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Energy governance in Brazil: meeting the international agreements on climate change mitigation

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INTRODUCTION

Since the first World Conference on the Human Environment in 1972, the United Nations has convened many times to search for solutions to protect the environment and mitigate climate change. In 1994, the 154 United Nations member States signed the United Nations Framework Convention on Climate Change (UNFCCC) to address global warming. In 1997, the assembly at the UNFCCC conference in Kyoto, Japan, approved the Kyoto Protocol, agreeing that industrialised countries were to take actions to stabilise greenhouse gases emissions. The latest and more expressive international meeting was the 21st Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (UNFCCC). It took place in Paris in December 2015. At this conference, a new international agreement was made to conduct initiatives worldwide for reducing the effects of climate change. In anticipation of the event, 187 states voluntarily submitted their Intended Nationally Determined Contribution (iNDC), in which countries drafted their post-2020 climate actions to be taken under the Paris agreement. The main goal of the new treaty is to hold the increase in global average temperature below 2°C above pre-industrial levels by reducing anthropogenic CO₂ emissions. Even though at the end of April 2021, 197 UNFCCC members had signed the agreement, there have been many questions about whether the treaty can and will be honoured. In fact, there is an emerging consensus among scholars that diplomat should move beyond the 2°C goal due to inconsistencies between science and international commitments and that a feasible global agreement is a utopia. Some argue that climate negotiation has become a political agenda and has allowed governments to make a good impression by appearing to take global warming mitigation seriously, whereas making a meagre effort or even taking no action at all.

Throughout the years, Brazil has actively participated in all international gathering to discuss environmental governance. Two of the most notable events organised by the UNFCCC were held in Brazil. The Brazilian government played a leading role by hosting the Earth Summit in 1992 and Rio+20 in 2012, both held in Rio de Janeiro. Brazil was also the protagonist in the Clean Development Mechanism creation under the Kyoto protocol, which was intended to foster clean development in developing countries. Two months before COP 21, Brazil submitted its iNDC. The government considered it extremely ambitious as it pledges to reduce GHG emissions by 37% in 2025 and 43% in 2030 below 2005 levels. However, since the iNDC submission, the country has been facing severe political and economic crises. These conjectures have worsened by the Coronavirus pandemic. Brazil's current situation indicates a dissonance with the country's pledges to reduce GHG emissions and its compliance with the international climate agreements. The Brazilian energy governance has great significance for achieving the global goals on climate change mitigations. Brazil has the world's 12th largest economy and ranked as the 7th most populated country. Area wise, Brazil is the 5th largest country in the world and therefore has great wind and solar power potential. Furthermore, around 60% of the Amazon Forest lies in Brazil. Its preservation also depends on Brazilian energy policies.

The energy transition is one of the main targets of the international agreements on climate change mitigation. In order to contain global warming, the world needs to abandon fossil fuels and expand the development and use of renewable energy sources. This research focusses on Brazil's energy governance and the conditions of the country's energy sector to put into practice the energy transition necessary to reduce GHG emissions.

Brazil is well known for having the cleanest electricity mix in the world. This reputation stems from the country's reliability on hydropower. Hydroelectric plants are responsible for most of Brazil's electricity generation, and in the last two decades, the county has shown a

considerable development of alternative sources such as wind, solar and biomass. Despite Brazil's enormous potential for generating renewable energy, its institutions are struggling to reduce the country's dependence on fossil fuels. The Brazilian energy sector drives on traditional sources. The electricity sector still depends on thermoelectric plants powered by fossil fuels (coal and diesel), especially when droughts occur. Large hydroelectric plants are a tradition in the country but have been very much criticised because of the environmental and social damage it causes and may not be as reliable as in the past. Due climate change, severe droughts put at risk the country's water resources. In addition, the transport sector is powered mainly by fossil fuels despite the country's strong ethanol industry. Almost seventy-five per cent of the Brazilian fleet is powered by gasoline and diesel. Considering Brazil's great territorial dimension, large population, and mainly road transportation, energy transition is urgent to make the country's iNDC pledges feasible.

To create and implement policies that stimulate energy transition in the country, decision-makers need to be independent and political choices must be based on science and the country's commitment to the international agreements it is signatory to. Currently, the decision-making process in Brazil is strongly influenced by interest groups that use their resources and power to direct public policies according with their interests. Power relation strategies, historically known in Brazil, are used to keep the energy sector on its traditional course. Clientelistic practices to gain or maintain power are used in the country in all areas of decision-making. In the energy sector, these practices favour monopolistic strategies for a limited number of companies. The enormous resources handled in the sector attract an oligarchic elite who seek opportunities for cronyism and rent-seeking. Under these circumstances, the capture of the state is inevitable, and public policies for the energy sector are directed to the interests of the incumbent industry. Under the control of these interest groups, policymakers tend to respond to stimuli from those around them and behave accordingly.

Brazil has good regulatory agencies and well-qualified professionals working on the development of policies for the energy sector. However, when it comes to decision-making for the implementation of these policies, the executive branch makes the final decision. At this decision-making level, both the power relations strategies and individual behaviour influence the policy choice. Currently, these two factors are the biggest obstacles to the energy transition in Brazil.

This research uses power relations strategies and behavioural economics as framework to understand the policymaking for the Brazilian energy sector. The literature shows that power relations strategies historically permeate Brazil's governance. Monopolistic practices, clientelism, bossism, political capture, cronyism, rent seeking, are subjects of many studies in different fields of knowledge. These phenomena, regarded in this research as power relations strategies, are a hindrance to a great deal of the decision-making processes in Brazil. This study seeks to contribute with public policy studies by understanding how these strategies influence policy choices for the Brazilian energy sector, especially how they limit the country's conditions to comply with international climate agreements. On the other hand, behavioural economics has been broadly applied in public policy studies to understand decision-making processes. Behavioural economics highlights the irrational aspect of decision making. This irrationality, also referred to as a behavioural failure, may be the reason people make choices against their long-term benefits. In order to understand the influence of Brazilian decision makers' behaviour in the energy sector policy choices, this research uses the following behavioural economics concepts: hyperbolic discounting and loss aversion; endowment effect and status quo bias; information avoidance; delusion of competence, overconfidence and planning fallacy. Behavioural economics shows that individuals make choices based on habits, preconception, simplified practical rules and personal experiences. Studies on power relations strategies and individual behaviour combined may offer a more elucidative explanation of the

Brazilian energy governance, which, in turn, give a more precise forecast of Brazil's capability to comply with the international climate agreements.

The power relations strategies mentioned above are the subject of many international and Brazilian studies (Dunne, 1995; Hopkin, 2006a; Quimpo, 2009; Bardhan & Mookherjee, 2012; Robinson & Verdier, 2013; Haber, 2002; Zywicki, 2016). Power relations strategies have been recurrently used to guide decision making in the Brazilian energy sector. That explains the great body of literature on the subject. The literature review carried out for the purpose of this research has shown a large body of evidence that monopolistic practices, clientelism, bossism, political capture, cronyism, rent seeking have strong influence in the decision-making processes for the Brazilian energy governance. In addition, information from primary sources have confirmed this hypothesis as demonstrated in chapter five. Nevertheless, when further studying the phenomena, a new insight seemed necessary to understand the reasons why and how certain decisions are made. Behavioural economics has been chosen as complementary theory to analyse the phenomena as stakeholder's personal behaviour appear to have enormous influence in policy choices. The first hint that this theory could give a more deep and modern insight to the subject of this research was found in the *Handbook on energy and climate change* edited by Roger Fouquet in 2013. Behavioural economics is a rather new theory and therefore is the Brazilian literature on this subject relatively limited. Nevertheless, using this theory as complementary to answer the research question proved to be particularly useful. To prove the hypothesis that stakeholder's personal behaviour has been affecting policy choice in the Brazilian energy sector, many pieces of evidence found in the literature as well as in newspaper articles, videos, audios, interviews, NGOs reports and working papers, among others, are demonstrated in chapter five.

Brazil's reputation as a 'green energy power' is an attribute that settles its energy sector, suppresses the need for change and hinders

technological and institutional innovation. Brazil's current energy policies are an unwise choice to meet the country's increasing energy demand and, at the same time, to decrease its GHG emissions. Even though Brazil has committed to all international agreement, Brazilian energy policies are still attached to decision-making processes from when environmental issues were not at the top of the world's political agenda as it is nowadays. Changes must be made to achieve an alignment between Brazil's energy policies and its iNDC pledges.

This study aims to analyse how decision-making processes take place regarding the Brazilian energy governance, particularly related to Brazil's collaboration with international agreements on climate change mitigation. The present research seeks to elucidate the extent to which Brazilian policymakers consider the country's commitments to reduce GHG emissions when implementing one or another energy policy. This investigation intends to answer the central question: to what extent current energy policies in the country are designed to comply with the international agreement to hold the increase in global average temperature below 2°C above pre-industrial levels? To answer this question, it is imperative to understand why one energy policy is chosen in detriment of others and what leads the decision-making processes in the Brazilian energy sector.

The hypothesis proposed to answer the research question is that the recurrent use of power relations strategies in the country's energy governance prevents innovative policies toward energy transition. The persistence of monopolistic and oligopolistic practices enabled by crony capitalism and rent-seeking dictates policy choices and imposes the use of established technologies, causing inertia in the Brazilian energy sector. Furthermore, the role of behaviour in policy choices investigated in behavioural economics may further elucidate that policymakers are influenced not only by political, economic, and institutional challenges but also by their deep-rooted personal behaviour, which can be decisive in the decision-making processes.

This research investigates the Brazilian energy governance and the challenges that the country faces to comply with the international climate agreements. The methodology chosen to conduct this study was an explanatory single case study. Case study is the most appropriate method for answering 'who' and 'why' questions (Yin, 2009), such as the one guiding this research. This approach is also known to be the most effective way to interpret intricate real-life events that occur in political, economic, institutional, and sociocultural domains (Bartlett and Vavrus, 2017). Brazil has a much-diversified energy matrix. It ranges from fossil fuels (oil, natural gas, and coal), renewable sources (hydro and nuclear power, biofuels, wind, and solar energy). Chapter three and four describe the applicability of this energy sources in the Brazilian energy sector. This context is presented to understand the sector's developments throughout the years. In a case study the context is always considered "as a way of understanding influences, relationships and in some cases cause and effect" (Chopard and Przybylski, 2021: 4). A qualitative research approach was used to investigate why certain policy choices are made in detriment of others, concerning the Brazilian energy governance. Brazil was chosen as case study because of its relevance for the international climate governance. The study of Brazilian energy policies and the circumstances of its formulation and implementation can contribute with the efforts to transitioning from fossil fuels to renewable energy use at international level.

According to Yin (2009) the data source list for a case study is quite extensive and includes literature review, documentation (e.g., administrative documents, formal studies, newspaper clippings, mass media articles, maps, and charts, white and working papers) interviews, films, videos, among others. Many of these sources were used during this study's data collection phase which took place in the period 2017-2020. During this interval up to 2022 Brazil has gone through a great political and institutional crisis especially due to the Bolsonaro's presidency -and his cabinet- and the Covid 19 pandemic which has affected the entire world. This period was a turmoil frequently portrayed in the news and

on the internet with many well-respected journalists, political scientists, writers, professors, etc. commenting the events in videos, articles, and interviews. This reality has contributed for the use of many sources in the data collection phase and beyond.

To build the framework on which this research is based, a literature review was carried out through an extent assessment of national and international studies, both primary and secondary sources. Chapter one presents the concepts found in the literature that explains the phenomenon best. Literature review was also used in the process of data collection and contributed with great part of the evidence shown in chapter five. Even though the occurrence of the power relations strategies mentioned above are frequent in the Brazilian energy sector, the vocalization of this practices by stakeholders is not as clear as it would be necessary do prove this research's hypothesis. That happens for two reasons: first, the phenomena are not named properly in everyday life or in locus as it is in the literature. Second, certain statements may be politically sensitives and therefore avoided by stakeholders. For those reasons, literature review was chosen the main strategy for data collection and the design of this study.

In an attempt to explain more completely the phenomenon, this research is based on the process of triangulation, which is the use of more than one research methods and approaches to investigate a particular subject. The framework combines two perspectives: the concept of power relations strategies and behavioural economics theory which were selected to be used as complementary after a thoroughly examination of a collection of written sources such as books, scientific articles, research reports. Furthermore, policy and legislations documents, outlooks from NGOs and international agencies, newspaper article, among others were used as secondary source of empirical evidence. In examining a problem like this in the Brazilian context, such sources are crucial to understand the reality of policymaking on the ground.

The fieldwork took place in the cities of Rio de Janeiro, São Paulo, Vitoria, and Brasilia. From July 21 to August 30, 2018, when the first round of interviews was conducted. The second phase of the research was conducted remotely between 10 and 31 of July 2020. In total, ten interviews were conducted with different Brazilian professionals in the fields of energy, public policy, and behavioural economics. The professionals chosen are active in different sectors, namely: academy, government, NGOs, private sectors, energy agencies. This choice was made based on earlier field work which resulted in the master research thesis *Energy transition in Brazil: barriers and possibilities within the institutional scope* (Ferraço, 2016). In this study evidence was found that information, incentives and planning usually are disconnected, unstructured and discontinued. With this reality a look into different professional areas facilitates a broader view of the phenomenon. Some interviewees were selected based on their knowledge on the subject as they were found during the literature review phase. Others were indications by their peers because of their knowledge and relevance in the field.

A semi-structured question list was used in search of evidence to answer the research question and verify the hypothesis. The interviewees were invited to try and answer fifteen questions related to the concepts which guide this research. The interviews lasted around one hour on average and were recorded to be analysed afterwards. All interviewees have agreed in having their names literally cited in this study.

By using a variety of written, audio-visual sources and a semi-structured interview, a great amount of relevant information was collected and verified, resulting in the validation of the findings, analyses, and conclusion. The later will reveal de lessons learnt from the combination of the concept of power relations strategies and behavioural economics theory and its use in the analysis of similar phenomenon.

In addition to this introduction and a general conclusion, this thesis is arranged with the following chapters:

The first chapter presents the theoretical framework on which this study is based. The first section elucidates the concept of power relations strategy and its synergy with behavioural economics theory. The subsequent four sections review the traditional concepts recognized as power relations strategies in this dissertation. These strategies are monopoly and oligopoly; clientelism; bossism and political capture; crony capitalism and rent-seeking. The last section introduces behavioural economics theory and some concepts studied by this strand of thinking. As behavioural economics comprises a vast variety of concepts, a selection was made considering the prevalence of such a concept in the phenomenon. The chosen concepts used in this study are hyperbolic discount, loss aversion, endowment effect, status quo bias, information avoidance, delusion of competence, overconfidence, and planning fallacy.

Chapter two is divided into two sections. The first one summarises the international agreements made on climate change mitigation. The overview starts with the first World Conference on the Human Environment in 1972 up to the United States' return to the Paris agreement. Section two outlines Brazil's five decades collaboration with the international community on climate issues and the country's attempt to comply with the global agreements.

Chapter three and four are both empirical literature-based sections and describe the Brazilian energy sector. The main goal here is to outline the state of the art of Brazil's current energy production and consumption. Chapter three addresses the traditional sources of energy that form the energy sector since the country's initial development in the 1930s. These sources are hydroelectric and thermoelectric power, oil, gas, and ethanol. Chapter four tackles the country's alternative energy industry and highlights the development of renewable energy sources which are: wind

and solar power, biomass, second-generation ethanol, biodiesel, biogas, and black liquor. Hydropower and ethanol are also considered renewable sources; however, they are presented in the previous chapter because these sources use started in the country in the 1950s and 1975s, respectively.

Chapter five reveals evidence that verify the phenomena described by the concepts introduced in theoretical chapter one. The passages presented illustrate that the theories chosen as framework for this study manifest itself in real life. This evidence was found in the literature, newspapers, documents and also in audio-visual material, which are nowadays an essential communication medium used by well-respected Brazilian scholars, journalists, politicians, philosophers, economists, among others. Furthermore, fragments of interviews conducted during fieldwork demonstrate that the framework chosen can in fact explain the phenomenon studied in this research.

The conclusion presents the answer to the research question. It also summarises how the power relations strategies described in the theoretical framework influence the decision-making processes in the Brazilian energy governance and how it hinders the country's effort towards energy transition. Furthermore, the conclusion recap how stakeholders personal behavioural have major influence in policy choice for the Brazilian energy sector. The conclusion also presents an explanation of how the combination of power relations strategy concept and behavioural economics theory can be a helpful tool in further research in this field of study.

