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Environmental Change

Alignment of mitigation pledges with government expenditure in Latin America

A case study of Chile, Colombia and Peru in the COVID-19 context

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Abstract

The implementation of Nationally Determined Contributions (NDC) in 2020 has coincided with the outbreak of COVID-19. Recovery paths taken to deal with the economic consequences of the pandemic can be either an opportunity to foster a sustainable growth or a return to business-as-usual model. Assuming that national budgets define the economic strategy of governments, this thesis addresses the relationship between mitigation pledges outlined in NDCs and mitigation-related expenditure in Chile, Peru and Colombia pre- and during the COVID-19 pandemic. A deductive thematic analysis of NDCs is used to identify the prioritized mitigation sectors and to allow for a refined focus in the analysis of the relevant mitigation-related expenses for each case country. Budgets of 2020 and 2021 are compared and discussed in the light of previous research. Results show different levels of climate ambition but common prioritised sectors (energy, land-use, and industry). Regarding Peru, the budgets indicate a higher mitigation ambition than their NDC by including expenditure in areas that are not mentioned in the NDC. Contrary, Colombia and Chile have detailed NDCs that cover more aspects than indicated through their government expenditure. Generally, energy and industry expenditure misalign with the NDC pledges, due to the increase of expenses on national fossil-fuels resources in 2021. Land-use mitigation expenditure, linked to forestry and agriculture, have increased in Chile and Peru but are hardly represented in Colombia. Thus, the thesis outlines early misalignments of mitigation targets with government expenditure and differences in accountability and transparency that could challenge the monitoring of progress towards the achievement of the pledges.

Keywords

Climate expenditure, LAC, mitigation, policy ambition

1. Introduction

The need of climate action was outlined in the 1980s and since then efforts to evaluate how economic growth aligns with sustainability emerged (Randalls, 2010). International cooperation to reduce Greenhouse gases (GHG) emissions and keep the increase in temperature below 2º has characterised the start of the 21st century (UNFCCC, 2015). However, the approach of these negotiations has changed over time. Traditionally, global climate goals were based on a collaborative basis, meaning that a top-down approach was taken and all parties negotiated the objectives for both adaptation and mitigation actions. Due to the plurality of the existing participants, common approaches were hard to find and the need of a bottom-up perspective was outlined under the Paris Agreement. That resulted in the Nationally Determined Contributions (NDC) (Robiou du Pont and Meinshausen, 2018) where countries individually outline mitigation and adaptation goals beyond 2020 (Hof *et al.*, 2017).

Coinciding with the start of the implementation of these NDCs, in 2020, the outbreak of the COVID-19 pandemic has shown a drastic reduction of the emissions worldwide (Le Quéré *et al.*, 2020). However, domestic recovery policies—lead by national governments—that deal with the derived economic crisis could lower the possibilities to comply with the Paris Agreement (Buckle *et al.*, 2020). That would happen if countries would choose Business-as-Usual (BaU) scenarios in an attempt to rapidly increase their Gross Domestic Product (GDP) (Smith, Taruiy and Yamagataz, 2021). Among the consequences of choosing the BaU path, would be the most likely contradiction to their NDCs and the resulting impact on the country international reputation (Weikmans, Asselt and Roberts, 2020). Opposite to this view, some view recovery as an opportunity for a transformational change and suggest that benefits from a sustainable approach exist since domestic climate intervention—characterized by ambitious domestic budgets—is believed to be efficient to comply with the global objectives and to increase wealth in developing countries (Oncioiu *et al.*, 2021). This is due to the rise of new sustainable activities, increase of efficiency and the attraction of private investment into countries (Kissinger *et al.*, 2019; Jin and Kim, 2017).

Therefore, high climate policy ambition when dealing with the consequences of the pandemic might be both necessary and beneficial, especially in developing countries and in areas that are extremely vulnerable to climate change. Among this regions is Latin America and the Caribbean (LAC) that, even if represents a low share of the global GHG emissions, is highly vulnerable to extreme weather and hydrological changes partly due to its relatively low social and economic development (Nagy *et al.*, 2018). Additionally, cities in LAC are growing fast and urbanization is already as high as 80% which is making these areas increase their shares of GHG emissions (Hardoy and Romero Lankao, 2011; Kim and Grafakos, 2019). The long-term effect of COVID-19 is still unknow, however, LAC has been strongly hit by the pandemic and the predictions of the International Monetary Fund are that the region will face one of the strongest recessions of the history (Bakker *et al.*, 2020). This could lead to local governments establishing ambitious economic recovery packages in their National Budgets (NB), that could negatively affect the GHG emissions reduction targets.

The importance of climate ambitious domestic policy has been widely outlined in the research. Still, this bottom-up approach has rarely been related to domestic expenditure in developing countries (Kissinger *et al.*, 2019). Additionally, post-COVID19 recovery predictions have been criticized for having a developed country approach and some scholars believe that they present biases when trying to do global predictions without considering the context-related issues of each area (Morea, 2020).

1.1. Aim and research questions

A research gap in the importance of bottom-up finance when dealing with climate objectives is outlined in the LAC region. This thesis contributes to filling this research gap by considering the current context. More concretely, it aims to analyse if pledged climate mitigation actions in the LAC region translate into national budgets and if the COVID-19 pandemic has impacted climate-related expenditure. To manage the analysis, Chile, Colombia and Peru have been selected—the reasoning behind the choice is presented in the method section. The following research questions (RQ) are established:

1. How are mitigation targets and actions characterized in the NDCs of selected LAC countries?
2. To what extent are these mitigation actions represented by climate-related public expenditure in the national budgets of 2020?
3. How has climate-related public expenditure, as represented in the national budgets of 2021, varied with the COVID-19 pandemic?

2. Background and previous research

This section introduces background information from previous research that is needed for understanding the formulation of the thesis as well as specific characteristics of the three selected cases.

2.1. An overview to international climate policy

In 1992 the United Nations Framework Convention on Climate Change (UNFCCC) was established based on the premise that action should be taken to reduce the anthropogenic effect in climate change impacts. Departing from the target of reducing GHG concentrations and keep global warming below 2º, objectives and responsibilities of the mentioned parties were defined (Savaresi, 2016); and incorporated different standards for developed countries (Annex I) and developing countries (non-Annex I). This separation—based in what has been called common but differentiated responsibilities (CBDR)—outlines the unconformity of developing countries to equally pay for the consequences of an industrialisation that brought developed countries into their economic predominant state in the globe (Brunnée and Streck, 2013). The Kyoto Protocol—which was signed in 1997 but was not ratified until 2005—outlines this differences and sets stronger requisites to Annex I countries as well as making its compliance mandatory (UNFCCC, 1997). This division—even if being widely criticized for not being representative of current times (Jernnäs and Linnér, 2019)—has characterized 20 years of negotiations with attempts to create legally blinding rules that would guide GHG emissions reduction without any solution (Carraro, 2016).

In this context, the Paris Agreement was signed in 2015, presenting a change into international climate action setup. Being aware of the impossibility to force countries to reduce GHG emissions, it moved from a top-down approach into a rather bottom-up one, which was materialized in the NDCs (Falkner, 2016). With the objective of keeping the increase of temperature below 2º, parties specify in their NDC how they will reduce their GHG emissions and how they will adapt to the consequences of climate change from the year 2020. Additionally, parties are requested to update their NDC every five years (Röser *et al.*, 2020). Even if the Paris Agreement represented a success in the history of climate negotiation, NDCs have been criticized for not being clear nor transparent. This has been defined as a consequence of the vague articles of the agreement that underlines the plurality of the members by the need of proposing rather ambiguous requirements (Savaresi, 2016). As a result, each country interprets the requests of transparency and NDCs vary not only in length and style but also in content (Pauw *et al.*, 2018). Robiou du Pont and Meinshausen (2018) argue that this has been counter-productive and that the overall ambition has been reduced, guided by each country self-interest of increasing economic growth. However, others believe that the need to make the pledges and inform about the progress towards the goals will be beneficial in the long-term since international reputation could be damaged if there is a gap between promises and actions (Weikmans, Asselt and Roberts, 2020).

2.2. State-of-the-art in Climate Policy Ambition and Climate-Related expenditure

The Paris agreement requires parties to "*reflect its highest possible ambition*" (UNFCCC, 2015 p.4) when establishing their NDC. However, this statement has been criticized for lacking of a clear definition of the concept "ambition" and a framework to approach it. This has developed heterogenic proposals for defining ambition that range from quantitative approaches to more qualitative ones and clusters not only scientific research but also popular indexes that can be found in the grey literature.

Isern *et al.* (2020) define the term ambition as the level of achievement of a proposed goal; considering climate ambition, they strongly link the concept to equity and more concretely to the CBDR principle. Similar to this approach, Bel and Teixidó (2020) take Climate Policy Ambition (CPA) as a quantitative variable based on the premise that the only impediment that makes a country not achieve zero emissions is funding. Therefore, they argue that by comparing the conditional scenario to the unconditional one, researchers can determine how dependent on climate finance a country is and consequently, how ambitious their domestic climate policies are. Tobin (2017), on the other hand, try to evaluate the factors that make a country more ambitious and takes the level of ambition from secondary data and more concretely the Climate Change Performance Index (CCPI) (Germanwatch, 2021). There, the analysis is individualized for all the studied countries and experts and NGO rank the measures from 1 "weak" to 5 "strong" based on a knowledge-based subjective criteria. Then, ambition of national policy is defined in how well it aligns with the Paris Agreement and the below 2º objective (Nascimento *et al.*, 2020). The rather subjective approach of the assessment has been discussed as being the source incoherence among countries when comparing their performance in different indexes found in the grey literature (Surminski and Williamson, 2014). Other indicators in the grey literature for CPA also exist. The Energy Policy Tracker (EPT) takes a bottom-up approach in which different approved government-related policies are identified and categorized in regards on their support to clean energy policy (Energy Policy Tracker, 2020).

The reader might by now have noticed on the diversity of approaches that can be found in the literature and even start imagining how conclusions differ depending on the approach taken. These approaches however, strongly link to NDCs—with the exception of the EPT that uses policy documents—and not take government expenditure on NB into account. However, NB tagging has been outlined as an efficient way of evaluating ambition of domestic policy and an efficient way of tackling progress towards NDC together with increasing transparency to attract international funding. Thus, some countries have started programs to evaluate their climate-related expenditure but it is still not a common trend (Bain, Baboyan and Nguyen, 2019). In LAC, Colombia created a Department for the National Planification (DNP) that aims to track climate finance and domestic expenditure on climate-change related actions. However, data is not updated and information is just available until the year 2019 (DNP, 2020).

Regarding climate-related expenditure on NB, two approaches have been identified as more appropriate for this thesis work. Firstly, *The analytical framework to assess the effectiveness of public climate change finance* (Bird *et al.*, 2016) evaluates different actions presented in the NB to identify climate relevant expenditure. After an initial screening, climate-related actions are assigned into relevance groups depending on their primary objective. Thus, these actions that had mitigation or adaptation as the main goal are considered as "high relevance", actions that had climate change as a secondary goal or mixed programs that are hard to separate are considered as "medium relevance" and these that indirectly affect climate change without being a goal are tagged as "low relevance". Then percentages are assigned to each category which has been defined as a subjective measurement based on experts advice by the authors (Bird *et al.*, 2016).

Sharing some common aspects, the Climate Finance Group of Latin America and the Caribbean (GFLAC for its name in Spanish) has developed a *Methodology for Measuring, Reporting and Verificating climate finance from a developing country perspective*. This includes specific key points for evaluating national expenditure in relation to climate change and allows adapting the method to the desired scope by determining the relevant sectors of interest for each country. This is done by an initial research and prioritisation of these actions

that are believed to be relevant for the problem that wants to be addressed. Additionally, it includes a classification of the main sector and actions that are usually related to mitigation and adaptation policies (GFLAC, 2016). Unlike *The analytical framework to assess the effectiveness of public climate change finance* it does not separate actions into relevance categories but instead bases the analysis on measurements of money allocation into climate-change related actions or weight of these expenses.

2.3. The adaptation and mitigation dichotomy

Mitigation aims to anthropogenically reduce the emissions of GHG while adaptation promotes resilience building in communities to reduce their climate change vulnerability (Swart and Raes, 2011). Both actions are contemplated under the Paris Agreement and, while adaptation is outlined as a global challenge that needs to be urgently addressed; mitigation is seen the way of not only tackling climate change but also reducing the need of further adaptation measures in the long term (UNFCCC, 2015). Indirectly, the definition outlines the different nuance of the concepts.

Firstly—as presented in Table 1—one of the main differences between the concepts is the scope of their actions. While mitigation actions have a long-term perspective, adaptation ones have an immediate result. Additionally, mitigation actions tend to have a global perspective meaning that climate policy decisions are usually taken in national or international level and its results are widely spread; whereas adaptation measures are most likely to be focused on local vulnerable areas with really localized results (Swart and Raes, 2011; Zhao *et al.*, 2018).

***Table 1**. Overview of Mitigation and Adaptation concepts.*

	Mitigation	**Adaptation**
Objective	Reduce GHG concentrations	Resilience building
Time perspective	Long-term	Short-term
Results	Globally	Locally
Success definition	Reduction of GHG emissions	Unknown

Source: Own elaboration using information from Asayama et al. (2019), Moser (2012), Swart and Raes (2011) and Zhao et al. (2018).

While mitigation has been prioritized for many decades, and its success measurement—in terms of GHG emissions changes—is clear and transparent; adaptation still lacks of a concrete approach and success definition (Moser, 2012). Explanations are the little importance given to adaptation until a decade ago—coinciding with the evident start of the effects on climate change (Zhao *et al.*, 2018)—or the nature of the concept itself that make success measurement hard, even creating incoherencies. Examples of these could be that actions that were successful in an area could have catastrophic results on another or the lack of standardization of risk definition that is usually the base to define and prioritize adaptation measures (Asayama *et al.*, 2019; Swart and Raes, 2011). Thus, further research is needed to clearly identify adaptation borders. Further implications of this are the need to develop measurements of success that should be individualized for each local community, since the results of the actions will be at a local level. (Asayama *et al.*, 2019)

2.4. Contextualization of the energy sector

To contextualize the results of the analysis, it is important to outline how the energy supply is distributed per energy source in each of the selected countries. Table 2 shows that all three countries strongly rely on fossil fuels, 76% in Chile and Peru and 74% in Colombia. Oil is the

major energy source in the three countries, representing 42% in Chile, 39% in Colombia and 44% in Peru. Biofuel is the major source of renewable energy in Peru and Chile, representing 17% in Chile and 13% in Peru and Colombia—that have a similar rate of hydropower. Additionally, coal has an important role in Chile (20%) at expenses of natural gas (14%). In Colombia and Peru, the distribution is the opposite, being coal relatively low—3% in Peru, 9% in Colombia— and natural gas one of the major—26% in Colombia and 29% in Peru.

Table 2. *Energy sources distribution in Colombia, Chile and Peru. The table shows how the energy supply is distributed per energy source in the last available year for each country - Colombia and Peru 2018 and Chile 2019. Excluding electricity.*

	Coal	Natural Gas	Hydro	Biofuels and waste	Oil	Wind, Solar, etc.	Share of Renewables
Chile	20%	14%	4%	17%	42%	3%	24%
Colombia	9%	26%	13%	13%	39%	0%	26%
Peru	3%	29%	10%	13%	44%	1%	24%

Source: (IEA, 2020)

The global picture changes considerably when considering electricity production. Colombia and Peru produce most of their electricity using renewables, mostly hydropower—which represents 71% in Colombia and 55% in Peru. On the other hand, the share of renewables is 45% in Chile—being hydropower also predominant with 25%. Opposite to the other two countries, Chile strongly relies on coal for electricity production, being the main source with 33%.

Table 3*. Electricity generation by source. The table shows from which sources electricity is generated in all three countries in 2019.*

	Coal	Oil	Natural Gas	Biofuels	Hydro	Wind	Solar PV	Share Renewables
Chile	33%	4%	19%	5%	26%	6%	8%	45%
Colombia	11%	2%	14%	2%	71%	0%	-	73%
Peru	0%	1%	38%	1%	55%	3%	1%	60%

Source: (IEA, 2020)

Finally, all three countries have access to electricity rates over 90%. More concretely, Chile has 100% of access to electricity, Colombia 99.9% and Peru 95.2% based on the latest reports of the World Bank (World Bank, 2018).

2.5. Contextualization of land-use change and Agriculture

Figure 1 summarizes the data on GHG emissions from agriculture and land-use change from FAO (2021). The emissions in Peru and Colombia have similar values—139,93 gigagrams in Colombia and 113,51 in Peru. The major contribution to GHG emissions in both cases are land-use change activities and removal of forest land. Other actions that contribute to GHG emissions in a lower scale are enteric fermentation and manure left on pasture.

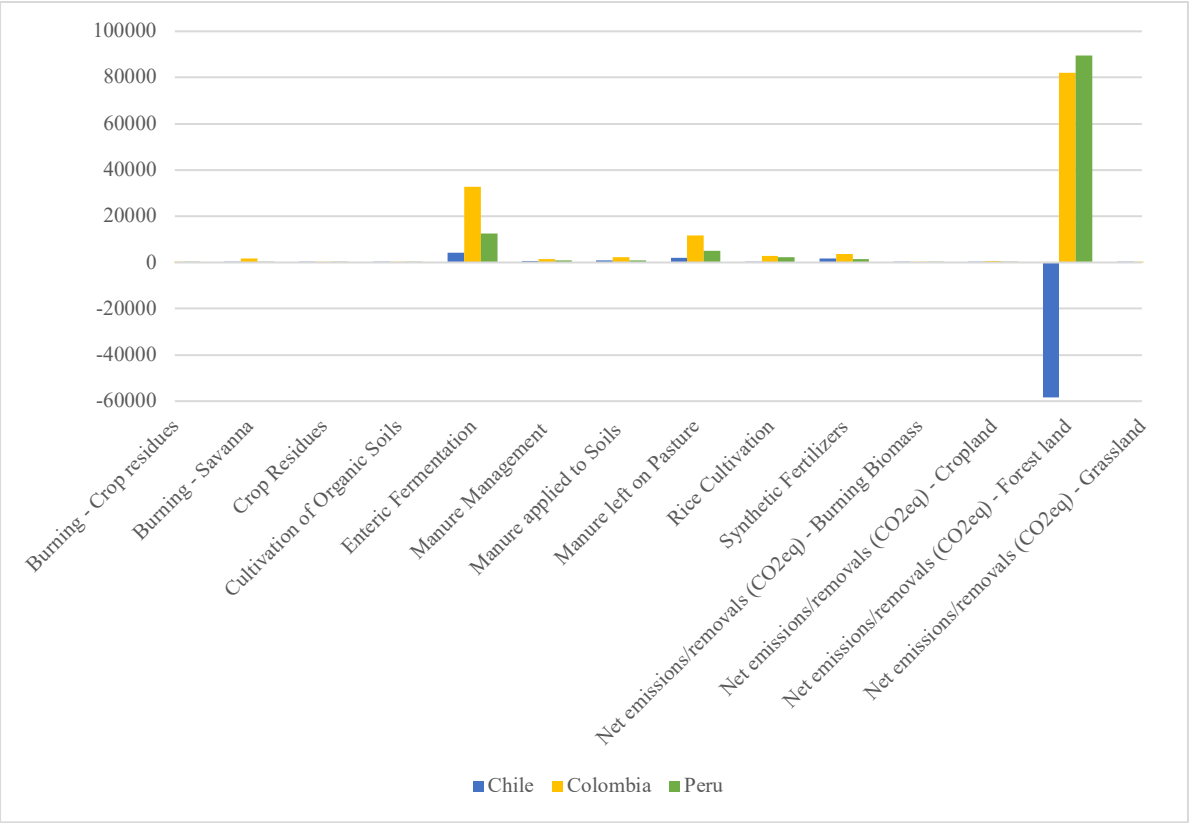

Figure 1. *GHG emissions of agriculture and Land-Use Change in gigagrams of CO2eq in 2018. Source: (Food and Agriculture Organization of the United Nations (FAO), 2021)*

On the other hand, Chile shows the inverse trend. In this case the GHG emissions inventory shows negative emissions—47,716 gigagrams—mostly motivated by forest land restoration. From the rest of the GHG emitter sectors, the country follows the same pattern than Colombia and Peru, with enteric fermentation and pasture as second emitters.

2.6. The economic cycle and inflation

Inflation refers to the level of increase on prices during a certain period of time which allows comparison of nominal monetary values by adjusting them to the value of money (Oner, 2010). The concept strongly relates to economic trends and low inflation rates that are stable and predictable have been related to economic growth periods. These have been characterized by low levels of uncertainty, development, reduction of poverty and financial stability (Ha, Kose and Ohnsorge, 2019). Therefore, annual inflation rates of 2021 are relevant for this study to understand the implications of the NB analysed. The annual inflation rate for 2021—from March 2020 to March 2021—in Chile was 2.9%, in Colombia 1.51% and 2.16% in Peru (Banco Central de Chile, 2021; Banco Central de Colombia, 2021; Banco Central de Perú, 2021) .

3. Materials and methods

This section presents the method for accessing and analysing the empirical material and case study selection. For the selected countries, information about the policy documents is outlined. Additionally, reliability and validity of the selected method are discussed.

3.1. Method for analysis of the empirical material

Due to the heterogeneity of NDCs and NB, the method needs to be both flexible to allow thematization and standardized to allow intercomparison. Following this requisite, the method was divided into a two-step approach that draws from GFLAC (2016) (see section 2.2). As summarized in Figure 2, firstly, the GFLAC (2016) methodology was applied to NDCs to structure a Deductive Thematic Analysis (TA) that helped to characterise the main climate mitigation aspects in the NDCs of the selected countries—and approach RQ1. The results of this analysis allowed a redefined focus for analysing the NB in the second step—and answer RQ2 and RQ3. The process was based on the hypothesis that it is in NDCs that countries set clear goals priorities and that NB represent the concrete planning of translating the goals into actions (Bird *et al.*, 2016).

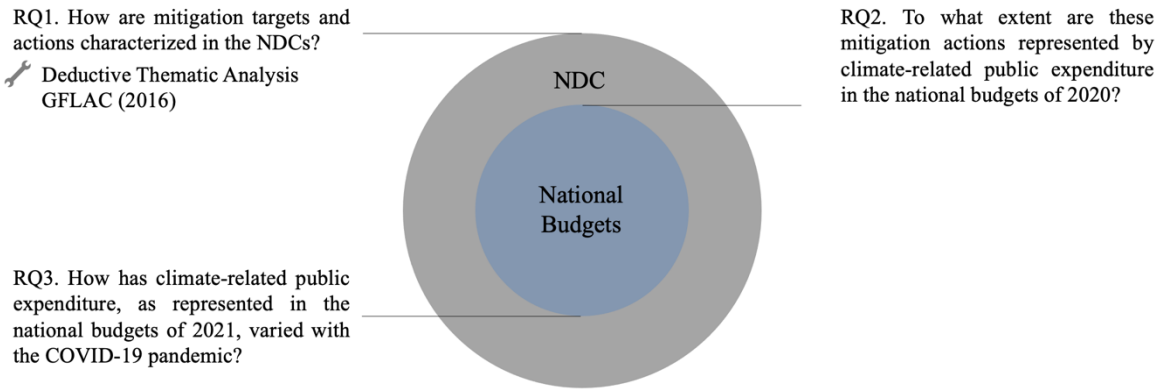

***Figure 2**. Method representation.*

The GFLAC (2016) method has the objective of evaluating the status of climate-related actions in the government expenditure. In this case however, the scope was limited to mitigation actions due to the complexities around adaptation boundaries (see section 2.3) and the prioritization of cross-country comparison over an in-depth analysis of a particular case. Additionally, mitigation actions are the ones that have a longer time perspective meaning that the time between its application and the results is longer than for adaptation measures (see section 2.3). Therefore, some initial moves in the budgets to achieve the presented NDCs should be visible already. This limitation of the scope to mitigation actions did not affect the procedure but it entailed a more focused analysis than suggested by GFLAC (2016). GFLAC (2016) offers a characterization of which actions contribute to the mitigation goal and outlines key aspects to operationalise the methodology and that can be summarised as following:

- Identification of the main sectors relevant for the analysis
- Identification of the main responsibles for the sectors selected
- Analysis of the actions and identification of these that are supporting climate change (in the case of the thesis it will be mitigation)
- Determine the value of the mitigation actions in relation to the ones that go against climate change (for example, subsidies to fossil fuel electricity generation)

- Link these results to the context of the country
- Identify the possible biases of the research that could appear due to the lack of transparency or information

3.1.1. Step 1: Thematic analysis to evaluate Nationally Determined Contributions

One of the main key points outlined by GFLAC (2016) is the need for identification of the sectors that are relevant for the analysis. In the case of this thesis and as mentioned in the RQ, the goal is to determine how mitigation actions are characterised in the NDCs and to evaluate to what extent these are represented in the NB. Giving that NDCs still vary in style and reporting standards (Carraro, 2016), Thematic Analysis (TA) was used as a method for identifying the main codes. TA has proved to be successful in many research problems due to its flexibility meaning that, even if based on epistemological knowledge-creation assumptions, it allows the researcher to develop a suitable theoretical framework for its defined aim (Braun and Clarke, 2019; Smith, 2015). More concretely, it provides a method that can be applied in multiple frameworks. It is used in qualitative research for generating codes that provide relevant characteristics that are interesting for the research questions (Clarke and Braun, 2017).

Thus, to bring these aspects together, the GFLAC (2016) methodology, and more concretely their identification of climate mitigation relevant actions that are presented in Table 4 guided a TA on NDCs. This means that the selected approach on TA was deductive—also called top-down or theoretical—since the analysis focus on the areas that are important for the RQ—rather than inductive—characterized by using the empirical material to determine the codes (Braun and Clarke, 2006; Maguire and Delahunt, 2017). Nonetheless, the study allowed elements of induction too. The codes adopted from the GFLAC (2016) where adapted when they were challenged by the empirical material.

Table 4. *Mitigation Actions Described in the GFLAC Framework*

Sector	**Action**
Energy	Power generation with low-carbon sources Use of power Reduction of energy poses
Transportation	Public Transportation Non-Motorized Mobility Transport efficiency Comprehensive urban development
Forest Development	Reforestation Forest Cover protection Sustainable Forest Management
Waste	Treatment Recycling
Industry	Efficient industrial processes
Water	Conservation Sewage Treatment
Transversal activities	Policies and regulation Monitoring systems Education Creation of capacities, analysis and reports Funding mechanisms Low-carbon technologies

Source: (GFLAC, 2016)

For the operationalisation of the method the software *Nvivo* was used. The following phases presented by Braun and Clarke (2006) were followed:

I. Familiarisation with the data
II. Generating initial codes
III. Searching for themes
IV. Reviewing themes
V. Defining and naming themes
VI. Producing the report

More concretely, initial nodes with the themes presented in Table 4 were created in *Nvivo*. Then the text was coded by adding the relevant text to each of the nodes. If a relevant theme that did not align with the already created nodes was found, a new node was created. That situation happened mainly when the GFLAC (2016) codes were too broad or did not cover some mitigation actions mentioned in the NDCs. This process was repeated for each of the NDCs. Once the text was coded, the nodes were reviewed and characterised as theme or subtheme to better create a project map that could guide Step 2 of the analysis.

3.1.2. Step 2: Redefinition of the analysis for the National Budgets

The results of the TA served to determine the sectors relevant for the study and the responsible ministries that operate the actions. With this information, the analysis on the NB was redefined to adapt it to the scope and RQ of this thesis and more concretely, to identify the main relevant aspects that the selected countries outlined in their NDCs. This means that just the areas prioritized were further analysed in the NB. For these areas the concerned ministries were defined and mitigation-related expenses were analysed. Additionally, for this particular sector, expenditure defined that negatively affects mitigation was also considered. The overall goal of the process was to end up with a comparison of expenditures that support and combated mitigation to draw conclusions about Climate Mitigation Ambition (Ferro *et al.*, 2020; GFLAC, 2016). GFLAC (2016) outlines as well the need to relate the results to the context of the country which in this thesis included previous literature and other policy documents from grey sources.

At this point it is important to remind the reader that the scope of this paper is limited mitigation expenditure in sectors that are expressed in NDCs and not all mitigation expenses that governments take nor government revenues related to, for example, potential carbon pricing mechanisms.

3.2. Empirical Material

3.2.1. Method for case selection

The choice of countries to study draw upon methods for selection of cases in small samples where context-specific variables are important (Ragin, 2014). The variables determining case selection are based on previous research of relevance to the aim of this thesis.

Firstly, since this thesis aspires to fill a gap in research, three indicators from the grey literature were selected: Climate Action Tracker (CAT), Climate Policy Performance Index (CCPI) and Energy Policy Tracker (EPT). All three tackle CPA from different perspectives but just three countries (Brazil, Mexico and Argentina) have been included in all. If countries are not covered in one or several of these indexes, this signals a research gap. Secondly, GDP Growth, CO_2 Emissions and Population have been selected in order to determine those countries that have positive economic growth and already high emissions and that consequently could be susceptible to base its development on an increasing GHG emissions path. Countries with already existing high emissions, positive growth and high population are prioritised. It is important to outline that even if the influence of GDP on CPA has been widely studied in the

literature (Tørstad, Sælen and Bøyum, 2020; Bel and Teixidó, 2020; Surminski and Williamson, 2014; Tobin, 2017), it goes beyond the scope of this thesis to establish a relationship between the variables and it will be used only for selection purposes. Table 5 shows the selected attributes for the top scoring countries of LAC.

Table 5. *Prioritisation table.* The variables Adjusted Population, Adjusted CO_2 Emissions, Adjusted CO_2 per Capita represent the scaled values for each case (based on the latest values published in 2019). More concretely, for the real values, redistribution has been done giving 1 to the maximum value and 0 to the minimum and scaling the rest. NDC takes value 1 if the countries published their goals. CAT, CCPI and EPT are binary variables that take value 1 if the countries take part in international indexes and 0 if they do not. For the GDP growth values, the real percentage increases are taken.

	Adjusted CO_2 Emissions	Adjusted Population	Adjusted CO_2 per capita	NDC	CAT	CCPI	EPT	GDP increase 2019 (%)	GDP Increase 2015 (%)	GDP Increase 2010 (%)
Mexico	1,00	0,604	0,12	1	1	1	1	-0,05	-3,41	5,12
Brazil	0,95	1,000	0,07	1	1	1	1	1,14	1,82	7,53
Argentina	0,41	0,213	0,14	1	1	1	1	-2,09	-3,55	10,13
Venezuela	0,34	0,135	0,16	1	0	0	0	0,00	0,00	-1,49
Colombia	0,20	0,238	0,06	1	0	0	1	3,26	4,86	4,49
Chile	0,18	0,090	0,14	1	1	1	0	1,05	6,93	5,84
Peru	0,12	0,154	0,05	1	1	0	0	2,15	3,83	8,33
Trinidad and Tobago	0,09	0,006	0,94	1	0	0	0	0,00	-2,69	3,32
Ecuador	0,08	0,082	0,07	1	0	0	0	0,05	3,08	3,53
Cuba	0,06	0,054	0,07	1	0	0	0	0,00	5,73	2,39
Dominican Republic	0,05	0,051	0,07	1	0	0	0	5,05	3,63	8,34
Bolivia	0,04	0,054	0,06	1	0	0	0	2,22	3,25	4,13

Sources: The World Bank (2020), Climate Action Tracker (2020), Germanwatch (2021), Energy Policy Tracker (2021).

The selected case studies are: Peru, Colombia and Chile. Peru and Colombia are not included in one of the grey literature indexes and Chile is included two of them however, there is inconsistency in the results of the country performance—in CCPI it is among the top 10 performers (Germanwatch, 2021); while in CAT the actions are defined as insufficient to achieve the below 2º target (Climate Action Tracker, 2020). This makes Chile interesting to study in order to fill this gap.

3.2.2. Empirical data collection

For the selected cases, data collection of the material was done using official governmental and international agency sources. NDCs are publicly available in the UNFCCC NDC Registry and were downloaded until the 5th of March 2021 (UNFCCC, 2021). Since the chosen countries include transparency policies, all the NB information was found in the online sites of the Governments. Table 6 shows the documents that were considered in the analysis. For each country, three documents were considered: budgets of 2020 and 2021 and NDC.

Table 6. *Overview of policy documents and NDCs.* List of empirical material used in the analysis, NB states for National Budget and NDC for Nationally Determined Contributions.

Country	Document Title	Type	Source
Chile	Ley de Presupuestos—Nivel Nacional 2020	NB	(DIPRES, 2020)
Chile	Ley de Presupuestos—Nivel Nacional 2021	NB	(DIPRES, 2021)
Chile	Contribución Determinada a Nivel Nacional (NDC) de Chile	NDC	(Gobierno de Chile, 2020)
Colombia	Proyecto de Ley de Presupuesto General de la Nación 2020	NB	(Congreso de Colombia, 2020)
Colombia	Proyecto de Ley de Presupuesto General de la Nación 2021	NB	(Congreso de Colombia, 2021)
Colombia	Actualización de la Contribución Determinada a Nivel Nacional de Colombia (NDC)	NDC	(Gobierno de Colombia, 2020)
Peru	Ley de presupuesto del sector Público para el año fiscal 2020	NB	(Republica del Perú, 2020)
Peru	Ley de presupuesto del sector Público para el año fiscal 2021	NB	(Ministerio de Economía y Finanzas, 2020)
Peru	Contribuciones Determinadas a Nivel Nacional del Perú (2021-2030)	NDC	(Gobierno del Perú, 2020)

3.3. Reliability and Validity

Reliability relates to how the selected materials measure the desired characteristics (Wienclaw, 2019). Early biases are detected due to the use of secondary data and more concretely policy documents that could not be clear enough. Additionally, the selected material contains only the information about NDCs and NB but no other regulations of a country such as policies at a regional level or special legislation outside the NB. However, based on the hypothesis that NB are the most important document for the yearly agenda of a country (Bird, 2017), the thesis draws on the hypothesis that early transformation on the expenditures should already occur at a national level to reach the 2030 pledges. Additionally, comparison of government expenditure among countries can be hard to do when countries face different realities and have to still guarantee human rights such as access to electricity. This bias is reduced by the inclusion of the NDCs individual pledges which draw from a bottom-up approach where countries can transparently and independently communicate their goals (Carraro, 2016). Furthermore, TA has been criticized for having a subjective or interpretative approach (Guest, MacQueen and Namey, 2011) and by the use of a deductive analysis and basing the codes on previous established categorizations, it could be possible that some themes or synergies would be lost (Javadi and Zarea, 2016). Being aware of the implications of such approach and to reduce this possible bias, the criteria and codes are explained transparently and detailed (Noble and Smith, 2015).

Considering validity, the proposed method allows the proper base for answering the previous mentioned research questions. Considering RQ1, NDCs mitigation policy characterisation is analysed with TA while the materialisation of these actions in the NB is performed with the GFLAC (2016) method. For RQ2, results from the GFLAC method will allow comparison between government expenditure in 2020 and 2021. It is important to outline the approach of the paper, focused on a national level, results in a conclusion that does not take into account the context-related variables of the different regions or the inequalities in among them. Due to the

complexity of the empirical material, this thesis does not aim to give exact values but more to give an approximation. It should allow pattern allocation that could be developed in further research. Early issues that could be encountered is the influence of climate finance (or internationally supported aids) could appear in the process of study; however, these issues are not in the scope (which will focus on domestically supported climate policy ambition) of the paper and will not be analysed.

4. Results and discussion

This section discusses the results of the analysis. The first subsection focuses on thematization of mitigation actions discussed in the NDCs and the second subsection focuses on NB and its relationship to the themes identified in NDCs.

4.1. Mitigation characterisation in Nationally Determined Contributions

Figure 3 shows the three themes identified through the TA of the NDCs of Colombia, Chile and Peru. Firstly, general pledges are identified and references to the method, transparency and stringent nature of the updated commitments. Secondly, references to the role of domestic climate policy in targeting mitigation are outlined. These mostly relate to CBDR and the strategy post-COVID19. Finally, references to the transversality of sectors of mitigation are outlined, these include energy, industry and land-use and align with the GFLAC (2016) mitigation actions description that has been presented in Table 4. However in this thesis, water is not treated as an independent theme but it is included on land-use and related to agriculture. This is because water-related mitigation actions have only been outlined in relation to irrigation in the NDC. Further development of the themes will be presented in the next sections.

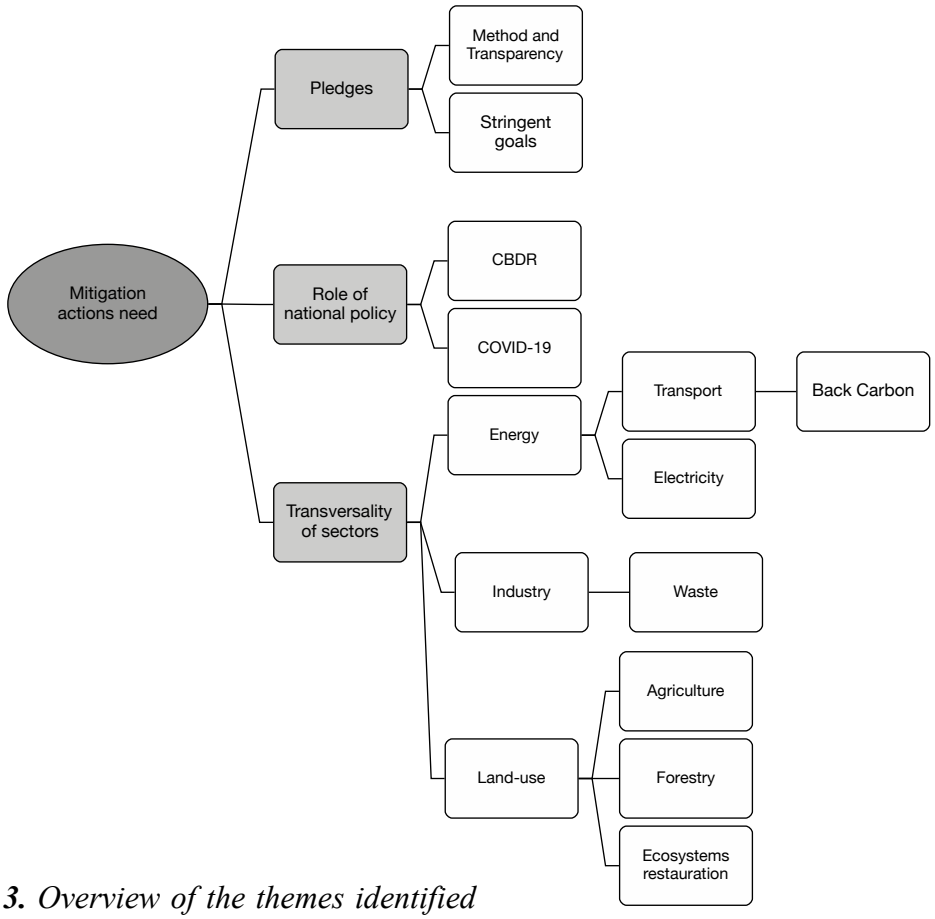

Figure 3. *Overview of the themes identified*

4.1.1. Mitigation pledges outlined in Nationally Determined Contributions

Patterns of GHG emissions evolution in LAC show that GHG emissions have been strongly related to GDP and population growth. Taking into account that the prospects are that both variables increase in the future, the region will certainly increase its GHG emissions if no mitigation policies are taken (Ruijven *et al.*, 2016). Table 7 shows the long term mitigation goals outlined by Colombia, Peru and Chile in their updated NDCs submitted in 2020. The data

shows that the approach of all countries is to present an absolute number of maximum emissions by 2030 based on reduction of the expected BaU path for 2030. However, some differences can be outlined. First, the existence of two absolute goals in the case of Peru—a more ambitious one if international support is received and a lower one if not—that is not mentioned in the case of Colombia or Chile. Second, the inclusion of a conditional relative goal in the case of Chile and Peru. Third, the aim for carbon-neutrality established in 2050 for Colombia and Chile and in the long term in Peru.

Table 7. *Mitigation goals in NDCs. The table shows the pledges provided by the three selected countries. In some cases, two pledges are presented and defined as unconditional (if international support is not received) or conditional (if international support is received).*

	Colombia	Peru	Chile
Pledge [Mt CO_2eq]	169.44	208.8 (unconditional) 179 (conditional)	95 (unconditional)
Relative reduction compared to BaU	–51%	–30% (unconditional) –40% (conditional)	–30% (unconditional) –40% (conditional)
Carbon-Neutrality	By 2050	In the long-term	By 2050

Source: NDC (UNFCCC, 2021)

It is challenging to evaluate CPA in NDCs when the information provided is not standardized (Weikmans, Asselt and Roberts, 2020). However, in an attempt to compare the three countries two aspects are contemplated: differences in the stringent goals and relative deviation of BaU paths.

Based on the updates on the last Biennial Reports submitted to the UNFCCC, Colombia's emissions were 236.97 MtCO_2eq in 2014 (Derly Pulido *et al.*, 2019), 167.63 MtCO_2eq in the case of Peru in 2014 (Ministryio de Medio Ambiente Gobierno de Peru, 2019) and 111.68 MtCO_2eq in Chile in 2016 (Gobierno de Chile, 2021). Even if the data is not updated by the countries, grey literature indicators can help to give an overview of the GHG emissions patterns also for years not covered by the official national reporting. According to data reported by CAIT and WRI (2020), emissions in 2018 were 267.97 MtCO_2eq in Colombia, 186.18 MtCO_2eq in Peru and 113.00 MtCO_2eq in Chile. Therefore, these emission patterns show that Colombia and Chile need to reduce its emissions to comply with their pledges—in their last Biennial Reports GHG emissions were already higher and based on the trend presented in CAIT and WRI (2020), they would have increased. In the case of Peru, GHG emissions were lower in 2014 than the pledges that they have presented in their latest NDCs—according to the Biennial Report of the country. However, following the CAIT and WRI (2020) data, GHG emissions would have increased since then. Nonetheless, based on the data, GHG emissions would still be lower than the unconditional pledge and slightly higher than the conditional one which would mean that the mitigation actions needed might not be that aggressive.

Therefore, even if the three countries present stringent goals—which are considered to be the most ambitious form of target specification by presenting absolute units of maximum emissions and little room for interpretation (Pauw, Mbeva and van Asselt, 2019)—the implications of these objectives vary. It is prudent to say that Colombia and Chile seem to have a higher mitigation ambition since their absolute maximum levels of GHG emissions are lower and mitigation actions that transform their operations are needed to comply with the presented pledges.

On the other hand, when looking at the deviation from the BaU path, Colombia aims to reduce emissions by 51% of the expected BaU path for 2030 while both Peru and Chile aim to reduce GHG emissions by 30% (unconditionally) and even up to 40% if international support is given, relative to their BaU projections. This deviations have been understood as a measurement of ambition however, there is also not common understanding on the BaU definition and a common method that allows comparison (Fei and Shuang-Qing, 2012). Ruijven *et al.* (2016) argue that in their comparison about CO_2 emissions perspectives outlined by different models, the results vary considerable depending on the data used and the base year selected for 2030 predictions. Therefore, relative deviations from the BaU path—if they are not standardized—can initially show differences that are resulting for the method and can lead the reader to incorrect conclusions on CPA. In an attempt to solve these problems, the Enhanced Transparency Framework of the UNFCCC (2020) states that:

"*the provision of information necessary to facilitate transparency, clarity and understanding of the NDC includes the Party's goal(s), assumptions and methodological approach(es) to be used in estimating GHG emissions and removals and accounting, as appropriate, for its NDC*" (UNFCCC, 2020 p.21).

However, the requirement is ambiguous and the extent to which this information is provided by countries differ. In the selected cases, differences have been outlined in the case of Peru. More concretely, the method presented is defined as a "*scenario planning of the different sectors based on their dynamic and estimations of the IPCC*" (Gobierno de Perú, 2020 p.12). However, no information exists about which scenario is taken or from which initial level of emissions per sector have the calculations started. In the case of Colombia, the initial scenario is described in detail and data of the projections to 2030 is presented, information about the choice of data is also presented and referred to the IPCC reports concrete values (Gobierno de Colombia, 2020). Similar to this case, Chile presents their method for the establishment of their pledges with a detailed description of the scenario. In this case however, the method used is not based on the IPCC calculations but on method developed by the Scientific Committee of Chile that allows projections based on the main economic indicators (Gobierno de Chile, 2020).

Therefore, the methodology applied for the BaU paths in the NDCs vary in the three cases selected which makes comparison challenging, especially when comparing relative deviations from the BaU path. Additionally, Herold, Siemons and Herrmann (2018) outlined that parties usually do not provide information about how or if they are planning adapt BaU perditions once the NDCs start taking place. This could be a source of concern in the next years when complete information about the impact of the pandemic exists as well as the final effect of the recovery packages in GHG emissions. This has been outlined as well in the case of Colombia, Peru and Chile where possible adaptations of the BaU predictions are not mentioned.

Further research will be needed, especially when the Enhanced Transparency Framework is further developed and includes more information about method, sectors included and data sources and updated GHG emissions. Then, comparison among countries would be possible and closer to the reality (Carraro, 2016). This differences in accountability phenomena has already been noticed even when looking at GHG emissions data in the grey literature where multiple databases exists and the results vary considerably depending on the indicator chosen. Reasons for these changes are the inclusion of different sectors or different GHG gasses accounting (ClimateWatch, 2020).

4.1.2. The role of national climate policy

The results of the TA of this thesis show different approaches for defining international support. More concretely, Peru appeals directly to "*common but differentiated responsibilities and respective capabilities*" (Gobierno de Perú, 2020 p.2.) and uses the term three times in relation to mitigation policies as well as establishing two different objectives depending on the level of international support. However, Colombia avoids references to CBDR that translates into an absolute unconditional pledge and states "*the fairness of its ambition based on their developing country of medium rent status*" (Gobierno de Colombia, 2020 p.33). Chile establishes also an unconditional pledge when considering the relative deviations from the BaU path—and not the maximum levels of emissions. More concretely, it is acknowledged that their mitigation actions could be more ambitious if "*enabling conditions intervene in terms of finance, technology or politics*" (Gobierno de Chile, 2020 p.33).

These examples show that even if no doubts exist about the need of mitigation policies, how to approach these aspects globally in the context of non-Annex I countries usually presents trade-off between equity and ambition—that has been widely discussed in the literature (Pan et al., 2017). Voigt and Ferreira (2016) acknowledge this need for equity but argue that the Paris Agreement—and more concretely NDCs—tackled the traditional bifurcated division of Annex I and non-Annex I countries by outlining that every country should be as ambitious as possible based on context-related issues. They argue that even with CBDR, the traditional division of countries into two categories is now being solved by instead introducing an individual component of goal establishment. However, some argue that the agreement still lacks of common features of equity such as considering per capita emissions convergence or differentiating emissions of survival and luxury (Pauw, Mbeva and van Asselt, 2019). The value of NDCs has been outlined for being not only a representation of individual intentions but also a political document that outlines parties conceptions on international climate policy (Mills-Novoa and Liverman, 2019; Jernnäs and Linnér, 2019). Mills-Novoa and Liverman (2019) analysed NDCs from Annex I and non-Annex I countries and outlines the common appeal to CBDR in the case of non-Annex I countries, especially when establishing mitigation goals.

The importance of how economy packages after the COVID-19 pandemic are framed is an issue of concern in the literature and in national policies. All three countries have updated their NDCs during 2020 after the outbreak of the COVID-19 pandemic, which has made them include the topic of economic recovery in their documents. Colombia outlines the importance of "*incorporating climate change criteria in the economic recovery*" (Gobierno de Colombia, 2020 p.28) and the "*integration of climate change in the objectives of recovery in the short-term*" (Gobierno de Colombia, 2020 p.1) while Perú defines "*the need to develop the country in the context of the COVID-19 pandemic*" (Gobierno de Perú, 2020 p.7) and the "*elaboration of GHG mitigation actions that have an impact in the economy*" (Gobierno de Perú, 2020 p.11). In the case of Chile, the prioritization of solving first the health crisis is outlined as well as their willingness to recover using sustainable development as a base. However, they identify that the results of the pandemic could intervene in the NDCs execution and that decisions will be taken to ensure the "*economic, social and environmental*" wellbeing (Gobierno de Chile, 2020 p. 49).

4.1.3. Mitigation sectors outlined in Nationally Determined Contributions

This section will continue to define the sectors outlined by the parties. This particular differentiation is crucial for the further steps in the analysis where relations between NDCs and NB are explored. Results for the TA have shown that all three countries prioritise the same sectors: energy, land-use and industry.

Energy is identified for all three countries as one of the priorities when dealing with mitigation. Additionally, this sector is the main source of GHG emissions in the LAC area, in Colombia (corresponding to 44% of the total) and Chile (76% of the total) and the second most important in Peru (31% of the total) (CAIT and WRI, 2020; Gobierno de Chile, 2020). Chile's NDC outlines that the main sources of energy emissions are the use of coal for electricity generation and the subsector of transport characterised by the use of diesel (Gobierno de Chile, 2020). This distinction is also made in Colombia's NDC and special attention is given to energy efficiency and change of mobility patterns. However, the NDC of Peru treats energy as a unique sector and does not establish differences in its subsectors. Related to the transport subsector, Colombia and Chile pledge for a reduction of black carbon—small particles resulting from fossil fuels and biomass incomplete combustion. Among the differential characteristics of these particles are a combination of a short-time living scope with a strong warming effect and harmful effects on health and food production. Its implications are both local and global: in urban areas air quality is strongly damaged while globally, these particles contribute to a general warming (Brewer, 2019). No relation to black carbon has been identified in the case of Peru.

The second source of emissions outlined by the three countries is land-use, which is the largest source of GHG emissions in Peru (42%) and the second one in Colombia (18%) and Chile (11%) (CAIT and WRI, 2020). Inside this theme, the following subthemes are outlined: agriculture, forestry and ecosystem restauration. Regarding forestry, Chile identifies it as a "national commitment" and aims to nationally develop policies to disincentivise land use change and promote ecosystem restauration (Gobierno de Chile, 2020 p.54). However, these aspects are considered in the long term, when achieving carbon neutrality. A similar approach is taken in the case of Colombia when outlining the need to reduce deforestation and "*massify the ecosystem restauration*" (Gobierno de Colombia, 2020 p.13). Additionally, both countries outline not only the need to focus on terrestrial resources but also the need for development of strategies for ocean protection. In the case of Peru, oceans are not mentioned but attention is also given to land-use change broadly (Gobierno de Perú, 2020). However, even if land-use change has been mentioned as one of the most important areas to improve in terms of mitigation, different approaches to establish proper measurements or transparent methodologies are usually not existing (Mills-Novoa and Liverman, 2019).

Regarding industry, it is mentioned in all three NDC but in relation to energy-use and waste management. Additionally, energy is treated as a general sector and despite mentions to mining or cement industry in Colombia (Gobierno de Colombia, 2020), there is lack of concrete information on what the pledges define.

4.1.4. Summary of the results of step 1: thematic analysis

The identified themes in NDCs serve to refine the focus when looking for more concrete aspects in the NB. Additionally, based on the information of the NDCs, a selection of the responsible ministries of the mentioned sectors was made. Table 8 shows the responsible ministries that are analysed related to the themes that have been found in the TA of NDCs. The results of the analysis will be presented in the next section and for each of the countries the three themes will be analysed.

***Table 8**. Ministries selected for further analysis.*

Sector	Themes	Ministries
Energy	Transport Electricity Energy efficiency	- Ministry of Mines and Energy Colombia Ministry of Transport Colombia - Ministry of Energy of Chile / Ministry of Transport and Telecommunications Chile - Ministry of Energy and Mines Peru / Ministry of Transport and Communications Peru
Land-Use Change	Ecosystem Recovery Agriculture Land-Use change and forestry	- Ministry of Agriculture and Rural Development Colombia / ministry of Sustainable Development Colombia - Ministry of Environmental Chile / Ministry of Agriculture Chile - Ministry of Environment Peru / Ministry of Agriculture Peru
Industry	Waste Treatment	- Ministry of Industry Tourism and Commerce Colombia/ Ministry of Housing, City and Territory - Ministry of Housing and Urbanism Chile / Ministry of Economy, Development and Truism Chile -Ministry of Production Peru

4.2. National Budget Analysis of Chile

The results of the NB analysis are presented for each country based on the three themes found in the TA analysis of the NDCs: energy, land-use and industry. All the results are discussed and related to the results of the step 1 of the analysis of the NDCs.

4.2.1. Energy expenditure as defined in National Budgets

Table 9 shows the distribution of the expenses of the Ministry of Energy of Chile. These have been categorized in four big categories based on the information extracted from the NB: nuclear power, petrol, renewable energy and energy efficiency. The categories follow the description provided in the budgets however they related to the GFLAC (2016) actions (see section 3.1.1.) by aligning/misaligning to low-carbon energy sources and acting on the use of energy. More information to concrete projects in renewable energy—such as the source for the energy or location—is not detailed.

***Table 9.** Distribution of the budget expenditures in the Ministry of Energy Chile. Monetary values are expressed in thousands of millions of Pesos. Percentages correspond to the proportion of each category in relation to the total expenditure of the Ministry. Δ% shows the percentual variation in the period studied.*

	Nuclear	Petrol	Renewable Energy	Energy Efficiency	Total Expenditure
2020	11,493,758	58,521,878	5,507,470	10,217,678	131,851,340
%	9%	44%	4%	8%	
2021	10,171,574	55,232,485	4,532,187	9,955,339	124,010,179
%	8%	45%	4%	8%	
Δ%	-12%	-6%	-18%	-3%	-6%

From the table, some information can be extracted. Firstly, the overall budget for the Ministry of Energy has been reduced from 2020 to 2021. This has been translated in absolute reductions in all the subsectors that are mostly visible in renewable energy and nuclear power. However, this reduction has not been proportional in relative terms in all the subcategories. This reduction is more accentuated in Nuclear Power (-12%) and Renewable Energy

(-18%). The overall reductions are even worsened by the inflation rate—of 3% as presented in section 2.6—due to reduction to the purchasing power of the budget from 2020 to 2021. The presented expenditures are mostly allocated to GHG emitter sectors, being the larger expenditure petrol—with 45% of the expenses. This aligns with the energy scheme that has been presented in the background section where oil represents 42% of the energy sources of the country and 4% of electricity generation (IEA, 2020).

Scholars agree that one of the main problems that Chile faced in the last decades was the need to satisfy an increasing energy demand. This demand could be satisfied with nationally produced hydropower in the 1970s but the high economic growth of the country and its international trade promoted the inclusion of fossil fuels imports (Morales *et al.*, 2015; Silva and Nasirov, 2017). This represents not only a threat for GHG emissions but also high vulnerability to price volatility of fossil energy sources (Candelo-Viafara and Oviedo-Gómez, 2020). Nasirov (2017) argue that the high international dependency has lead Chile to redesign its energy scheme by trying to sustainably increase the national energy production. Different options have been considered: increasing the share of renewable energy, improvements on efficiency and the possible inclusion of nuclear power—which are the same categories that have been identified in this analysis.

The use of nuclear power as a source of energy has been object of debate. While some argue that it is a clean energy, with high levels of efficiency and constant reseach for improvements; others suggest that the risk of its development is high considering the possibility of accidents with high health and environmental impacts in case of an accident (Adar, 2020). This debate is present as well in Chile where a national comission on nuclear power—where the expenses have been identified—is operating with two small reactors for reseach purposes (Comisión Chilena de Energía Nuclear, 2021). Silva and Nasirov (2017) argue that the registered accidents that in some cases have been related to earthquakes—that are common in Chile—have prevented the further and faster implementation of this energy source. Adar (2020) argue that even if research is constantly evolving and new generations of nuclear power have been already created, there is always a risk which could however be minimised with proper security controls. Whether Chile will opt to a transformation based on the development of nuclear power cannot be predicted; however, even if government expenditure has been identified, no mention on nuclear power can be found in the NDC. More concretely, Chile, in their NDC, aims to:

"*Remove coal plants and substitute these for renewable energy sources*" (Gobierno de Chile, 2020 p.89).

As outlined in the background section, Chile strongly relies on coal for electricity production, being the energy source 33% of the total supply. Although no direct expenditures have been outlined in relation to coal plants removal, the government of Chile aims to close 11 plants before 2024 and the totality—38 plants—of the country by 2040 and compensate the resulting loss in electricity generation capacity through renewable energy. In their latest guide, they establish a plan for decarbonization in which coal powerplant owners have a major role. More concretely, they signed a voluntary agreement in which they accept to close coal plants and establish a gradual plan to ensure that the electricity demand is covered during the process. The role of the Ministry of Energy will, in this case, be to coordinate and organize the tables for discussion and the transition is not going to be subsidized by the state. Therefore, this explains the lack of investments in terms of energy scheme change (Ministerio de Energía, 2020). Simsek *et al.* (2019) argue that the policy actions taken will most likely not be enough to ensure the pledges and that further actions should be taken, especially in the industry sector

which will be discussed in the next sections. Furthermore, even if it cannot be concluded that it is due to the COVID-19 pandemic, the expenditure on renewable energy has been reduced for the year 2021, which could represent a threat to achieve the 2030 pledge if the tendency is not changed. The Climate Action Tracker has already charactered Chilean policies as insufficient to ensure the compliance of the Paris Agreement (Climate Action Tracker, 2020).

The importance of developing hydrogen technologies in the future is outlined, and information on marginal abatement costs of geothermal and biogas are also presented in the NDC (Gobierno de Chile, 2020). However, there is no reference to how "renewable energy sources" is defined. This is similar to the results in the NB analysis where the theme "renewable energy" is identified but without further details. The same aspect has been outlined in the guide for decarbonisation where the closing of coal plants is presented and aim to compensate with renewable energy without clearer instructions (Ministerio de Energía, 2020). As outlined, the expenses identified in this regard have been just 4% of the total for the year 2021.

Related to mitigation actions, another theme identified in the NB is energy efficiency. Energy efficiency is understood as one of the most cost-efficient mitigation measures with high revenues in the long-term in comparison to the adoption costs (Simsek *et al.*, 2019). Even if efforts have been done—as the results show, the expenses represent 8% of the total and its relative percentage have increased in 2021—scholars believe that the potential of energy efficiency in the country is larger than the actions taken (Simsek *et al.*, 2019; Zabaloy, Recalde and Guzowski, 2019). More concretely, Simsek *et al.* (2019) identify the lack of inclusion of the industry sector as one of the main flaws while Zabaloy, Recalde and Guzowski (2019), go an step forward and conclude that the voluntary base of the regulations is limiting the potential of energy actions of all the sectors, even if industry is the main GHG emitter.

Finally, to understand the importance of petrol, it is important to outline the existence of a national refinery (ENAP by its Spanish acronym) that is the receiver of the national expenditure assigned to oil. This nationally-own company, operates in the extraction and transformation and commercialization phases (ENAP, no date). Morales *et al.* (2015) elaborated a Life Cycle Assessment on the industry and concluded that the country is highly dependent on imports of raw oil which is mostly coming from other countries of LAC through road transport and that national extractions represent only 1% of the total. However, all the imported crude is refined in the three plants that the company operates in Chile making that 97% of the oil-based products used nationally are refined in Chile. This highly dependency to oil, particularly is expected to increase emissions by 2030 by 400% (Morales *et al.*, 2015). This has also been identified in the NDC of the country as one of the main sources of GHG emissions and more concretely stating that:

> "*The energy sector (corresponding to the consumption of fossil fuels) is the main GHG emitter of the country, representing 78% of the emissions, mostly due to the use of coal to energy generation and diesel in transportation*" (Gobierno de Chile, 2020 p.17).

However, as can be seen in the results of the NB analysis, little progress is being done in a transformation of the energy expenditure when it comes to electricity and transportation sector—which is the main receiver of oil sources. To better analyse the state of the transport sector, Table 10 shows the distribution of the expenses in the Ministry of Transport and Telecommunications. Three themes that align with the GFLAC (2016) actions are outlined: public transportation expenditure, transport efficiency and transversal activities.

Table 10. *Distribution of Transport expenditures in the Ministry of Transport and Telecommunications (in thousands of millions of Pesos).*

	Transversal Activities	Transport Efficiency	Public transport	Total Expenditure
2020	6,594,515	1,144,778	1,000,935,786	1,157,215,049
%	1%	0%	87%	
2021	13,854,076	1,026,794	972,803,165	1,082,723,948
%	1%	0%	90%	
Δ%	110%	-10%	-3%	-6%

Table 10 shows that the expenses of 2021 have also been reduced by 6% in the case of the Ministry of Transport and Telecommunications even when including the extra investments due to the emergency of the COVID-19 pandemic. From the three categories, "transversal activities" are the only ones that have increased—and even doubled. These correspond mostly to tasks of research and analysis of the *Program of roads and public transport* (SECTRA, no date). Additionally, the share of subsidies to public transport are almost 90% of the total expenses, even if having been slightly reduced in 2021. Finally, the program for improving the transport efficiency in logistics represent less that 1% of the expenditure. In their NDCs, even if electromobility is considered as a target, the goals aim for a long-term perspective. More concretely, Chile aims to have 100% of its public transport and taxis free from fossil fuels by 2050 and 60% of the private vehicles (Gobierno de Chile, 2020). However, a more urgent characterisation is given to the treatment of black carbon that is mostly produced with the use of diesel engines. More concretely it is stated that:

> *"The reduction of black carbon, contributes to multiple health benefits, to achieve cleaner cities and to minimise local events of contamination together with contributing to climate change mitigation."* (Gobierno de Chile, 2020 p.12)

The implications of the (non)-inclusion of black carbon in the mitigation targets are a source of discussion in the literature. Some argue that there is need to include it as a priority in the Conference of the Parties of the UNFCCC and motivate its definition in NDCs, while others identify giving more priority to black carbon as a possible source of deviation from CO_2 emissions goals (Brewer, 2019). The ones that defend the latest vision, suggest that indirect effect of mitigation actions will end up reducing black carbon eventually but still identify policy strategies as a successful complement for short term progress (Harmsen, 2020). This argument relates to the characteristic of it being a short-lived pollutant; the particles stay only during a few days in the air. However, even in this case, black carbon has been outlined for some to be the second most warming pollutant just after CO_2 (Brewer, 2019; NRDC, 2014). Considering Chile, the analysis shows that the prioritisation of the transport sector as a mitigation action is outlined both in the NDC and NB. However, the share investment on petrol, mostly used for transportation, is more than four times higher than the investment done in Transversal Transport activities and Transport Efficiency.

Thus, even if measures are taken to improve the transportation sector, mostly by the development of programs to monitor, analyse and develop it, there are no signs of modernisation and change to non-fossil fuel combustibles or electromobility—as highlighted in the NDCs. Morales *et al.* (2015) argue that is in the private transport sector where most of the emissions occur. Vehicles run mostly on diesel and gasoline which highly contributes to GHG emissions. Therefore, even if the promotion of public transport could limit the spread of

black carbon, this solution will mostly apply to urban areas, being the sources of the problem and the energy scheme not tackled.

4.2.2. Land-use expenditure as defined in National Budgets

The positive uptake of GHG emissions of the agriculture and land-use change sector of Chile has been presented in the background (see section 2.5). Furthermore, Chile includes in the NDC some measures to ensure that the sector continues acting as a sink. More concretely, the NDC aims to promote good practices and improvements in the manure treatment (Gobierno de Chile, 2020). Additionally, the NDC states that:

"*in the agriculture sector options are given to reduce GHG emissions and improve the carbon absorption. These options improve the productivity of lands, nutrients on land, organic waste management, microclimates and biodiversity*" (Gobierno de Chile, 2020 p.91).

Table 11 shows the distribution of the government expenditure presented in the NB of the ministry of agriculture of Chile divided in five categories: transversal activities, forest recovery, agriculture efficiency, ecosystem conservation and livestock efficiency. This represents a change from the GFLAC (2016) actions (see section 3.1.1.) by including agriculture-related expenditure that has not been defined in the method. This change is justified by the analysis of the NDC where agriculture-related actions are identified in relation to mitigation.

Table 11. *Distribution of public expenditures in the Ministry of Agriculture (in thousands of millions of Pesos).*

	Transversal	Forest recovery	Efficiency of Agriculture	Ecosystem conservation	Livestock Efficiency	Total Expenditure
2020	116,678,944	94,320,180	80,438,883	15,777,392	15,018,742	707,949,053
%	17%	13%	11%	2%	2%	
2021	103,785,451	111,891,446	128,831,968	13,650,763	13,851,279	757,477,983
%	14%	15%	17%	2%	2%	
Δ%	-11%	19%	60%	-14%	-8%	7%

From the results a few initial characteristics can be extracted. Firstly the increase of the overall expenditure from 2020 to 2021 in the NB in 7%—which is lower in real terms due to the inflation rate of 3%. This expenditure increase is better reflected in the public expenses destinated to agriculture efficiency—which increased in 60%. More concretely, the investments are derived into the National irrigation commission (*Comisión Nacional de Riego* in Spanish) which aims to reach the most efficient irrigation method in agriculture, minimising the use of resources and modernising the sector (Comisión Nacional de Riego, no date). Novoa *et al.* (2019) outline that the growth of Chile has been based on the use of natural resources and argue that the legislation does not ensure a proper environmental protection to a resource that is predicted to be scarce due to climate change. More concretely, in central Chile where most of the agriculture land is located, predictions estimate water scarcity in the future.

However, what makes the case of Chile special? Chilean water resources are guided by the Water Code, which establishes a limited amount of permits on water that can be traded with little restrictions—as it could be done in any other commodity under a market economy. Different opinions on this matter exist and while some believe that scarcity of resources is managed better in markets—which strongly relates to the principles of neoclassic economics—others suggest that these permits are growing inequalities and illegal forms of trade (Budds, 2004). Comparing these results to the NDCs analysis, the role of water is outlined and more

concretely:

> "*related to water management, where the need for climate action has been outlined, the pledge focuses on the development of indicators that allow the establishment of goals for water security*" (Gobierno de Chile, 2020 p.13).

There are still knowledge gaps on how irrigation relates to GHG emissions. However, it has been proven that highly irrigated soils increase CO_2 and N_2O emissions in comparison to not irrigated soils. This process occur because higher levels in soil accelerate natural processes such as microbial respiration and bacteria growth that increase the CO_2 flows (Sapkota *et al.*, 2020). Considering that agriculture represents 80% of the total consumed water in the country (Novoa *et al.*, 2019), it is alarming to see that little or no attention is given to the link of irrigation and agriculture in the NDCs. More concretely, the pledges cover water security and the development of forest-land and tundra that ensure the water cycles and natural purification of water. However, agriculture actions expressed are mostly related to the reduction of fertilizers—which are not directly included in budgets—and do not include irrigation techniques that ensure high levels of carbon sequestration.

Secondly, the increase of expenditure into forest recovery mostly managed through the National Forest Corporation (*Corporación Nacional Forestal* in Spanish) aims to contribute to the growth of the country through sustainable management of the forest-lands which is translated into measures to ensure restauration—and reduction of fires—ecosystem conservation and adaptation and mitigation (CONAF, no date). This strongly relates to the pledges presented in the NDC where special emphasis is given to the importance of minimising catastrophes. Overall, Chilean NDC outline the essential role of forests and promotes more concrete goals that aim to increase the forest-land by 2030 (Gobierno de Chile, 2020). In this case, pledges and government expenditure show trends of being aligned, presenting the National Forest Corporation 15% of the investments and increases from 2020 to 2021. However, the action of recovering forest-land, even if contributing to GHG mitigation, has been criticized by some scholars for not having been done with autochthonous species. More concretely, Uribe, Estades and Radeloff (2020) present the effects of pine plantation policies taken in the central area of Chile and argue that had impacts on the loss of biodiversity of the area. They outline the importance of maintaining original species to ensure the proper ecosystem balance that has not been followed by mass plantations of pines in the centre of the country. In relation to ecosystem restauration, just 2% of the expenditure has been found to directly tackle the matter. However, the NDC emphasises the role of ecosystems and the need to preserve it and together with forest recovery, prioritizes the plantation of species that align with the native ones (Gobierno de Chile, 2020).

Even if livestock is one of the main sources of GHG emissions in relation to land-use and agriculture, Chilean NDC pay little attention to its role. More specifically, they state that the sector has not been included in the long term projections and concrete actions just exist in relation of forests—by ensuring the proper distribution of land to ensure both activities (Gobierno de Chile, 2020). In the NB the Program for Livestock Development has been identified which aims to modernise the sector to prepare it for future challenges, however, there are no concrete project actions available and expenses represent only 2%. Finally, transversal activities include the investments on research and monitoring. The concrete application of these funds is not well specified on the budgets in most of the cases. For example, expenses encountered in transversal activities category are "laboratories" or transfers to agencies. Through a screening of the recipients' activity of the funds, following the method

characteristics, these activities have been characterized as transversal to have an indirect effect on the modernization of the sector and contribute—at least indirectly—to mitigation GFLAC (2016).

4.2.3. Industry expenditure as defined in National Budgets

Industry in Chile is strongly related to the mining sector. More concretely, based on the information published by the Ministry of Mines, mining represents 10% of the GDP of the country. Furthermore, Chile has one of the largest reserves of copper—which can alone satisfy one third of the global demand—in addition to producing also molybdenum, gold and silver (Comisión Chilena del Cobre, no date; Northey, Haque and Mudd, 2013). The main environmental impacts of the mining sector are the use of water, energy and land-use change. With decreasing ore grades, the amount of resources needed to satisfy the demand is expected to grow in the future representing a threat for sustainability (Northey, Haque and Mudd, 2013). However, the discovery of new deposits could change the predictions and the inclusion of new technologies should reduce the amount of fossil-fuel use and electricity could come from renewable sources (Lagos *et al.*, 2018). In their NDC, Chile establishes the pledge of using new hydrogen techniques and/or electrify the processes that are currently done with fossil fuels by 2050 (Gobierno de Chile, 2020).

However, no references to GHG mitigation actions have been found in the NB of the Ministry of Mines and the expenditure of the sector corresponds to 0.1% in the total for the years 2020 and 2021 (DIPRES, 2021). Additionally, taking into account that the results of the energy sector have found high dependency on fossil-fuels and low investments on renewable sources, these show few signs of encouragement of climate transformation of the energy scheme which mining relies on. Simsek *et al.* (2019) outline that the mining sector is concentrated in the north of Chile, where the capacity for solar power is higher than elsewhere in the country. Therefore, they suggest to design policy actions that force the exploration of synergies between solar power development and the mining sector. However, the pledges of Chile set goals for 2050 could represent a trade-off between the economic importance of the sector and the high investment needed for its transformation to more climate friendly means of production. More concretely, on their NDC Chile states:

"*For example, the electrification of industry and mining has a potential of GHG reduction of 3.3 $MtCO_2eq$ and a negative abatement cost. However, this measure finds relevant economic barriers for its implementation*" (Gobierno de Chile, 2020 p.93).

Considering other subsectors of industry, no references are found in the NDC or the NB. More concretely, the term "industry" is used in a broad term and the goal contemplates the electrification of motors to reduce GHG emissions. Tables 12 and 13 show the results of the analysis of the Ministry of Economy, Development and Tourism and the Ministry of Housing and Urbanism. From the analysis, few actions were identified as favouring mitigation. Related to the GFLAC (2016) actions, sustainable projects subsidies, sustainable tourism, subsidies to innovation in sustainable construction can be related to efficient industrial processes and to transversal activities by funding (see section 3.1.1.). Train subsidies relate to public transportation and seaweed repopulation relates to ecosystems–which have not been included by GFLAC (2016) but inductively added for the purpose of this thesis. Additionally, no relations to waste management or promotion of biomass has been identified. Explanations for these aspects could be that they are managed at a regional level and consequently are not directly mentioned in the general budgets (Mardones and Cabello, 2019).

Table 12. *Distribution of public expenditures in the Ministry of Economy, Development and Tourism of Chile (in thousands of millions of Pesos).*

	Sustainable Projects	Sustainable Tourism	Seaweed Repopulation	Entrepreneurship	Total
2020	1,472,566	2,226,420	794,339	72,391,190	1,211,478,764
%	0%	0%	0%	6%	
2021	665,759	1,591,522	794,339	66,915,506	1,120,197,944
%	0%	0%	0%	6%	
Δ%	-55%	-29%	0%	-8%	-8%

Table 13*. Distribution of public expenditures in the Ministry of Housing and Urbanism of Chile (in thousands of millions of Pesos).*

	Sustainable Construction	Train Infrastructure	Total
2020	1,187,896	1,292,760	3,015,472,228
%	0%	0%	
2021	1,205,183	1,108,522	3,722,690,939
%	0%	0%	
Δ%	2%	-14%	24%

Finally, Table 14 shows the expenses of the Minister of Environment. The role of this ministry could be defined as transversal based on the GFLAC (2016) actions (see section 3.2.1.), since it covers aspects of all sectors. More concretely, it includes transferences to international agencies (e.g. GHG protocol, UNFCCC) or national agencies (animal conservation, recycling etc.), plans of environmental impact evaluation for new projects developments and environmental inspections of different activities. Therefore, even if in some cases it is indirectly, these projects support GHG mitigation through research, cooperation or monitoring.

Table 14. *Distribution of public expenditures in the Ministry of Environment (in thousands of millions of Pesos).*

	Transferences to international agencies	Environmental Impact Evaluation	Environmental Inspection	Total
2020	33,386,262	14,911,922	12,426,611	60,724,795
%	55%	25%	21%	
2021	33,967,940	15,060,609	11,837,977	60,866,526
%	56%	25%	19%	
Δ%	2%	1%	-5%	0%

4.3. National Budget Analysis of Colombia

The results of the NB analysis of Colombia are presented in the following sections using the same structure that was presented in the case of Chile.

4.3.1. Energy expenditure as defined in National Budgets

Table 15 shows the two categories relevant to this study: natural gas and renewable energy expenditure which aligns with the actions of GFLAC (2016) by impacting low-carbon energy.

Table 15. *Distribution of public expenditures in the Ministry of Energy and Mines of Colombia (in Colombian Pesos).*

	Natural Gas	Renewable Energy	Total
2020	259,000,000,000	17,543,000,000	1,449,067,741,737
%	17%	1%	
2021	702,320,596,325	13,770,806,777	4,230,655,944,251
%	16%	0%	
Δ%	171%	-21%	192%

Natural gas is one of the main energy sources in Colombia (see section 2.4), representing 26% of the energy supply and 14% of electricity generation. Its importance is expected to increase in the next decades mostly due to household and hospitality sector usage (Nieves *et al.*, 2019). This predictions align with the NDC of Colombia which contemplates replacing coal power with natural gas in the mid-term; but also achieving carbon-neutrality in 2050 (Gobierno de Colombia, 2020). Natural gas importance is also translated into the NB, as can be seen in Table 15, showing that expenses have more than duplicated in 2021—while renewable energy expenditure has been reduced in 22%. Becerra-Fernandez, Cosenz and Dyner (2020) argue that natural gas is having high importance in the energy transformation because—even if it is a fossil fuel—its GHG emissions are lower than the traditional energy sources such as coal and oil. This vision is shared in the Energy Transition guide of Colombia where the defined goal is to use Colombian natural resources as a middle-step to carbon neutrality and promote a solid market that allows financing the transition. This middle-step is financed by the state in form of regulation and subsidies that allow the integration of the natural gas market at a national level (Ministerio de Minas y Energía, 2021).

Simultaneously, Colombia pledges for a renewable-energy based economy in 2050 (Gobierno de Colombia, 2020). In relation to this goal, expenses on "*sustainable environmental development of the energetic mining sector*" have been categorized as renewable energy (Congreso de Colombia, 2021 p.21). These include three aspects: electricity generation, mining and fuels (UPME, 2015). However, no other expenses are outlined. Nonetheless, the share of electricity from renewable sources is 71% in the case of Colombia, mostly due to the use of hydropower (see section 2.4.). Still, climate change and phenomena like El Niño have introduced longer drought seasons that influence the water availability for electricity generation. Some believe that could force a transition towards other resources such as solar power in the long term and the use of fossil fuels such as petrol or natural gas as an emergency supplier (Becerra-Fernandez, Cosenz and Dyner, 2020), however the results presented in Table 15 show an increase of reliance on natural gas. Until now, Colombia introduced a Renewable Energy Law in 2014 that contemplated some policy instrument such tax reductions on the use of renewable energy, which could explain the lack of participation on the NB (Arias-Gaviria, Carvajal-Quintero and Arango-Aramburo, 2019). Other explanations could be that renewable energy are included in the general expenses to promote energy generation.

In the transportation sector, the reader might remember that Colombia—like Chile—had identified black carbon as one of the priority lines in GHG mitigation. In relation to black carbon, three main actions are mentioned in the NDC: transportation,—by limiting the import of vehicles that do not align with the environmental regulation—industry—by having stricter regulation for industrial machinery—and agriculture waste management—by regulating open pile burning of waste (Gobierno de Colombia, 2020). Of these, transport actions would be the responsibility of the Ministry of Transport but no direct actions have been found in the NB that

correspond to black carbon reduction. However, a National Hydrocarbon Association (ANH from its Spanish acronym) dependent on the Ministry of Transport exists. Among the expenses assigned, there are two hydrocarbon-related concepts relevant to this study: first the usage of sustainable hydrocarbons and innovation in relation to fuels. The expenses of the first one have duplicated between 2020 and 2021 representing a 3% of the total assigned to the agency—30,000,000,000 Colombian pesos (COP) which is more than double the amount designated to renewable energy. The late, has been included in the budgets of 2021 but was not existing in the budgets of 2020 and it represents 16,000,000,000 COP (ANH, 2021). Among the information provided in the budgets, no direct references to petrol are found. However, the role of petrol goes beyond its use as an energy source and represents as well a high revenue of the state. More concretely, Ecopetrol—linked to the Ministry of Energy and Mining and responsible of the refinery of natural gas and petrol—provides high income to the government in terms of export, income and international investment (Ecopetrol, 2020; Gutiérrez Mejía *et al.*, 2018).

Overall, the mitigation potential of the transport sector has been outlined and actions that modernize the vehicle fleet could represent a reduction between 8 and 18% from the BaU path in 2030. The costs of these actions would however be high—up to 4% of the GDP. (Espinosa Valderrama, Cadena Monroy and Behrentz, 2019). So far, the analysis shows improvements in research and innovation—transversal activities according to GFLAC (2016)—however, no direct programs to translate that into general road vehicle transport.

4.3.2. Land-use change expenditure as defined in National Budgets

The main source of GHG emissions related to land-use change and agriculture in Colombia is deforestation or forest degradation (see section 2.5.). More concretely, FAO estimated in the last update for the year 2018 that emissions from Forests corresponded to approximately 800 $MtCO_2eq$ (FAO, 2018). Reducing Emissions from Deforestation and Forest Degradation (REDD+) has been identified as one of the priority activities in the NDC of Colombia. Specifically, the pledge of reducing deforestation to 50,000 hectares/year is believed to have a mitigation potential of 59.18 $MtCO_2eq$—which would correspond only to about 7.5% of the emissions of 2018 registered by FAO. The main strategy outlined in the NDC is the enforcement of national stricter regulations together with international support that leverage the knowledge of the involved stakeholders and economically support the implementation of projects (Gobierno de Colombia, 2020). This need for international support might be the reason for not having encountered any expenses that relates to forest in the 2020 and 2021 budgets of Colombia. Concrete details can be seen in Table 16, which summarizes the information on expenses of the Ministry of Environment.

Table 16. *Distribution of public expenditures in the Ministry of Environment Colombia (in Colombian Pesos).*

	Ecosystem conservation	Information and Knowledge	Water Management	Transformation	Environmental Education	Total
2020	43,104,049,110	29,044,791,710	6,630,847,135	79,069,459,291	2,320,657,783	345,741,833,070
%	12%	8%	2%	23%	1%	
2021	31,981,009,096	31,993,383,189	5,412,280,220	63,621,822,125	4,820,657,783	358,582,358,877
%	9%	9%	2%	18%	1%	
Δ%	-26%	10%	-18%	-20%	108%	4%

The table shows that the ministry covers transversal activities as defined by GFLAC (2016) (see section 3.2.1.), mostly by environmental education, information and knowledge creation and subsidies to transformation. Additionally, they support water and ecosystem restauration activities. The overall expenses of the Ministry of environmental affairs have increased by 4%—which is lower in real terms due to the effect of the inflation that reduces the purchasing power of the budget—and that the distribution of the resources among categories have changed considerably. More concretely, the variation of the expenses distributed to ecosystem restauration have been reduced by 26% in absolute numbers, which translates into a reduction of 4% of the relative weight of the category in the total expenses of the ministry. However, the gathering of information management expenses have increased by 10%, representing 10% of the total expenses in 2021. Even if no concrete information exists on what exactly the information and knowledge relates to, the lack of proper environmental tracking, especially in relation to land-use change has been criticized by scholars. Specifically, forest-land change, even if being a main driver of GHG emissions—and of high ecosystem value—lacks updated and accurate information for the whole territory. The latest publications of the government, on this topic, included graphical information until 2018 (IDEAM, 2018). This makes it hard to monitor changes, especially in remote areas with socio-political conflicts that promote illegal agriculture as a subsistence method (Anaya *et al.*, 2020).

Moreover, Krause (2020) determine that deforestation increased since 2016, the year in which the FARC guerrillas dissolved[1]. Krause (2020) argues that FARC participation in remote areas of the Amazonas limited the development and agricultural activity with implicitly translated into lower rates of deforestation. However, since their dissolution, the lack of control and decentralisation of policies has translated into increases of industries and illegal land-use change. These land areas have been mostly used for land-speculation, mining and cattle (Rodríguez-de-Francisco *et al.*, 2021). On the other hand, the dissolution of the guerrillas has allowed scientists to better explore the area and document the importance of the biodiversity of the area, raising more concerns on the need to develop policies to prevent biodiversity loss (Reardon, 2018). Rodríguez-de-Francisco *et al.* (2021) argue that forest policy is decentralised in the case of Colombia and that international collaboration is just tackling some of the areas. They argue the need of holistic perspective and stronger regulations that include monitoring measures. These ideas, align with has been found in the NDC—that aim for international support and stronger regulation—but which are not included in the NB. This, together with decentralization might be the reason for not identifying expenses related to forestry, since the scope of this thesis is national level expenditure.

Further GHG emitter sectors are agriculture and land-use change related to cattle. Table 17 shows the distribution of the emissions of the Ministry of Agriculture. Initially, the global budget has increased more than the inflation, a 8%. This increase is mostly translated into transversal activities and more concretely “Innovation” which has multiplied in. The same has happened when considering measures taken to promote agriculture efficiency. On the other hand, irrigation-related actions have been reduced from 2020 to 2021. The same decreasing trend was already identified in Table 11 where the expenses of water-related activities have also been reduced for the ministry of environmental affairs.

[1] Armed conflict that started in the 1960s due to the link of politics to the economic elite of the country and the inequalities in the country. Its activity continued until 2016 and resulted in violence, deaths and geographical mobility of the people located in the affected areas (Fisas, 2017).

Table 17. *Distribution of public expenditures in the Ministry of Agriculture Colombia (in Colombian Pesos).*

	Irrigation	Agriculture Efficiency	Innovation	Total Ministry
2020	103,124,000,000	11,516,000,000	1,500,000,000	685,658,664,354
%	15%	2%	0%	
2021	84,981,857,492	19,266,000,000	10,746,000,000	743,515,667,593
%	11%	3%	1%	
Δ%	-18%	67%	616%	8%

The need of innovation that promotes a transformation of the agriculture sector has been also outlined in the NDC:

"*Colombia recognizes the value that solutions based on nature, bioeconomy, sustainable infrastructure and climate-smart agriculture*" (Gobierno de Colombia, 2020 p.4)

In the NDC, Colombia outlines that the need of development is linked to the efficient use of fertilizers, which translate into high mitigation potential (Gobierno de Colombia, 2020). Research on the impact of cacao plantations nitrogen fertilizers has shown to be useful when establishing sustainable agriculture paths in Colombia. More concretely, it has allowed to better quantify the impact of this fertilizers and explore synergies with economic growth—due to an increase of productivity and reduction of GHG emissions and limitation of climate-related changes (Khatri-Chhetri *et al.*, 2020).

Emphasis is given also to the cattle sector in the NDC which is considered as a necessary measure including the education in environmental matters of all the stakeholders involved (Gobierno de Colombia, 2020). However, expenditure targeting livestock-related mitigation activities is not identified in the NB. On the other hand, the expenses on Environmental Education have doubled from 2020 to 2021—as seen in Table 16. Tapasco *et al.* (2019) argue that progress has been made in the inclusion of livestock policies and the joint of international cooperation. Still, they argue that there is a lack of standardization of policies and that good practices have been done in some areas, but they have not been implemented on a large scale. Reasons for this are the lack of financial incentives and institutional faults—such as the lack of control, technical guidance or collaboration among actors. This lack of national implementation might be the reason for not having found expenses related to livestock, since the thesis is limited to a national-level scope.

4.3.3. Industry expenditure as defined in National Budgets

Industry sector—that is not related to energy generation—represents 4.8% of the GHG emissions of Colombia based on the NDC information (Gobierno de Colombia, 2020). Among the actions prioritized, mostly all relate generally to all the industry and aim for the reduction of energy in production processes and combustibles in logistics. However, special attention is given to the construction subsector (Gobierno de Colombia, 2020). Specifically, Colombia pledges in the NDC that it will target:

"*Sustainable processes in the production of concrete and management for the integrated development of the brick industry*" (Gobierno de Colombia, 2020 p.xli).

These actions are expected to be achieved by the promotion of energy efficiency and a reduction of the use of fossil fuels, which again relates to the energy sector. Furthermore,

international support in the NDC is considered as essential but the established programs are linked to adaptation—e.g. planning of an innovation congress to promote adaptation actions or implementation a knowledge exchange platform where companies can share experiences on adaptation (Gobierno de Colombia, 2020).

The link of measures to energy might be the reason why no actions have been found in the Ministry of Industry or Urbanization that linked to mitigation. However, in Table 16, where the expenses of the Ministry of Environment were presented, "Transformation" was outlined as one of the categories. Inside it, expenses such as "*strengthening of the environmental performance of the productive sectors*" or "*management of climate change for a low carbon future*" (Congreso de Colombia, 2021 p. 39) are included. Nonetheless, the expenses in these matters have been reduced by 20% from 2020 to 2021—even if it still represents 18% of the expenses of the ministry and higher investments than the one that have been identified in relation to renewable energy.

4.4. National Budget Analysis of Peru

The results of the NB analysis of Peru will be presented in the following sections using the same structure that has been presented in the case of Chile and Colombia.

4.4.1. Energy expenditure as defined in National Budgets

The access to electricity in Peru is highly unequal between regions. While urban areas have a 100% rate, in others like the Amazon region just 63% of the population have access to basic services such as electricity and water (Ministerio de la Mujer y Poblaciones Vulnerables, 2020). This need to guarantee basic needs is identified in the NDC that states:

"*The formulation of the NDC has been done in consistency with the no-discrimination principle and right to equality, taking into account the objectives of sustainable development and strengthening the efforts of the state for eliminating poverty*" (Gobierno de Perú, 2020 p.29*)*.

This priority is translated in the NB where most of the expenses of the Ministry of Energy and Mines are invested into rural electrification. Table 18 shows the results of the analysis and allows extracting few conclusions. First of all, the overall budget for the Ministry of Energy and Mines has been reduced by 36% from 2020 to 2021. This reduction is mostly related to the reduction on investments for rural electrification. Still, these categories represent 45% and 21% of the budgets. On the other hand, the expenses on environmental remediation in hydrocarbons and transversal activities—related to research and education programs—have increased in the studied period. Additionally—similar to the case of Chile—a Nuclear Power department exist, having its expenses remained constant in the period studied.

Table 18. *Expenses of the Ministry of Energy and Mines (in Soles).*

	Rural Electrification	Environmental Remediation Hydrocarbons	Environmental Remediation Mining	Nuclear Energy	Transversal	Total
2020	401,356,473	88,458,245	111,783,519	44,998,616	68,178,009	737,890,941
%	54%	12%	15%	5%	9%	
2021	295,144,769	100,227,678	100,146,727	40,544,684	67,606,806	476,136,666
%	45%	21%	21%	10%	14%	
Δ%	-46%	13%	-15%	14%	0%	-36%

From the analysis of the NB and NDC, it cannot be determined which the energy source priority for the country is. There is no information on how rural electrification is planned to be conducted and how energy is going to be generated in the short, medium and long term. However, by complementing these results with other policy documents (Vazquez, Tamayo and Salvador, 2017), the strategy of Peru in rural areas seems to be linked to the expansion of solar energy. This is mostly justified by the cost and technical complexities associated to the connection of rural areas to the main grid. The reader might remember from the section 2 that Peru's share of renewable energy in electricity production was 60%. This percentage increased during the COVID-19 lockdown in Peru and most of the demand was covered with renewable energy sources. However, the general trend when looking at the overall energy supply shows high dependence on petrol and natural gas. This is expected to continue, specially by the increase of natural gas which has an important role in the countries' supply (Hilares, Vargas and Gastelo-Roque, 2020).

This energy scheme has been identified in some cases as resource nationalism defined by high levels of protection to important economic sectors—natural gas in the case of Peru—creating a trade-off in technological developments at expenses of social or political priorities (Fontaine, Narvaez and Velasco, 2018). However, "resource nationalism" is not seen as a drawback for all. Zambrano-Monserrate *et al.* (2018) argue that the use of natural gas would be an alternative to oil—which represents 44% of the energy sources as presented in section 2.4—which would allow the stabilization of GHG emissions. This is due to the more inelastic relationship between natural gas an CO_2 emissions in comparison to oil in Peru—which implies that increases in natural gas results in lower emissions compared to the same increase in oil. Furthermore, Corral, Schling and Montiel (2018) studied the case of a natural gas expansion in the Amazon area of Cusco in Peru. In their results they show that the infrastructure had high economic potentials in the area with low environmental impact. This was due to ambitious environmental protection actions that minimized the deforestation rates that could be expected of such a program. Even if research on different energy sources exists, further information on strategies of the country has not been found.

Furthermore, the NB include environmental remediation of hydrocarbons and mining. The definition of these expenses were not found in the NB but can be found in other complementing policy documents. Specifically, hydrocarbons remediation investments are aligned with optimization of the existent processes and improvement the current status of environmental remediation. In the case of Mining, activities are related to a proper closure and environmental restoration of mining areas that have been already abandoned—by reforesting the areas and recovering ecosystems that improve carbon sequestration (OGPP, 2020). Mining is defined as the most dangerous both for humans and ecosystems, therefore the urge to invest into remediation actions, is outlined in the annual analysis of the environmental impact of the country (Instituto Nacional de Estadística e Informática, 2019).

Regarding transport-related expenditure, the results are presented in Table 19. It shows how the overall expenditure has been reduced in 2021 and how this expenditure strongly links to investments in the road transportation sector—mostly related to improvement of roads. Public transport expenditure accounts for less than 1% in both of the studied years. Peru is prioritizing in the NDC adapting transportation to reduce the vulnerability to impacts of climate change (Gobierno de Perú, 2020)—instead of treating it as a mitigation potential as Chile and Colombia do. This could explain the lack of investments in mitigation-related aspects. Still, public transport has been outlined as one of the opportunities of urbanization linked to the facility to

develop routes and access more people which could reduce the use of private transport and GHG emissions (Hardoy and Romero Lankao, 2011).

***Table 19**. Distribution of the Expenses Ministry of Transportation and Communications (in Soles).*

	Public Transport	Road Infrastructure	Total
2020	47,790,969	9,434,047,879	12,325,210,898
%	0%	77%	
2021	67,388,579	9,936,026,893	10,263,822,734
%	0%	97%	
Δ%	29%	5%	-17%

The reader might remember that Peru did not include the treatment of black carbon in its pledges—unlike Chile and Colombia. However, already in 2017, the Ministry of Environment outlined the existence of black carbon in glaciers which accelerates its deterioration (Ministerio del Ambiente, 2017). Still, most of the road transport runs with Diesel followed by Gasoline which negatively affects black carbon (Ministerio de Medio Ambiente Gobierno de Peru, 2019). The expenses to maintain and expand the road infrastructure represent 97% of the total of the ministry and its value is still higher than the amount invested in mitigation of hydrocarbons—which is 100,227,678 as presented in Table 15.

4.4.2. Land-use change expenditure as defined in National Budgets

As presented in Section 4, agriculture and land-use change are the highest source of GHG emissions in Peru. These are particularly high considering forest land removal; however, no information on the NDC can be found in relation to forest-land mitigation actions that instead are included as an adaptation target (Gobierno de Perú, 2020). The reason for this allocation is not presented in the NDC but, it could be possible that it relates to the lack of set boundaries for the concept of adaptation—as presented in the section 2.3—or the prioritization of adaptation due to the short-term results and the high vulnerability of the country (Zhao *et al.*, 2018). This vulnerability is outlined in the NDC as following:

> "*Due to its geographic characteristics, ecologic and social, Peru is one of the most vulnerable countries to the effects of climate change*" (Gobierno de Perú, 2020 p.21).

Table 20 shows the results of the NB analysis of Peru. Overall, the expenses have been reduced from 2020 to 2021. This pattern does not apply to all the themes, since irrigation expenses—that represent 42% of the total expenses of 2021—and land-management activities have more than doubled. It is important to outline that while in 2020 expenses in relation to water were been mostly related to adaptation—flood prevention and risk reduction—in 2021 investments mostly better practices in irrigation. This difference might partly explain the variation between the two years since adaptation is not the scope of this thesis and this actions have not been accounted.

Table 20. *Distribution of the expenses of the Ministry of Agriculture Peru (in Soles).*

	REDD+	Water Management	Organic Fertilizers	Land-Management	Supply-Chain	Transversal	Total
2020	6,440,570	152,214,513	0	1,650,000	17,611,613	245,560,222	1,950,015,739
%	0%	8%	0%	0%	0%	13%	
2021	11,768,186	92,423,193	28,419,533	5,318,299	16,046,037	50,698,690	1,379,349,350
%	1%	43%	2%	0%	1%	4%	
Δ%	83%	289%	—	222%	-9%	-79%	-29%

Other changes have been the accounting of organic fertilizers in 2021 that was not present in 2020. Additionally, plans related to reforestation of damaged areas have growth in a 83% in the studied time. Further investments have been categorized as "supply-chain" and these mostly relate to cattle and concrete agriculture process—such as cacao—that aim to become more efficient and sustainable.

In the case of Peru, the Ministry of Environment deals with land-related issues and in Table 21, it can be seen that its overall expenses have increased by a 43% which is mainly due to the increase on land-restauration programs and transversal activities—these mostly cover the development of better GHG emissions trackers. On the other side, the expenses on Waste Management infrastructure have been reduced by 70% from 2020 to 2021.

Table 21. *Distribution of Expenses of the Ministry of Environment (in Soles).*

	Ecosystem Conservation	Waste Management	Land Restauration	Transversal	Total
2020	26,584,450	58,019,826	14,346,391	4,551,493	107,408,715
%	25%	54%	13%	4%	
2021	28,748,043	34,041,192	49,216,236	9,115,247	186,873,802
%	15%	18%	26%	5%	
Δ%	8%	-70%	71%	50%	43%

Even though the increase in the expenditure of the Ministry of Environment, Chazdon *et al.* (2020) argue that its role is limited in certain aspects and conditioned to the Ministry of Agriculture. More concretely, the Ministry of Environment is the responsible of land-use plan however, the Ministry of Agriculture is the responsible of issuing permits. Inconsistences can appear for example when a land recovery project is presented by the Ministry of Environment but permits on that area are given to land-exploitation purposes. This division of powers leaves possibilities to effectively issue land-use policies and forces a strategy focused on carbon taxes (Chazdon *et al.*, 2020)—which relates to income and they are not in the scope of this thesis.

4.4.3. Industry expenditure as defined in National Budgets

The NDC defines the focus of Industrial activities into "*industrial processes and use of products*" (Gobierno de Perú, 2020 p.12). Aligned with this target, Table 21 has presented the expenses of the Ministry of Environment which included Waste Management investments. More concretely, these expenses define processes that ensure the collection and proper treatment of waste. The expenses related to these actions represented more than half of the ministry's total expenditure in 2020 however, its contribution has been reduced by 70% in 2021. The importance of improving the waste collection sector has been outlined in the literature. More concretely, the use of open dumpsters has been widely spread in Peru and a transition to landfills is envisioned. However, these landfills should be accompanied with digestion of

organic waste into biogas—that currently represent just 1% of the energy sources as presented in section 2.4—in order to further contribute to GHG mitigation (Ziegler-Rodriguez *et al.*, 2019). Apart from the technical complexities involved in such programs, the centralization of the country that give local governments with little actions has been outlined as one of the impediments to improve the collection systems (Harvey, 2017).

More information on industry can be extracted from the results of the Ministry of Production presented in Table 22. The overall amount has been reduced by 30% and expenses are higher in investments related to achieving fishing sustainability and research—which includes transversal activities to promote innovation mostly in agriculture and fishing. On the other hand, expenses designed to mitigate the effects of industry and to monitor the environmental impact of the sector are identified. GHG mitigation actions have been reduced by 19% from 2020 to 2021 whereas monitoring actions have been increased by 11%. Overall, most of the expenses identified in relation to GHG mitigation actions are mostly related to food processing industry and little is found in relation to other industrial activities. Nonetheless, other industries have been identified in the literature for having a greater impact on GHG emissions. To give an example, cement demand and production in Peru is growing with economic development and measures to modernize the processes, improve the waste treatment and ensure energy efficiency could contribute to limiting the GHG of the industrial sector (Vázquez-Rowe *et al.*, 2019).

Table 22. *Distribution of the expenses of the Ministry of Production (in Soles).*

	GHG Mitigation	Monitoring	Fishing	Research	Total
2020	1,864,132	4,803,094	8,881,437	116,294,323	350,434,213
%	0%	1%	3%	33%	
2021	1,509,279	5,320,313	2,264,441	90,823,903	244,456,424
%	0%	2%	1%	37%	
Δ%	-19%	11%	-75%	-22%	-30%

4.5. Cross-country comparison

4.5.1. Differences in accountability and transparency

The reader might have noticed that the information provided for the countries varies in themes selection, detail and placement of the categories. These differences by a methodological limitation that relates to two factors: accountability and transparency. Reasons outlined in the literature to justify accountability and transparency in NB range from efficiency—by the reduction of corruption rates or improvement of fiscal performance—to moral concerns of these that believe that openness is intrinsic to governments' duties (Wehner and de Renzio, 2013). While concerns about transparency have grown in the last decades, developing countries and in particular Latin America have been underrepresented in the research (Cucciniello, Porumbescu and Grimmelikhuijsen, 2017). However, indicators from the grey literature for the evaluation of transparency in NB exist. The Open Budget Survey is used in previous literature as an indicator of performance (Khagram, Fung and Renzio, 2013). It shows that Peru is the only country of the three that offers sufficient information to support and understand fiscal actions; followed by Chile and Colombia where transparency is defined as limited (International Budget Partnership, 2019).

Even if the scope of the analysis of this report has been limited to certain ministries, different levels of transparency are noticed. While Peru presents really detailed budgets that include information on the location of the projects investments, Chile and Colombia mostly define the generic names with little information on the concrete details of the investments. Contrary to

that, the level of openness of data is higher in the case of Chile, where a centralized database includes all the NB based on a common format and style (DIPRES, 2021). In the case of Colombia, information on concrete budgets on the ministries is presented in each of the ministries websites. However, the level of digitalization varies in each of the cases and in some the information is not even visible, forcing the reader to move to the complete NB files to access the information on concrete aspects [2]. In the case of Peru, a change in formats has been outlined in the period studied; while in 2020 the information was just available in document file, currently spreadsheet format are available.

4.5.2. Mitigation Policy Ambition and COVID-19 Impact

Ambition strongly links with efficacy meaning that mitigation goals that becoming more stringent need to be feasible and include concrete policies to achieve them (Pauw and Klein, 2020). To further evaluate the variation during the COVID-19 on government expenditure, Figure 4 collects the main results of the budgets' variation and relates them to the three categories proposed by the GFLAC (2016) method. More concretely it identifies the themes mentioned in the NDC and shows if there are represented in NB and to what extent they have varied or not in the studied period.

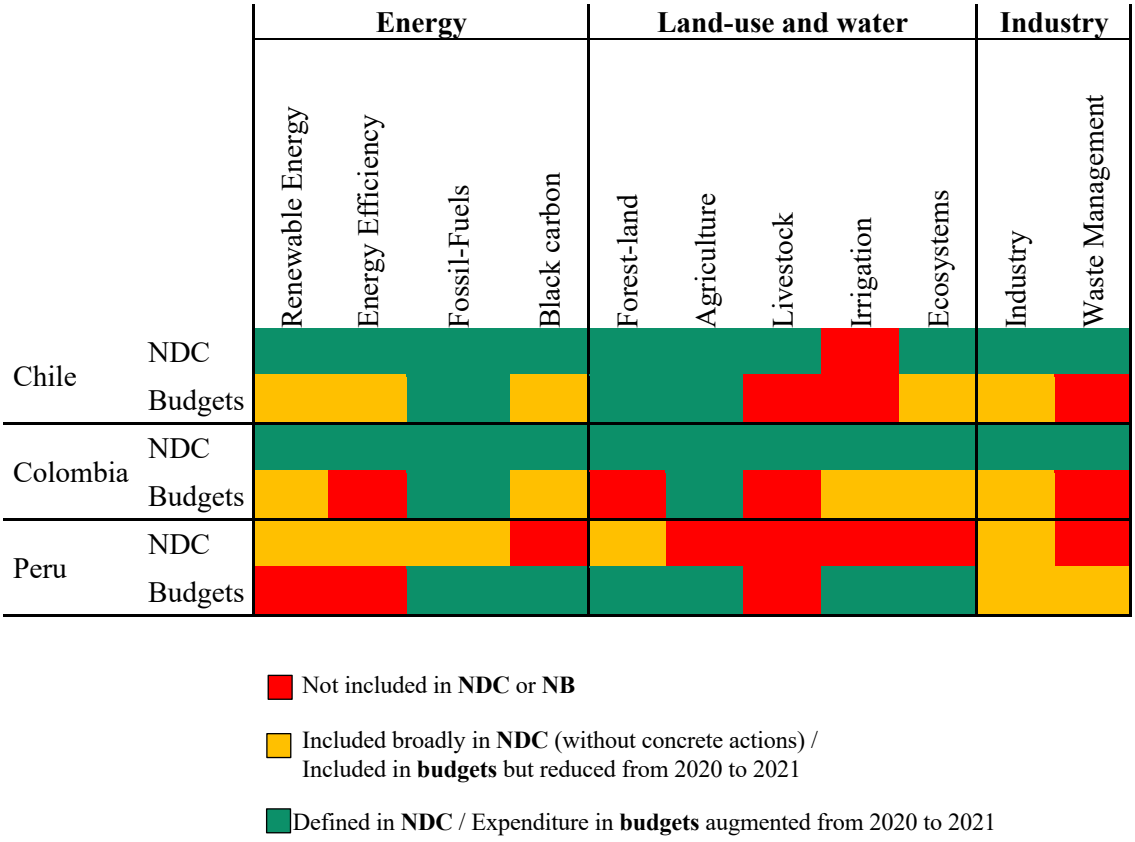

Figure 4. *Pledges determination on National Budgets.*

In relation to energy, the updated NDC of Colombia and Chile presented ambitious goals in the reduction of fossil-fuels, energy efficiency and reduction of black carbon in transport. However, expenditure of renewable energy in both countries has been reduced in 2021. The expenditure on natural gas has more than doubled in the case of Colombia (see section 4.3.1) and petrol and nuclear power investments still represent more than 50% of the budgets of the

[2]See: Ministerio de Minas y Energia (2020)

ministry of energy in Chile—even if having been slightly reduced from 2020 to 2021 (see section 4.2.1). The importance of patterns relates to the two major paths of recovery after COVID-19: either countries invest into already existing infrastructures that promote the use of fossil-based energy resources or use the pandemic to impulse a transformational change by investing in low-carbon alternatives (Shan, 2021). Establishing more concrete paths, the OCDE established a three-categories measures: (1) Rebound actions that aim for fast recoveries without considering GHG emissions, (2) Decoupling actions, which focus on GDP growth but considers GHG emissions therefore it has a more middle-long term objective, (3) Wider well-being, which does not take GDP growth in consideration and instead aims to improve societal aspects in the long term (Buckle *et al.*, 2020). Initially, Chile seems to be taking the first option and if continuing, this trend could induce future GHG emissions where expenditure relates to oil, considered one of the major GHG emitters source (Becerra-Fernandez, Cosenz and Dyner; 2020). The case of Colombia is slightly different. Even if investments relate to natural gas infrastructure, this is seen as a middle-step to carbon neutrality in the long term (see section 4.3.1), which could be considered as a decoupling action. Regarding Peru, the NDC mentions energy however, it does not give information on concrete actions. The NB in this case does not include references to any of the policies and instead focus mostly on increasing electrification in rural areas. In this case, even if the results do not show high mitigation actions, they align with the climate ambition of the country presented in the NDC, where national development is prioritised and the idea CBDR is presented repeatedly (see section 4.1.2).

In relation to the transport subsector, both Chile and Colombia outlined in their NDC the need to tackle black carbon, especially in urban areas. In relation to this goal, just expenses related to Public Transportation are found in the case of Chile and Peru and innovation in the case of Colombia. Chile has reduced the expenses in these matters by 3% (see 4.2.1) while Peru has increased it in 29% (see section 4.4.1), which is interesting considering that Peru did not include black carbon or transportation among its pledges.

Regarding land-use related actions, the picture varies in each of the country. Colombia is the country that includes more concrete actions on the NDC however, related expenditure has been reduced nor included for most of aspects mentioned with the exception of agriculture—which has increased from 2020 to 2021. Additionally, it is the only country that includes irrigation in the NDC but as well the only for which irrigation-related expenditures have been reduced. Chile and Peru have, on the other hand, generally increased expenditure on mitigation actions related to land-use change. However, in the case of Peru, land-use aspects are not concrete in the NDC and adaptation measures are prioritised (see section 4.4.2).

Industry is the sector for which less information is given in the NDC however, some expenses have been accounted. Waste management is included in the NDC of Chile and Colombia however no expenses related to this sector have been outlined in the NB. Contrary, Peru—even if not including it in the NDC—includes waste-management related activities in the NB which have been reduced in 2021.

5. Conclusions

All three countries updated their NDCs in 2020 which make the COVID-19 crisis part of their pledges. While mitigation is characterized as an urgent matter for which actions need to be taken, the extent of proposed public climate policy varies. While Peru outlines the CBDR principle and establishes a conditional and an unconditional target, the approach of Chile and Colombia differs. They outline the importance of technology transfer and climate finance but only establish a stringent target. Regarding the sectors considered, all three focus on energy, land-use and industry but the subsectors and detail of the actions diverge. In the case of Peru, sectors are mentioned without further details on concrete actions or subsectors. Colombia and Chile however provide information on the targeted subsectors and a list of concrete actions to achieve the pledges. Furthermore, they give particular importance to transport—a subsector within the energy sector—as a source of black carbon.

The representation of the outlined sectors on the NDC on NB varies in all three cases. Generally, it could be said that in the case of Colombia and Chile, where the NDC are more detailed and concrete actions are presented, several expenses contradict the pledges. This is shown for example in numerous investments on fossil fuels, even when pledges aim to promote renewable energy. Regarding Peru, where the NDC are more vague and pledges could be seen as less ambitious, the analysis of government expenditure shows higher areas of expenses than the ones mentioned in the NDC. Here for example, forest recovery is included in the national budgets while not being mentioned in the NDC.

The effect of expenses after the COVID-19 pandemic varies per sector and country. Overall, the existing investments on energy-related mitigation aspects have been reduced and fossil-fuel infrastructure is prioritized. This relates to the availability of national fossil resources or nationally owned companies that deal with fossil fuels. In relation to agriculture, Colombia has reduced most of the land-use mitigation related expenditure while Chile and Peru have increased expenditure in sectors such as forest-land recovery or irrigation improvement actions. For the industry sector, the scope of actions is vague and mostly linked to energy. Nonetheless, individual actions such as waste management or concrete policies on specific subsectors have been identified. Investments of these have however decreased in 2021 in all cases.

Since the scope of the thesis was limited to a national level and the expenditure side of the budgets, further research would be needed to determine if some of the low investments detected are managed at a local level or through income-related actions such as carbon taxes. For the thesis, the impact of COVID-19 was measured though the variation of the budgets. This was needed in order to operationalise the analysis but could have ignored other aspects that might have contributed to the variation of the budgets. Therefore, it would be interesting to repeat the study in the future—with more budgets available—to complement the analysis and determine a better defined trend.

Finally, from the results one might wonder what is prioritised for recovery. Even if the focus of the thesis has been the two first years of the implementation of NDC, a starting tendency towards fossil-fuels support has been identified. In some of the cases, not only though investing on already existing fossil energy infrastructure but also by aiming to create new one. Considering that the returns of these investments result in the long term, one might wonder if the transformational approach outlined in the NDCs is the actual vision that is leading the countries' development strategies. The area of LAC is highly vulnerable to climate change as well as being characterised by fast-growing economies. Thus, unsustainable growth and the

continuation of the patterns identified in this thesis could even worsen the consequences. Moreover, a lack of standardization and transparency of government expenditure in relation to mitigation has been outlined. The same applies to the NDC studied that vary in style, detail and methods. This analysis could be a premonition on how different the reported progress toward the 2030 pledges is presented and monitored if standardization policies are not promoted.

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