Sustainable Action Plan

for

The Department of National Planning

Colombia

Consultant: Maria Margarita Amin
Harvard University
Professor William O'Brien

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I. Background

The Department of National Planning (DNP) is a government organization that was created by law 19 in 1958. The DNP is a technical and administrative organization that could be classified as equivalent to the Office of Management and Budget of the United States. However, the DNP has additional responsibilities and a more relevant role in the generation of public policy. Therefore, in Colombia, the Department of National Planning has a status of Secretary.

The Department of National Planning has several responsibilities of which the most important ones are: (I) The development of the National Development Plan, which is the legal and formal instrument for setting the Government's objectives and the tool used to evaluate the president at the end of his presidency, (II) The coordination and formulation of national public policy guidelines for the diverse economic and social sectors, and finally, (III) The investment and resources' management of the General National Budget as well as the general system of royalties.

The DNP is located in Bogotá, Colombia at 26th Avenue #13-19. The organization is housed in a building with a total size of 12.038 square meters. There are around 849 employees involved in administrative functions (there are no industrial processes).

II. Client Requirements

Due to the administrative nature of The Department of National Planning, the client's expectations from the sustainable action plan are: (I) Minimize their environmental impact based on energy conservation, efficient water usage and waste management, switching to green information technology and green office and to incentive the use of green forms of transportation and travel. (II) Reduce operating costs of the building and (III) Create a sustainable leadership and governance for the organization.

III. Opportunities and Risks

Since this organization is not profit-oriented, but a national public institution, it is in the interest of all Colombians that operational costs reductions are achieved. Savings for a public organization means more money for other public works and less for operational costs.

Also, as a transversal public organization, having a culture of sustainability can influence not only the DNP building but also other government institutions as well as most sectors in the country.

The DNP, as a national policy advisor, successfully incorporated green growth guidelines into the National Development Plan (governmental strategy of the executive power). The successful implementation of the sustainable action plan will align them with their own recommendations.

The Plan (law 1753 of 2015) "Everyone for a New Country" defines the country's growth as one that should integrate "kind and sustainable cities". This objective is related to the mission of the DNP and will define the Colombian city system by year 2035 (DNP, 2011).

Consequently, if The Department of National Planning is including green growth in the national agenda, then this sustainable action plan is an opportunity to start implementing the green agenda in their own building and sharing the sustainable practices with their stakeholders. Applying these environmental practices is the best way to promote them. Therefore, this is an opportunity to build a good reputation for the organization.

The risks and challenges that could arise in the implementation of the strategy could include: The costs involved to implement the plan. However, this sustainable action plan will include an economic analysis to make an informed decision about costs and returns on the investment.

IV. Stakeholders

The organization's Director, Luis Fernando Mejia, is the main actor of the strategy to promote sustainable practices. Then, there are two sub directors: Juan Felipe Quintero for territorial and public investment and Alejandra Coachella for the country's sectors. Mr. Quintero is responsible for the national budget, commodities' royalties, territorial finances, territorial sustainable development and sustainable environmental development. On the other hand, Ms. Coachella is responsible for the social development sector as well as justice, security, government, urban

development, sustainable rural development, sustainable infrastructure and energy and private sector development.

Figure1. National Planning Department Organizational Structure
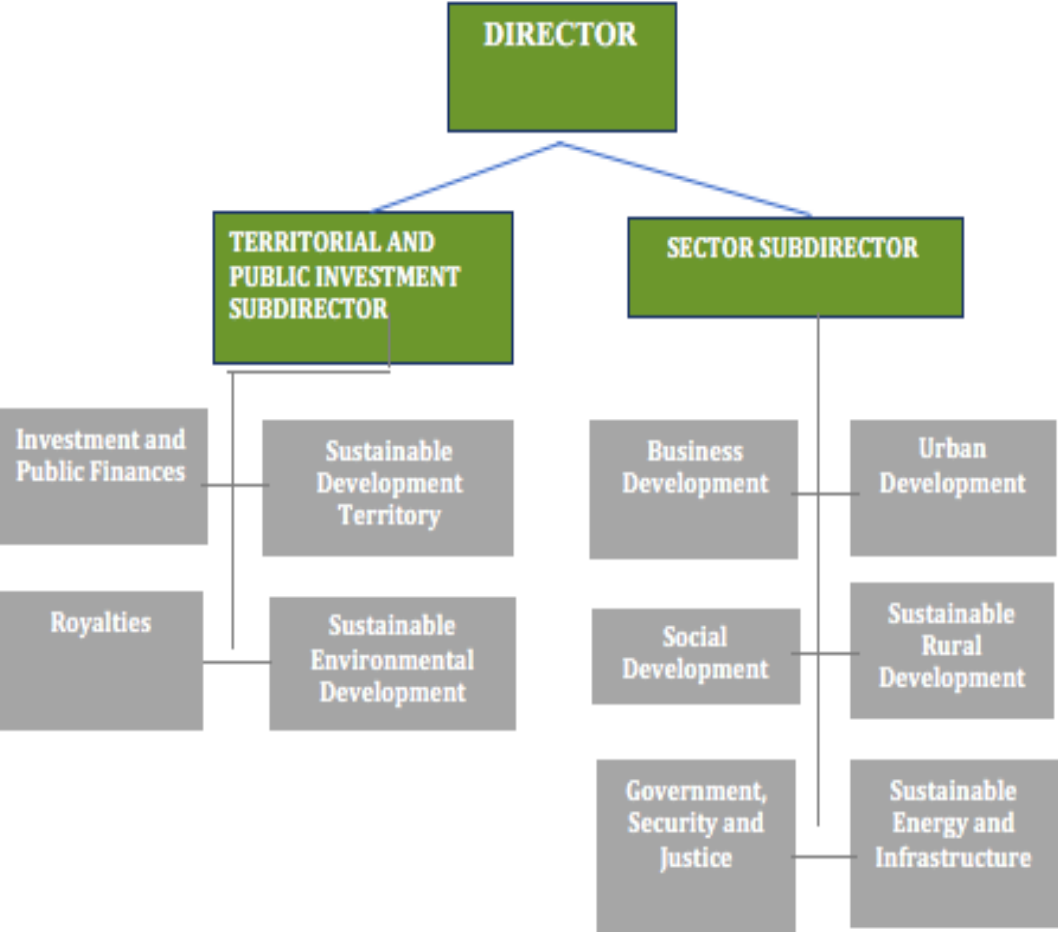
V. Recommended Initiatives

Exhibit 1 National Planning Department Building

Source: DNP- Administrative Department (2018)

1. Energy Conservation

The Department of National Planning building uses only purchased electricity for its energy needs because the building does not have alternative energy sources. For example, there is no gas

connection in the building. In addition, although the DNP building is more than 30 years old, it is eco-friendly because it has a passive design that allows sunlight through the windows minimizing the need for artificial lighting.

Also, due to the geographic location of Bogota, the building does not use temperature regulation devices. The average temperature of the city is 14°C and it varies between 9°C and 22°C. This shows there are only mild temperature changes during the year with rainy days most of the year except the dry months of December, January, February and March.

The energy company in Bogotá is "Codensa", a company that generates hydroelectric energy through three different hydrographic watersheds (Pagua, Menores and Filo de Agua).

Taking into account the climate of the city and the passive design of the building, the organization should take maximum advantage from the flow of natural light throughout the building and the comfortable temperature of the city. They should keep blinds open or use translucent ones to make the most out of the sunlight.

For the daily administrative functions of the organization, energy-consuming devices such as computers, printers and light bulbs are used. On average, the DNP building uses 99 kWh/m2 per year of purchased electricity. According to the Camacol consumption baseline for sustainable construction, the average energetic consumption for an office building in a geographic location like Bogota should be 81.2 kWh/m² per year. Therefore, the organization could set as building

target consumption the Camacol suggested amount. **Appendix A** shows energy consumption and calculations for the DNP building.

To measure the carbon footprint of the building, three factors were taken into account: cars owned by the organization (scope1-direct emissions), purchased electricity (scope 2- indirect emissions), and employees' travel (scope 3- indirect emissions). In order to increase accuracy in the calculations, the guidelines from the Colombian Mining Planning Unit were used. **Appendix B** shows CO_2 emissions from purchased electricity.

According to the calculations, the DNP building emits an average of 470 tons of CO_2 yearly from purchased electricity. Decreasing electricity will reduce emissions and the environmental footprint of the building. Therefore, it is recommended that strategies to reduce energy consumption be implemented. For instance, the use of LED (light-emitting diodes) lighting is highly recommended throughout the entire building. Although they could cost more than other forms of lighting, they are energy efficient (2-17 watts) when compared to traditional light sources such as incandescent bulbs that are used in the DNP building. LED lighting typically uses about 25%-80% less energy than the traditional incandescent bulbs (Energy.gov, 2017). Other benefits LED lighting provides are its small size, low heat output, energy savings and durability (30,000h-50,000 h) that could be 3-25 times longer (UNEP, 2007). Upgrading the lighting system also enhances employees' productivity and comfort in the building (Sitarz, 2008).

It is also recommended to install control lighting for energy savings. This strategy, which focuses on turning off or dimming lighting when it is not needed, can reduce energy costs by up to 30-75%. It can also facilitate complying with commercial building energy codes and standards. Moreover, dimming can extend the useful life of LED lighting, thus increasing its value. Control lighting can also enhance security because during afterhours the presence of people can be detected from lights turning on when spaces are occupied. Finally, control lighting can provide useful information to measure and analyze energy use (U.S Department of Energy, 2013). Motion sensors could be used for hallways, parking spaces and even in the offices to maximize savings. Once a sensitivity coverage area is defined, either passive infrared or ultrasonic sensors could be installed depending on the needs of the building.

The use of smart power strips is also recommended to decrease energy consumption. When computers, printers and other electric devices are not in use, the power strips control the amount of power electronics consume. Therefore, they decrease and control energy consumption (Bregell, et al., 2013, p. 3).

Finally, when considering replacing the equipment, it is advisable to look for the latest green technology, always considering Energy Star products. This label from the Energy Protection Agency (EPA) guarantees a minimum standard in energy performance. Meeting the Energy Star requirements ensure benefits in terms of energy consumption, environmental protection and budget optimization (Energy Star, 2010).

Table 1. Recommendations for Electricity Use Reduction

RECOMENDATION	BENEFITS	ECONOMICS	RESOURCES
ELECTRICITY		Cost Benefit= 2.01	
1. Natural light Keep blinds open or use translucent material	. Reduces lighting needs . Increases employees' comfort and cognitive performance . Positive impact on employees' mood		
2. Energy Star LED bulbs and Fixtures	. Reduces electricity consumption 25-80% less than incandescent bulbs (2-17 watts) . Increases efficiency . Low heat output . Durability (30,000-50,000h)-(3-25 times longer) . Enhances productivity and comfort	. Payback= 16 months . ROI=62% Year	http://www.home center.com.co/ho mecenter-co/product/29910 3/Lampara-Panel-Led-Incrustar-60x60-46W-Blanca/299103
3. Control Lighting	. Energy costs reductions by up to 30-75% . Extend the life of LED bulbs . Provide security . Measure energy use		
3. Smart Power Strips	. Decrease and control energy consumption	Payback : 26 months . ROI=34% Year	http://www.enter. co/especiales/hog ar-digital/ahorre-energia-y-plata-con-estos-tips-para-el-hogar/
4. Replace equipment: computers and printers Energy Star technology	. Reduce energy consumption . Improves productivity		

Appendix C shows Electricity Economic Analysis

2. Green Computing

In terms of equipment, increasing the upgradability of computers is always desirable. On, average, a computer is used for three years (Sitarz, 2008). Therefore, moving to newer energy efficient technologies is always recommended. If possible, leasing is desirable especially when Energy Star equipment and LED monitors are considered.

To save energy with appliances, it is recommended to turn them off at night and on weekends. As mentioned before, using smart power strips saves energy by blocking consumption while not in use. Moreover, power management settings from computers can be used to promote efficiency. For example: low power stand by and turn off of monitors could be used for this purpose. Also, the entire equipment of the building could be turned ON and OFF automatically according to an established job schedule. If more working hours are needed, then the computers could be manually turned ON and OFF.

Table 2. Recommendations for Green Computing

RECOMENDATION	BENEFITS	ECONOMICS	RESOURCES
GREEN COMPUTING			
1. Upgrade computers to newer energy efficient technologies. Energy Star equipment and LED monitors.	. Reduce energy consumption . Increases efficiency . Protect human health . Easier to upgrade and recycle		U.S. EPA Electronic Products Environmental Assessment Tool: www.epeat.net
2. Use smart power strips	. Decrease and control energy consumption	Payback: 26 months . ROI=34% Year	http://www.enter.co/especiales/hogar-digital/ahorre-energia-y-plata-con-estos-tips-para-el-hogar/
3. Use power management settings: . Low power stand by and turn off monitors . Turn computers off during nights and weekends. .	. Reduce energy consumption		
Train employees involved in purchasing, using and disposing equipment about the new sustainable goals of the organization.	. The implementation of the strategy is easier . Sustainability is better filtered within the organization		
AS NATIONAL LEADERS: 1. Create legislation for electronic equipments. . Waste: return the equipment to the manufacturer or retailer free of charge. . Promote reuse and recycling			

3. Travel and Transportation

The DNP owns vehicles that are used to transport the Directors of the organization. These vehicles emit greenhouse gases (scope1-direct emissions) that need to be minimized to lower the environmental footprint of the organization. The Department of National Planning owns 28 official vehicles and according to the gasoline consumption, the organization emitted 126 tons of CO_2 for 2016. **Appendix D** shows CO_2 emissions for owned vehicles.

Employees travel a lot by airplane because the organization has responsibilities all over the country. These trips also increase the environmental footprint (GHG emissions-Scope 3) of the organization generating the necessity to minimize them. During 2015, airplane travel emissions accounted for 550 tons of Co_2 and in 2016 airplane travel emissions accounted for 410 tons of Co_2. The higher consumption of Co_2 in 2015 can be attributed to the elaboration of the National Development Plan 2014-2018 ''All for a New Country'' because the elaboration of this document demanded visiting the different regions of the country. **Appendix E** shows employees' travel CO_2 emissions.

In order to minimize airplane travel and transportation emissions, the DNP should consider implementing strategies to encourage the use of green transportation alternatives. For instance, DNP could offer a bus service from the building to the nearest public transportation station. This bus could motivate the use of Transmilenio (public transportation) among employees because of the security and comfort that this DNP bus could provide. Moreover, promoting alternative means of transportation such as bikes and walking could lead to better health and fitness for

employees. Shared car rides could also be a solution to decrease the number of cars used in the organization.

To decrease the need for airplane travel, the organization could promote the use of virtual meetings and telecommuting. These strategies could increase productivity because less time is wasted in commuting and traveling. This could lead to employees having more personal time, which in turn could improve their quality of life.

Table 3. Recommendations for Green Travel and Transportation

RECOMENDATION	BENEFITS
SCOPE 1: Transportation-owned cars	**GHG Emissions 126 CO2/Ton**
1. Offer bus service to the nearest public transportation station (Transmilenio)	. Increases security . Promotes comfort . Increase the use of public transportation . Saves money and energy
2. Promote alternative means of transportation such as bikes and walking	. Promotes better health for employees . Reduces the use of cars and GHG emissions . Saves money and energy for both company and worker
3. Promote car pooling	. Reduces the use of cars and GHG emissions . Saves money and energy
SCOPE 3: Travel- airplane	**GHG Emissions 550 CO2/Ton**
1. Promote the use of virtual meetings – audio and video conference	. Less airplane travel and less GHG emissions . Increase productivity . Saves money and energy
2. Promote the use of Telecommuting	. Less daily commute to the office . More personal/family time for employees which provides more satisfaction . Less wasted time commuting . More productivity . Saves money and energy

4. Waste Management

The Department of National Planning signed a contract agreement with the Association of Recyclers from the city of Bogota: "Sustainable Arbo". The object of the contract is to "collect and recycle non-hazardous solid waste generated by the organization".

In this way Arbo provides the recycling service to DNP and in return they can profit from the collected material. However, Arbo has to issue disposal certificates of the recyclable waste as well as to comply with all the requirements of the Administrative Unit of Public Services (UAESP). Therefore, measurements and controls are possible within the system.

The strategy of the program is focused on a recycling plan for paper, cardboard, plastic bottles, glass bottles, magazines, newsprint and other elements. The contract was broadened to include new materials such as aluminum, steel, plastics (PVC pipes, acrylics, resins, gutters) and glass (ordinary, tempered and laminated).

The infrastructure for the recycling program is already in place with recycling bins on every floor to separate organic and inorganic products. The objective is to increase the quantity of recycled materials. The organization could also create training programs to better inform employees about recycling and its benefits and in order to increase motivation and participation from the work force.

During 2016, 9,723kg of materials were recycled. The objective is to achieve a 10% yearly increase.

Table 4. Waste Management Recommendations

RECOMENDATION	BENEFITS
WASTE MANAGEMENT	
1. Develop training programs for employees	. Increase motivation and effectiveness of the strategy . Increase the quantity of recycled material . Increase employees' participation in the process
2. Create a strategy to deal with computing appliances (computers, printers, cell phones)	. This could be a pilot plan to be replicated by other organizations.
3. Develop an impact assessment for Arbo (Association of recyclers)	. Increase engagement with Arbo . Improve Arbo's operations (environmental and social impact)

5. Paper use Reduction

The Department of National Planning does not quantify the paper consumption of the organization. Therefore, it is difficult to measure their performance in terms of paper use. Nevertheless, the DNP has launched some technological improvements to avoid the need of printed-paper.

The organization has the document management system ORFEO, which allows every employee to access digitized files such as memos, investigations and responses, among many others. In addition, the DNP uses the software SISGESTION to make internal information requests fast and paperless.

However, including paper use reduction in the sustainable strategy could bring additional benefits such as:

- Reduce storage space

- Avoid loss of documents

- Decrease administrative expenses such as paper and ink purchases

- Promote efficient use of time

Therefore, the organization should identify their paper needs in order to plan their paper consumption. Keeping records of paper use through printers is recommended in order to achieve the proposed goal. Once the need is quantified, then a target for paper use could be considered.

Table 5. Paper use Recommendations

RECOMENDATION	BENEFITS
PAPER USE REDUCTION	
1. Identify paper needs 2. Keep records of paper use	• Decrease paper and ink purchase • Avoid loss of documents • Quantify the need
3. Set a target	• Reduce storage space • Decrease administrative expenses • Promote Efficient Use of Time

6. **Water Use Reduction**

According to the Camacol water consumption baseline, water use in the building is high. In 2016, the average consumption per employee was 65 liters per day, which is high, compared to

the 45 liters per day that Camacol suggests. Therefore, it is suggested to decrease the daily consumption of water per employee to be nearer the Camacol suggested limit. **Appendix F** shows water consumption and calculations for year 2016.

In order to decrease water consumption, water pressure reducing valves are recommended. The valves control the water flow generating a constant and regular output (Watts Industries, 2012). The valves could generate a reduction of water use by 10-80% if installed. The proposal is to reduce 4 liters per person daily. Therefore, by 2021, the organization could achieve the goal that Camacol proposes.

Table 6. Recommendations for Water Use Reduction

RECOMENDATION	BENEFITS	ECONOMICS	RESOURCES
WATER		Cost Benefit= 1.97	
1. Water Saver-Toilets	. Control water flow . Reduces 10-80% water consumption . Efficient	. Payback= 30 months . ROI=17% Year	http://www.easy.com.co/p/valvula-doble-descarga-kit-ahorrador-agua/?gclid=EAIaIQobChMIv77_26C12QIVUVcNCh32NQxMEAQYAyABEgJxT_D_BwE
2. Water Saver-Sinks	. Control water flow . Reduces 60% water consumption . Efficient	. Payback= 2 months . ROI=585% Year	https://articulo.mercadolibre.com.co/MCO-456699718-set-filtros-ahorradores-de-agua-_JM

Appendix G shows Water Economic Analysis

VI. Fostering a Culture of Sustainability

The base for success of this plan relies on the leadership's commitment with the plan. Since this is a public, transversal organization and the intent is to affect the institution, the government and the country as a whole, the engagement of its leaders is imperative for attaining this goal. Therefore, in order to foster a sustainable behavior from leaders and staff, the organization should take into account the following recommendations.

1. Governance

According to Robert Tricker, governance is the overall direction given to the organization and executed when overseeing and controlling the executive actions of management complying with regulation and accountability beyond the organization's boundaries. This definition does not specify responsibility towards society and the environment, however modern scholars include it as part of governance (Tricker, 1984).

Through the organizational culture, governance could be implemented. There are various levels to operate within the culture of an organization. The first level is the first impression attributes such as dress code, furnishing and symbols. The second level is the "declared" culture in the vision and mission statements and expressed values of the organization. The third level is more intuitive and may reflect expressed values that are not practiced in the organization (Farver, 2013).

Therefore, incorporating sustainable values within the culture of the organization could lead to a successful implementation of the plan. To begin with, the mission statement of the organization, which includes the words sustainable and inclusive to describe the desired development of the country, shows the intention to implement sustainable practices in the organization.

1.1 Mission: Lead, coordinate and articulate medium and long-term planning for the **sustainable and inclusive development of the country**.

However, the vision of the organization does not include a sustainable agenda. Therefore, incorporating sustainable objectives in the long-term goals of the organization could lead to achieving sustainable objectives in the future:

1.2 Vision: To be recognized as the technical organization that leads and coordinates the development agenda of the country, with a medium and long-term perspective.

Suggested Vision: To be recognized as the technical organization that leads and coordinates the _**sustainable**_ development agenda of the country, with a medium and long-term perspective.

1.3 Values: The organization includes as its core values honesty, respect and responsibility. When promoting honesty, it is important to effectively operate in accordance with what the organization expresses.

Therefore, implementing the Sustainable Action Plan could promote congruence within the organization. As mentioned before, the last Development Plan Law promoted national green initiatives. Consequently, implementing the plan could be a start to practice what is preached.

Moreover, as a respectful organization, they recognize and legitimize the rights and duties of others. DNP validates plurality to coexist with diverse opinions that enrich their perspectives. However, this value could include respect towards the environment and society. This could promote care and respect for future generations and our environment that do not have a voice now.

Finally, the responsibility value could be focused not only on the compliance with legal obligations but also integrating both social and environmental responsibility to promote sustainable goals.

2. Leadership's Role

The organization should create a Green Team to implement the Sustainable Action Plan. No new employees are required to develop the strategy because people from the organization could start the implementation of the plan. To begin with, a green team could be created with one representative from the operations divisions, one from the finance division and one

environmentalist from the organization. The responsibility of the Green Team is to work on the implementation of the plan on a daily basis.

However, as Kotter mentions, the need for a "Guiding Coalition" that includes participation from the leaders of the organization is needed to drive forward the implementation of the plan (Kotter, 1995). Therefore, besides the Green Team, the general director and the two sub-directors from the territorial and sectors division should integrate the Guiding Coalition. This Coalition could meet every two months to ensure the completion of the plan.

3. Communications

The DNP's web site is an opportunity to spread the message about the Sustainability Action Plan and its benefits. The communications team should work on creating internal messages to encourage the staff to be concerned about the strategy.

Also, the organization has some monitors on every floor to show relevant information to employees. These monitors should be used to spread weekly messages about the environmental goals of the plan in order to keep the staff interested in the process.

4. Educational Programs

The organization should offer virtual courses to all the staff in order to teach employees about the green practices. In addition, interactive activities such as competitions and games could

motivate employees to actively participate in the plan. Also, awards and prizes could be offered

to increase motivation.

Table 7. Fostering Sustainable Culture

RECOMENDATION	BENEFITS
GOVERNANCE	
1. Incorporate sustainable values within the culture of the organization: mission statement, vision statement and values.	. Give a sustainable direction to the organization and implement the plan
1.1 Mission: Lead, coordinate and articulate medium and long-term planning for the **sustainable and inclusive development of the country**.	. Already include sustainable terms
1.2 Vision: To be recognized as the technical organization that leads and coordinates the *__sustainable__* development agenda of the country, with a medium and long-term perspective.	. Include the word sustainable in the long term goals of the organization
1. 3 Values: honesty, respect and responsibility	. These values will be incorporated including environmental and social concerns for the organization
2. LEADERSHIP'S ROLE	
2.1 A Green Team should implement the strategy. One representative from the operations division, one from the finance division and one environmentalist from the organization should integrate this team. 2.2 Create a Guiding Coalition integrated by the General Director and both sub-directors from the Territorial and Sectors division.	. No new hiring processes . Implementation with in-house team . Participation from the leadership of the organization (from different levels and divisions to ensure full participation) . No cost
3. COMMUNICATIONS	
3.1 Use the web site to spread the message 3.2 Use the monitors on every floor to communicate the plan	. Messages could be shown and changed as often as needed . High impact in the organization . No cost
4. EDUCATIONAL PROGRAMS 4.1 Virtual courses 4.2 Interactive activities	. The courses and activities could be created in house. . No cost

6. Strategies to Promote Sustainable Behaviors

Moreover, McKenzie-Mohr says, "Behavior change is the cornerstone of sustainability". Therefore, the expected behaviors from employees to implement this plan were identified and analyzed to ensure an effective transition towards a sustainable environment in the office. From each behavior, benefits and barriers were identified as well as the proper strategies to promote the desired behavior. Furthermore, piloting and evaluation systems were suggested to ensure successful completion of the plan (McKenzie-Mohr, 2011). **Table 8** shows the strategies to promote sustainable behaviors

Table 8   Strategies to Promote Sustainable Behaviors

BEHAVIOR TO BE PROMOTED	BARRIERS AND BENEFITS	DEVELOPING STRATEGIES	PILOTING THE STRATEGY	IMPLEMENTING AND EVALUATING
1. Turn off monitors when not in use	**BENEFITS:** -Reduce energy consumption **BARRIERS:** -People forget or do not care	**Prompts-** remind people to act with a small sign on each computer **Communication-** post messages on the computers **Social Diffusion-** one person of the floor is in charge of spreading the behavior	Pilot the strategy in a specific floor	Compare energy consumption before and after implementation. Show data on the screens.
2. Turn off computers and printers during nights and weekends	**BENEFITS** -Reduce energy consumption **BARRIERS:** -People forget or does not care	**Prompts-** remind people to act with a small sign on each computer and printer **Communicatio**	Pilot the strategy in a specific floor	Compare energy consumption before and after implementation. Show data on the screens.

		n- post messages on computers and printers **Social Diffusion-** one person of the floor is in charge to spread the behavior		
3. Promote the use of bus service from the office building to the nearest public transportation station	**BENEFITS:** -Increases security - Promotes comfort - Increase the use of public transportation - Saves money and energy **BARRIERS**: -Employees prefer the comfort and flexibility of the private car	**Convenience-** using public transportation (transmilenio) helps avoid the traffic jam from the city **Communication-** show messages on the screens of each floor with the schedule of the bus and its benefits **Social Diffusion-** Leaders from the organization should make a **Commitmen**t to use the service at least twice a week **Prompts-** show reminders of the schedule on the screens	Pilot the strategy with a performance indicator from the building: how many employees use the bus.	Show results and testimonies from users on the screen and the website
4. Promote car pooling	**BENEFITS:** -Reduces the use of cars and GHG emissions - Saves money and energy **BARRIERS**: - Lack of flexibility	**Convenience-** making arrangements with a couple of car pools could work for schedule	Pilot the strategy with the employees that use car and do pooling	Show results and testimonies from users on the screen and the website

		issues. Car pools should take turns during the week. **Communication and Social Diffusion:** employees should create chats to communicate and Prompt co-workers about times for car pools.		
5. Promote the use of telecommuting	**BENEFITS:** - Less daily commute to the office - More personal/family time for employees which provides more satisfaction - Less wasted time commuting - More productivity - Saves money and energy **BARRIERS**: -Lack of work space and conditions at home -Third party meetings - Team work with office peers	**Convenience-** creating a weekly schedule in which two or three days a week all meetings are arranged in the office and the rest of the week practice telecommuting.	Pilot the project with one division initially	Show testimonies on the screen of each floor
6. Promote the use of virtual meetings- audio and video conference	**BENEFITS:** - Less airplane travel and less GHG emissions - Increase productivity - Saves money and	**Convenience**: If appropriate technical tools are used for the meetings, they can feel as presence as a	Pilot the project with one division	Show testimonies on the screens and on website

	energy **BARRIERS**: - On campus type of meetings	live meeting. **Social Norms:** -Trips should be technically and economically justified		
7. Promote the use of colored bins on each floor	**BENEFITS:** - Increase motivation and effectiveness of the strategy - Increase the quantity of recycled material - Increase employees' participation in the process **BARRIERS**: -Employees do not know how to classify waste according to the colored bin - Employees do not care	**Convenience**: -Show a list of possible products that classify in each bin and also label each bin with the type of products - Put the bins in a visible and accessible place. **Communication and Prompts:** create messages on how and why to correctly use the bins and show them on the screens and the website.	Pilot the project on one floor	Compare results before and after the promotion of this behavior.
8. Avoid printing paper	**BENEFITS:** -Decrease paper and ink purchase -Avoid loss of documents -Quantify the need -Reduce storage space -Decrease administrative expenses -Promote Efficient	**Communication and Prompts:** -Make sure each computer from the organization shows a message on avoiding printing when necessary.	Pilot the project on one floor	Compare results before and after the promotion of this behavior.

	Use of Time **BARRIERS**: -Employees used to work on printed paper -Employees do not care about paper use	Employees should use Orfeo and Sisgestion **Social Diffusion:** -Leaders from the organization should avoid the use of printed paper **Convenience:** - Employees should use Orfeo and Sisgestion		

VII. Performance Metrics

Performance metrics are important to ensure that the Sustainable Action Plan implementation is contributing to the established goals. Some of the identified priorities concerning this plan are:

- Reduce the carbon footprint

- Reduce energy and water consumption

- Reduce the costs of utilities

- Incorporate a waste management system and recycling

- Reduce paper use

- Foster a culture of sustainability within the organization

Table 9 shows measurable activities and key performance indicators

SUSTAINABLE INITIATIVES	INDICATORS	SUSTAINABILITY GOALS
ENERGY CONSERVATION/GREEN COMPUTING/		
. Transition to Energy Star LED bulbs and fixtures . Control Lighting . Installation of smart power strips . Power management features on computers and electricity saving behaviors . Leasing or purchasing Energy Star products	. Proof of installation . Evidence of reduced electricity consumption	. Reduce carbon footprint . Reduce energy consumption/cost
TRANSPORTATION/TRAVEL		
. Promote the use of virtual meetings, audio and video conference . Promote the use of Telecommuting . Use of public transportation, bikes and ride share	. Less airplane/miles traveled . Less commuting to the office . Create surveys	. Reduce carbon footprint . Less spent on airplane tickets
PAPER USE REDUCTION		
. Identify paper needs and quantify them	- Paper use reduction	- Reduce paper use
WATER CONSUMPTION		
- Use water savers for toilets and sinks	- Water use consumption/ cost reduction	- Reduce water consumption/cost
WASTE MANAGEMENT		
- Use waste management system	- Quantity of recycled material	- Efficient waste management
CULTURE OF SUSTAINABILITY		

- Create a green team and a committee for strategy implementation	-Create an online tool to encourage employee participation -Record attendance and progress in the committees	- Create a sustainable culture in the organization

VIII. Recommendations

In order to increase the impact of the plan and go beyond the walls of the DNP building, the organization should incorporate sustainable key performance indicators into the score evaluation system for royalties' investment allocation (SEP- Sistema de Evaluacion por Puntajes) and into the REIPI, which is the methodology used to make national investment management decisions.

For one thing, as part of the evaluation strategy, the SEP includes environmental criteria to approve regional project investments. For instance, projects that include reforestation and ecosystem recuperation get additional points as well as renewable energy resources projects.

On the other hand, the REIPI system gives incentives so that the general performance metrics are aligned with the National Development Plan. Although the vision of the Plan incorporates the Sustainable Development Objectives, the REIPI does not explicitly include sustainable performance metrics in its decision system strategy.

Therefore, if the SEP and REIPE incorporate sustainable values in their evaluation criteria, the sustainable impact could go beyond the Department of National Planning building. These two systems could be used as instruments to influence the government and the nation as a whole.

IX. Roadmap

A roadmap is useful to keep track of the Sustainable Action Plan implementation. A solid implementation plan, that shows short and long-term objectives will result in a higher rate of project completion. The following roadmap outlines the project implementation and describes activities within a timeline: the Pre-launch phase is the activities that need to be completed before the implementation of the plan. Short-term objectives are the near term wins and long-term objectives that require more time and resources to be implemented. It is important, for the completion of the plan, that all employees be engaged throughout the process. Showing a long-term vision and short terms objectives is necessary for project success (Kotter, 1995).

Table 10   Roadmap

SUSTAINBLE INITIATIVE
PRE-LAUNCH PHASE (By the end of June 2018)
1. Establish the Sustainable Team. Ideally, three members from the human resources team.
2. Establish the Sustainable guiding coalition, which should include the general director, sub directors and sectors representatives preferable with environmental background.
3. Conduct first sustainability team and coalition meeting to define responsibilities. It is suggested that the human resource team have the daily and short wins responsibilities of the plan. The coalition should meet less frequently, and is responsible to guide the initiative in the long run.
4. Make a checklist of all the purchases and policies to implement the strategy.
5. Communicate the Sustainable Action Plan via new policies to all employees. Also create a suggestion box (could be virtual) for employees to actively participate in the plan.
6. Second sustainability team and coalition meeting.
SHORT TERM OBJECTIVES: (By the end of July 2018)
7. Complete the bidding process for purchases
8. Purchase and install
9. Create a list of sustainable habits expected from employees: power management settings in computers, turn off lights and computers, use waste management trash cans, transportation alternatives, keep track of prints, among others.
10. Communications plan.
LONG TERM OBJECTIVES: (Between November 2018 and December 2019)
11. Organize educational sessions for employees to keep track of the sustainable habits and add new concepts.
12. Implement business travel policies to increase video conference use
13. Apply the sustainable governance approach: mission, vision, and values. Update the website with the new information.
14. Establish green procurement policies
15. Create an online survey for employees and start measuring first reactions to the plan
16. Incorporate sustainability related objectives into employees performance for contract renovation year 2019
17. Check sustainability metrics and reports and decide on following steps.
18. Share results
19. Implement Sustainable Key Performance Indicators into the REIPI and SEC investment evaluation systems.

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XI. Appendices

Appendix A- Energy Consumption and Calculations

Purchased Electricity DNP Building Consumption

CONSUMPTION	SOURCE	UNITS	TOTAL	kWh/m2-year
2013	Hydroelectric	kWh	1,246,805	103.57
	Col Pesos	Value	$ 463,317,110	
2014	Hydroelectric	kWh	1,231,048	102.26
	Col Pesos	Value	$ 474,062,172	
2015	Hydroelectric	kWh	1,184,898	98.42
	Col Pesos	Value	$ 492,889,707	
2016	Hydroelectric	kWh	1,132,821	**94.103**
	Col Pesos	Value	$ 520,173,137	

Source: DNP- Administrative Department (2018)

Calculation kWh/m2-year

CONSUMPTION YEAR 2016	
kWh	**COLOMBIAN PESOS**
1,132,821	$ 520,173,137

DNP area of the building = 12,038 m2

Calculation kWh/m2-year= **94.10 kWh/m2-year**

Average= 99 kWh/m2-year

94.10 kWh/m2-year-80 kWh/m² - Year= 14 kWh/m2 /4 Years= 3.52 kWh/m2Y

The suggestion is to reduce electricity consumption in **3.52 kWh/m2-year** so that in four years the consumption level is the one that Camacol suggests. However, in the long run, the objective is to go below the baseline and become as energy efficient as possible.

Camacol Electricity Consumption Baseline

kWh/m² - Year	Cold	Mild	Warm - Dry	Warm - Wet
Hotels	96,1	151,3	132,5	217,8
Hospitals	249,6	108,3	344,1	344,1
Offices	81,2	132,3	318,2	221,3
Malls	403,8	187,8	187,8	231,5
Educational	40	44	72	29,8
Non-VIS Housing	46,5	48,3	36,9	50,2
VIS Housing	44,6	44	34,6	49,3
VIP Housing	48,1	53,3	44,9	50,6

Source: (Camacol, 2015)

YEARLY REDUCTION GOAL (PROJECTIOIN)

YEAR	REDUCTION GOAL kWh/m2-year	REDUCED KWH YEARLY
2017	94.10 - 3.52 = 90.58	90.58*12,038M2= 1,090,376
2018	87.05	1,047,907
2019	83.53	1,005,534
2020	80.00	963,040

Cost of the expected consumption=

KWH CONSUMPTION	COST COLOMBIAN PESOS
1,132,821.00	$ 520,173,137
1,090,375.75	X

Or cost of consumer KWh = $ 520,173,137/1,132,821.00= $460 ColP*1,090,375.75=

X= $500,682,963

Possible savings from expected consumption=

$500,682,963-$ 520,173,137 (2016 consumption)= **$19,490,174 Colombian Pesos**

Appendix B- CO_2 Emissions from Purchased Electricity- Scope 2

GHG Emissions SCOPE 2 (Purchased Electricity)

YEAR	CONSUMPTION MWh	COLOMBIAN EMISSION FACTOR TONCO2/MWh	CO2 TON EMISSIONS
2013	1,246	0.374	466.0
2014	1,231	0.388	477.6
2015	1,184	0.401	474.8

Source: DNP- Administrative Department (2018)

Factor 2013: Ministry of Mining & Energy (2014)
Factor 2014: Ministry of Mining & Energy (2015)
Factor 2015: Ministry of Mining & Energy (2016)

NOW, if reduction is achieved…

Reduction in CO_2 emissions=

Emission factor 0.401 (latest)*1,090,375 kWH=**437 Co2 Ton**

474.8- 437 Co2 T= 38 Ton LESS for reducing energy consumption.

Savings for CO_2 reduction:

$19,490,174/38 ton= $519,138 Saving per TON

Appendix C- Electricity Economic Analysis

CONSUMPTION	SOURCE	UNITS	TOTAL	kWh/m2-year	COST per kWh
2013	Hydroelectric	kWh	1,246,805	103.57	
	Col Pesos	Value	$ 463,317,110		371
2014	Hydroelectric	kWh	1,231,048	102.26	
	Col Pesos	Value	$ 474,062,172		385
2015	Hydroelectric	kWh	1,184,898	98.42	
	Col Pesos	Value	$ 492,889,707		415
2016	Hydroelectric	kWh	1,132,821	94.103	
	Col Pesos	Value	$ 520,173,137		459

Average consumption kWh= 1,198,893
Average increase of kWh COST= 7.35%

ESTIMATED CONSUMPTION BY SOURCE (2016)		
ASSUMPTION		
Lighting	60%	679,693
Computing	30%	339,846
Other	10%	113,282
Total	100%	1,132,821

IF THE STRATEGY IS NOT IMPLEMENTED Incandescent 100W bulbs					
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CONSUMPTION (kWh)	1,198,893*.60= 719,336	719,336	719,336	719,336	719,336
COST OF kWh	(7.35%+1)*459 =492	529.1	568.0	609.7	654.5
Value of Consumption	354,570,524	380,615,923	408,574,519	438,586,846	470,803,765

IF THESTRATEGY IS IMPLEMENTED LED BULBS					
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CONSUMPTION (kWh)	1,198,893*. 18=215,800	215,800	215,800	215,800	215,800
VALUE OF CONSUMPTION	215,800*492 =106,370792	114,184,385	122,571,935	131,575,603	131,575,603
SAVINGS	354,570,524- 106,370792= 248,199,731 -	266,431,538	286,002,583	307,011,243	329,563,120

LED bulbs produce same lumen as incandescent bulbs using 18% W. Codema (2015)
Energy Star LED bulbs use 70-90% less energy than traditional incandescent bulbs (EnergyStar, 2018)

IF THE STRATEGY IS NOT IMPLEMENTED POWER STRIPS					
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CONSUMPTION (kWh)	113,282+339,8 46=453,128	453,128	453,128	453,128	453,128
COST OF kWh	(7.35%+1)*459 =492	529.1	568.0	609.7	654.5

Value of Consumption	223,353,229	239,759,907	257,371,756	276,277,304	296,571,583

IF THESTRATEGY IS IMPLEMENTED POWER STRIPS					
	YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
CONSUMPTION (kWh) 10% REDUCTION	453,128*(1-.10)=407,816	407,816	407,816	407,816	407,816
VALUE OF CONSUMPTION	407,816*492= 201,017,907	215,783,916	231,634,580	248,649,574	266,914,424
SAVINGS	223,353,229 -201,017,907= 22,335,323 -	23,975,991	25,737,176	27,627,730	29,657,158

Power Strips use can reduce electricity use by 10% (Alliant Energy, 2018).

SIMPLE COST PAYBACK PERIOD ANALYSIS			
		BULBS	**POWER STRIPS**
TOTAL INITIAL COST		$ 344,880,000	$ 50,000,000
SAVINGS YEAR 1		$ 248,199,731	$ 22,335,323
PAYBACKP PERIOD	**INITIAL COST/SAVING Y1**	1.38 Years 16 months	2.23 Years 26 months

Assumptions: Required Units 2,874 Unit Cost 120,000 ColP Total Cost 344,880,000 ColP
Required Units 500 Unit Cost 100,000 ColP Total Cost 50,000,000 ColP

SIMPLE RETURN ON INVESTMENT ANALYSIS		
	BULBS	**POWER STRIPS**

LIFE OF INVESTMENT	10 Years	10 Years
ANNUAL SAVINGS	$ 248,199,731	$ 22,335,323
INITIAL CAPITAL COST	$ 344,880,000	$ 50,000,000

NET RETURN			
NET RETURN	**NET ANNUAL SAVING*LIFE OF INVESTMEN- CAPITAL COST**	2,136	170
ROI	**NET RETURN/CAPIT AL COST**	620%	340%
ROI YEARLY	**ROI/LIFEOF INVESTMENT**	62%	34%

UNIT COST- LIGHTING	
COST	**SOURCE**
119,900	http://www.homecenter.com.co/homecenter-co/product/299103/Lampara-Panel-Led-Incrustar-60x60-46W-Blanca/299103
139,900	http://www.homecenter.com.co/homecenter-co/search/?Nrpp=40&Ntt=PANEL+LED&sorter=2
104,900	http://www.homecenter.com.co/homecenter-co/product/233841/Lampara-Led-Panel-60x60cm-48w-Ilumax/233841
120,000	**AVERAGE**
120,000 * 2,874 Units = 344,880,000	TOTAL COST BULBS
POWER STRIPS 70,000-100,000	**http://www.enter.co/especiales/hogar-digital/ahorre-energia-y-plata-con-estos-tips-para-el-hogar/**
100,000*500 Units= 50,000,000	TOTAL COST POWER STRIPS

Appendix D- CO2 Emissions from owned vehicles- Scope 1

GASOLINE CONSUMPTION 2016	
GALLONS	**COLOMBIAN PESOS**
14,890 G	$ 112,597,480

CONVERSION FACTOR
1 GALLON= 0.000121645939629676 TJ

Conversion a TJ
1.811400492 TJ

Then the CO2 Emission Factor by Fuel from the GHG Protocol was used: 69,300kg/TJ

Table 1. CO2 emission factors by Fuel

	Fuel	Lower heating Value TJ/Gg	Energy basis kg/TJ	Mass basis kg/tonne	Fuel density information Of liquids (kg/litre fu	Of gases (kg/m³	Liquid basis kg/ litre	Gas basis kg/m³
Oil products	Crude oil	42.3	73300	3100.59	0.8		2.480472	
	Orimulsion	27.5	77000	2117.5				
	Natural Gas Liquids	44.2	64200	2837.64				
	Motor gasoline	44.3	69300	3069.99	0.74		2.2717926	
	Aviation gasoline	44.3	70000	3101	0.71		2.20171	
	Jet gasoline	44.3	70000	3101	0.71		2.20171	
	Jet kerosene	44.1	71500	3153.15	0.79		2.4909885	
	Other kerosene	43.8	71900	3149.22	0.8		2.519376	
	Shale oil	38.1	73300	2792.73	1		2.79273	

1.811400492 TJ*69,300kg/TJ
125,530 CO2kg
125.5 Ton Emissions

Source: UPME (2016)

1.811400492 TJ*69,323kg/TJ
125,573 CO2kg
126 Ton Emissions

Appendix E Emissions from Airplane Travel -Scope 3

Year	Source Description	Region	Mode of Transport	Scope	Type of Activity Data	Vehicle Type (For air transport, see footnote)	Distance Traveled	# Of Passenger	Units of Measurement	Activity Data Fossil Fuel CO2 (Metric tones)	GHG Emissions Total GHG Emissions, exclude Biofuel CO2 (Metric tones CO2e)
2015	Displacement officers	Other	Aircraft	Scope 3	Passenger Distance (e.g. Public Transport)	Air - Domestic	25.888	77	Passenger Mile	550.081	550.081

2016	Displacement officers	Other	Aircraft	Scope 3	Passenger Distance (e.g. Public Transport)	Air - Domestic	22.894	65	Passenger Mile	410.650	410.650

Source: DNP- Administrative Department (2018)– Calculation Tool GHG Protocol

Table DNP travel of employees by airplane in 2015-2016

ORIGIN	DESTINATION	DISTANCE (KM)	DISTANCE (Miles)
Bogotá	Santa Marta	957	598
Santa Marta	Bogotá	957	598
Bogotá	Barranquilla	1.009	631
Barranquilla	Bogotá	1.009	631
Bogotá	Riohacha	1.046	654
Riohacha	Bogotá	1.046	654
Bogotá	Valledupar	872	545
Valledupar	Bogotá	872	545
Bogotá	Quibdó	565	353
Quibdó	Bogotá	565	353
Bogotá	Neiva	308	193
Neiva	Bogotá	308	193
Bogotá	Barrancabermeja	432	270
Barrancabermeja	Bogotá	432	270
Bogotá	Santa Rosa	330	206
Santa Rosa	Bogotá	330	206
Bogotá	Montería	795	497
Montería	Bogotá	795	497
Bogotá	Armenia	279	174
Armenia	Bogotá	279	174
Bogotá	Florencia	544	340
Florencia	Bogotá	544	340

Bogotá	Villavicencio	121	76
Villavicencio	Bogotá	121	76
Bogotá	Manizales	279	174
Manizales	Bogotá	279	174
Bogotá	Bucaramanga	414	259
Bucaramanga	Bogotá	414	259
Bogotá	Pasto	827	517
Pasto	Bogotá	827	517
Bogotá	Bucaramanga	414	259
Bucaramanga	Bogotá	414	259
Bogotá	Valledupar	872	545
Valledupar	Bogotá	872	545
Bogotá	Cúcuta	573	358
Cúcuta	Bogotá	573	358
Bogotá	Bucaramanga	414	259
Bucaramanga	Bogotá	414	259
Bogotá	Pereira	318	199
Pereira	Buenaventura	258	161
Buenaventura	Cartagena	1.095	684
Cartagena	Bogotá	1.068	668
Bogotá	Armenia	279	174
Armenia	Bogotá	279	174
Bogotá	Armenia	279	174
Armenia	Santa Marta	1.025	641
Santa Marta	Bogotá	957	598
Bogotá	Florencia	544	340
Florencia	Bogotá	544	340
Bogotá	Ibagué	199	124
Ibagué	Bogotá	199	124
Bogotá	Manizales	279	174

Manizales	Bogotá	279	174
Bogotá	Corozal	967	604
Corozal	Bogotá	967	604
Bogotá	Villavicencio	121	76
Villavicencio	Bogotá	121	76
Bogotá	Medellín	425	266
Medellín	Bogotá	425	266
Bogotá	Saravena	601	376
Saravena	Bogotá	601	376
Bogotá	Pasto	827	517
Pasto	Ipiales	83	52
Ipiales	Pasto	83	52
Pasto	Tumaco	277	173
Tumaco	Bogotá	1.107	692
Valledupar	Santa Marta	254	159
Bogotá	Cartagena	1.068	668
Cartagena	Barranquilla	120	75
Barranquilla	Bogotá	1.009	631
Bogotá	Montería	795	497
Montería	Bogotá	795	497
Bogotá	Bucaramanga	414	259
Bucaramanga	Bogotá	414	259
Bogotá	Villavicencio	121	76
Villavicencio	Bogotá	121	76

Source: DNP- Administrative Department (2018)

Appendix F Water Consumption and Calculations

Building Water Consumption 2016
Water Consumption

Month	Liters per day	Value
Jan-Feb	50.200	$ 1.402.505
Mar-Apr	57.067	$ 13.281.533
May-Jun	52.833	$ 16.683.450
Jul-Aug	55.833	$ 12.173.340
Sep-Oct	58.367	$ 14.038.708
Nov-Dec	57.967	$ 15.851.637
Total		$ 73.431.173

Source: DNP- Administrative Department (2018)

Average water consumption for year 2016 is 55,378.00 liters per day. Each employee (849 employees approximately in the building) consumes on average 65 liters per day compared to the 45 liters that Camacol suggests.

Camacol Water Consumption Baseline

Liters/Person/Day	Cold	Mild	Warm - Dry	Warm - Wet
Hotels	188,5	564	242	278,9
Hospitals	620,2	600	438	800
Offices	45	45	52	45,8
Malls	6 lt/m²	6 lt/m²	6 lt/m²	6 lt/m²
Educational	50	50	50	24,8
Non-VIS Housing	145,4	145,3	189,8	174,9
VIS Housing*	105,7	113,9	156,7	125,4
VIP Housing*	78,1	98,3	189,8	110,6

*Subsidized housing

Source: (Camacol, 2015)

Appendix G Water Economic Analysis

WATER CONSUMPTION		
YEAR	M3	VALUE
2016	9,968	$73,431,173

ESTIMATED CONSUMPTION BY SOURCE (2016)		
TOILETS	60%	5,981
SINKS	35%	3,489
OTHER	5%	498
TOTAL	100%	9,968

TOILETS					
IF STRATEGY IS NOT IMPLEMENTED					
	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5
CONSUMPTION (M3)	6,000	6,000	6,000	6,000	6,000
COST OF M3	$73,431,173/9,968= $7,366	7587.7	7815.3	8049.8	8291.3
COST OF CONSUMPTION	6,000M3*$7,366= 44,200,144	45,526,149	46,891,933	48,298,691	49,747,652

TOILETS					
IF STRATEGY IS IMPLEMENTED					
	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5
CONSUMPTION (M3) with 10% reduction	5,400	5,400	5,400	5,400	5,400
COST OF CONSUMPTION	5,400*7,366= 39,780,130	40,973,534	42,202,740	43,468,822	44,772,887
SAVINGS	44,200,144 - 39,780,130= 4,420,014	4,552,615	4,689,193	4,829,869	4,974,765

According to the California water efficiency report, toilets and urinals water consumption could decrease 10% or more implementing the strategy. (Haunstein, H. Quinn, T. Osann, E, 2013).

SINKS					
IF STRATEGY IS NOT IMPLEMENTED					
	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5
CONSUMPTION (M3)	3,500	3,500	3,500	3,500	3,500
COST OF M3	$73,431,173/9,968=	7,587.7	7,815.3	8,049.8	8,291.3

	$7,366				
COST OF CONSUMPTION	3,500M3*$7,366= 25,783,417	26,556,920	27,353,628	28,174,236	29,019,464

SINKS					
IF STRATEGY IS IMPLEMENTED					
	YEAR1	**YEAR2**	**YEAR3**	**YEAR4**	**YEAR5**
CONSUMPTION (M3) with 30% reduction	2,450	2,450	2,450	2,450	2,450
COST OF CONSUMPTION	2,450*7,366= 18,048,392	18,589,844	19,147,539	19,721,966	20,313,624
SAVINGS	25,783,417 - 18,048,392= 7,735,025	7,967,076	8,206,088	8,452,271	8,705,839

According to EPA-WaterSense, the faucet aerators of 1.5 gpm could reduce water consumption in 30%. (Neoperl, 2013).

SIMPLE COST PAYBACK PERIOD ANALYSIS			
		TOILETS	**SINKS**
TOTAL INITIAL COST		$ 16,100,000	$ 1,300,000
SAVINGS YEAR 1		$ 4,420,014	$ 7,735,025
PAYBACKP PERIOD	**INITIAL COST/SAVING Y1**	**3.64 Years 30 months**	**0.16 Years 2 months**

Assumptions: Required Units 230 Unit Cost 70,000 ColP (Toilets) Total 16,100,000
Required Units 260 Unit Cost 5000 ColP (Sinks) Total 1,300,000

[;-''']

SIMPLE RETURN ON INVESTMENT ANALYSIS			
		TOILETS	SINKS
LIFE OF INVESTMENT		10 Years	10 Years
ANNUAL SAVINGS		$ 4,420,014	$ 7,735,025
INITIAL CAPITAL COST		$ 16,100,000	$ 1,300,000
NET RETURN	NET ANNUAL SAVING*LIFE OF INVESTMEN- CAPITAL COST	28,100	76,050
ROI	NET RETURN/CAPIT AL COST	174%	5850%
ROI YEARLY	ROI/LIFEOF INVESTMENT	17%	585%

UNIT COST- TOILETS	
COST	SOURCE
73,000	https://articulo.mercadolibre.com.co/MCO-446925296-kit-ahorrador-de-agua-para-sanitario-economice-hasta-el-80-_JM
70,990	
61,871	https://articulo.mercadolibre.com.co/MCO-457842960-lasco-04-2108-valvula-de-descarga-para-inodor-envio-gratis-_JM
70,000	AVERAGE
70,000*230 Units= 16,100,000	TOTAL COST TOILETS

UNIT COST- SINKS	
COST	**SOURCE**
4,700	https://articulo.mercadolibre.com.co/MCO-453476679-ahorrador-de-agua-economizador-grifos-lavaplatos-_JM
5,000	https://articulo.mercadolibre.com.co/MCO-456699718-set-filtros-ahorradores-de-agua-_JM
4,900	https://articulo.mercadolibre.com.co/MCO-452746155-economizador-ahorrador-de-agua-disminuir-cuenta-de-servicios-_JM
5,000	**AVERAGE**
5000*260=1,300,000	**TOTAL COST SINKS**