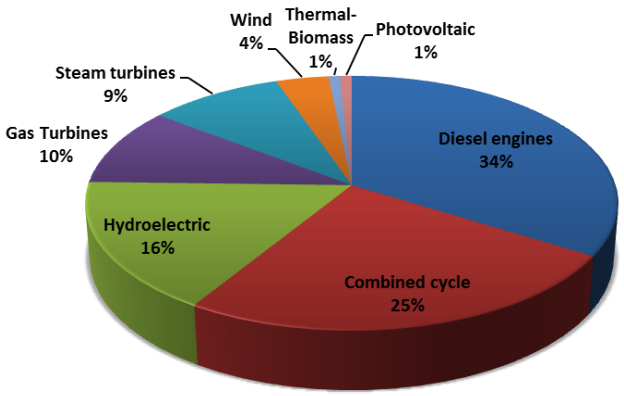
Electricity market

Before 1997, the electricity market in the Dominican Republic was highly regulated, state-owned and heavily subsidized. In 1997, the sector was reformed to allow private companies to participate in the generation and distribution of electricity. The National Energy Commission (CNE) in charge of defining state policy in the energy sector and overseeing renewable energy development in the country was established in 2001. The Superintendence of Electricity oversees compliance with the laws, regulations, and technical standards of electricity generation, distribution, and transmission. (Energy Transition Initiative, 2015)

According to the Superintendence of Electricity, the Dominican Republic has an installed electricity generation capacity of 3,713.6 MW, distributed as follows:

Table 12. Electric installed capacity by sector

Technology	Capacity(MW)	%
Diesel engines	1,257.8	33.9%
Combined cycle	927.3	25.0%
Hydroelectric	615.7	16.6%
Gas Turbines	370.5	10.0%
Steam turbines	346.6	9.3%
Wind	135.7	3.7%
Thermal-Biomass	30.0	0.8%
Photovoltaic	30.0	0.8%
TOTAL	**3,713.6**	**100.0%**

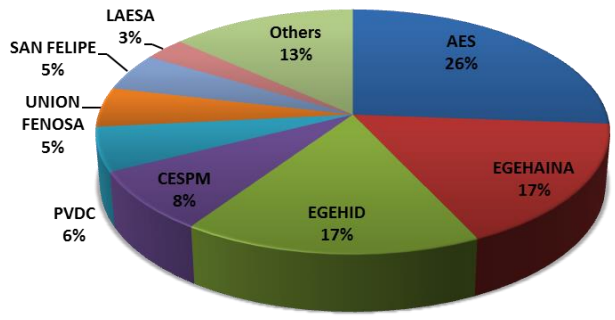


Source: Superintendence of electricity, 2018.

In the same sense, when total electric installed capacity is disaggregated by company, as of August 2018, almost 60% of the total installed capacity is owned by three major companies: AES Dominicana (26.2%),

followed by Empresa Generadora de Electricidad Haina - EGE Haina (16.8%) and Empresa de Generación Hidroeléctrica Dominicana- EGEHID (16.6%).

Figure 16. Electric energy capacity installed by company



Source: Superintendence of electricity, 2018.

Company	Capacity (MW)	%
AES	972.5	26.2%
EGEHAINA	622.3	16.8%
EGEHID	615.7	16.6%
CESPM	300.0	8.1%
PVDC	215.1	5.8%
UNION FENOSA	194.5	5.2%
SAN FELIPE	185.0	5.0%
LAESA	111.2	3.0%
Others	497.1	13.4%
TOTAL	**3,713.4**	100.0%

Potential participants in an ETS

In order to develop valid options for an ETS in the Dominican Republic, it is essential to develop an estimation of the potential covered entities.

Although a national inventory of the Dominican entities or installations, which would comply under an ETS scheme, is not available, the authors of this report have been able to compose a first draft a list of such entities. The list has been elaborated on basis of public data provided by relevant institutions and by individual experts.

Table 13. First draft of ETS covered entities in the Dominican Republic

POTENTIAL ENTITIES TO PARTICIPATE IN ETS SCHEME			
Entity	**Sector**	**Entity**	**Sector**
Cemex	Cement	Luz y fuerza de las Terrenas	Energy
Argos Dominicana	Cement	CEPM	Energy
Cemento Santo Domingo	Cement	ASONAHORES	Hotels
Cementos Cibao	Cement	GERDAU METALDOM	Iron and steel
Domicem	Cement	IMCA	Construction
Bayer	Chemical	Grupo SID	Logistics and transportation
Inter-Química Dominicana	Chemical	Mardom	Maritime industry
Plastifar	Chemical	Agencia Naviera B&R	Maritime industry
Claro	Communications	Barrick Gold	Mining
VINCI Construction Grands Projets	Construction	Falcondo	Mining
CESPM	Energy	Inversiones Ban Sai	Mining
AES Dominicana	Energy	V Energy / Total Dominicana	Oil & Energy
EGE Haina	Energy	SIGMA PETROLEUM CORP	Oil &Gas
The CocaCola Company	Food and beverages	Dominican Energy Crops	Renewable Energies
Bepensa	Food and beverages	LatAm Bioenergy Dominicana S.R.L.	Renewable Energies
Brugal & Co.	Food and beverages	RENSA Energía Solar	Renewable energies
Cervecería Nacional Dominicana	Food and beverages	Soventix	Renewable energies
Quala Dominicana	Food and beverages	Centro Cuesta Nacional (CCN)	Retail
Vinícola del Norte	Food and beverages	Grupo Ramos	Retail
Tropigas	Gas	Gildan	Textile
Propa-Gas	Gas	Hanes Brands	Textile
Gas Natural Fenosa	Gas		

Also, a table with possible participants (by installation) from the electric generation sector can be found below. These participants have been listed based on the fuel they use and not necessarily on their generation.

Figure 17. Possible electric generation installations covered by an ETS in the Dominican Republic

Installation	Fuel	Energy generated (GWh)
BARAHONA CARBÓN	Carbon	232.68
ITABO 1	Carbon	873.7
ITABO 2	Carbon	920.23
CESPM 1	Fuel #2	58.8
CESPM 2	Fuel #2	191.86
CESPM 3	Fuel #2	235.38
HAINA TG	Fuel #2	33.74
QUISQUEYA1	Fuel #6	1150.08
CEPP1	Fuel #6	41.94
CEPP2	Fuel #6	175.82
INCA D L01	Fuel #6	29.2
BERDAL	Fuel #6	29.43
LA VEGA	Fuel #6	429.09
METALDOM	Fuel #6	193.91
MONTE RÍO	Fuel #6	428.81
PALAMARA	Fuel #6	495.62
PIMENTEL 1	Fuel #6	131.84
PIMENTEL 2	Fuel #6	122.89
PIMENTEL 3	Fuel #6	242.83
QUISQUEYA 2	Fuel #6	1385.67
SULTANA DEL ESTE	Fuel #6	200.04
SAN FELIPE	Fuel #6 and #2	222.94
AES ANDRÉS	Gas	2448.66
LOS MINA 5	Gas	694.39
LOS MINA 6	Gas	773.75
LOS MINA 7	Gas	548.62
ESTRELLA DE MAR 2	Gas and Fuel #6	874.74
LOS ORÍGENES	Gas and Fuel #6	330.98

Source: Annual Report of Operations and Economic Transactions for the year 2017 (SENI).

Ongoing and Planned Policies

Nationally Determined Contributions (NDCs)

The Dominican Republic's Nationally Determined Contributions submitted to the UNFCCC under the Paris Agreement include a 25% reduction of GHG emissions per capita by 2030, taking 2010 as the base year, conditional upon favorable and predictable support, feasible climate finance mechanisms, and corrections to the failures of existing market mechanisms. The commitment period is 2010-2030, with a review every five years. (UNFCCC, 2017) In 2010, the emissions per capita were of 3.6 tCO_2e.

The gases covered are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), while the sectors covered include:

- Energy
- Industrial processes and product use
- Agriculture
- Waste
- Land-Use Change and Forestry

All climate change related policies implemented, enacted and planned in the Dominican Republic, including, those mentioned hereafter have the main purpose of helping achieve this international compromise.

Article 6 of the Paris Agreement

Article 6 aims to offer the Dominican Republic with a framework for collaborative approach either through direct bilateral cooperation (Art. 6.2) and sustainable development mechanisms (Art. 6.4). (UNFCCC, 2015)

For bilateral cooperation to be properly applied, it would require transparent processes and accurate accounting of the emission reductions at a national level, as well as considering the linkage of international mitigation mechanisms under a market-based approach.

The second option involves the use of instruments that contribute to the mitigation of GHG emissions supervised by a body designated by the Conference of the Parties and that aims to mobilize the private sector to participate in climate change mitigation by providing suitable incentives.

Emissions reductions coming from both bilateral cooperation and sustainable development mechanisms can be transferred between countries to achieve NDC's targets. (BMU, 2016)

MRV System (ICAT Project)

The Initiative for the Climate Action Transparency (ICAT) objective is to achieve the immediate and long-term impacts that will result in sustainable improvements in the administrative, legislative and institutional infrastructure transparency within its participating countries.

For the Dominican Republic, the initiative currently focuses in the creation of a proposal for a legal framework that specifies and guides the management of a National System of Measurement, Reporting

and Verification (MRV) and transparency to comply with the objectives of Article 13 of the Paris Agreement within the framework of the UNFCCC. (CNDCCMDL)

Biennial Update Report (BUR)

This initiative is focused on the reporting and updating of information related to actions and initiatives carried out by the country to comply with the Dominican Republic's international agreements, as well as for the identification of needs, updating the Greenhouse Gases National Inventory of the Dominican Republic (INGEI) and the description of monitoring, reporting and verification activities in mitigation projects in force. (CNCCMDL)

Nationally Appropriate Mitigation Actions (NAMAs)

As a part of the Bali Action Plan concluded at COP 18 in Doha, developing country Parties will take Nationally Appropriate Mitigation Actions (NAMAs) in the context of sustainable development. This NAMAs refer to any action that reduces emissions in developing countries and is prepared under the umbrella of a national governmental initiative. (UNFCCC). These are defined in two contexts:

- NAMAs at the National Level
- Individual NAMAs that contribute towards meeting the objectives of NAMAs at the National Level

The following are the NAMAs registered for the Dominican Republic before the UNFCCC:

Table 14. Registered Dominican Republic NAMAs

NAMA ID	NAMA Name	Status
NS-51	Tourism and Waste in the Dominican Republic	NAMA seeking support for implementation
NS-52	NAMA in Cement/Co-Processing and Waste Sector	NAMA seeking support for implementation
NS-118	Energy Efficiency in Public Sector	NAMA seeking support for implementation
NS-149	Reducing Greenhouse Gases (GHG) Emissions in Pig Farms in the Dominican Republic	NAMA seeking support for implementation
NS-189	Blue Carbon NAMA: Conserve and Restore Mangroves in the Dominican Republic	NAMA seeking support for preparation
NS-256	NAMA - Low Carbon Coffee in Dominican Republic	NAMA seeking support for preparation

Source: MÉXICO$_2$ based on data from the UNFCCC.

Tax on motor vehicles

It is a tax on registration and allocation of the first plate of all motor vehicles and motorcycles. The tax covers the registration of the vehicle (the plate), the transfer of ownership and the right to circulate. Imported vehicles pay a tax of seventeen percent (17%) on the gross CIF (cost, insurance and freight) value, excluding agricultural wheeled tractors. Additional to this cost, two more taxes corresponding to the "vehicle circulation tax" and the "CO_2 emission tax" should be paid depending on the carbon content that the vehicle generates (CO_2/km). This cost ranges from 0 to 3% of the CIF.

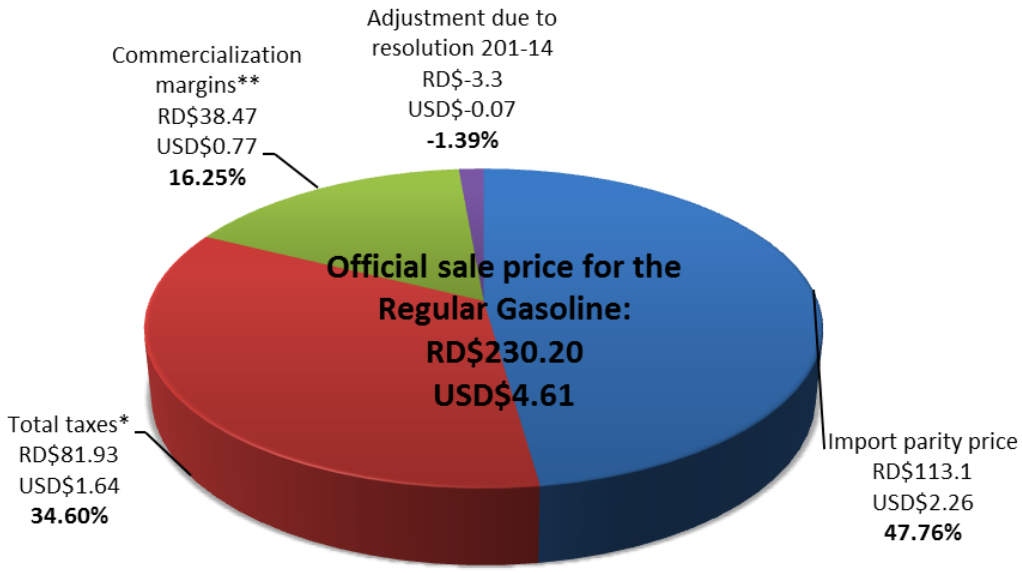
In the Dominican Republic, the Hydrocarbons Law (112-00) has established a tax for fossil fuel (upstream) so every single barrel of oil pays 5% of its cost to feed a specialized fund (energy saving and renewable energies promotion and development.

The Tax Code Law (557-05) states in its article 23 that in addition to the tax on fossil fuels and derivatives of the oil provided by Law No.112-00, a selective tax of 13% ad-valorem is established on the internal consumption of fossil fuels and petroleum derivatives. Also the Tax Reform Law (495-06) modified part of this article and establishes a selective tax of 16% ad-valorem on domestic consumption of such fossil fuels and petroleum derivatives. Finally, article 31 of the Tax Reform Law (495-06) adds another tax of three Dominican pesos (RD $ 3.00, approximately USD$0.06) per gallon on the consumption of fossil fuels in relation to premium diesel, and regular use diesel general, and of five Dominican pesos (RD $ 5.00, approximately USD$0.10) to regular gasoline for general use. This tax is charged together rest previously mentioned.

Even when it seems feasible to change the current gasoline tax scheme for a carbon tax without altering the level of taxation, it could face a very complex political scenario, since there are a series of taxes currently related to GHG emissions (fuel tax, first plate tax) and low reception for a tax reform. Also, due to political and electoral matters, a carbon tax could be included in a tax reform, at best, after the 2020 presidential and general elections.

Currently, there is no general subsidy on gasoline, though a levy on liquefied petroleum gas is applied. This subsidy is politically sensitive and its withdrawal is not planned. However, some exemptions of current fuel taxes can be found, for example, public transport and the use for domestic cooking is exempt from it.

Figure 18. Regular gasoline sale price structure as for October 13th to 19th 2018 ($/gal)



**Price due to Law 112-00 is RD$63.83(USD$1.28), and due to Law 495-06 Ad-valorem 16%, and due to AVTUR 6.5% IS RD$18.10 (USD$0.36). **Price due to distributor RD$12.60 (USD$0.25), retailer RD$20.19 (USD$0.40) and transport commission RD$5.68 (USD$0.11).*

Source: MÉXICO$_2$ based on data from the Ministry of Industry, Commerce and Micro & SME's (MICM).

The official sale price represents the price the final consumer on the Dominican Republic have to pay for a gallon of regular gasoline. This price breakdown shows how this final price is disaggregated into: import parity price, two different taxes, three commercialization tariffs and a final tax adjustment. The official sale price for this gasoline and other fossil fuels is updated weekly by the MICM.

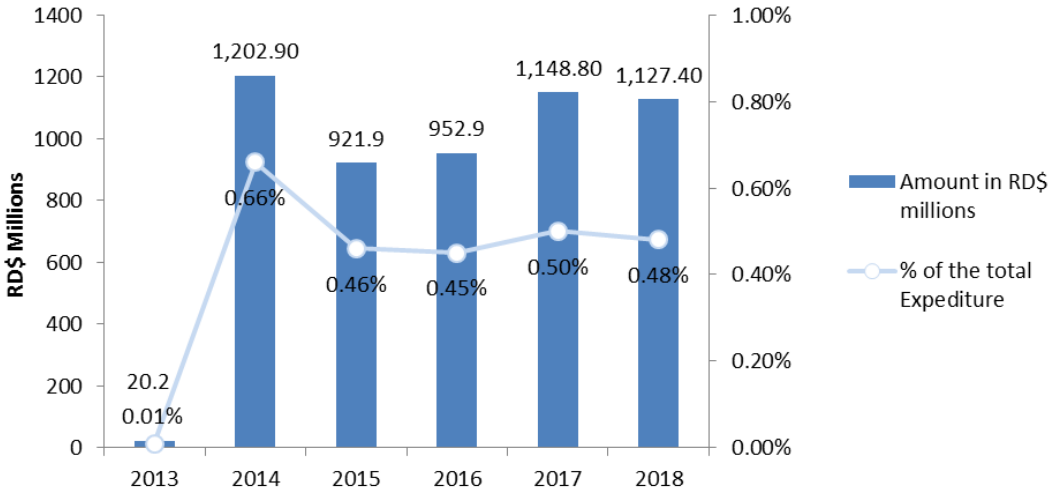
As for 2017, the tax on hydrocarbons in the Dominican Republic represented 1.5% of the country's GDP (RD$ 54,541 million) (Ministry of Finance, 2018), taxing 905,649,339 gallons of different fuels (under law 12-00) (Ministry of Finance, 2018).

Renewable energy policies

The 2007 General Electricity Act promotes rational energy use and gives the CNE responsibility for regulating and creating energy efficiency policies, programs, and standards. In addition, the Law on Renewable Sources of Energy Incentives and Its Special Regimes (Law 57-07) which includes a 100% exemption for renewable energy technologies from import taxes and taxes on the Transfer of Industrialized Goods and Services –ITBIS– (Art. 9). It also provides a 10-year tax exemption on income generated from the sale of renewable energy power and equipment, a reduction of taxes on external financing (Art. 10), and a 40% tax credit for self-producers to change or enlarge renewable sources systems (Art. 12). (Energy Transition Initiative, 2015) (Congreso Nacional, 2007) (Congreso Nacional, 2012)

Incentives granted for renewable energy sources generated an estimated average tax expense of RD$895.7 million (approx. US$17.9 million) between 2013-2018[30], representing 0.43% of total tax expenditure and 0.03% of GDP. (DGPLT, 2018)

Figure 19. Incentives granted for renewable energy



Source: MÉXICO$_2$ based on data from Dirección General de Política y Legislación Tributaria (DGPLT).

Electric tariffs

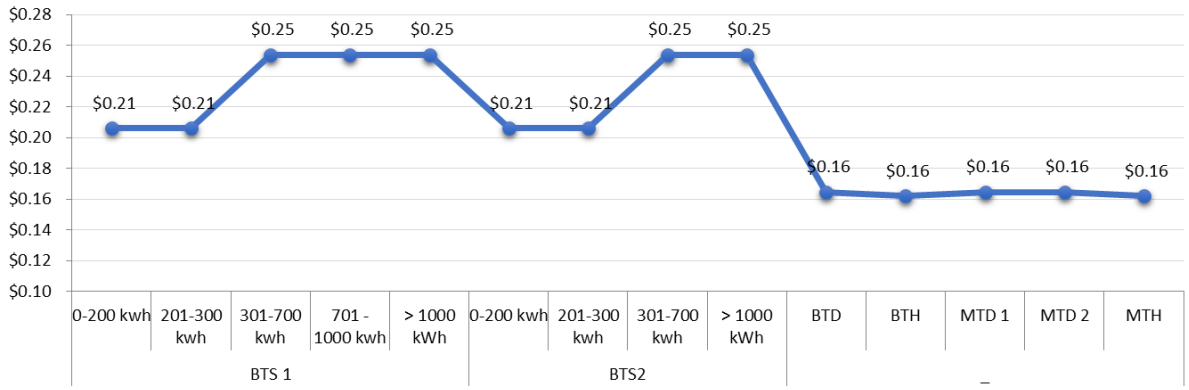
The General Electricity Law in its Article 24 orders the Superintendence of Electricity (SIE) to "elaborate, enforce and systematically analyze the structure and price levels of electricity and set, by resolution, tariffs and tolls subject to regulation in accordance with the guidelines and norms established in the law and its regulations". In addition, in its article 111, it establishes that "tariffs to users of public service will be fixed by the Superintendence. They will be composed by the electricity supply cost to the distribution companies established competitively, referred to the points of connection with the distribution facilities plus the added value for distribution costs, adding them through indexed tariff formulas that represent a combination of such values".

The Fund for the Stabilization of the Electricity Tariff (FETE) constitutes the subsidy to the electricity tariff that has been generalized to the entire population. This fund was created by Decree No. 302-03 in 2003, which establishes as a function of the FETE "the smoothing of the fluctuations in the electricity tariff due to the variations in the prices of hydrocarbons, Consumer Price Index (CPI) and exchange rate."

A tax on fossil fuels could have impacts on the electric tariffs currently paid in the Dominican Republic; however this impact is likely to be "absorbed" by the FETE, which means no direct impact for the average consumer. As for October 2018 the tariff scheme in the country is as follows:

[30] The 2018 estimated tax expense is based on the General State Budget 2018.

Figure 20. Indexed prices of electric tariffs in the Dominican Republic (cents US$ by kWh, October 2018)



BTS: Simple low voltage, BTD: Demanded low voltage, BTH: Time demand low voltage, MTD: Demanded medium voltage, MTH: Time demand medium voltage.
Source: MÉXICO2 with information from the Superintendence of Electricity, 2018.

To determine the possible economic impacts in the tariff scheme, it would be necessary to carry out a specific study that analyzes different tax rates applied to different fossil fuels used in electricity generation.

National decision-making process

Legal dispositions related to climate policy

The national constitution of the Dominican Republic, Article 194 states that ”It is the State's priority, the formulation and execution, by law, of a land-use planning scheme that ensures the efficient and sustainable use of the nation's natural resources, in accordance with the need for adaptation towards climate change”. (National Assembly of the Dominican Republic, 2010)

The National Development Strategy to 2030 proposes as part of its fourth strategic axis “a society with a culture of sustainable production and consumption that manages risks and the protection of the environment and natural resources with equity and effectiveness and promotes an adequate adaptation to climate change”. It also states in Article 10 of the fourth strategic axis that the general objectives in this context are: a sustainable environmental management, an effective risk management to minimize human, economic and environmental losses, and adequate adaptation to climate change. (MEPyD, 2012)

The General Law of Environment and Natural Resources (Law 64-00) was enacted in August 2000 and aims to "establish the norms for the conservation, protection, improvement and restoration of the environment and natural resources, ensuring their sustainable use". The Law has the character of a framework law that establishes the general principles on which the regulatory process for the protection of the environment and the use of natural resources is based. (Lizardo & Guzmán, 2005).

The institutional framework foreseen by the implementation of the mandates of Law 64-00 is integrated by the following organisms:

- Secretary of State for the Environment and Natural Resources (today, the Ministry of Environment and Natural Resources) (PNUMA);
- National Council of the Environment and Natural Resources;
- National System of Environmental Management and Natural Resources;
- Attorney for the Defense of the Environment and Natural Resources;
- Other important instances are the National Fund for the Environment and Natural Resources, the Environmental Management Units and the Office of the Environment and Natural Resources.

(The National Congress, 2000)

Table 15. Responsibilities of the different organisms created by the Law 64-00

The Ministry of Environment and Natural Resources	National Council of the Environment and Natural Resources	Attorney for the Defence of the Environment and Natural Resources
The Ministry is in charge of the following activities: - To elaborate, execute and supervise national policy on the environment and natural resources of the country. - To ensure the preservation, protection and sustainable use of the environment and natural resources; - To develop new standards, review existing ones and monitor the effective implementation of environmental legislation; - To establish mechanisms that guarantee that the private sector adjusts its activities to the planned sectorial policies and goals; and - To control and prevent environmental pollution in the emission sources.	Responsible for programming and evaluating environmental policies based on the coordination between the institutions integrating the National Planning System, the productive sector, civil society and centralized and decentralized public administration entities that have a greater impact on the environment and natural resources.	The Attorney is in charge of the following activities: - To exercise the actions on behalf of the State derived from damage to the environment, independently of those promoted by individuals who have suffered damage to their person or heritage. - To exercise the other actions foreseen in this law, in the Law of Judicial Organization of the Republic and in the other relevant laws.

Source: MÉXICO$_2$ based on data from the Law No. 64-00 to create the Secretary of State for the Environment and Natural Resource (2000) and the Coordination of fiscal and environmental policies in the Dominican Republic (2005)

The National Council for Climate Change and Clean Development Mechanism (CNCCMDL) created by Presidential Decree 601-08 on September 20th, 2008, aims to articulate all efforts from different institutions that integrate the country's actors in the fight against climate change. Its main functions are to formulate, design and execute the necessary public policies for the prevention and mitigation of GHG emissions, adaptation to the adverse effects of climate change and promote the development of programs, projects and climate action strategies related to compliance with the commitments assumed by the Dominican Republic in the UNFCCC and its derivative instruments. (CNCCMDL)

Legal reforms and presidential decrees

Alternative ways to incorporate legal changes into the legal system in the Dominican Republic are of great importance since they reflect possible ways in which changes in climate and environmental policy could be implemented.

The National Congress is the first power of the Dominican State, divided into two chambers, the Senate and the Chamber of Deputies, performs, fundamentally the work of legislating, taxing and representing. Being the first of these the most important and performed through the preparation and approval of laws. (Crispín & Reyes, 2017). However, as in any country, the legislative process can be time consuming and the subsequently approved bill may suffer changes that could affect the spirit under which it was conceived.

It is important to identify the actors able to submit law projects to the chambers that can potentially become law and special interest must be given to the presidential decrees, which legislative process tend to be faster and other law reforms. For example, it has been identified that a presidential decree is a very feasible option to establish a MRV system in the country. A precedent already exists; other laws and regulations have been approved through presidential decrees like the Decree 134-14 which establishes the Regulation for the National Development Strategy 2030 and, as part of it, the Monitoring and Evaluation National System (SNM&E).

A recent example, the Solid Waste law project, was presented by initiative of a group of deputies. This law project includes the creation of a Green Tax (“Gravamen Verde”) defined as a "selective tax on the consumption of final goods, intermediate goods and inputs that generate solid waste, in order to remedy the impact on health and the environment, as well as the promotion of the valorization of solid waste".

The Ministry of Finance would collect the Green Tax and transfer it in full, via the National Treasury, to a trust ascribed to the Ministry of Environment and Natural Resources, but administered by a Council of Directives integrated by the Ministries of Environment and Finance, the Dominican Municipal League, a municipal representative, a representative of The National Council of Private Enterprises (CONEP) and two representatives of sectors defined by the Association of Industries of the Dominican Republic (AIRD). (Molina, 2018)

This law project promotes inter-institutional coordination between different Ministries, municipalities and private and social actors; however, several private sector organizations and associations have expressed their unconformity during the process (Matías, 2018), which has led to the necessity of carrying out a series of dialogues with the different stakeholders in order to reach common agreements.

It is possible that any future tax or fiscal reform must incur in such negotiations with stakeholders from virtually all sectors. These impacts on lobbying capacity and in the time of implementation should be considered to effectively match its application and results with the possible implementation of other

mechanisms or public policies and with the achievement of national and international commitments like the NDC's and the renewable energy generation goals.

Stakeholders

As previously reviewed, much of the political feasibility during the implementation and operation of a carbon pricing depends on the level of understanding and engagement with the country's stakeholders. Therefore, identifying them and their interests in the different carbon pricing mechanisms is paramount to successfully implement a price on carbon.

As part of this consultancy, a series of interviews with different stakeholders were carried out concerning a series of carbon pricing and renewable energies instruments and their acceptance and feasibility. For full details about the findings and insights for each interview please refer to Annex I of this report.

Table 16. interviews conducted by the consultancy team with the country's stakeholders

Type of stakeholder	Number of interviews	Interviews undertaken
Governmental authority	9	- Ministry of Economy, Planning and Development (MEPyD) - Ministry of Finance - The Ministry of Energy and Mines - National Council for Climate Change and Clean Development Mechanisms (CNCCMDL) - Superintendence of Electricity - Superintendence of Securities - National Energy Commission (CNE)
Potentially regulated entities	5	- Dominican Association of Cement Producers (ADOCEM) - Dominican Electricity Industry Association (ADIE) - Empresa Generadora de Electricidad Haina (EGE Haina) - National Business Support Network for Environmental Protection (ECORED) - Electricity Company of San Pedro de Macorís (CESPM)
Other	1	- The Dominican Republic Stock Exchange

Other stakeholders have been identified and must be considered in the engagement process during the implementation of a carbon pricing instrument in the Dominican Republic; however the consultancy team was not able to meet with them. These identified stakeholders are: Ministry of Environment and Natural Resources, the Dominican Corporation of State Electric Companies (CDEEE), the Center for Agricultural and Forestry Development (CEDAF), Dominican Agribusiness Board (JAD) and the Dominican Environmental Consortium (CAD).

Main Findings

As part of the research made for this consultancy and enriched by the interviews conducted with major stakeholders in Santo Domingo, the main findings for the possible implementation of different carbon pricing instruments have been selected and are presented below.

Carbon Pricing

While establishing a price on carbon is a low-cost, efficient way to achieve mitigation targets as expressed in the NDCs, these approaches have to be coupled with complementary energy and environment policies to truly harness the potential that carbon pricing promises. (UNFCCC)

MRV

The country is currently working on a proposal for a national MRV system through the Initiative for Climate Actions Transparency (ICAT) project, carried out by the CNCCMDL in collaboration with UNEP DTU. With this initiative, a domestic MRV system will be designed and a roadmap for its creation will be developed.

An MRV system could be approved through a presidential decree. The proposal for this decree would come directly from the office of the CNCCMDL. Also, all information related to the MRV system will be compiled and administered by the National Statistics Office (ONE).

There seems to be very good technical capacities in the private sector to measure their emissions. In this sense, an agreement could be reached between the public and private sectors on the methodology used to carry out this type of measurements or calculations to create confidence on the future system and on the subsequent data.

If the government wants to preserve the opportunity to participate in regional/international markets, it would be useful to specifically start applying facility-level MRV on large emitters. This should in particular take into account the "Carbon Pricing in the Americas" declaration and related work stream dedicated to converging MRVs in the region among participating countries

Regional MRV hub.

In August 2018, the Greenhouse Gas Management Institute announced that the Caribbean Cooperative MRV Hub (CCMRVH) will assist countries in the Caribbean region to efficiently develop GHG inventories, mitigation projections, and track their NDCs. The CCMRVH will pool experts from participating countries to establish regional MRV institutional arrangements and products. (The Greenhouse Gas Management Institute, 2018)

Key activities of this project include:

- Establishing and operating the CCMRVH;
- Conducting needs assessments;

- Developing streamlined MRV institutional arrangements;
- Producing transparent MRV and mitigation outputs for countries;
- Enhancing expert capacity through mentoring and training; and
- Developing frameworks for Hub sustainability and for replication.

Emissions trading schemes

The minimal threshold for an ETS to work properly depends on the national context. More than the total number of possible market participants (market size), the feasibility of an ETS should focus its attention on the size of covered entities, for this plays an important role on its effective implementation. Covered entities should have similar GHG emissions levels since EA are allocated based on them; if covered entities have very different emissions levels from each other and EA are allocated accordingly, this could handle much market power to large emitters distorting the market itself. These large participants are also more averse to risk and capable of moving through a wider range of EA prices compared with small participant. In this sense, different mechanisms should be considered to avoid market distortions on prices and the level of emissions reductions.

Both ETS and carbon taxes are subject to uncertainty about benefits. However, ETS has the advantage of reducing some of the uncertainty on the environmental benefits associated. We do not know in advance the effect that any particular carbon tax level will have on emissions and therefore on estimated benefits. (Frank, 2014)

Carbon pricing is not unfamiliar to several international companies in the Dominican Republic, since their headquarters or some operations are located in other jurisdictions where carbon taxes or ETS have been adopted. In some cases, they operate in several jurisdictions with a carbon price in place (i.e. California, China and the European Union).

For an ETS to bring economic efficiency gains and to allow participants to exploit the lowest-cost mitigation it is imperative to have well-functioning markets with sufficient numbers of participants, otherwise they might incur in substantial transactions costs, limited efficiency gains, and increase the risk that individual firms could gain enough market power to distort the efficient use of emissions allowances. “Cap-and-trade may work in rich countries with the capacity to pay for transaction costs and technology development. But the money made from selling surplus EA may or may not finance development of technology that reduces emissions. Most painfully for poorer countries, the glacial speed of cap-and-trade programs does little to address the most urgent challenge of climate change”. (Shende, 2014)

In an ideal world for environmental protection, a cost-blind approach to the cap setting would dominate and the cost of compliance would not be considered while emissions reductions would be set at what is environmentally acceptable, rather than what is politically affordable. Ultimately, however, costs are usually considered. And the consideration of costs often also mandates the consideration of existing

technology that companies would be able to use to achieve emissions reductions. (The Climate Reality Project, 2017)

Some disadvantages of ETS programs have more to do with its design than with the program itself, for example, weak emissions caps, volatility in emissions allowance prices, and overly generous allocations of emissions allowances to regulated entities. (Kaufman, 2016)

The Latin American experience in the management of economic instruments shows some important elements to take into consideration:

Firstly, the administrative and institutional burden could be as demanding as a command and control policy scheme. This administrative burden is related to monitoring, compliance and payment collection tasks, legal instruments requirements, public consultation procedures, etc.

Secondly, the design and application of economic instruments must be flexible enough to enable adaptation to country-specific variables, in terms of economic development, pollution levels and the institutional capacity of environmental local institutions. It is also recommended that an important part of the revenue generated is allocated to environmental programs that positively impact the very regions from where revenue was generated. (Lizardo & Guzmán, 2005)

The Dominican Republic's stock market could provide operational trading platforms, a deposit of emission allowances records, as well as clearing and settlement services. This infrastructure could also be used to trade green certificates. The infrastructure to carry out auctions for emission allowances and initial public offers (IPO's) of green certificates is also available.

According to preliminary research and interviews, in the Dominican Republic, an emission allowance is a value creation element; however, it would not be a commodity per se since it is not physical or storable good. It would be a derivative financial instrument and could represent an asset for the entity that owns it in its balance sheet.

Carbon tax

In cases where the primary goal of the carbon tax is to meet a specific emission reduction target, like the Nationally Determined Contributions (NDCs) or other national laws and policies, governments can decide to set the carbon tax rate at the level that is expected to enable the required abatement target to be achieved. In cases where the jurisdiction is driven primarily by raising revenue through the carbon tax, the rate can be set so that it generates a specific level of revenue, though within the constraints dictated by supply and demand. (PMR, 2017)

Carbon taxes can work directly by the price signals they provide as well as through possible recycling of revenues reinvested in mitigation activities. Therefore while the overall achievement of carbon taxes is not known beforehand, the achievement could be adjusted if necessary through the share of revenues allocated to mitigation projects.

Carbon taxes work better for emissions reductions in countries with high price elasticity in energy demand. Therefore, if the demand is inelastic, a higher tax rate would be needed, carrying out possible political obstacles for its implementation.

For a carbon tax on gasoline to effectively reduce GHG emissions in the Dominican Republic, its rate should be considerably high due to the country's low price elasticity of demand and a high income elasticity of demand.

Currently, there is no general subsidy on gasoline, only liquefied petroleum gas. This subsidy is politically sensitive and its withdrawal is not planned, however, some exemptions of current fuel taxes can be found, for example, in public transport and for its use in domestic cooking.

What specific measures are chosen to address carbon leakage or distributional risks can have important repercussions for the effectiveness of the tax. All else being equal, measures that retain the price signal of the tax will tend to be more environmentally effective. (PMR, 2017)

Where an upstream carbon tax can often be supported by an existing tax administration, an ETS might require a new administrative structure to track and enforce allowance ownership, making carbon taxes often more suitable for jurisdictions that lack the substantial capacities needed to implement an ETS. (PMR, 2017). Also, if, during the implementation of the carbon tax, an MRV system on large emitters is developed, it can be a stepping stone to the introduction or participation to an ETS (including regional one) in the future.

Finally, in the Dominican Republic coal is not subject to any form of taxation, including of course, that which is used for the generation of electricity and this can be an impediment for the country to achieve its climate objectives. At the international level there are some examples of countries that have implemented a tax on coal like India or the Philippines. It is recommended that the Dominican Republic considers the application of a similar tax as well as a study of its possible impacts on emissions reductions and energy efficiency.

Hybrids

Hybrid instruments respond to the specific needs and characteristics of the country's emissions profile and economical and political context.

In recent years, this kind of approaches have gained strength and are increasingly being used by different jurisdictions due to their flexibility and the opportunity to include elements that integrate or complement a public policy mix. However, in a hybrid system there are a number of ways for carbon prices to interact with each other and sometimes this process adds a great deal of complexity to political, economic and environmental challenges. (Joshi, 2009)

Additionally, a considerable amount of institutional and technical work is necessary for the implementation of these mechanisms. This implies the need for capacity building in collaboration with

the private sector, academia, civil society, etc. Such a process can turn to be financially complex and time consuming.

Revenue

Redistributing carbon pricing revenue as a regular carbon dividend is the single most promising option for enhancing political acceptability, although other ways of using the revenue can be appropriate in given circumstances.

Recycling revenues as lump-sum dividends addresses most of the political and behavioral barriers; however, there is no "one size fits all" solution. Some of the recycling methods used worldwide include transfers to households or public investment, green spending, targeted transfers or tax cuts. In reality we generally experience mixed recycling strategies. Ultimately, designing revenue recycling mechanisms with an eye on behavioral insights and in accordance with the political context can help make carbon pricing a political success. (Funke & Mattauch) In practice, most carbon taxes have a certain share or recycling destined to environmental purposes.

Electricity sector

The Dominican Republic has a relatively highly developed energy sector. With almost 4GW of installed capacity, (22% being renewables), and an electrification rate of 96% it is among the most developed in Latin America. However, energy generation is still highly dependent on fossil fuels. There are plans by the government to increase renewable's share of generation and decrease oil and coal's dominance, with goals set at 25% total energy generation derived from renewable and clean sources by 2025.

The Dominican Republic's energy demand grows approximately 75 megawatts per year (between 2% and 4% of the total electric installed capacity) and the current peak demand oscillates at 2,300 megawatts.

The State plays a leading role in the country's electricity sector, "it is a regulator, user, and entrepreneur and finances the deficit".

The government of the Dominican Republic exempts fuels taxes used by electricity distributors, that is, they do not pay the Tax on Transfer of Industrialized Goods and Services (ITBIS).

Renewable energies

With dropping solar and wind technology costs, the installed capacity of renewable energies will double in just over a year and a greater penetration of renewable energies is foreseen, mainly due to this interaction between their cost and generation efficiency worldwide.

The Punta Catalina coal plant will represent approximately 35% of installed capacity in the country. This could hinder the goal of having a 25% of the electricity matrix coming from renewable sources by the year 2025. It will also significantly increase the country's GHG emissions.

A problem with intermittent renewable energies (wind and solar) in the country is that the greatest generation capacity is located in places with a more limited transmission grid, as in the west and southwest of the country.

Fiscal benefits of up to 40% of the cost of investment in renewable energies new equipment are currently granted as a single credit to income tax. This is a tax incentive to the self-production of renewable energies, however, gradual changes in this instrument are foreseen due to the change in prices (investment flows) in renewable projects.

Green certificates can be a good option and have been generally accepted during most of the interviews with stakeholders from the private sector. However it should be noticed that they are not a carbon pricing instrument and do not pursue, in principle, GHG emission reductions: it is a co-benefit of their implementation. In addition, the complexity of the local electricity sector must be taken into account when considering this market instrument.

It is currently not possible to track the production or consumption of energy from renewable sources once it is injected into the grid. A registry of this is necessary for this traceability to be feasible. Possible amendment on Law 57-07 can be made by the National Energy Commission (CNE) on this subject.

Assessment of feasibility and acceptance for carbon pricing mechanisms

The following table shows the pros and cons of different carbon pricing mechanisms and the green certificates instrument based on literary research and international experiences. Also, different levels of technical and political feasibility and acceptance from the public and private sector are given for the specific context of the Dominican Republic. This assessment has been made based on the different interviews conducted by the consulting team with national stakeholders.

Table 17. Assessment of feasibility and acceptance for carbon pricing mechanisms

Mechanism /Instrument	Main focus on	Theoretical Pros	Theoretical Cons	Technical feasibility	Political feasibility	Private sector acceptance	Public sector acceptance
Carbon Tax	Emissions reductions	- Easy to understand. - Low cost of implementation. - Revenue source for governments. - Certainty on prices (price set by the government). - Can use current infrastructure and administrative structures - Allows the use of offsets.	- Effectiveness depends on the cost of the tax (usually needs to be high). - Difficult to link internationally. - Uncertainty on emissions reductions. - Less time for business to adapt. - Carbon leakage is difficult to manage.	High	Very low	Very low	Medium to low
Emissions Trading Scheme	Emissions reductions	- Revenue source for governments. - Relatively easy to link internationally. - Certainty on emissions reductions. - Allows the use of offsets. - Carbon leakage is relatively easy to manage.	- More difficult to understand by government and all stakeholders. - Effectiveness depends on the design of the ETS. - High cost of implementation. - Uncertainty on prices. - Usually needs of infrastructure and administrative structures. - More time for business to adapt. - Requires a fair number of participants (covered entities).	Medium to low	Medium to high	High	High

Mechanism /Instrument	Main focus on	Theoretical Pros	Theoretical Cons	Technical feasibility	Political feasibility	Private sector acceptance	Public sector acceptance
Hybrid Instrument	Emissions reductions	- Designed for the jurisdiction's specific needs. - Usually allows the use of offsets.	- More difficult to understand. - High cost of implementation. - Usually difficult to design due to convergence with other instruments. - Possible higher costs for covered entities compared with an ETS.	Medium	Medium to low	Medium	Medium to high
Green Certificates	Renewable energies	- Easy to understand. - Relative certainty on the use of renewable energy. - Increased electric generation capacity.	- Uncertainty on emissions reductions. - Potential policy overlap.	Medium	Medium	High	High

Note: For the correct interpretation of the information, we should consider the following definitions for the concepts of:

Carbon Tax: A tax applied on direct CO_2 and other pollutants emissions or, a direct taxation on the carbon content of fossil fuels.

Hybrid instrument: Several hybrid carbon pricing instruments exists worldwide, combining elements of emissions trading with a levy on carbon emissions. For the sake of this document, we will understand a hybrid instrument as a "cap and offset" scheme in which companies receive an overall cap for their emissions and will need to compensate all further emissions with offsets.

Green certificate: A tradable instrument which has a market value and represents a fixed amount of electricity which has been generated through a renewable (green) energy source. A green certificate is usually equivalent to 1 MWh of generated renewable energy.

Figure 21. SWOT analysis for a carbon tax in the Dominican Republic

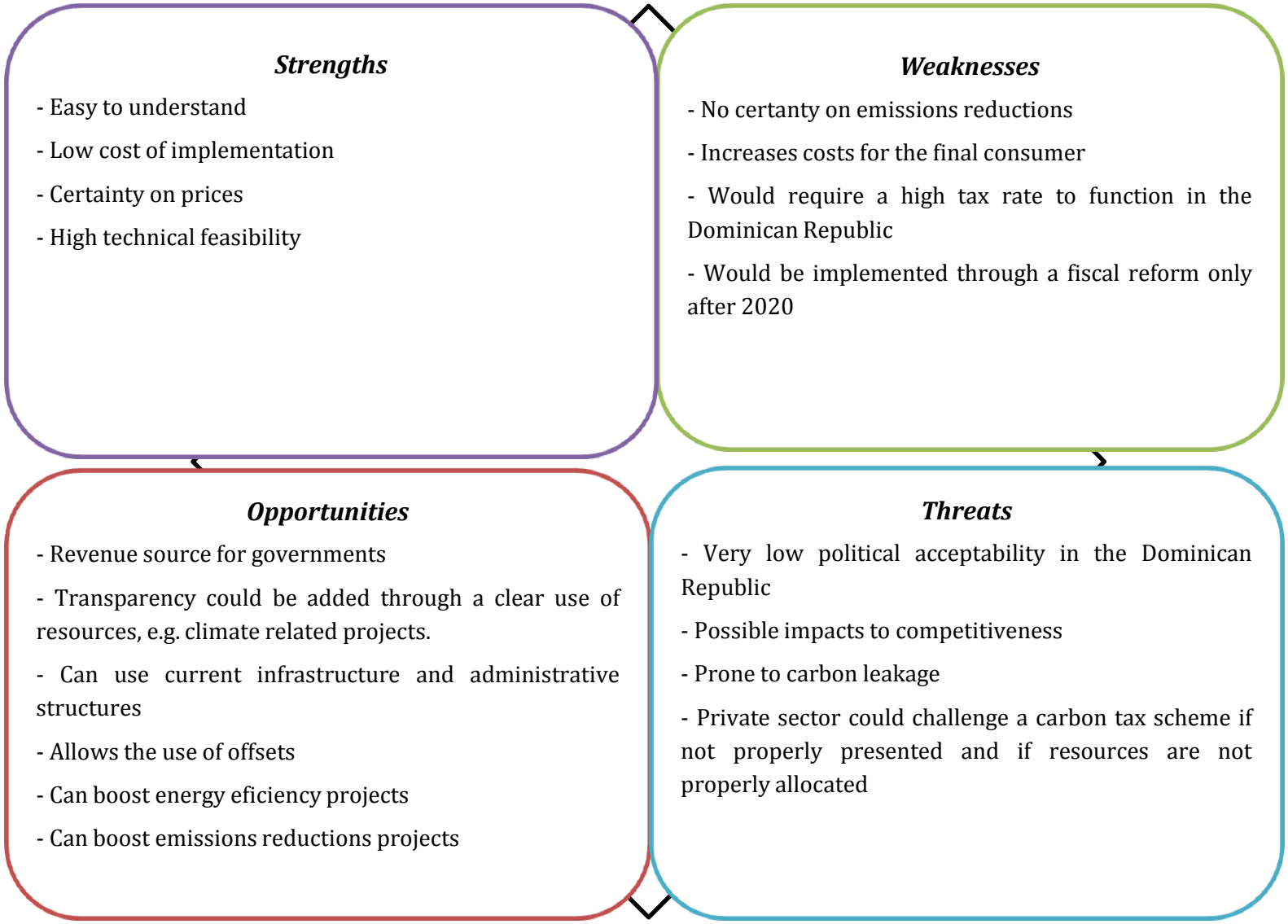
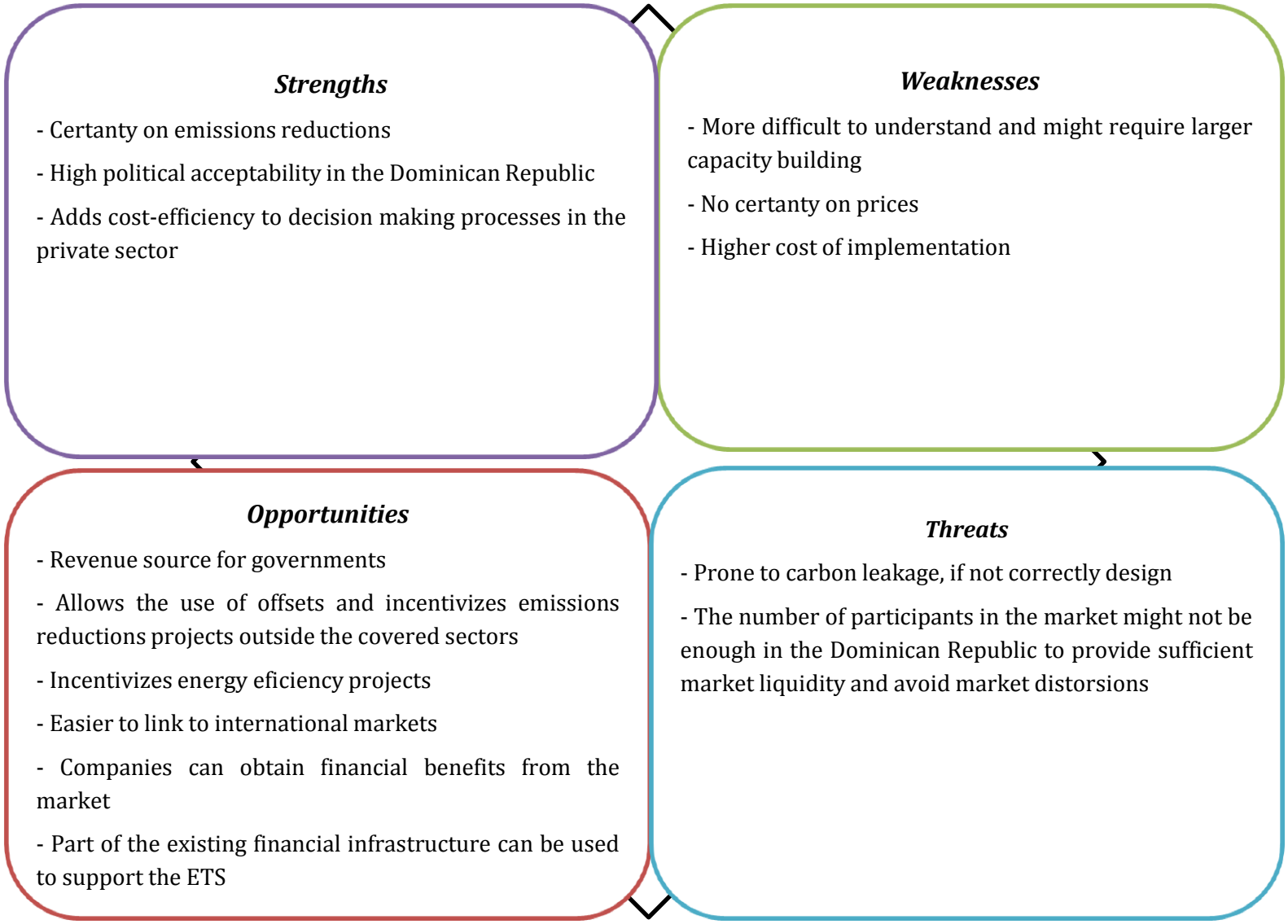


Figure 22. SWOT analysis for an ETS in the Dominican Republic



Recommendations

Based on the main findings of this report and the assessment made on the feasibility and acceptance of different carbon pricing mechanisms for its implementation on the Dominican Republic, the consulting team makes the following recommendations:

Carbon Pricing

- To consider the adoption of simpler carbon pricing instruments which engage the largest possible number of GHG emitters (even individuals), and not only large industries. It may be suitable to consider a payment for GHG emissions reductions scheme or a personal carbon trading scheme[31]. However, it must be stressed that whatever the scheme, it includes simpler and more disruptive instruments. In this sense, a research study on this subject must be conducted as a possibility for implementation in the future.
- A series of different capacity building activities on carbon pricing should be considered to enrich the national conversation on the subject even when there is no final decision over the implementation of any mechanism. Also, it is paramount for this capacity building process to be consistent over time and directed to different audiences including of course public sector, private sector, academia, NGOs and the media.
- To consider the creation and administration of an independent online platform that contains general information about carbon pricing, technical information specific to the Dominican Republic related to the subject such as the country's level of emissions, the country's NDCs, energy consumption metrics national emissions registry or MRV system (when applicable), etc.
- All this offered in a language easy to understand and accessible to the general public.
- Finally, it is recommended that the Dominican Republic becomes a partner to the Carbon Pricing Leadership Coalition (CPLC) to improve knowledge sharing, technical analysis and public-private dialogues related to a carbon pricing policy adoption and implementation. This partnership can come in a national or subnational level or even through motivating the private sector, the academia or the civil society to join the program.

MRV system

- If the Dominican government adopts any carbon pricing mechanism, an MRV system would be a vitally needed tool. In fact, for the development of an emissions trading scheme, a solid MRV system is a central pillar. For a carbon tax, the MRV may be a useful tool to measure emissions of

[31] This is an emissions trading scheme where equal rights to emit are allocated to individuals in the economy as emission allowances (or 'carbon credits'), which must be surrendered when purchasing goods or services that cause emissions.

participating companies and estimate emissions reductions. An MRV system would help track the environmental integrity of any chosen carbon pricing instrument.

- A series of MRV components that could be considered for implementation are shown in the following table:

Table 18. Cooperation for the development of MRV components

MRV Components	Individual cooperation under common principles	Joint development
MRV regulatory framework	Adaptation of the national regulatory framework to the development of common MRV components.	Creation of a Legal and Regulatory Coordination Committee.
MRV institutional framework	Adaptation of the national institutional framework to the development of common MRV components.	Creation of a Technical Coordination Committee.
Measurement and management of data and report	To converge to common GHG measurement methodologies for national inventories.	To have a common system of GHG reporting methodologies for mitigation actions.
Emissions registry	Registry of GHG facilities and data of other policies related to GHGs.	To have a common GHG registry for mitigation actions.
Accreditation and verification	Harmonization of national protocols and schemes to best practices agreed internationally.	Common accreditation and verification system.

- Alternatively, the government may explore is to join the existing Carbon Pricing of the Americas (CPA), an initiative launched during the One Planet Summit in Paris, in December last year by several countries and jurisdictions in the region including California, Chile, Colombia, Costa Rica, Mexico, Quebec and Washington State, among many others. The participating jurisdictions commit to put a price on carbon and build collaborative approaches with the vision of a common inter-American carbon market.

  The current working program is centered in strengthening and harmonizing the MRV systems with the ultimate goal of setting the necessary foundations to link their carbon markets. This could be highly beneficial for the Dominican Republic by boosting regional cooperation and giving the country the possibility to gain access to different resources for the development of capacity building and infrastructure.
  To read the full declaration, please refer to: https://www.ieta.org/resources/News/Press_Releases/2017/Declaration%20on%20Carbon%20Pricing_FINAL.pdf

ETS

- To conduct a specific research study to assess the feasibility of the introduction of an Emissions Trading Scheme in the Dominican Republic. This study should focus mainly on the technical feasibility of the ETS including a more in depth study of the possible sectors covered and the number of facilities liable as well as its political feasibility, timeframe for implementation and linkage options. This report must also contain a cap modeling which delivers possible costs of implementation and the system's mitigation potential.
- To conduct a field trip to one or more jurisdictions that have implemented an ETS or are currently going through the design of an ETS in order to learn best practices and to have first-hand information regarding the design of the mechanism. The mission could integrate public and private sector representatives.
- Given the absence of a wide number of large GHG emitters, a challenge to establish an ETS would be the creation of liquidity in the market. In this sense, it is proposed to create a pool of energy products (this includes futures for physical goods like coal and natural gas, financial transmission rights –FTRs-, financial options, etc.) and emission allowances to create this liquidity, that is, a spot and forward energy market carried out in a stock trading environment where emission allowances are added.
- Given the distribution of current roles, the industrial sector and the State will certainly participate in an ETS in the Dominican Republic. In this sense, the engagement of the energy and industrial sector and financial institutions in the process of defining the ETS is critical to the success of the mechanism.
- The potential contribution of international cooperation agencies during a possible implementation of an ETS should be assessed.
- While an emissions trading scheme could be much more desirable and politically feasible than a carbon tax, the size of the Dominican Republic's economy and the need for capacity building at all levels are an important barrier to its implementation. In this sense, it would be necessary to use simpler and more disruptive instruments. These instruments should consider the largest possible number of GHG emitters (even individuals), and not only large industries, with the ultimate goal of incentivizing emissions reductions, for example, in transportation. It may be suitable to consider a payment for GHG emissions reductions scheme or a personal carbon trading scheme.
- Another option that the Dominican Republic should consider is the integration of the country into a regional ETS for the Latin American or the Caribbean region. In this sense, the CPA can offer the country with an alternative to achieve a more stable number of covered participants and, hence, the necessary market liquidity for the EA financial transactions.
- Different types of personal carbon trading that have been identified as options for other countries are[32]:

[32] (Department for Environment, Food and Rural Affairs, 2008)

- A mandatory scheme involving individuals and organizations, where a percentage of carbon credits are allocated for free to individuals and the remaining are auctioned
- 'Carbon credits' would be surrendered to cover the carbon content incurred in due to household electricity and gas and personal transport fuel purchases.
- All individuals and organizations would have access to the market to trade their carbon credits.
- A 'pay as you go' option would allow individuals to pay the price of the carbon credits at the point of purchase, leaving the vendor to buy and surrender sufficient allowances for that sale.

Carbon tax

- Price mechanisms alone will not be enough to reduce gasoline consumption in Latin America and the Caribbean during times of rapid economic growth. Market mechanisms will therefore have to be coupled with regulatory instruments to bolster these economic incentives. (ECLAC, 2015)
- Even when it might seem feasible to adapt the current gasoline tax scheme to a carbon tax under the Dominican Republic framework, it could face a very complex political scenario, since there is series of taxes currently related to GHG emissions (fuel tax, first plate tax) and low reception for a tax reform. Actually, due to political (and electoral) circumstances, a carbon tax could be included in a tax reform, at best, after the 2020 presidential and general elections.
- A large share of the national budget comes from the tax on fuels. With the increase of the fleet of electric vehicles, the loss of this income for the national budget can be compensated by energy efficiency or a tax per kWh.
- To conduct a research study to have up to date technical information regarding short term and long term price elasticities of the demand and short and long term income elasticities of the demand for gasoline (and maybe other fossil fuels) to properly assess the real impact of a carbon tax measured as GHG emissions reductions in the Dominican Republic.
- To conduct a targeted study which reflects the possible impacts of the establishment of a carbon tax on the electric tariffs for the consumers in the Dominican Republic which analyzes different tax rates applied to different fossil fuels used in electricity generation.
- To conduct a study regarding the applicability of a tax on coal and its possible impacts on emissions reductions and energy efficiency.
- If it is decided to implement a carbon tax in the country, it is recommended that the use certified emission reductions (offsets) as a form of payment is allowed (and limited to a pre-defined level).

Revenue

- Whatever mechanism is used to set a price on GHG emissions for the Dominican Republic, it is important that the revenue raised from it is used for projects related to climate change and the reduction of emissions. As international experiences have shown, the recycling of revenue can help to address most of the political and gain the private sector participation.

- It is recommended to use the revenue raised from the implementation of any carbon pricing mechanism in a clear fashion and with a pre-defined structure of revenue spending, preferably on projects related to climate change.

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Annex I

Visit report by MÉXICO$_2$consultant team to the Dominican Republic as part of the CI-ACA project

Introduction

From the 10th to the 14th of September 2018, MÉXICO$_2$'s consultant team carried out a field visit to Santo Domingo, Dominican Republic, as part of the Collaborative Instruments for Ambitious Climate Action (CI-ACA) project. The team consisted of Brian Oronoz, Carbon Pricing Coordinator and Eduardo Piquero, Director. The team was accompanied by Nelly Cuello, who acted as a support consultant in the Dominican Republic.

This report includes the main topics discussed, the recommendations and initiatives noted during the interviews with distinct actors and stakeholders (henceforth "stakeholders") as part of the consultancy project for the identification of carbon pricing mechanisms and instruments that will permit the Dominican Republic fulfill its environmental commitments and goals regarding emission reductions.

In particular, these conversations were centered on the possible implementation of a carbon tax, an emissions trading scheme (ETS) or a hybrid scheme. Additionally, the convenience of implementing other types of instruments, such as green certificates33, was debated.

The report is structured as follows: the names of the different stakeholders (associations, companies, government agencies, etc.) with whom the interviews were conducted, as well as the name of the attendant person and their title.

Given that the interviews were conducted following a conversational model following previously agreed upon subjects, the results and conclusion obtained cannot be completely standardized, however, these have been grouped in subcategories such as monitoring, reporting and verifications, carbon pricing mechanisms, renewable energy, electricity sector, transport, etc.
Lastly, a summary of the main and/or more common conclusions is presented.

[33] A green certificate is a tradable instrument which has a market value and represents a fixed amount of electricity which has been generated through a renewable (green) energy source. A green certificate is usually equivalent to 1 MWh of generated renewable energy.

Interviews

Manuel Cabral – Executive Vice-President, **Amaury Vásquez** – Technical Manager – **Dominican Association of the Electricity Industry (Asociación Dominicana de la Industria Eléctrica, ADIE)**

Electricity sector

- All three electricity distribution companies operate under concession in the three macro-regions of the country and are in charge of distribution and commercialization activities.
- By law, electricity transmission must be public.
- All of the Dominican Republic's hydroelectric installations are the property of the State. Except those under 5MW, where, under the law for incentives to renewable energies, incentives exist for private generators.
- AES Dominicana and EGE Haina represent about 36% and 19%, respectively, of all electricity generation in the country. About 4% of the installed capacity (excluding hydroelectric) is from non-conventional renewable sources (photovoltaic, wind and biomass).
- The Government of the Dominican Republic exempts taxes on the fuels used by distributors, that is, they do not pay the Tax on the Transfer of Industrializes Goods and Services (ITBIS).

MRV

- Regarding a possible system of measuring, reporting and verification (MRV), it was noted that there already exists an over-measuring of companies and that these all count with emission inventories given the measuring protocols of their head offices. Similarly, the Ministry for the Environment and Natural Resources conducted a thorough evaluation and is in possession of the relevant information thanks to the Environmental Compliance Reports (ICA, per its acronym in Spanish).
- There is a good amount of technical capacities within companies to measure their emissions, however, there is a need to standardize methodologies and calibrate equipment in order to avoid discrepancies between data reports in the estimations' results. In this regard, an agreement must be reached between the private sector and the public sector concerning the methodologies that are to be used to carry on these measurements and build trust on both the systems and the collected data.

Carbon pricing mechanisms

- In general, it is possible that a new tax will not be well received by the electrical companies and the public in general, given that end consumers will end up footing the bill. Furthermore, there is a widespread belief that the energy produced in the Dominican Republic is the most expensive in the region, when in fact it is not necessarily so. This is a strong political sentiment, shared by the public in general.
- Regarding emissions reduction mechanisms, it is of paramount importance that assurances can be made that any incentives related to said mechanisms are deployed in a wholesome and agreed upon fashion, given that prior experience tells us that this is not always the case.

Julissa A. Báez – Executive Director –
Dominican Association of Portland Cement Producers (Asociación Dominicana de Productores de Cemento Portland, ADOCEM)

Carbon pricing mechanisms

- The price on carbon is not a new subject to the companies represented by ADOCEM, given that some are multinational enterprises, such as CEMEX and Argos, and can also count on the recent experience related to carbon taxes in Chile and Colombia and an emission trading scheme in Mexico.
- Currently, work is being conducted through a consultancy to prepare a roadmap towards a low carbon economy for the cement sector in the Dominican Republic, in which all six cement companies are participating. Through this roadmap, possible synergies within a MRV system will be identified and a base line (currently in the data administration phase) is being established. This initiative is promoted by the Inter-American Cement Federation (FICEM, per its acronym in Spanish) and work alongside the International Energy Agency (IEA) has been conducted.
- With this and other initiatives the aim is to eliminate certain barriers, for this reason cooperation with the government has been sought. This roadmap represents a "preliminary" effort, aiming to prepare the sector to the possible implementation of mechanisms that require information on their emission levels and abatement potentials.
- ADOCEM noted that it is committed to participate in the dialogue processes regarding the establishment of a carbon pricing mechanism, such as an emissions trading scheme, including assisting in developing technical and impact analysis on different sectors, among other things.
- The importance of strengthening climate governance in the country was highlighted, given that it is a subject that is increasingly being considered by investors. A holistic approach regarding analysis of new regulation on the subject was deemed necessary.
- Regarding the position taken by the sector on an emissions trading scheme, it was noted that it is not defined, given that it will be conditioned on the options analyzed, evaluated and debated within the sector. Possibly, a consensus among the sector will be needed, in order to allow its members to maintain their operations and competitiveness.
- Special interest was shown on the use of the proceeds obtained through the different carbon pricing mechanisms discussed, and it was recommended to channel these proceeds towards incentives and/or projects related to addressing climate change and emissions reductions.

Juan Manuel Hirujo – Chemical and Environmental Superintendent
Compañía de Electricidad de San Pedro de Macorís (CESPM)

Renewable energy and self-generation

- The San Pedro power plant, built with a capacity of 300 MW, is fully operated by fuel oil since 2002 despite being stated to transition towards natural gas after five years. The necessary infrastructure (gas pipeline) to make the change is still not available.
- Sometimes sugar plantations give the residual bagasse of their operations to power plants. An example being the Colón sugar plantation and the biomass power plant San Pedro BioEnergy.
- Regarding possible modifications to the investment schedule within the electrical sector, the conversation spanned natural gas conversions, renewable energy such as solar and wind, and the possibility of investments in technologies for wave energy installations.

Emissions reductions

- The possibility of reducing emissions in a technical manner is open for consideration, that is, production remains the same but through carbon capture and sequestration technologies emissions are reduced.

Federico A. Grullón – Supervisor Technical Department
Nacional Council on Climate Change and the Clean Development Mechanism (Consejo Nacional para el Cambio Climático y Mecanismo de Desarrollo Limpio, CNCCMDL)

MRV

- Currently, work is being conducted on a project aimed at developing a national MRV system through the Initiative for Climate Action Transparency (ICAT), specifically it will be an emission inventory system and a support system.
- Concerning the information related to the MRV system, so far it seems likely that it will be gathered and managed by the National Office of Statistics (ONE, per its acronym in Spanish).
- A MRV system could be approved through a presidential decree. The proposal for such a decree would originally be drafted by the CNCCMDL office, given its institutional importance and legal faculties.
- There is already a draft proposal for a Climate Change Law. In the case where this Law were ratified after the approval of the MRV system, the presidential decree that mandated its establishment would be derogated and included in said law.

Carbon pricing mechanisms

- Gasoline consumption in the Dominican Republic is not only subject to low price elasticity of demand and a high income elasticity of demand, but also to aspirational factors that come into play that must be considered when developing a high impact policy. These low price elasticities of

demand prevent large changes in the price of gasoline to affect its demand, and high income elasticities of demand mean that growth in income leads to higher demand for gasoline.

- An example is the perception among large parts of the population that having a truck is a necessity to cope with strong rains, floods and potholes in Santo Domingo, given that there are no suitable alternatives available.

José Carlos Fernández – Project Coordinator ICAT – **and Sara González** – Consultant – **Nacional Council on Climate Change and the Clean Development Mechanism (Consejo Nacional para el Cambio Climático y Mecanismo de Desarrollo Limpio, CNCCMDL)**

MRV

- Currently, work is being conducted on a proposal for a National MRV System through the Initiative for Climate Action Transparency (ICAT) by the CNCCMDL in cooperation with UNEP DTU34. Alongside this initiative, a domestic MRV system will be designed and a roadmap for its implementation will be developed. The next steps in the process are:
  - Develop a final proposal for the MRV system;
  - Validate and socialize the proposal;
  - Implementation through a presidential decree drafted by CNCCMDL.
- As of September 2018, two workshops have already been conducted to promote projects and initiatives throughout the country regarding the MRV system, which considers not only the Biennial Update Report (BUR) and REDD+ but also the Dominican Republic's civil aviation sector. Similarly, three additional workshops are being considered on mitigation actions and support MRV.
- Once the roadmap has been validated by a transparency framework which agrees on results, the decree proposal could be developed.
- During the meeting several other subjects, recommendations and initiatives which could add value to the MRV system proposal and the consultancy were discussed, such as:
  - Define who will hold the registry's information and keep track of any transactions under a possible ETS.
  - Have the ONE handle the consolidation, verification and consistency of the data, with the objective of pooling the information gathered by sub-sectors to be systematized and sent to the Intergovernmental Panel on Climate Change (IPCC).
  - The Central Bank gathers, generates and publishes the environmental accounts. The Central Bank is a decentralized and autonomous financial institute, who regulates monetary policy, and is widely trusted by the distinct sectors of the country's economy.

[34] UNEP DTU Partnership (previously UNEP Risø Centre, URC)) is a world leading international institution in research and advisory services in energy, climate and sustainable development. It is part of the United Nations Environmental Programme (UNEP).

- The Ministry of the Environment and Natural Resources has a designated department charged with managing the Nacional Greenhouse Gas Inventory (INGEI, per its acronym in Spanish), however it needs to strengthen its technical capabilities.

Moisés Álvarez – Technical Director – **Victor R. Viñas** – Advisor and Coordinator of the Executive Vice-Presidency –
Nacional Council on Climate Change and the Clean Development Mechanism (Consejo Nacional para el Cambio Climático y Mecanismo de Desarrollo Limpio, CNCCMDL)

Carbon pricing mechanisms

- During the meeting, the consultancy project was discussed in broad terms and a short summary on the two main market mechanisms for emissions reductions that could be implemented in the Dominican Republic was presented: a carbon tax and an ETS. The main components of each option were discussed as well as the reactions of those who had been interviewed to both ideas and the green certificates scheme.
- The main findings CNCCMDL is expecting from the consultancy's final product were discussed, such as final recommendations and a series of next steps to take on a national level to adopt said mechanisms, for example, a technical analysis on gasoline's elasticities.

Hipólito Nuñez – Advisor –
National Energy Commission (Comisión Nacional de Energía, CNE)

Electricity sector

- Regarding the new coal power plant in Punta Catalina, it was noted that the construction of a natural gas facility with a 600MW capacity was initially considered but given economic conditions (prices were USD$14-17 per MMBTU) this option was discarded.
- The Dominican Republic's energy demand is growing at approximately 75MW per year and current peak demand is around 2,300MW.
- In September 2018, a tender process is to be organized for a privately owned (PPA35) natural gas power plant in Monte Cristi of 30-50MW.
- The State plays a central role in the country's electrical sector, being "regulator, user, entrepreneur and funds the deficit".
- Currently a prepaid electricity program is being considered which would be applicable in low income areas where the service is not paid but it is used. This may reduce electrical demand in the long term by regulating those who are currently not paying.

Renewable energies

[35] Power Purchase Agreement

- During the meeting, it was noted that currently up to 40% (until recently 75%) of the investment cost of equipment could be written off as an income tax credit, this as a part of a fiscal stimulus package for self-production of renewable energies, however gradual changes to this amount are expected given that the prices for renewables have changed, this will be done through modifications to the current law on incentives or through the pending fiscal reform.
- One of the problems of intermittent renewable energies (wind and solar) in the country is that most of the installed generation capacity is located in places with limited access to the distribution grid, such as the western and southwestern parts of the country. Additionally, the areas with the highest potential are currently protected areas.
- Currently, maximum plant factors for renewable energies are around 22% for solar installations and 40% for wind facilities.
- International financial support for renewable energies is usually accompanied by a higher technical workload, as well as greater equity percentages compared to investments in conventional energy projects.

Carbon pricing mechanisms

- When discussing command and control mechanisms in comparison to market mechanisms, it was noted that there were inconveniences in implementing prohibitions given the risk of creating a black market, for this reason it was better to give economic signals.
- A proposal for raising awareness in the electrical sector regarding carbon pricing is to publish today what the expected prices on energy could be under a pollution tax following a business as usual scenario.
- There are concerns regarding carbon leaks, however it was noted there are mechanisms to prevent it, for example applying a carbon tax or renewable energy quotas (green certificates scheme) only on industries which cannot leave the country easily, such as cement and mining.
- Currently the biggest source of revenue to the national budget comes from fuel taxes. If the electric vehicle fleet is increased, then the loss of this revenue stream will have to be compensated either through taxes on energy efficiency or on kW/h.

César Santos – Renewable Energy and Business Development Specialist

Carbon pricing mechanisms

- While an emission trading scheme may be much more desirable and politically feasible than a carbon tax, the size of the Dominican Republic's economy and the need for capacity building throughout all levels may prove to be large barriers for its implementation. In this regard, it may prove necessary to consider much simpler and disruptive instruments to set a price on carbon. This instruments should include as many emitters as possible (including individuals), not only big industry in order to generate the necessary incentives to reduce emissions, for example in the transport sector. Mr. Santos noted that it may be necessary to explore a carbon reduction payment scheme.

- Such instruments should lean on available communication and finance technologies, such as smart phones and mobile applications.
- Currently there is great interest for emission reduction projects in the Dominican Republic.

Maria Alicia Urbaneja – Executive Director
National Business Support Network for Environmental Protection (Red Nacional de Apoyo Empresarial a la Protección Ambiental, EcoRed)

Private Sector

- The current president of EcoRed, Rafael Izquierdo, has worked for several years on carbon bonds and has been one of the country's pioneers in calculating its carbon footprint. They are also very interested in green finance instruments.
- EcoRed's 82 members are almost all private sector industries, including power generating companies.
- In order to become a member of EcoRed, the company must have an Environmental License/Permit and be up to date in its environmental compliance reporting to the Ministry of the Environment and Natural Resources.
- The cement industry is currently working on a roadmap that includes MRV topics. Additionally, in cooperation with its members, most of ADOCEM's companies are measuring their emissions directly due to requirements from their headquarters.

Renewable energies

- Installed capacity (thermal and renewable) surpasses demand, however there are problems with distribution (technical and non-technical losses), high operation costs, low collection levels and high financial expenses for contract management, for this reason additional power plants are needed.
- It is necessary to increase investments in renewable energy that present attractive financial yields. Some possible actions to do so may be the development of incentives for biomass energy and other renewables as well as self-production to lower dependency on the grid.
- The green certificate mechanism to incentivize the use of renewable energy seems to be a good option.

Carbon pricing mechanisms

- At Corporación Dominicana de Empresas Eléctricas Estatales (CDEEE) there have been discussions with companies dealing in generation and distribution regarding the initiative presented by the Carbon Pricing Leadership Coalition (CPLC)36.

[36] Carbon Pricing Leadership Coalition (CPLC) is a voluntary association of national and sub-national governments, companies and civil society organizations that promote the use of effective carbon pricing policies that maintain competiveness, create jobs, foster innovation and deliver significant emission reductions.

- A carbon tax would not be well received by the private sector for several reasons, including previous experiences such as the Law on Waste that was recently being discussed, which under its final format risked becoming a perverse incentive for waste production since it did not incentivize efficient waste management nor changes in behavior.
- Whichever emission reduction mechanism is implemented, it is important that any resources levied are channeled to projects that mitigate environmental impacts, for example a green bond fund to create new businesses, circular economy projects, etc.
- During September 2018, EcoRed and Asociación de Hoteles y Turismo de la República Dominicana (ASONAHORES) signed an agreement that seeks to promote good environmental practices among the members of both organizations, drive the development and implementation of incentives and other voluntary and flexible mechanisms that contribute to a sustainable development and social responsibility, as well as developing energy conservation policies and incentivize the use of clean technologies and a wholesome management of waste from the tourism sector.

Ricardo Estevez – Development Manager
EGE Haina

Voluntary Carbon Market

- As of September 2018, the developments of Los Cocos I and II have generated between 600-700 thousand tCO2 certified carbon reductions. The carbon credits have been put up for sale, but only relatively small offers have been received (approximately 15 thousand tons). As local industries become more internationally involved, the demand for this type of credit will rise.

Carbon pricing mechanisms

- Companies are committed to the implementation of a carbon pricing mechanism as long as it generates some kind of economic, social or environmental benefit. In general, it is believed that sustainability matters, if not profitable, will not be valued by the public.
- Given that the State will act as judge and participate in these carbon pricing instruments in the electrical sector, if the producer must assume the costs and pass it on to the client (the State) it is possible it would not want to pay.
- Volatility impacts projects. Price security is needed to make the necessary investments.

Renewable energies

- Additional incentives, besides purely economic ones, are necessary to sell renewable energy to non-regulated users (who represent between 30-40% of demand), it is necessary that a win-win situation is reached.
- The Dominican Republic is a country rich in natural resources, renewable energy factors are between 17-20%, which makes them attractive but are currently difficult to exploit.
- A greater penetration of renewable energy is foreseen, given its cost effectiveness.

- Within a year the total installed capacity of renewables is expected to double. Furthermore, with the development of new renewable energy projects and Punta Catalina, several obsolete facilities will disappear and some may be recovered (retrofitting, unit changes, fuel changes, etc.).
- Regarding electro mobility, it was noted that a good part of the current vehicle fleet is obsolete. Being a developing country, it would be a good strategy for the Dominican Republic to bet on, from the beginning, mobility powered by renewable energies, given that it represents a competitive advantage. Furthermore, it could help make an offset of the energy demand curve by shifting peak demand from the night towards the afternoon (when the sun is highest).

Alexis Cruz – Director – **Delio Rincón** – Sector Analyst – **Juan Carlos López** – Coordinator – **Martín Francos** – Coordinator
Ministry of Economy, Planning and Development (Ministerio de Economía, Planeación y Desarrollo, MEPyD)

Carbon pricing mechanisms

- There is a concern about market size regarding the implementation of a possible emission trading scheme, given the number of potential participants. Similarly, assurances must be given that the cost of implementation is lower that the financial benefit from the trading of emission allowances.
- There is certain interest on the Chilean model of carbon pricing, mostly due to its feasibility and the resources levied.
- Regarding the implementation of a carbon tax, the first step that the companies or actors covered will take is to lobby for exemptions.
- It seems to be possible to change the current tax system on gasoline for a carbon tax modeled on the Argentinean approach where the number of taxes was reduced (from having three types of taxes to only two).
- Currently, there are no gasoline subsidies but liquefied petroleum gas (for cooking and public transport) is subsidized. Said subsidy is a politically sensitive subject and there are no plans to eliminate it. There are some exemptions to the fuel tax when it is used to generate electricity.
- During the meeting it was confirmed that there is the impression that the Dominican Republic has the highest tax on gasoline in the region.

Renewable energies

- Green certificates may be a good option to drive the adoption of renewable energy and reach the goal of having 25% of the power mix based on renewable energies and comply with the national development strategy's indicators in terms of emission intensity, but it is necessary that the complexity of the local electrical sector is considered.

Juan Felipe Ditrén Flores– Director of Environmental Affairs and Climate Change
Ministry of Energy and Mines (Ministerio de Energía y Minas, MEM)

Carbon pricing mechanisms

- Implementing a price on carbon is a good idea; actually, giving a price to carbon through a carbon tax mechanism like Chile is doing seems like a good option. However, it should be noticed that so far that country's experience has shown no direct relation between the tax and emissions reductions.
- A carbon tax would signify changes in the application of the law, since only the State can implement a tax, in this sense, the question would be if it is viable the modification of such law.
- Also, a carbon tax on directly applied on industries' emissions and a carbon tax applied on fossil fuels for transportation and electric generation would be complementary to the tax already implemented on motor vehicles (first plate tax).
- The feasibility of a carbon market scheme should be examined together with the Superintendence of Securities.

Electricity sector

- The electric industry has had a modest participation in GHG emissions reductions, for example, facilities have been switching their energy sources (from fossil fuels) to renewable energies. These changes have been driven by the reduction of operational costs and also because the demand of some company's headquarters to do so.
- Also, the industry is in the process of creating a reporting system with external verification. Under this scheme, all electric generators with an environmental permit should report. The first exercise regarding this subject has already taken place with the collaboration of the Ministry of Environment and Natural Resources and the country's electric generators.

Renewable energies

- For both renewable energies and carbon pricing instruments to get enforcement in the country, it is necessary to have changes in the law; the Climate Change Law and the Energy Efficiency Law will be fundamental. Currently, the Energy Efficiency Law is in its phase for public consultation.

Ruth de los Santos – Internal General Director – **Miriam Ortiz** – Internal General Deputy Director – **Omar García Portalatín** – General Finance and Debt Structuring Supervisor – **Richard Medina** – Financial Advisor
Ministry of Finance (Ministerio de Hacienda)

Carbon pricing mechanisms

- Implementing a carbon tax may be politically difficult, since a fuel tax already exists, in addition to taxes on vehicle imports and on vehicle efficiency measured by emissions per kilometer traveled (a fixed tax and a variable tax). However, the implementation of these taxes have not had the expected results in terms of imported vehicles demand and, while updated data on said imports is not available, there has been no noticeable change on the consumption curve. Public transport and non-conventional fuel cars are exempted from these taxes (both currently represent a very small amount at a national level).
- Politically, it is extremely delicate to promote fiscal reform, particularly before the 2020 presidential elections. Under such circumstances, the tax could be implemented, at best, after 2020.
- Regarding an emissions trading scheme, an analysis on the costs of implementation and on expected government expenses would have to be conducted.
- Green certificates may be a good option and are widely accepted by the private sector, however, it must be made clear that they do not represent a carbon pricing mechanism and do not deliver, in principle, emission reductions since these are merely a byproduct of their use.

Transport

- In order to affect the consumption curve of imported vehicles and reduce per capita CO2 emissions, the option of expanding the offer of public transport may be considered, particularly in Santo Domingo. A mass transport plan has been developed in INTRANT, which includes de construction of six subway lines and modernizing land transport (guaguas) as a complement (feeder routes). In this specific case, the sector's unions represented a strong opposition and the initiative was not fully implemented. Currently, Santo Domingo only has two subway lines.

Stefan Bolta – Supervisor Risk Analysis and Economic Studies Department –
Superintendence of Securities of the Dominican Republic (Superintendencia de Valores de la República Dominicana, SIV)

Carbon pricing mechanisms

- A carbon tax would have a minimal impact on the financial sector since the cost would be passed on to consumers.
- An emission trading scheme has an interesting potential for financial institutions who might benefit from the associated trading inherent in an emissions trading scheme, in fact the financial sector is the second most interested in its implementation only behind the public sector who would be the prime beneficiary from said reductions.

- It was noted that the industrial sector and the State will always be participating in an ETS on the supply and demand side, respectively, additionally including the power sector and financial institutions is critical to guarantee the success of the system.
- An emission allowance is a value creation element; however it would not be possible to label it as a commodity per se in the Dominican Republic, since it is not a physical good and cannot be stored. It would be classed as a financial derivative and could be counted as an asset for the entity that holds it in its balance.
- These emission allowances could be linked to a derivatives market, mainly in the electrical sector. These enterprises may even change their business models, which is currently static and highly dependent on the State given that they are subject to long term purchase contracts. Emission allowances would be an option for long term purchasing agreements that make conditions on these companies less flexible and gradually enter the market by establishing a price at lower risks. The establishment of this price on energy through a pro-market price may help reduce risk.
- As things stand, the supervision on these emission allowances would not be the purview of the Securities Regulator, however this may change depending on the design of the ETS. The Regulator would also be unable to make mandatory the standardization and registration of said allowances, but this may also be subject to change.
- The local securities market may provide a trading platform, a registry depository for allowances, and liquidation and compensation of transactions. This infrastructure could also be used to certify green certificates.
- The Stock Exchange of the Dominican Republic would acquire more relevance under a new law, which may give it the possibility of including energy products.
- The infrastructure to conduct allowances auctions and initial public offerings of green certificates (OPAs or IPOs) is also in place.
- The expertise of industries already listed in the stock exchange needs to be leveraged, since it could also present economic benefits to said enterprises through capacity building and knowledge transfer activities.
- Some of the challenges faced by an ETS is the lack of knowledge on the subject. The finance departments of companies may have money market tables, currency tables and fixed income tables (State debt), to these a commodity table and an energy table could be added.
- Another challenge facing the development of a carbon market is generating liquidity by achieving a critical minimum of a range of products that create synergies. To address this, a proposal is to develop a pool of energy products and emission allowances to generate liquidity, that is, a spot and a forward energy market that leads to a trading environment in addition to the emission allowances.
- Finally, the adequate infrastructure to minimize operational and credit risks (registry deposits, trading mechanisms, centralized counterparts and offsetting) is needed.
- It was recommended to broaden the market as much as possible, that is, that many actors participate in trading and not only large corporations.
- An important recommendation was that the economic benefits raised through this mechanism are used for emission reduction actions or to strengthen other similar mechanisms.

Daniel Araujo – Junior Engineer – **Héctor Valdéz** – Senior Engineer –
Electricity Regulator (Superintendencia de Electricidad)

Electricity sector

- Currently, work is being conducted on rules governing air quality which has been strongly opposed by electricity producers, who argue that its implementation will prove too expensive, since it includes adapting equipment to new emission limits.
- It is necessary to strengthen the institutional reach of the Electricity Regulator. It needs to have the capacity to propose and create new instruments, including those that permit improvements to the electricity mix and avoiding distortions in the market due to regulatory fails.
- There is support for a green certificate scheme, however, its certification would not fall under the purview of the Regulator, adding that the production or consumption of energy of renewable energy cannot be tracked once it is fed into the grid, for this reason it will be necessary to come up with a solution since a registry will be needed to track these instruments.
- Modifications to Law 57-07 to allow the inclusion of these themes may be done by the National Energy Commission (Comisión Nacional de Energía).
- Currently between 30% and 40% of all electrical installations are obsolete and their lifetime cannot be further extended. Each generator must have an updated environmental license (environmental impact assessment).
- There are currently more than 100 unregulated users in the country, who must abide by a set of rules to qualify as such.

Carbon pricing mechanisms

- While analyzing how to drive investments in renewable energies through carbon pricing, it was noted that a carbon tax would not be sufficient since the cost is passed on to the final consumer and in the case of the electrical sector the final consumer, in most cases, is the State.
- Prices in the voluntary carbon market are low and their study depends on the Ministry of Energy and Mining.

General conclusions

The following are the main conclusions derived from the interviews conducted. They are not given in any particular order and are listed according to topic.

Carbon tax

- A carbon tax could face a very complex political scenario, since there is series of taxes currently related to emissions (fuel tax, first plate tax) and there is little appetite for tax reform.
- Due to political (and electoral) matters, a carbon tax could be included in a tax reform, at best, after the 2020 presidential and general elections.
- Currently, there is no general subsidy on gasoline, only liquefied petroleum gas. This subsidy is politically sensitive and its withdrawal is not planned, however, some exemptions of current fuel taxes can be found, for example, public transport and the use for domestic cooking is exempt from it.
- The consumption of gasoline in the Dominican Republic is not only subject to a low price elasticity of demand and a high income elasticity of demand, but it is also related to aspirational issues that must be taken into account for the design of a high-impact public policy. This low price elasticity of demand causes that an increase the price of gasoline does not affect its consumption and, a high income elasticity of demand causes that with higher income levels the demand for gasoline increases. In addition to this, the low availability of substitute goods and services is to be considered.
- A large share of the national budget comes from the taxon fuels. With an increase on the fleet of electric vehicles, the loss of this income in the national budget can be compensated by energy efficiency or a tax per kWh.
- A carbon tax has a very low impact on the financial sector since the cost would be passed through to the final consumer.

Emissions Trading Scheme

- Given the distribution of current roles, the industrial sector and the State will always participate in an ETS in the Dominican Republic. Additionally, the engagement of the energy and industrial sector and financial institutions in the process of defining the instrument is critical to the success of the ETS.
- In the Dominican Republic, an emission allowance is a value creating element; however, it would not be a commodity per se since it is not a physical nor storable good. It would be a derivative financial instrument and could represent an asset for the entity that owns it in its balance sheet.
- The local stock market can provide a platform for operations, a depository of emission allowances records, as well as provide the clearing and settlement of transactions. This infrastructure can also be used to trade green certificates. The infrastructure to carry out auctions for emission allowances and initial public offers (IPO's) of green certificates is also available.

- Given the absence of a wide number of large GHG emitters, a challenge to establish an ETS would be the creation of liquidity in the market. In this sense, it is proposed to create a pool of energy products and emission allowances to create this liquidity, that is, a spot and forward energy market carried out in a stock trading environment where emission allowances are added.
- Carbon pricing is not unfamiliar to several international companies in the country, since their headquarters can be located in other jurisdictions where carbon taxes or ETS have been adopted.
- Whatever mechanism is used to set a price on GHG emissions, it is important that the revenue obtained is used for projects related to climate change and the reduction of emissions.
- While an emissions trading scheme could be much more desirable and politically feasible than a carbon tax, the size of the Dominican Republic's economy and the need for capacity building at all levels are important barriers to its implementation. In this sense, it would be necessary to use simpler and more disruptive instruments. These instruments should consider the largest possible number of GHG emitters (even individuals), and not only large industries, with the ultimate goal of incentivizing emissions reductions, for example, in transportation. It may be suitable to consider a payment for GHG emissions reductions scheme.
- Another option that the Dominican Republic should consider is the integration of the country into a regional ETS for the Latin American or the Caribbean region. In this sense, the CPA can offer the country with an alternative to achieve a higher number of covered participants and, hence, the necessary market liquidity for the EA financial transactions.
- Specifically on an emissions trading system, an analysis should be made regarding the cost of its possible implementation and what it would mean for the government, as well as the potential contribution of international cooperation agencies.

Monitoring, reporting and verification

- The country is currently working on proposal of a national MRV system through an Initiative for Climate Actions Transparency (ICAT) project carried out by the CNCCMDL in collaboration with UNEP DTU. With this initiative, a domestic MRV system will be designed and a roadmap for its creation will be developed.
- An MRV system could be approved through a presidential decree based on the article 128 of the Dominican constitution. The proposal for this decree would come directly from the office of the CNCCMDL.
- Information related to the MRV system will be compiled and administered by the National Statistics Office (ONE).
- There are very good technical capacities in the private sector to measure their emissions. In this sense, an agreement should be reached between the public and private sectors on the methodology used to carry out this type of measurement and create confidence on the system and on the corresponding data.

Electricity sector

- The Dominican Republic's energy demand grows approximately 75 megawatts per year and the current peak demand oscillates at 2,300 megawatts.
- The State plays a leading role in the country's electricity sector, "it is a regulator, user, and entrepreneur and finances the deficit".
- AES Dominicana and EGE Haina currently represent the largest share of electricity generation in the country. About 4% of the installed capacity of this energy (excluding hydroelectric plants) is non-renewable.
- The government of the Dominican Republic exempts fuels used by electricity distributors, that is, they do not pay the Tax on Transfer of Industrialized Goods and Services (ITBIS).

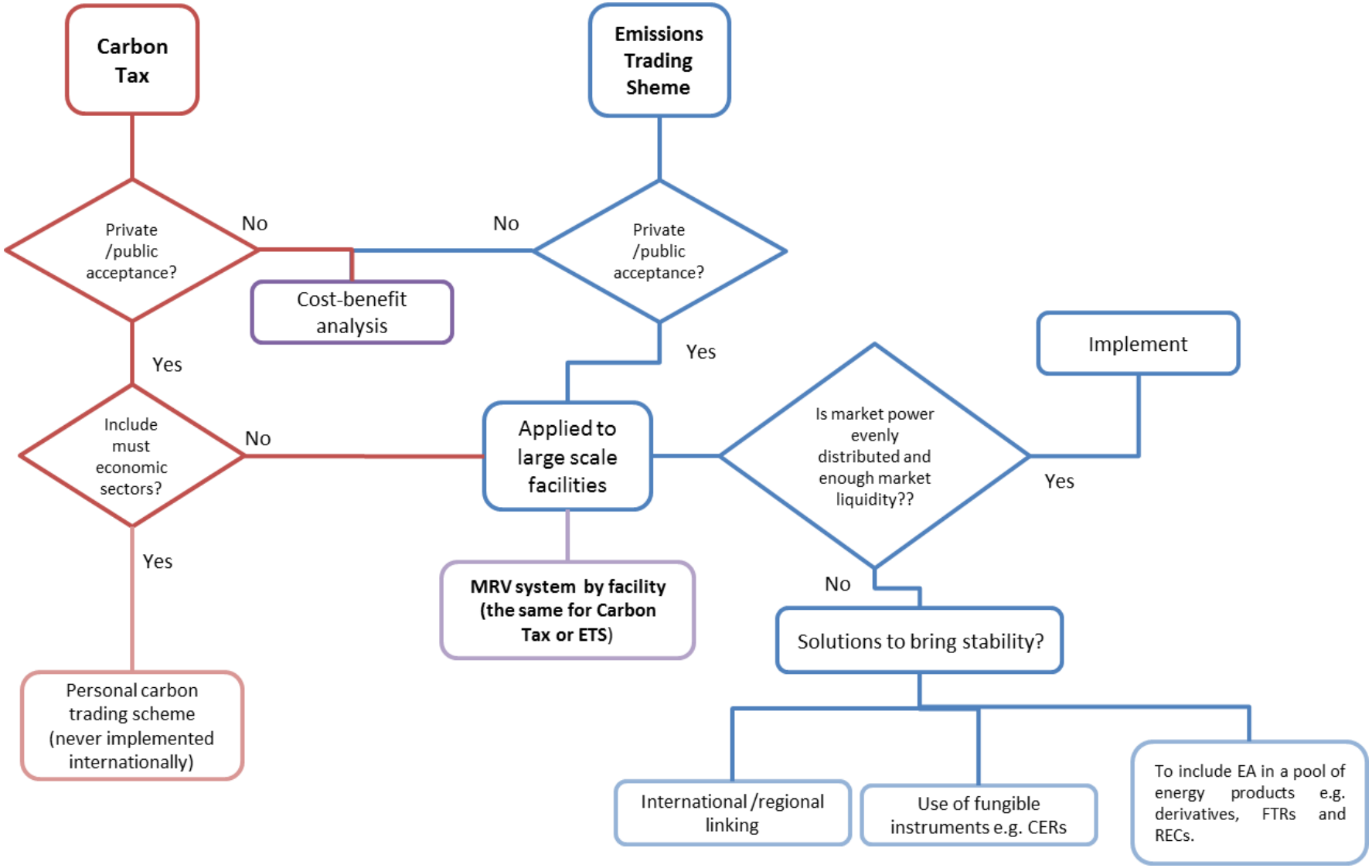
Renewable energies

The installed capacity of renewable energies will double in over a year and a greater penetration of renewable energies is foreseen, mainly due to the relationship between their cost and generation efficiency.

- The Punta Catalina plant will represent approximately 35% of the generation capacity in the country, and this will come entirely from non-renewable energies (coal). This could hinder the goal of having a 25% of the electricity matrix coming from renewable sources by the year 2025. It will also significantly increase the country's GHG emissions.
- A problem with intermittent renewable energies (wind and solar) in the country is that the greatest generation capacity is located in places with a more limited distribution grid as in the west and southwest of the country.
- Fiscal benefits of up to 40% of the cost of investment in renewable energies new equipment are currently granted as a single credit to income tax, this as a tax incentive to the self-production of renewable energies, however, gradual changes in this amount are foreseen, due to the change in prices (investment flows) in renewable projects.
- Green certificates can be a good option and have been accepted during interviews with the private sector, however, it should be noticed that they are not a carbon pricing instrument and do not pursue, in principle, the reduction of GHG emissions, it is a co-benefit of their implementation. In addition, the complexity of the local electricity sector must be taken into account.
- It is currently not possible to track the production or consumption of energy from renewable sources once it is injected into the grid. A registry of this is necessary for the traceability of these instruments. Amendments to Law 57-07 can be made by the National Energy Commission (CNE) on this subject.

As part of the general conclusions and to facilitate the understanding of the pathways regarding the two main different carbon pricing options stressed on this document, the following decision-making flowchart is proposed:

Figure 23. Decision making flowchart of pathways for the implementation of carbon pricing instruments in the Dominican Republic



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