



DNP Departamento Nacional de Planeación



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Colombia-Korea Knowledge Exchange

Key background information: Colombian context, challenges and expectations.

GREEN GROWTH MISSION

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CONTEXT: GREEN GROWTH MISSION

JUSTIFICATION

- The National Development Plan 2014-2018 "All of us for a New Country" (PND) established Green Growth (GG) as a crosscutting and "enveloping" strategy to achieve the fundamental aim of reaching peace in Colombia as well as sustainable development
- The Law that enacted the PND (1753 of 2015) mandated the National Government to formulate a *Long-Term Green Growth Policy*, through the National Planning Department (DNP) in coordination with the Ministry of Environment and Sustainable Development and with the participation of other Ministries. This policy should define objectives and goals for sustainable economic growth
- In 2012, Colombia adhered to OECD's Green Growth Declaration, as a step in its process of accession to this organization. The Declaration urges countries to encourage green investment and sustainable management of natural resources, through various policy instruments aimed at a low carbon economy; to promote policy reforms with the aim of avoiding or removing environmentally harmful policies that might thwart green growth, such as subsidies; to consider the requirements with respect to social and human capital (green jobs); and strengthening the role of international cooperation in this field, considering the principles of free trade and investments.
- On January 1st, 2016 started the implementation of the new Agenda for Sustainable Development, and the "Sustainable Development Goals", which established 17 objectives and 169 goals that encompass the economic, social and environmental spheres of development. It is expected that the GG Policy supports the fulfillment of a large part of these objectives

WHAT IS THE GREEN GROWTH MISSION (GGM)?

- It is an initiative led by the National Planning Department (DNP), which seeks to produce technical inputs and public policy guidelines to orient comprehensively economic development of the country towards green growth in the year 2030
- The DNP is the national leading agency in long-term structural discussions and supports national and sectoral planning for the definition of public policies, prioritization of public investment as well as the and coordination between different levels of government. For this reason, the DNP is the most appropriate entity to coordinate the GGM
- Given the importance of this mission and its close relation regarding the country's development in the coming years, it is expected that it will contribute to envisage the "post-conflict period" and to consolidate peace in Colombia

THEMATIC FOCUS

The GGM will have the following main themes:

Sectors with added value for society, with efficient use of resources and low carbon development



Resource-efficient growth

Promote an economy based on the sustainable use of biodiversity



New economic opportunities based on the sustainable use of natural capital

Labour productivity, formalization and green jobs



Socially Inclusive Growth



Economic Tools

Enabling tools to drive Green Growth



Innovation and Technological Development

More efficient and less polluting processes

OBJECTIVES

General objective:

Perform diagnostic and prospective studies and to identify policy options for incorporating the green growth approach in the planning of economic development which:

- ❖ Promotes economic competitiveness
- ❖ Protects and ensures sustainable use of natural capital and ecosystem services
- ❖ Promotes an economic growth resilient to disasters and climate change
- ❖ Ensures social inclusion and wellbeing

Specific objectives

1. Perform a macroeconomic analysis and a GG potential assessment of the country to determine the critical issues for development with a focus on green growth
2. Propose cross-sectoral as well as sectorial policy measures, including economic and regulatory instruments, that ensure development with a focus on green growth by promoting:
 - ❖ The efficiency and productivity in the use of resources
 - ❖ New sources of income generation and green jobs
 - ❖ Innovation and technological development
3. Gather robust data to structure the Long-term GG Policy with the participation of different ministries, which encompasses other ongoing policy goals and linking with the Sustainable Development Goals (SDG).

EXPECTED OUTCOMES AND OUTPUTS

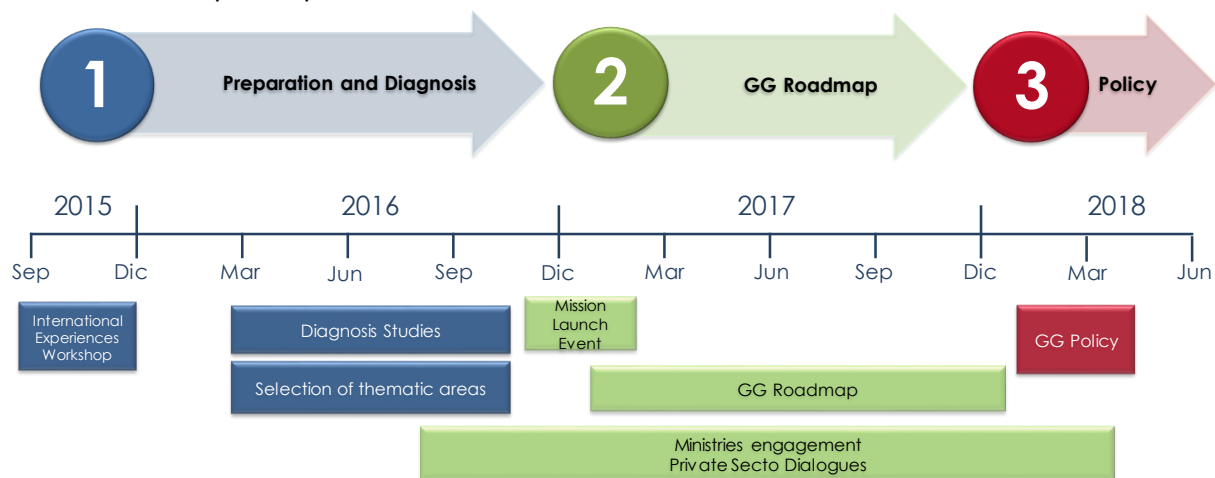
- The main outcome is to identify the actions which could lead Colombia to orient its development towards green growth during the next 15 years

➤ The main outputs are:

- Prospective macroeconomic analysis and green growth potential as of the of in Colombia
- Estimated investments required to orient the country towards GG
- Proposal of economic instruments for Green Growth
- GG indicators and targets for 2030.
- 2030 Green Growth Policy adopted articulated with SDGs

TIMETABLE AND PHASES

The schedule and phases planned for the mission are:



The activities planned for each phase are the following:



PREPARATION AND DIAGNOSIS

- **Component A:** International Context
 - Review of international experiences on GG strategies
 - Review of GG indicators

Work modality: International Experiences Workshop (November 2015); individual consultants
- **Component B:** Prospective Analysis
 - Analysis of macroeconomic trends of economic growth in Colombia, understanding drivers that boost this growth, the international context and the long-term perspectives

Work modality: Study led by DNP (Economic Studies Division) with the support of GGI
- **Component C:** Green Growth Potential Assessment (GGPA)
 - The GGPA is an analytical tool developed by GGI that evaluates the GG potential and key factors
 - Bases on a selection of economic, social and environmental indicators, an international benchmarking is made, as well as an analysis of underlying causes
 - Subsequently, a validation will be held with stakeholders

Work modality: Study conducted by consulting firm, with guidance and technical support from DNP, GGI and UNEP with the support of an economist

The Director will be hired, as well as the whole team of experts that will support Phase II

Outputs of Phase I:

- Potential for green economic growth in Colombia
- GG Thematic areas prioritized
- Macroeconomic analysis and growth forecasts up to 2030 under a baseline scenario
- ToR for hiring experts of Phase II

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GG ROADMAP

POLICIES, INVESTMENTS, INDICATORS, GOALS

- Development and deepening of thematic areas
- Prioritization of cross-cutting and sectoral policies
- Quantification of investments
- Selection of indicators and targets
- Evaluation of economic benefits of the GG approach

ECONOMIC TOOLS REFORMS

- New tools
- Adjustments in existing instruments

SCIENCE, TECHNOLOGY AND INNOVATION:

- Proposed Program for GG and STI

REGIONAL FOCUS

- Opportunities to scale up GG in regions

Work modality: Sectoral and thematic experts working with technical teams in DNP, ministries and other institutions

Outputs Phase II

- Technical, institutional and economic recommendations for the formulation of LT GG policy
- Quantification of investments required to implement the policy
- Proposal of economic instruments for GG
- Proposed Program for Innovation, Science and Technology

Phase

3

POLICY FORMULATION

- Validation of GG recommendations, actions and goals WITH Ministries and stakeholders
- Drafting of the policy document and review with ministries and stakeholders

Working modality: The CONPES formulation work will be conducted by DNP following SISCONPES methodology

Outputs Phase III

- GG Policy formulated and discussed with stakeholders
- Approval of the policy by CONPES
- 2030 GG Targets and indicators

| INSTANCE | COMPOSITION | DUTIES |
|-------------------------------------|---|---|
| Technical Secretariat | <ul style="list-style-type: none"> • DNP | <ul style="list-style-type: none"> • Responsible for the planning, development and monitoring of the Mission • Coordinate opportunities for discussion and sharing of progress • Documentation |
| Strategic Advisory Committee | <ul style="list-style-type: none"> • High-level level representatives • National and international experts participate occasionally | <ul style="list-style-type: none"> • Provide strategic feedback for the development of the Mission • Discuss and provide inputs on the progress and partial results of studies and proposals |
| Mission Director | <ul style="list-style-type: none"> • Hernando José Gómez | <ul style="list-style-type: none"> • Coordinates and provides guidance to experts and consultants of the Mission • Presents proposals to the Strategic Advisory Committee |
| Institutional Partners | AFD, World Bank, GGGI, UNEP, others | <ul style="list-style-type: none"> • Provide resources and knowledge to the process, under the guidance of the Technical Secretariat |

PROFILE OF COLOMBIAN PARTICIPANTS IN THE KNOWLEDGE EXCHANGE

Hernando José Gómez



Economist from Los Andes University, holds a Master of Arts and a Master of Philosophy in Economics from Yale University. Broad experience in central banking, public organizations management, policy-making, macroeconomics programming, design and implementation of economic programs, fostering competitiveness, innovation, housing policies and green growth and sustainable development.

He has served as the Advisory Director of the Bank of the Republic of Colombia, President of the Private Competitiveness Council, Chief Negotiating Team of the Colombian Government in the negotiation of the Free Trade Agreement with the United States and Director of the National Planning Department of Colombia (DNP), among others Positions. Currently serves as Director of the Green Growth Mission of Colombia, led by the DNP.

Juan Sebastian Robledo Botero



Deputy Director of Industrial and Trade Policy at the National Planning Department (DNP) of Colombia. He and his team draft, overview and evaluate long-term public policies intended to raise the productivity and the degree of internationalization of the Colombian economy. Before joining the DNP, he was a direct advisor to the Minister of Finance of Colombia, where he successfully coordinated the MoF's efforts to join six OECD committees and helped pass reforms on tax policy and financial markets supervision. Previously, he worked at the OECD in Paris, France, analysing public policy issues in Latin America related to transport infrastructure.

Mr. Robledo holds a joint B.A in economics and finance from McGill University, a MSc. in Economics from Sciences Po Paris and a MSc. in Public Policy from École Polytechnique.

Beatriz Chaparro Rico



Biologist from the Javeriana University, with master's and specialization in Planning and Administration of Regional Development from Los Andes University, and courses in ecology and paleoecology in Holland and fish farming in Japan. She has worked in the Regional Autonomous Corporation of Cundinamarca (CAR) in the design and execution of research in the flora and fauna resources for its protection, preservation and sustainable use. She is currently an advisor to the Sectorial and Urban Environmental Affairs Division leading the implementation of the Sustainable Consumption and Production Policy and in the coordination of the Interministerial and Intersectorial environmental agendas at the Ministry of Environment and Sustainable Development.

Javier Sabogal Mogollón



Industrial Engineer from Los Andes University with a Master's in Environmental Economics from the same university and a Master's Degree in Climate Change from the University of East Anglia (United Kingdom). He currently serves as an Advisor on climate change and sustainability issues in the Office of the Technical Vice Minister in the Ministry of Finance and Public Credit.

Previously, he coordinated a project on climate change finance for UNDP, UNEP and WRI, and worked at WWF as a specialist in Green Economy. He has been a consultant to the Ministry of the Environment, the Environment Secretariat, Ecovera Corporation, among others.

Catalina Rueda



Political scientist of Los Andes University, with emphasis in international relations and comparative politics. She holds a Masters in Political Science, focused on international negotiation, from the same university and has postgraduate studies in European Political Science from the Robert Schuman University in Strasbourg.

In 2007 she began his professional career in the Office of Disarmament of the United Nations in New York and later worked at the Embassy of Colombia in Bern. Her experience in Colombia has focused on building peace and development, as an advisor to the Administrative Department for Social Prosperity, and generating alliances between social organizations, the productive sector, the media and the State, in order to promote sustainable development models.

Since 2010, she is Deputy Director of Mines and Energy of the Directorate of Infrastructure and Sustainable Energy of the National Planning Department.

Edith Urrego



Professional specialized in International Trade, with more than 20 years of experience in the public sector, especially in matters of coordination and management of issues of sustainability and green growth.

Experienced in the design and implementation of business programs and instruments that contribute to the transition of Industry towards circular and efficient production processes in the use of resources and in the design and agreement of norms, strategies and instruments for the improvement of competitiveness and business productivity, in accordance with the guidelines of the national policy.

Diego Polania



Colombian economist with a Master's degree in Competition and Market Regulation acquired at the Barcelona Graduate School of Economics.

He has been working water and sanitation topics for more than fourteen years as an advisor of the Water and Sanitation Deputy Direction at the National Planning Department as well as an advisor of the Executive Director of the Water Regulation Commission.

Currently, he is the Deputy Director of Water and Sanitation in the National Planning Department, job in which he has the chance to apply my sector experience in the design of public policy and the structuration of projects, as well as the development of regulatory measures to improve access to water and sanitation.

BRIEFINGS: COLOMBIAN CONTEXT, KEY CHALLENGES, EXPECTATIONS AND QUESTIONS

Agricultural Policy in Colombia: Context, Objectives and Progress 2014-2016

Document prepared for MAFRA meeting on May 29th

General context:

-Our agricultural sector typically grows at a slow pace (average growth 2010-2016 is 2.5% vis a vis the rest of the economy (4.0%)).

-The share of agriculture in GDP declined from 16.5% in 1990 to 8.9% in 2000, and continued to decline at a more moderate pace over the next decade, reaching 6.5% in 2016.

-We have very low productivity, which undermines the sector's competitiveness largely driven by infrastructure deficiencies and weak supply chains.

-Furthermore there is a large space to improve in terms of technology appropriation, and a persistent rural poverty phenomenon. This is compounded by the fact that unequal access to land and land use conflicts continue to pose a problem (inequality, accumulation of large estates for non-productive purposes, internal conflict, etc.).

-Export competitiveness in the agriculture sector has fallen. Agricultural products were the main export items until the mid-1980s, accounting for 54% of the total value of exports of goods and services. The share dropped to 31% in 1987-99, to 20% in 2000-05 to less than 10% nowadays.

-Agricultural activities – crops and livestock – are the largest users of water resources; they were estimated to consume 60% of available resources in 2008 and are projected to reach 64% in 2019. However, only 2% of the agricultural area benefits from irrigation works, while six times this area is thought to be suitable for irrigation.

-Key products include coffee (some 20 per cent of all cultivated land in Colombia is dedicated to growing mild Arabica beans), flowers (with an industry worth around US\$1 billion per year), sugarcane (with around 2 million metric tons produced annually) and cattle.

General Colombian Agricultural Policy Goals 2014-2018:

1. Reorganize the country's rural land in order to: i) grant access to producers with none of insufficient land, ii) foster an efficient and productive use of land, and iii) strengthen the legal framework regarding land ownership with a focus on green growth.
2. Close the rural-urban gap and jumpstart a social mobility process by providing public goods and services for the rural population.
3. Speed up the process of overcoming poverty and middle class consolidation in rural areas using a strategy of inclusive production and value chains.
4. Boost rural competitiveness through the provision of goods and services to support agricultural activities as sources of wealth to rural producers.

5. Develop an institutional arrangement reflecting the reality of the rural land and the needs of its inhabitants in order to ameliorate the wellbeing gap and to promote equal opportunities for development.

Flagship program of the Ministry of Agriculture: Colombia Sows 2015-2018

Goal: Increase by one million the number of hectares sown (upsurge in the agricultural internal offer and expansion of agricultural exports).

Areas of action:

1. Development of map of agricultural zones –Use of land optimization according to regional productive vocations-.
2. Program of technical assistance and rural extension.
3. Program of rural risk management.
4. Improvement of access to credit.
5. Rural entrepreneurship schools.

Progress Made in 2014-2016:

- Update of official record of land ownership.
- Creation of National Land Agency.
- Study of agricultural zones: productive vocation of each region.
- Collective land ownership recognition to ethnic groups.
- Public provision of free housing in rural zones (16.000 houses).
- Formulation of prospective plans, including market studies and value chains analyses, for the agricultural development of six regions in the country.
- Co-financing of small rural businesses and program for rural associativity.
- Development of new sanitary regulation.
- Third national agricultural census.

Key challenges to be addressed in Colombia

Bring technology and modern production techniques to our rural lands. There's a prevalence of very small farms with artisanal means of production, while the large concentrations of land could still benefit from an intensive use the soil and the generation of scale economies.

Improve the well-being of our farmers. There is a higher prevalence of poverty in the rural lands, the coverage of public utilities is lacking, and the educational offer is poor. In order to create an agricultural engine of growth, farming has to be an attractive and profitable life choice.

Articulate the agricultural institutions in order to facilitate exportation. The institutional framework for designing and implementing agricultural policies is complex, thus increasing the risk of overlapping activities. There is room for improvement in terms of agency coordination to foster agricultural exportations. Challenges pertaining to sanitary requirements, regulatory clarity, and celerity remain.

Consolidate R&D capabilities in the agricultural sector. The country needs to undertake a serious effort to adapt and generate knowledge with the potential of boosting the productivity of the sector (currently, agriculture-related sciences fail to attract students). This include agronomic research, but also comprises the development of pertinent packages of technical assistance.

Reform support systems that induce large market distortions. A major component of agricultural support in the country has been market price support for different crops and livestock products. Poultry, pigmeat, rice, maize, milk, sugar and, more recently, coffee attract high levels of support. Budgetary transfers have

been growing in recent years. Payments based on input use have dominated, although large transfers based on output were given to coffee producers recently,

Expectations and questions:

In general, we would like a summary of the key policy aspects behind the Korean success (ie. How to disseminate agricultural technologies, upgrade agricultural infrastructure, development of logistics centers, modernization of production, stable income for farmers, etc.)

-Could you share a successful experience in terms of providing technical and financial assistance to rural producers?

-What should be the government role in defining priority crops/sectors or setting goals for cultivated areas?

-How to convince relevant stakeholders of the importance of sustainable practices when they come at a higher cost than the regular approach? How to change traditional culture of farmers to modernize the agricultural sector?

Financing, Financial Markets and Budgeting

Document prepared for MOSF meeting on May 30th

Colombian context

- Colombia has made great progress in strengthening its national capacity and increasing the level of awareness across public and private institutions in regards to accessing and managing green finance, mainly in issues related to climate. It is considered a regional leader in various aspects of climate change financing readiness, with the formulation of a Colombian Financial Strategy of Climate Change, pending for adoption and implementation, led by the Climate Finance Committee of the SISCLIMA (Climate Change System).
- The Climate Finance Committee of the SISCLIMA, is the country's inter-institutional entity responsible to coordinate mobilization of national and international climate finance. This entity, which includes DNP, the Ministry of Finance, the Ministry of Environment, among others, was formally established in February 2016 in the context of a national decree that formalized the operation of the broader National Climate System.
- Colombia has advanced in a Climate Public and Expenditure Review (CPEIR) that has shown preliminary results in terms of public budget related to climate. It finds that the country mobilize approximately USD 570 million per year (0,24% of GDP) in activities related to climate change. However, in order to fulfil only mitigation targets, there is a need to invest resources in the order of USD 1.000 million per year until 2030 (including an important participation of the private sector) that shows an important gap in terms of resources needs. A more deeply assessment is currently in place that is working on evaluating their effectiveness of this allocation and the participation of the private sector.
- Regarding specific economic instruments to finance green growth, it is relevant to mention that the country recently established a carbon tax, as part of the tax reform process that ended in Law 1819 of 2016. This reform was the first in the country to explicitly include green issues, showing the commitment of the government to advance towards a more comprehensive fiscal system that includes environmental and sustainability considerations.

- The carbon tax is about USD 5 per ton of CO₂, which translates into approximately USD 220 million per year. Fossil fuels derived from petroleum and gas, which represent approximately 24% of the total GHG emissions in the country, are taxed. The tax includes an exemption in the case of natural gas, and it is only charged in the industry of hydrocarbons refining and petrochemicals. Additionally, subjects of the tax that certified to be carbon neutral, are not charged.
 - The tax will not only support the fulfilment of the objectives for mitigation of emissions, as Law 1819 of 2016 also provides that the proceeds of this tax are earmarked to, among others, watershed conservation, ecosystem protection, and coastal erosion management. Therefore, these resources will signify an important engine to implement adaptation measures, also included in the National Determined Contributions presented to the Climate Convention, as mentioned above.
 - The resources will help to capitalize a national fund that is in process of implementation, which will manage the monies collected to carry out a strategy of paramount importance for the government: the peace process (Fondo Colombia en Paz). Therefore, the fund will be instrumental in the coordination of peace and environment policy initiatives, as pillars of the country's medium-term development agenda.
- As mentioned before, the tax reform included green issues as one of its pillars. The main issues, besides the carbon tax, are:
 - Tax on plastic bags used in retail businesses: Beginning in July of 2017, 7 cents per bag will be charged to consumers. The amount increases to 17 cents in 2020.
 - Income tax exemptions were approved to the sale of electric energy from non-conventional renewables sources of energy (solar, wind, biomass, among others) to promote this source of energy (beginning in January 2018).
 - The previous exemption also applies to investments for harnessing new forest plantations, and for owners of plantations of timber trees.
 - Incentives for electric and hybrid vehicles: VAT for these vehicles was approved to be 5%, compared to 19% for traditional vehicles.
 - Related to electric and hybrid vehicles, besides the incentives included in the tax reform, the government recently approved a 0% custom tariff for electric vehicles, and a 5% custom tariff for hybrid vehicles (compared to a the 35% custom tariff for traditional vehicles). The number of vehicles approved to be imported increased from 1.500 in the year 2017 to 3.000 in the year 2030, for each type (electric and hybrid), reaching 46.000.
 - Exclusion of VAT for the purchase and sale of equipment for projects that certify greenhouse emissions reductions, according to regulation of the Ministry of Environment.
 - The government is discussing a Climate Law project to be presented to the Congress, where the institutionality related to Climate Change is strengthen (Sisclima), and one of the chapters includes the design and definition of a Carbon Emissions Trade Scheme.
 - The Climate Finance Committee has developed an assessment of the potential of implementing Green Bonds in Colombia. So far, two private banks have issued green bonds (in the order of 100 – 150 million USD, each transaction), that where entirely purchased by the IFC.
 - In addition, it is important to highlight advances in the Disaster Risk Finance and Insurance (DRFI) policy strategy. Following the 2010-2011 La Niña event, the Finance Ministry issued a DRFI policy strategy in 2013, with the following elements: Improving the evidence base on the fiscal consequences of natural

disasters; developing a comprehensive strategy for the financial management of natural disasters; insuring public assets against catastrophic risks.

- This strategy has a wide spectrum of tools to manage Colombia's financial exposure to climate-related risks. It aims to ensure that the government has the option of responding promptly to losses, while maintaining macroeconomic stability and fiscal balance. The strategy is comprehensive, ranging from frequent low-severity events to rare but high impact events, and consists of a layered approach to managing the financial consequences of natural disasters. This includes resources from different budgets, such as the national budget, the liquidity obtained from the Catastrophe Deferred Drawdown Option (Cat DDO), department and municipal budgets, and external donations from cooperation agencies.
- Some examples of instruments included in the strategy:
 - Colombia has arranged contingent credits with the multilateral banks (World Bank, IAdB, and CAF). The risk remains with the government, but the credit provides greater flexibility and immediate access to resources, which helps to avoid the need for disruptive, emergency budget reassignments when a disaster occurs. The first Cat DDO was approved in 2008 with the World Bank for USD 150 million and its full value was accessed at the end of 2010 to address immediate needs following the floods of La Niña event. The government has subscribed to a new Cat DDO for USD 250 million in 2012, currently active until 2018 (possibility of extension of maximum 15 years).
 - Colombia is working with the other Pacific Alliance countries (Mexico, Peru and Chile) to develop a catastrophe bond, initially for earthquake risk, but with a view to covering other hazards in the future.
 - The Ministry of Finance is currently analysing the business case for transferring weather risks via market instruments, such as climate derivatives, parametric insurances, and catastrophe bonds, as the one described above, considering the high exposure of the country to hydro-meteorological hazards, and the necessity to cover possible fiscal risks.

Challenges of the country

- Definition of what is green growth finance in a framework where climate finance, SDG finance, and similar agendas are relevant for the country and there is a need to prioritize.
- In order to fulfil commitments, the country needs to fill the gap and find additional resources from different sources (private and public).
- Following the issuing of green bonds by the private sector, government development banks are evaluating the possibility of issuing this kind of bonds. However, these banks (and the government) still find common bonds to be a better strategy in terms of transactions costs and returns.
- As there is an interest to implement a carbon trade scheme, it is fundamental to evaluate how it would be coordinated with other economic instruments, specially the carbon tax recently implemented.
- The coordination between finance institutions at the national and sub-national levels should be further strengthened. In addition, there is a need to strengthen capacities in subnational institutions and sectoral institutions in the national level.
- There are opportunities and challenges to include green growth considerations in national and subnational budgets. In order to be able to include these considerations in the planning process of the budget, several steps need to be taken (for instance, capacity building for people responsible for budget

preparations, including dissemination of information regarding analyses of green growth public expenditure and economic instruments; to support the budget planning process to green growth considerations are included).

Expectations and potential learning

- How to prioritize green growth issues in the budget when other priorities (such as peace and education) are the main issues?
- In terms of fiscal reforms: What instruments have been included and how they have been received by the population? How to increase the willingness to accept of these instruments among economic actors?
- Regarding economic instruments: What instruments have been implemented in Korea and how they have worked in coordination (ex. Carbon taxes and emission trade schemes)?
- What financial strategies has Korea implemented to handle natural disasters events?
- What is the experience of Korea in issuing green bonds? The government has issued green bonds? How have the markets respond?
- How have Korea worked with the private sector? Have they increase their allocation of resources in green growth issues? How Korea tracks this allocation, both public and private?

Water and Sanitation in Colombia

Document prepared for *MoE* meeting on May 30th

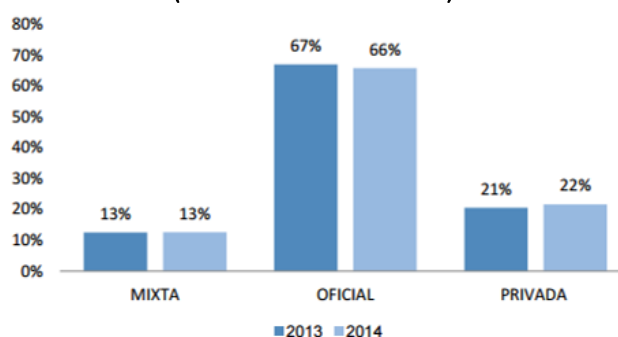
1. General context:

Colombian Water and Sanitation provision evolved since the late 80's in the past century into a decentralized sector, where the responsibility of securing a high quality service falls in every Major, in 1101 municipalities. The main principles of the general scheme for water provision are *free market* and *efficiency*. And as the water market is typically a natural monopoly, economic regulation, control and surveillance, as well as planning and public policy, are the Central State main roles.

The whole scheme, established on a 1994 Law, was based on the idea that every municipality should had made a public invitation to interested utilities to serve its population and only as an exception, if the procurement process failed, there will be public providers operating on the market.

Nevertheless and despite the Central Government's effort to impulse the bussines model transformation, it was not accomplished, and today there are sitill 486 cases where the provider is directly the municipality, and only 35% of the utilities have private capital on them.

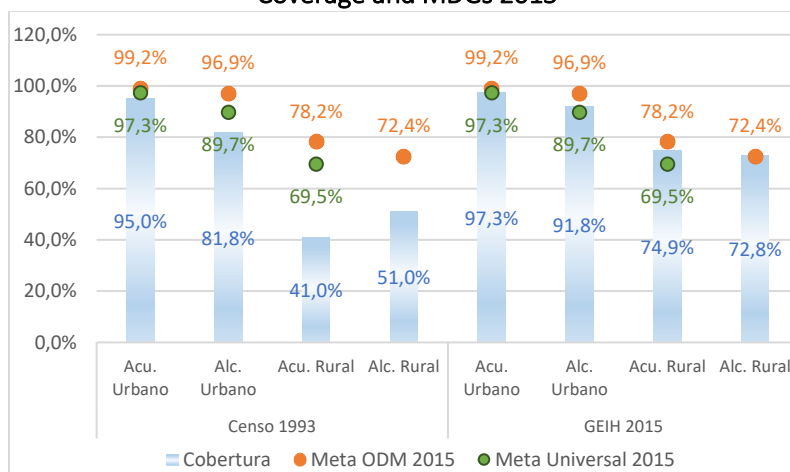
Aqueduct and sewage provider (Over 2.500 subscribers)



Source: SSPD 2015

On the other hand, service coverage has importantly evolved, although the Millennium Development Goals were not met in the sector as it is shown in the next graph:

Coverage and MDGs 2015



Source: DNP

In terms of water quality and None Revenue Water - NRW, 46% of municipalities that hold 52% of Colombia's population provide safe drinking water, while 49% of the municipalities provide water with some risk level for human consumption; in average, NRW goes up to 43% in the country, with some dramatic results in scarce regions as *La Guajira*, where it goes up to 82%.

On waste water treatment there has been a very slow increase in coverage in the last 10 years; the base line in 2015 is 37.2% of urban waste water treated, and the goal is to reach 41% on 2018.

The next table summarizes base lines and proposed goals for the Sustainable Development Goals:

| Indicator | Base line | Intermediate goal 2018 | Final Goal 2030 |
|---|-----------|------------------------|-----------------|
| Percentage of the population with acces to adequated methods of water provision | 91,76% | 92,80% | 95,70% |
| Percentage of the population with acces to adequated methods of sanitation | 87,40% | 89,00% | 91,60% |
| Percentage of households urban waste water tretaed safely | 37,26% | 41,00% | 68% |
| Percentage of urban solid waste regularly collected and with adequate | 94%(2014) | 95% | 98% |

2. Key challenges to be adressed

Estimations made by the DNP shows investment needs up to 15 thousand million dollars (approximately) in order to get universal coverage in water and sewage, and 50% of urban waste water treatment. Impelling Public Private Partnerships may be a key strategy to leverage this kind of investment.

Highly atomized provision is a major challenge to ensure high quality service to everyone in the country; this gets more complex if we take into account rural dispersion and great urban rural gaps. To face this, a differentiated strategy in special schemes is needed, as well as a special governance institutional arrangement.

Articulation with the environmental sector in order to ensure supply, and defend an integrated view is needed. The goal is to adopt a circular economy approach that makes reuse and waste water treatment key components to protect the resource.

3. Notes on Colombia's expectation regarding the Korea Knowledge Exchange

Finally, I might say that the main expectation are on the next topics

- Governance
- Public Private Partnerships models
- Public policy to increase reuse and waste water treatment.
- Integration between environment and infrastructure sectors, developing resilient and adaptive economic growth.

Solid Waste in Colombia

Document prepared for *MoE* meeting on May 30th

1. General context:

In 2014, according to the Colombian Statistics National Department, the country generated 18.2 million tons of solid waste (hazardous and not hazardous), and general estimations made by the households public service superintendence in 2015 established that urban and rural households produce 13.8 million tons of waste every year. This means nearly 283 kg of waste per year per person; 61.5% of the urban waste is composed by organic material, while 30% of the total production is recyclable material as paper, paperboard, metal, glass, textiles or plastic.

Urban solid waste collection and disposal is understood as a regulated public service, provided by specialized utilities, restrained by a tariff methodology set by the national water and sanitation regulation commission. The service has high coverage rates: for collection and transport is up to 97.8% (when taking into account rural areas it goes down to 80%). 73% of subscribers is served by a private utility, and 94% of the total production is adequately disposed (landfilled).

Regional final disposal has increased: while in 2009, 92 sites served 573 municipalities, in 2014 65 sites served 803 municipalities across the country. This is important in terms of economies of scale and it facilitates control and surveillance.

As the solid waste management has improved in the past ten years, increasing collection and transport rates, closing open skies dumpsites and strengthening regional landfilling, the next step is to introduce more efficient and sound technologies from an environmental perspective; today only 17% of the total waste generation is recycled and reintroduced to the economic productive function.

2. Key challenges to be addressed

- Increase recycling rates in the country
- Implement Extended Producer Responsibility schemes
- Internalize environmental and health costs into service cost equations
- Close remaining open skies dumpsites
- Develop an adequate institutional arrangement to promote circular economy on solid waste
- Improve solid waste information systems

3. Notes on Colombia's expectation regarding the Korea Knowledge Exchange

Finally, I might say that the main expectations are on the next topics

- Governance and institutional arrangements
- Economic, legal and technical incentives to promote recycling and other new technologies treating solid waste, i.e. Waste to Energy Plants, for every type of waste.

Energy Policy in Colombia: Context, Objectives and Progress 2014-2016

Document prepared for KEA /KIAT (TBC) meeting on May 31th

Presentation by Energy Institutions

General context:

- **Colombia has a mature wholesale electricity market.** The country reformed the power sector in 1994 and introduced a wholesale electricity market where competition is established across the value chain, including in generation (*cargo por confiabilidad*), transmission (with tenders for transmission expansion) and in retail (free non-regulated consumers). Commercial transactions are made through spot (price based bidding and marginal cost dispatch) and contracts' markets. Also, private sector participation is allowed in all segments of the value chain.
- **A fundamental characteristic of the Colombian electricity market is its hydro dominance.** About two-thirds of the installed capacity is hydro-based and roughly 68% of Colombia's energy is produced from hydro resources. To ensure the availability of firm energy, the regulator introduced a capacity payment mechanism – whose design and procurement has gone through a series of adjustments – to create incentives for the availability of “firm energy services” during times of hydro scarcity. The original capacity payment has evolved into an auction for “firm energy” (reliability payment).
- **Recently, the country endured a prolonged and intense drought, which lowered hydro reservoir levels threatening the stability of the market and increasing the risk of potential rationing.** The length of the episode has indeed tested the effectiveness of the regulatory framework (specifically the reliability payment) and the ability of reserve generators to deliver “firm capacity”. In March 2016, the aggregated hydro reservoir reserve lowered to a record 30 percent.
- **As a result of the supply-demand imbalance, the spot price exhibited spikes of 370 USD/MWh (November 2015) and 270 USD/MWh (March 2016), while the scarcity price remained at 100 USD/MWh.** Spot prices reflect the short term marginal cost (including cost of natural gas), while scarcity electricity price is an administratively set figure indexed to fuel oil price. The mismatch between the actual costs incurred by some thermal plants and the lower scarcity prices paid for the energy generated have aggravated the financial imbalance of thermal generators in charge of delivering “firm energy” under critical conditions.
- **Colombia is endowed with abundant and diverse renewable energy resources.** Both hydro and non-hydro renewable energy resources in Colombia are significant. The International Renewable Energy Agency estimates that Colombia has a “high” resource potential to develop wind, solar, hydro and geothermal generation (IRENA, 2012). Recent assessments suggests that Colombia has a wind resource with the potential to develop 30 GW of installed capacity, geothermal resources to develop 1-2 GW, as well as regions with very high solar irradiation such as the Guajira and Costa Atlántica (UPME, 2015). The world atlas of the International Journal of Hydropower and Dams places Colombia's (economically feasible) hydropower potential at 140 TWh per year (which is significant considering average annual generation in the order of 45 TWh). In addition, renewable resources in Colombia present a high degree of seasonal complementarity which enables the country to produce energy more reliably and at a lower cost.
- **Investments in the range of US\$ 2.6-3.5 Billion will be needed to scale-up non-conventional renewable energy in the period 2015-2029, as per Colombia's electricity generation expansion plan.** Based on information included in the expansion plan for the period 2015-2029 prepared by the Energy Planning

Unit (UPME) of the Ministry of Mines and Energy (MME), investment needs in generation are estimated in at least US\$ 22.8 Billion (under a scenario based on a conventional mix) and US\$27.7 Billion (under and scenario with a mix that include renewables). Renewables alone, under scenario 10 of existing expansion plan would require an amount in the order of US\$2.6 to 3.5 Billion. It is important to note that coal based generation continues to be a firm energy alternative for Colombia; renewable energy deployment would contribute to substantially lower potential coal based capacity additions (about 1.5 GW).

General Colombian Energy Policy Goals 2014-2018:

- 6. Objective: To continue the expansion of the coverage and the improvement of the quality of the electric power service
 - Strategies:
 - a. Increase of electric energy funds for expansion of coverage (rural energy fund- FAER, Non-interconnected energy fund- FAZNI, normalization program- PRONE and social energy fund -FOES).
 - b. Energy solutions with criteria of energy and economic efficiency.
 - c. Implementation of differential schemes of service provision that allow the reduction of costs of invoicing and collection.
 - d. Sustainable Rural Energization Plans - (PERS).
 - e. Encouraging non-conventional renewable sources (OCDE Recommendation).
 - f. Strengthening the planning and identification of needs in generation and transmission.

Colombia’s progress in renewable energies and energy efficiency:

The GoC is fully committed to the development of non-conventional renewable energy (NCRE). The GOC has enacted a law to promote renewable energy (Law 1715, revised in May 2014) and committed to the target of adding 1,220 MW between 2013 and 2018 in the National Development Plan. In addition, the regulatory framework includes fiscal and financial incentives for large scale grid connected renewables as well as a price incentive for distributed generation.

The following are the decrees and resolutions that have been developed, as regulation of Law 1715 of 2014:

| Self-generation (Article 6, numeral 1, literal a) | |
|---|--|
| Decree 2469 of 2014 | Establishes the guidelines of energy policy in the matter of surplus delivery of self-generation. |
| Resolution 0281 of 2015 (UPME) | Defines the maximum power limit of small-scale self-generation. |
| Resolution 024 of 2015 (CREG) | Regulates the activity of large-scale self-generation in the National Interconnected System (SIN). |
| Demand response (Article 31) | |
| Decree 2492 of 2014 | Provisions are adopted regarding the implementation of mechanisms of demand response. |
| Resolution 11 of 2015 (CREG) | Regulates the program of response of the demand for the daily market in critical condition. |
| Renewable energies in Non-Interconnected Zones (Article 6, numeral 1, literal a, y article 34) | |

| | |
|--|---|
| Decree 1623 of 2015 | Establishment of the policy guidelines for the expansion of coverage of the electric power service in the National Interconnected System and Non-Interconnected Zones. |
| Consumer Labeling and Information Systems on Energy Efficiency (Article 6, numeral 1, literal c) | |
| Resolution 41012 of 2015 and Resolution 40947 of 2016 (Ministry). | Issue the Technical Regulation of Labeling - RETIQ, for the purposes of Rational Use of Energy applicable to some equipment of end use of electric energy and combustible gas, for its commercialization and use in Colombia. |
| Tax Incentives chapter III, articles 11, 12, 13 y 14. | |
| Decree 2143 of 2015 | Definition of the guidelines for the application of the incentives established in Chapter III of Law 1715 of 2014. |
| Resolution 045 of 2016 (UPME) | Procedures and requirements for issuing certification and endorsing projects from non-conventional sources of energy (FNCE). |
| Technical regulations for renewable energy generation, distributed generation and surplus delivery on a small scale | |
| Decree (published for commentaries) | Modifies the Technical Regulation of Electrical Installations – RETIE. |
| Decree 348 of 2017 | Establishment of public policy guidelines on efficient energy management and delivery of surplus small-scale self-generation. |

Key challenges to be addressed in Colombia

Recent assessments have identified a number of broader structural issues affecting the performance of the electricity market in Colombia. Including:

- i) High vulnerability to “Fenómeno de El Niño” (El Niño Southern Oscillation, or ENSO events), the power system still lacks resource diversity and thus flexibility to cope with seasonal and weather shocks. Colombia has to find other ways to diversify its energy mix and increase the resilience of the power sector.
- ii) The insertion of non-conventional renewables to a hydro system is needed because of its counter-cyclical effect. On one hand, the water accumulated in the reservoir works like a huge storage source, therefore mitigating the generation volatility of wind and solar at several time intervals. On the other hand, the counter-cyclical feature of wind generation enables a more reliable operation of the hydro system in times of scarcity.
- iii) Limited availability of natural gas and high prices (closing of the border with Venezuela has created congestion in port, pipeline and storage infrastructure).
- iv) Lack of incentives for renewable energy and energy efficiency development, and the need to design of reliability payments challenged by extreme or long weather episodes.
- v) High degree of market concentration and power (50% of the market dominated by vertically integrated utilities).

Expectations and questions:

In general, we would like a summary of the key policy aspects behind the Korean experience in the development of their energy system, and particularly in the implementation of energy efficiency measures (ie. Basic aspects of the energy market -generation, wholesale market, energy efficiency, etc.).

Could you share your experience in terms of:

1. Development of renewable energy generation projects.
2. What kind of incentives did Korea apply or introduce for the development of these projects?

3. What is the policy in terms of self-generation projects and delivery of surplus to the system/grid?
4. What is the policy in terms of energy efficiency? What are the main challenges of Korea in the development of this type of projects?
5. What measures have the Government adopted to promote energy efficiency?
6. Does Korea have scheme like: demand aggregators? Energy Service Companies -ESCOs? If so, how do they operate?
7. How does the wholesale market operate (in the case it exists), and incorporate renewable generation?

Water, Air and Waste Resources

Document prepared for *KECO* meeting on June 1ST

Green growth contributes to sector competitiveness, secures the basis of natural capital, and prevents the externalities associated with the costs of degradation and the impacts of disasters and climate change from being concentrated on the poorest and most vulnerable population.

The national green growth strategy has four strategic objectives. Goal 2 is to: "Protect and ensure the sustainable use of natural capital and improve environmental quality and governance", with its different strategies, which focus mainly on the actions that develop the Ministry of Environment of Sustainable Development and the Environment Sector¹.

WATER RESOURCE

Present Situation

According to the National Water Survey², the agricultural sector uses 16,760.33 million m³ equivalent to 46.6% of the total volume of water used in the country. The use for power generation participates with 21.5%, the livestock sector with 8.5% and domestic use with 8.3%. It is estimated that 20% of the water extracted is returned to the water sources and used in processes specific to the resource users.

Also based on the list of 301 municipalities identified by the Ministry of Housing, City and Territory (MVCT) with a high probability of water shortages, 17 additional municipalities were identified by Institute of Environmental Studies (IDEAM by its Spanish acronym) in the departments of La Guajira, Bolívar, Sucre, Córdoba, Cesar and Casanare. Information obtained from the Regional Autonomous Corporations and Sustainable Development, as well as the territorial planning schemes and plans, the municipal development plans and in some cases the entities or companies providing the aqueduct service, of the 318 towns with a probability of shortage, 265 have surface currents as source, 24 are supplied with deep wells, 11 have mixed uses (surface and underground), 14 of reservoirs and 4 are provided with block water.

¹ National Development Plan "Todos por un Nuevo País"

² National Water Study; IDEAM 2014

Results obtained from water quality management

In 2010, the Ministry of the Environment formulated the Policy for Integral Management of the Water Resources in response to regulate supply, demand, quality, risks and information management through a participatory and concerted planning structure, based on 5 macro-basins of the Country: Amazon, Pacific, Caribbean, Orinoquía and Magdalena - Cauca specifically:

- Macrobasins (5): Strategy: formulation of Guidelines for Strategic Planning, whose compliance would be guaranteed by the Regional Environmental Councils of each Macrobasin (CARMAC by its Spanish acronym).
- Hydrographic Sub - Zones: Susceptible to regulation and management through the Regulation and Management of a Basin Plan, (POMCAS by its Spanish acronym), which define the planning of the use and sustainable management of its renewable natural resources, so that it is possible to maintain or reestablish an adequate balance between the economic use of such resources and the conservation of the physical and biotic structure of the basin and particularly of its water resources. In total we have 396 POMCAS, of which 43 instruments have been formulated. The Basin Councils and Joint Commissions are the spaces for participation in the formulation, execution and follow-up of the POMCA.

On the other hand, in the Hydrographic Zones within the 5 macro-basins, a National Network of Quality and Amount of surface and underground water is implemented that supports the national program to monitoring the water resource.

At this time the Ministry has been working on:

- Formulation of the Strategic Plans for the Pacific, Amazon and Orinoco Macrobasins.
- Installation of the Regional Environmental Councils of the Amazon, Orinoco, and Pacific Macrobasins, coordination body to ensure water governance in the macrobasin.
- Provide technical assistance in 60 basins in the process of regulation and management (POMCA by its Spanish acronym) being carried out by 30 Autonomous Regional Corporations on about 15.5 million hectares involving the participation of 25 million inhabitants.
- Progress is made on 24 additional basin management processes, where 39 Joint Commissions and an equal number of Technical Committees operate to coordinate the Basin Regulation and Management Plans (POMCAS by its Spanish acronym) in shared basins and 30 Technical Advisory Committees with equal numbers of Corporations to deal with POMCAS (by its Spanish acronym) technical matters.
- Progress is made on the implementation of the Basin Regulation and Management Plan of the Chinchiná River (Caldas) and Ciénaga de Mallorquín and Arroyos Grande and León (135.396 hectares) including the risk management component.
- Progress is made on the design of the early warnings monitoring system for Cerro San Antonio and phase I of the hydro-sedimentary design of the Ciénaga Grande de Santa Marta.

Challenges

- Generate the National Plan for Regulation of Water Resources.
- Riverside and lakeside management: delimitation, review of factors affecting productive sectors and urbanism.

- Understanding and planning of groundwater, prioritizing necessary supply sectors for human consumption and productive sectors.
- Understanding and management of the rate for water use
- Conceptual evolution of water resource management.

AIR RESOURCE

Present Situation

According to the most recent data published by National Planning Department (DNP by its Spanish acronym), the costs incurred by Colombia for mortality and morbidity associated with air pollution increased from 1.59% of GDP in 2014 and 1.93% of GDP in 2015 need to continue implementing strategies to achieve the effective reduction of particles in the air.

Colombia has 168 air quality monitoring stations forming 22 Air Quality Monitoring Systems (SVCA). According to the State of Air Quality Report 2011 - 2015 (IDEAM, 2016).

The pollutants that represented the greatest non-compliance with the National Air Quality Standard were PM2.5 and PM10 particles.

The highest concentrations were recorded as follows: PM10 (Particles of 10 microns): Metropolitan Area of the Aburrá Valley, Bogota, Bucaramanga, Cundinamarca, and in the mining zone of the department of Cesar. PM2.5 (Particles smaller than 2.5 microns: Bogotá, Aburrá Valley and in the mining area of Cesar department. Ozone - O3: Failure to comply with the standard occurred in some stations in Bogotá, Bucaramanga, Cali and the Aburrá Valley. The other pollutants did not exceed the standard.

Advances in management

The Ministry is carrying out actions aimed at reducing emissions, among which:

- Evaluation of the Air Pollution Prevention and Control Policy (PPCCA) with the support of the DNP (by its Spanish acronym), for its revision and updating in 2018.
- Updating air quality standards, fixed sources and mobile sources.
- Promotion of zero transport or low emissions, which includes the implementation of electric mobility pilots in different urban centers of the country.
- Formulation and implementation of strategic sectoral and regional plans to strengthen the implementation process of the PPCCA.
- Launch of the information system for the reporting of emissions information by industrial and vehicular sources.
- As for education and citizen participation, a pilot project is implemented for the innovation of the eradication of polluting smoke from mobile sources, with the support of the DNP (by its Spanish acronym).
- Adoption of the National Plan for the Mitigation of Short-lived Climatic Contaminants.
- Preparation of the first national PM2.5 particulate emissions inventory.
- Strengthening of technical and normative instruments. 25 technical and regulatory instruments on emissions (industry and vehicles) and air quality have been issued between 1995 and 2015.
- Improvement of fuel. Investments amounting to US \$ 9 billion were made in updating and modernizing the Barrancabermeja and Cartagena refineries to expand capacity and reduce sulfur content in diesel (from 3,500 ppm of sulfur to 50 ppm).
- Strengthening information systems by Air Quality Information Subsystem (SISAIRE by its Spanish acronym), which is administered by IDEAM (by its Spanish acronym).

- Support to productive sectors. The implementation of the use of tires as fuel for the cement industry and the technological reconversion of 17 kilns of the brick industry between the years 2015 and 2016 has been achieved.
- Alliances with International Organizations. For the transfer of knowledge, investment and exchange of experiences with: Presidency of the Intergovernmental Air Quality Network of Latin America and the Caribbean, Coalition for Climate and Clean Air, MOVE strategy on electric vehicles and International Cooperation Agency Of Korea - Koica.
- In the framework of the Koica process, 9 automatic stations were installed to monitor air quality in the departments of Boyacá, Magdalena and Atlántico, as well as a data acquisition system managed by IDEAM.

Challenges

To achieve the reduction of air pollutant emissions and to achieve air quality levels that guarantee not only the quality of the environment but also the health and well-being of the people, Minambiente requires the support and commitment of other decision makers to solve aspects such as:

- Citizen education and participation.
- Strengthening environmental authorities.
- Renovation of the car park.
- Management of transport demand.
- Incentives for clean technologies.
- Support strategic sectoral projects.
- Improvement in fuel quality parameters. Reduce from 50 ppm of sulfur in diesel and 300 ppm of sulfur in gasoline to 10 ppm in both fuels. These improvements would significantly reduce emissions of particulate matter from combustion equipment (90%).
- Reduction of emissions by resuspension of dust

WASTE MANAGEMENT

Present Situation

Based on data provided by the Superintendence of Public Utilities - SSPD (by its Spanish acronym), it can be seen that the amount of tons of waste generated between 2007 and 2013 has increased by 29%, which makes it possible to project that if the country continues with the same current conditions of production and consumption, the trend will be maintained and, therefore, the amount of waste generated will increase accordingly.

Based on data provided by the SSPD (by its Spanish acronym), the Ministry of Housing City and Territory - MVCT (by its Spanish acronym) and the DNP (by its Spanish acronym) by 2015, 32,000 tons of waste were generated daily in the country, of which 26,528 were collected by the public waste management service. It is estimated that 17% of the total solid waste generated is recycled, which amounts to 5,440 tons per day.

Similarly, it has been estimated that in recent years, the number of municipalities that have made an adequate disposal of the waste generated increased by 90%. Collection and transportation coverage increased from 94.6% in 2014 to 97.8% in 2015.

Likewise according to data from the SSPD (by its Spanish acronym) (2015), the country has a total of 232 final disposal sites, of which 176 sites are authorized by the environmental authority and 56 sites are not authorized by the environmental authority.

In this regard, it is essential that the national government advances in the structuring of instruments that allow the incorporation of new technologies for the final disposal of waste, with an emphasis on the use of waste (recycling and energy recovery).

In 2016, the National Policy for the integrated management of solid waste National Council of Economic and Social Policy (CONPES 3874 of 2016) (by its Spanish acronym) it was issued, based on three (3) pillars: circular economy concept, Sustainable Production and Consumption Policy and Governance.

As for post-consumer programs there are 7 streams which are listed below:

Expired medications, lead acid batteries, used batteries, used tires, used fluorescent bulbs, discarded computers and printers, and pesticide containers.

In 2013, Congress issued Law 1672 on Electrical and Electronic Equipment Waste EEEW, assigning to Ministry of Environment of Sustainable Development the obligation to formulate a national policy for the integral management of EEEW and issue the regulations that are required to establish collection and management systems of EEEW for all waste streams of electrical and electronic equipment.

On March 10, 2017, the National Environmental Council approved the National EEEW Policy, which is in the process of being published and disseminated, and is expected to be launched in June. Also in March 2017, the Ministry of Environment of Sustainable Development called a public consultation for the new EEEW decree that regulates Law 1672 of 2013. It is expected that this decree (signed jointly with the Ministry of Commerce, Industry and Tourism) will be issued in the second half 2017.

During the year 2016 the Ministry developed an application for mobile devices that allows citizens to easily and quickly locate the points of collection of post-consumer waste from the streams that have been regulated.

In the year 2016 approximately 4,300 tons of EEEW were collected including computers, batteries and light bulbs through EEEW collection and management systems.

Recently the Ministry of Environment and Sustainable Development promulgated the following resolutions:

Resolution 0754 of November 25, 2014 "Establishes, among other aspects, the use of solid waste in the framework of the PGIRS".

Resolution 0668 of April 28, 2016 "Establishes the obligation to formulate, implement and keep up to date a Program of Rational Use of Plastic Bags, defining six indicators of its progress in implementation.

Resolution 0472 of February 28, 2017 "Establishes the provisions for the integral management of construction and demolition waste for those who generate, collect, transport, store, take advantage of and dispose of this type of waste in the national territory.

Challenges

- Increase the use and formal treatment of solid waste and, with it, improve the environmental performance of the sector
- Relieving the pressure of landfills because 38% of them have a useful life of less than three years, it is becoming increasingly difficult to acquire land for the location of new disposal sites and 124 municipalities in the country still have the Solid wastes at inappropriate sites (SSPD, 2015)
- Improve citizen education and participation to promote prevention in waste generation, reuse and adequate separation at source;
- Coordination between the institutions of the sector and other strategic sectors to ensure that products remain for longer in the economic cycle
- Ensure the inclusion of the recycling population in the context of the public collection service
- Promote regional schemes that are differentiable and flexible according to the heterogeneity of the country
- Have information systems that allow people to make the right decisions

Expectations and questions:

-Do they perform recharge of aquifers in South Korea if so how is it done?

-What is the technical and legal conceptual framework for the reuse of treated municipal wastewater in Korea?

-How communities participate in the management of water resources?

Public Policies to Promote Technological Development, Green Initiatives and Sustainable Growth in the Private Sector

Document prepared for *KEITI* meeting on June 1ST

PUBLIC POLICIES TO PROMOTE TECHNOLOGICAL DEVELOPMENT

The environmental sector, in accordance with the functions established in Colombia by Law 99 of 1993 and Law 1715 of 2014, makes part of the protection of resources and their proper use, specifically:

- Promotion of the use of Non-Conventional Energy Sources (FNCER by its Spanish acronym), and the principles of energy efficiency through its policies and technical and normative instruments.
- Development of technical and normative instruments to date: the Terms of Reference (TDR) for Environmental Impact Studies (EIA) for onshore wind projects were issued, and the geothermal EIAs for the exploration and Exploitation, solar and biomass.
- Issuance of Resolution 1283 of 2016, which regulates the environmental certification process to access incentives for the development of new projects in FNCER.
- Actions under the Low Carbon Development Strategy.
- At this time, the implementation of Law 1715, as it concerns Minambiente, focuses on the issuance of instruments to facilitate the licensing process and obtain incentives for new investments in FNCER.

Target Groups for FNCER

- Energy supply in non-interconnected areas (ZNI by its Spanish acronym), especially rural areas, dispersed homes or communities distant from traditional sources of supply (diesel plants).
- Energy supply to support and develop production processes at different levels, offering opportunities for local and regional economies growth.
- Contribution to the improvement of the quality of life in communities, by providing the necessary energy in activities such as water pumping, desalination, the opportunity to have mechanical ventilation (fans), food preservation and processing, input for access to education and entertainment, as growth tools.

Potential for generation by resource

The Energy Mining Planning Unit (UPME by its Spanish acronym)³ identified as opportunity niches in FNCER the following projects:

- The design and development of wind projects in areas of high potential, starting in the department of La Guajira.
- The Massive development of distributed solar photo voltaic systems at small and medium scale.
- The design and development of cogeneration projects based on the use of biomass for energy purposes.
- The design and development of geothermal projects in high potential areas such as the Ruiz volcanic massif area.
- The design and development of projects with FNCER, especially through hybrid generation schemes, as an energy solution in ZNI.

The major advances in the utilization of agricultural residual biomass are speed up to date by the sugarcane growers' national association (ASOCAÑA by its Spanish acronym) and by the palms growers' national association (FEDEPALMA by its Spanish acronym), which carry out cogeneration, and proposals for the use of forest plantations (with Refocosta in Vichada and the Caribbean Region), as shown below:

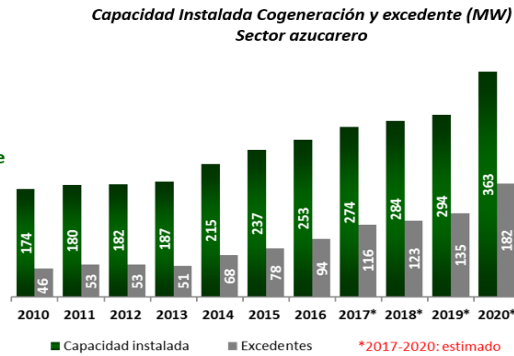
In Colombia the current installed Capacity of energy production by non-conventional sources in the Sugar Sector is 274 MW with a surplus of 116 MW, as represented by ASOCAÑA (2017) in the following graphic.

³ UPME.2015. Integración de energías renovables no convencionales en Colombia. Revisado en http://www.upme.gov.co/Estudios/2015/Integracion_Energias_Renovables/INTEGRACION_ENERGIAS_RENOVANLES_WEB.pdf

Cogeneración

Ventajas de la cogeneración:

- ✓ Combustible renovable
- ✓ Reducción de emisiones de gases efecto invernadero
- ✓ Generación distribuida
- ✓ Firmeza al sistema
- ✓ Eficiencia Energética



On the other hand, the potential of energy production associated with the palms' growing agricultural sector is 340 MW located in two main regions, as represented in the following graphic.



Source: Fedepalma 2017

Other sources to be explored correspond to the water resource, which can be used through micro turbine, wave, thermal differential and other technological options. These lines need to be evaluated in detail.

POLICY OF SUSTAINABLE PRODUCTION AND CONSUMPTION

Likewise, the Ministry of Environment and Sustainable Development issued the Sustainable Production and Consumption Policy in 2010, which updates and integrates the National Strategic Green Business Plan and the Cleaner Production Policy. The sectors prioritized for the implementation of the Policy were: Infrastructure, social housing, technologies, public transportation, energy, construction, manufacturing (food, chemicals, metallurgy, containers, packaging), agro industrial, tourism, organic food, products and services from biodiversity and SMEs as suppliers of large companies. The framework of this national Policy has produced important results such as:

- The implementation of environmental criteria for the implementation of Sustainable Public Procurement in State entities.
- The environmental certification through the Colombian Environmental Seal: to date there are 125 certified goods and services and 25 categories with environmental criteria to obtain the Colombian Environmental Seal as a tool for differentiating goods and services obtained and produced with criteria of environmental sustainability.

Fiscal Policies and Incentives

Law 223 of 1995

The deduction of up to 20% in Net Income for investments in environmental improvement and control. Article 158-2, Tax Status. (Regulated decree 3172 of 2003 and resolution 136 of 2004).

- Exclusion of VAT on national and imported equipment and elements, intended for environmental control and monitoring systems 424-5 and 428, paragraph f of the Tax Statute. (Regulated by decree 2532 of 2001 and resolution 978 of 2007).

Law 788 of 2002

Income Exemptions (Article 18):

- Sale of electricity generated with wind resources, biomass or agricultural resources.
- Ecotourism services 9% of income tax.
- Harvesting of new forest plantations.
- Discount on income tax in aqueduct and sewer companies (Article 104)
- Imports that do not cause VAT: equipment and machinery for projects to reduce CO2 emissions. (Article 95, Literal i). (Regulated by the same decrees previously mentioned).

Law 1607 of 2,012

- The reduction of VAT to electric buses and taxis (including their chassis and bodies) that operate in the provision of public transportation. According to article 48 the previous vehicles are taxed with a rate of 5% VAT, lower than the rate that taxis and buses that operate with diesel and gasoline must pay.
- In addition, electric vehicles are excluded from the consumption tax.

Law 1819 of 2016

- Electric motors and generators for use in electric, hybrid and plug-in hybrid vehicles, electric motorcycles and electric bicycles.
- Electric vehicles, hybrids and plug-in hybrids for special purposes, except those principally designed for the transport of persons or goods.
- Electric motorcycles (including mopeds).
- Electric bicycles (including delivery tricycles). Bicycles and other cycles 87.12 I (including delivery tricycles), not motorized, the value of which does not exceed 50 UVT.

The following goods are excluded from the sales tax: National or imported equipment and elements used for the construction, installation, assembly and operation of control and monitoring systems, necessary for compliance with current environmental regulations, regulations and standards, for which this

condition must be accredited to the Ministry of the Environment and the national authority of environmental licensing (ANLA by its Spanish acronym).

Law 1715 of 2014 (Article 12).

Instruments for the promotion of FNCE. VAT tax incentive

GREEN AND SUSTAINABLE BUSINESS

The Ministry of Environment and Sustainable Development through its Office of Green and Sustainable Business identified a total of 606 green businesses, of which 356 were verified with criteria defined by MADS, promoted two (2) Regional Green Business Programs, in the Pacific and Amazonia Regions, also contributed to the implementation of 19 Green Business windows with 19 Regional Environmental Authorities.

The Portfolio of Goods and Services included 93 of these identified companies, finding that 87% is in the category of sustainable goods and services from natural resources, 53% of which is the sector of sustainable agro-systems and 47% of bio-trade. In the latter, the predominant subsector is nature tourism / ecotourism with 71%, non-timber with 26% and products derived from wild fauna with 3%.

Other category stands out in terms of industrial eco-products (13%), waste (58%), non-conventional sources of energy / solar (8%) and other sustainable green goods and services (33%), highlighting in the latter the Coodmilla Initiative for gold mining without using mercury or cyanide, in the town of La Llanada, Nariño, which has been awarded important international praise.

Expectations and questions:

- Based on the experience of Korea, which kind of incentives have had the best outcome in order to promote further development of alternative energy sources?
- Does the environmental certification process effectively promote the development of productive crop/sectors?
- Where do the small farmers' associations fit into these programs in Korea?
- How to promote these programs with small and medium size enterprises?

Green Growth and human capital in Colombia

Document prepared for *KRIVET* meeting on June 2ND

1. Context

One of the three pillars of Colombia's green growth initiative focuses on creating a more inclusive economy that can boost job creation, skills development and the adaptability of the productive apparatus as it tackles the challenges of green growth. A key aspect towards this goal is the development of human capital.

While data on the quality of Colombia's human capital is not abundant, certain facts point towards structural issues that need to be addressed if the country wants to achieve its ambitious green growth goals. Labour productivity in Colombia is low (US\$10.133 per worker) compared to higher middle-income countries (US\$12.794) and OECD economies (US\$23.141). In addition, despite a persistent drop over the

past 15 years, the country's unemployment rate (around 9%) remains one of the highest in the Americas and is as high as 18% among university graduates.

Part of the problem stems from poor student retention and quality of basic education. The survival rate in basic education is only 50%. Colombian 15-year-old students rank 57th in reading, 65th in math and 60th in science among 72 countries (2015 PISA survey). However, the government has ambitious policies to tackle these issues and, with respect to Colombia's green growth initiative, the challenges of human capital development are focused on higher education and labour markets.

In this respect, there are issues related to human capital gaps and the quality and pertinence of education programs. Only 49.4% of the eligible population access higher education and the system does not graduate enough technicians and vocational graduates. This is partly because these types of programs are broadly viewed as of lesser status than university education and their quality is perceived to be particularly low. Moreover, there are large and persistent gaps between the skills demanded by the productive sector and those that are taught both in technical and vocational institutions and universities.

2. Key challenges to be addressed in human capital development

- **Better data and information regarding the education system and the labour market.** Even when combining efforts made by the Ministry of Education (MEN), the Ministry of Labour (MdT) and the Agency for Public Employment Service, there is not enough data to produce comprehensive evidence-based policies. Current efforts in this regard need to be expanded and going forward they must also help anticipate future labour demand changes. More data is also needed on how graduates perform in the labour market.
- **The implementation of a skills-based tertiary education system.** The Government is working on a comprehensive higher-level education system (SNET). The SNET aims to smooth transitions between technical and university programs and help education institutions design more pertinent programs. Among other things, it involves the development of a national qualification framework (NGF), which will map the different skills that the market requires for different jobs and productive activities. Finishing the design of this ambitious program and successfully implementing it in a coordinated manner with all the actors involved is key.
- **Working closer with education institutions to raise the quality and pertinence of their programs.** In implementing the SNET, it is key to introduce policies that better incentivize education institutions to comply with high quality standards and continuously upgrade their curriculums to keep up with the needs of the productive sector.
- **Continued education policies and programs.** Even all higher-level education programs are improved and better linked with the needs of the productive sector, the challenge of developing skills among older workers remain. As green growth strategies based on innovative production processes and new technologies are successfully implemented, upgrading the skills of older workers will be crucial for them to be able to adapt.
- **Improve coordination among government agencies responsible for human capital development.** Despite progress, the MEN and the MdT, among others, mostly move forward in their own policy objectives independently.

3. Notes on Colombia's expectations regarding meetings in Korea

We would like Korean authorities to comment on some key issues related to the challenges above, either based on successful experiences in Korea or on international best practices.

- How does the technical and vocational education system works in Korea and how does it relate to university education?
- When implementing Korea's Green Growth Strategy launched in 2009, what were the biggest challenges in terms on human capital and labour market and how were they tackled?
- What mechanisms are used to identify human capital gaps or deficits in specific sectors?
- What policies have been successful in:
 - Incentivizing education institutions to pursue and achieve higher quality standards?
 - Promoting a closer relationship between education institutions and private companies to assure education and training programs remain pertinent to the everchanging human capital needs of the productive sector? What processes do institutions go through to update their curriculums?
- How do authorities collect and analyse data on graduates' success in the labour market?
- Which skills and qualifications do you deem are the most important for companies focused on green growth strategies, particularly those associated with the adoption of new technologies and business models, as well as with innovation activities?
- In a framework of fast-pace technological evolution how do authorities:
 - Anticipate future human capital needs of new and emerging sectors, especially those associated with a greener growth model?
 - Help older workers to keep acquiring new skills well into their professional careers so that they can adapt to technological advances and new production trends?

In this regard, should education programs focus on specialized knowledge and skills that might become out-dated with technological changes or on general skills that make students more adaptable professionals but leave them lacking specific knowledge needed to work in certain industries that will become more relevant in greener economies?

Green Growth and STI in Colombia

Document prepared for *MSIP* meeting on June 2ND

1. Context

One of the two overarching issues of Colombia's green growth initiative is science, technology and innovation (STI) to support the adoption of cleaner and more efficient technologies and develop sustainable production processes.

Colombia has been making efforts to improve its public policies directed at fostering and promoting STI-based economic and social development. These efforts include a key policy document for STI with a specific implementation plan as well as various important programs scheduled to be launched as part of Colombia's new productive development policy (PDP).

A key objective of these efforts is to promote knowledge and technology adoption. The McKinsey Global Institute (2015) calculates that approximately 82% of potential productivity gains in emerging countries will come from adopting existing knowledge successfully implemented in other economies (catching-up).

Other key aspects of Colombia's STI policies are improving the interaction between the productive apparatus and academia, raise the level of innovation activity and knowledge generation and better structuring the institutional framework to tackle these policy challenges.

2. Key challenges to be addressed

- **Boost the productive sector's ability to identify, demand and adopt knowledge and technology.** The Global Entrepreneurship Monitor (2016) found that in Colombia 69.6% of established companies use technology that is more than 5 years old, while 81.9% of new companies do not use state-of-the-art technology in their production processes. Thus, Colombia's new productive Development Policy (CONPES 3866) aims to foster the adoption of existing technologies by the productive sector. This involves promoting the emergence of a critical mass of companies that can provide knowledge-intensive business services (KIBS). The Government will implement a National Manufacturing Extension Program to provide consulting services to over 8,000 companies focused on improving managerial capacities, diagnosing the current state of the company's technology and facilitating the absorption of knowledge and technology. This implies training 950 productivity specialists beforehand.
- **Promote greater interaction between the productive sector and academia.** Per the Survey on Development and Technological Innovation in the Manufacturing Industry (EDIT), only 11% of innovative or potentially innovative companies (around 3% of the total number of companies) had some support from universities in their STI activities. Apart from boosting the business sector ability to adopt existing knowledge and technology (see above), this requires helping knowledge-generating institutions become more willing to and efficient in transferring knowledge and technology to the productive sector.
- **Increase the level of knowledge generation and high impact research.** This involves:
 - *Strengthen capabilities to carry out R&D.* Colombia has insufficient R&D capabilities both in terms of researchers and physical infrastructure. In 2016, of a total of 4,638 research groups, just 20% are considered to have high performance. Out of a total of 66,084 people who claim to have done research, only 10,042 met the minimum requirements to be considered researchers. Of these, only 12% are senior, while 60% are junior researchers.
 - *Raise the impact of scientific production.* Out of a total of 474,000 scientific and academic products (research articles and patents) identified by Colciencias in 2014, only 17.8% produce new knowledge.
 - *Increase highly qualified human capital performing R&D.* Although large support of doctoral training raised the number of PhD graduated per million inhabitants from 1.5 in 2000 to nearly 7 in 2013, it remains low compared to 76 in Brazil, 45 in Mexico and 34 in Chile.
- **Generate more innovative activity and entrepreneurship ventures in the business sector, by:**
 - *Improving the environment to innovate.* According to the Survey on Development and Technological Innovation in the Manufacturing Industry (EDIT), 76.8%, of Colombian manufacturing companies are non-innovative, mainly due to weaknesses in human talent, lack of inter-company cooperation and cluster formation, absence of a strong innovation culture, an underdeveloped market for KIBS and rigidities of some regulations.

- *Providing financing mechanisms for innovation and entrepreneurship.* Colombia has introduced tax deductions for ITC investments to promote private investment in research, technological development and innovation (R&D) activities. Now the government is designing an innovation vouchers program intended to encourage companies to hire knowledge-generating institutions and KIBS.
- **Strengthen the current governance framework for the adequate development of STI policy.** There are two separate institutional frameworks that deal with STI policies in Colombia: The National System of STI, focused on research and development and the National System for Competitiveness and Innovation, which approaches innovation from a productive development perspective. These conflicting visions erode the public sector's ability to conceive and implement policies efficiently and in a coordinated manner. The Presidency of Colombia is working on integrating both systems to clarify roles and smooth coordination within the public sector, but faces legal issues to do so, as well as some resistance from academia and the R&D community. Moreover, more and better data and data analysis is needed to improve the design, monitoring and evaluation of the STI Policies.

3. Notes on Colombia's expectations regarding meetings in Korea

We would like Korean authorities to comment on some key issues related to the challenges above, either based on successful experiences in Korea or on international best practices.

- What policies have been successful in promoting an effective transfer of knowledge and technology?
- Could you describe the process for drafting a new STI policy, how much time does it take and for what extent of time are they planned?
- What type of policy instruments performs better in fostering cooperation between academia and business sector?
- What can the government do to foster the development of a market that demands and supplies knowledge-intensive business services?

Green Growth from an industrial and business policy perspective

Colombian Context

The Ministry of Commerce, Industry and Tourism has advanced in the incorporation of business actions that will contribute to the development of new ways of production, oriented to: life cycle and product improvement, efficient usage of the resources and therefore the incorporation of new materials and product design. In addition to meeting improvement requirements that will result in economic and sustainable benefits they also focused on meeting the needs of existing local and external consumers.

Based on the analysis of the industry and its actual evolution and also with the special need for improvement with an integral vision, the Productive Development Policy was issued, which includes a strategy to promote the compliance of quality standards by national producers and the Insertion of goods and services into national and international production chains. In general, the policy seeks to increase the share of the Colombian economy in international trade, through diversification and sophistication, improved productivity and regional linkages.

The Ministry was involved in the Colombian Low Carbon Development Strategy (ECDDB), defined by the Ministry of the Environment as a short, medium and long-term planning program, aimed at having a national vision that disconnects the growth of emissions of Greenhouse gas (GHG) from national economic growth. As the main result of the Strategy, the MinCIT formulated in a concerted manner with the private sector (guilds and companies) the Industrial Mitigation Sector Action Plan - PASm, which identifies specific lines of action aimed at the technological renewal and modernization of the use of boilers, engines, and use of new energy sources.

This planning tool has facilitated the identification and analysis of proposals to develop actions aimed at promoting the sustainability of companies, in specific aspects and especially in the definition of the lines of action that will guide the contribution of the industry sector to the Reduction of greenhouse gases (GHG) to 2030, according to the country commitment in the Paris Agreement.

The identified lines that have been aimed at promoting good energy efficiency management systems, low and high investment technology conversion, biomass fuel substitution, logistics optimization, transport processes in industry and contribution to the reconversion of artisanal kilns in the brick-making sector. The main sectors that have been identified are pulp paper, food, chemical, cement steel.

As a part of the support for business transformation, through business experiences and with the support of international cooperation, pilots have been introduced on Eco-innovation and circular economy, in companies in the chemical, cosmetic and natural products sectors, in which the country has a vast potential. An interrelation with the universities was also achieved, which has allowed to define the incorporation of these subjects in the academic programs.

The Ministry was also involved in the implementation of the Sustainable Production and Consumption Policy (PPCS) and in the implementation of the National Green Business Plan, both led by the Ministry of the Environment, an entity with which it has been working in an articulated manner. The PPCS works to promote the linkage of MSMEs in sustainable production projects, to review and evaluate financing alternatives and to incorporate sustainable criteria in the purchases of the Ministry and some entities that make up the sector.

Challenges facing the country

1. The change of Government and the political year that will be held next year. It is a historic moment since it will be the first Government to implement the priority development actions framed in the Peace Agreement.
2. Define the Green Growth Policy, as the line that will define sustainable development in the medium and long term. And the allocation of resources, both from the national budget and real sources of resources for the implementation of the actions required.
3. In the Ministry of Industry and Commerce it is necessary to make progress in the appropriation of the green development vision. The actions to be carried out involve issues related to regulations, design and implementation of long-term business programs and also incorporation of resources for the implementation of projects
4. Review possible incentives in order to motivate companies to make changes and investments that could be recognized.

5. It is also necessary to promote the continuity of this work scenario in the next administration of the Ministry and in the entities and programs that are part of the sector.
6. Continue in the process of raising awareness and awareness of companies, especially in medium and large entities. It is necessary to demonstrate the benefit of addressing the sustainability of the industrial sector, demonstrating the economic benefit that is generated as a result of the new way of doing things. (If you look for different results you need to do things differently).

Learning expectations

1. From the field work, get to know the work developed in Korea and evaluate possible alternatives for implementation in Colombia (lines of policies and programs) that are executed jointly with the Ministry of Industry
2. The process with the training centers is of special interest, since developing skills in the relevant human resources with the new vision of development is the key and I believe that it is still incipient in the country.
3. In the finance theme, to know the management that has been given according to the characterization by size of companies. (Even though it is known that by the level of development, the classification by size is not comparable Korea - Colombia).
4. Identify the strategies and policy strategies that led to the decision of companies to opt for a green development model.