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## Disabling the Steering Wheel? National and International Actors' Climate Change Mitigation Strategies in Latin America

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Mitigation Strategies in Latin America**

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# Disabling the Steering Wheel? National and International Actors' Climate Change Mitigation Strategies in Latin America

## Abstract

This article addresses the question of how Brazil, Costa Rica, and Colombia came to decide on their climate change mitigation strategies, which are based on market-oriented policies. The analysis compares Brazilian bioethanol, Costa Rican renewable energy, and Colombia's clean development mechanism. Using the "chicken game," the best response is to "disable the steering wheel." This means that an actor reduces his or her capacity for action in order to signal a commitment to continue acting in line with his or her past behaviour. The study assesses this strategy at the level of relationships between national and international actors. The findings show that the national actors examined here are either continuing with criticised projects, in the Brazilian case, or slowing down their mitigating strategies, in the cases of Costa Rica and Colombia, and thereby restricting their capacity for action in order to reach a better negotiating position.

**Keywords:** climate change, mitigation, bioethanol, energy, carbon markets, Brazil, Costa Rica, Colombia

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## 1 Introduction

Sustainable development is one of the biggest challenges in the context of climate change, and climate change mitigation policies are crucial.<sup>1</sup> The difficulties of the sustainable development process transcend borders and are bound up in political and scientific debates. A good indicator of sustainable development's relevance is the fact that it has reached the international arena (e.g. international conferences such as Rio 92, Doha, and RIO+20). After the

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1992 conference in Rio, expectations of a more sustainable world increased, and the Kyoto Protocol addressed this hope in 1997 with the first real commitment on the part of developed countries to reduce emissions (Schiermeier 2012). Nevertheless, the difficulties of sustainable development remain at the level of the actors' relationships (Zoeteman and Tavenier 2012), and every new international conference (Rio+5, the Johannesburg Summit in 2002, and RIO+20) has confirmed how difficult it is to make countries commit to mitigating climate change by reducing greenhouse gas emissions (Bernstein 2013; Ivanova 2013).

Unlike other studies on mitigation strategies, which concentrate on climate negotiations or the trade-off between policy fields (economic, environmental, or social), this paper focuses on actors' interactions when policies are applied. To that end, it uses game theory to explain mitigation policies at the domestic level – important means for achieving a low-carbon society – in Brazil, Costa Rica, and Colombia. It explains how these countries decide on their strategies for negotiating with international actors in the context of limiting carbon emissions. In doing so, it poses the following question: How did Brazil, Costa Rica, and Colombia come to decide on their climate change mitigation strategies, which are based on market-oriented policies?

The Latin American region holds important potential for mitigation and has a long-standing tradition of crafting policies and drafting legislation on climate change. Brazil recently succeeded in reducing Amazonian deforestation, and net carbon dioxide emissions have dropped significantly as a result (UNFCCC 2008). In 2007 Costa Rica was the first nation to commit to carbon neutrality by 2021 as a coherent continuation of the country's prioritisation of green policies (Zimmerer 2011). Colombia is a pioneer within the region with regard to the establishment of market mechanisms for mitigation (Cadena and Haurie 2001; Hook et al. 2010). Although Brazil, Costa Rica, and Colombia differ in most of their characteristics, they do demonstrate a similar mode of interaction with the international actors in implementing their mitigation strategies.

The metatheoretical approach known as actor centred institutionalism (ACI) offers the advantages of organising and structuring the inquiry (Scharpf 1997: 30). We propose to answer the research question by evaluating the strategic behaviour of the main actors involved in the policymaking processes, using the ACI approach to connect the three cases and the game theoretical model known as "chicken game" to compare the cases (DeCanio and Fremstad 2013). The specific strategy used by the actors is referred to as "disabling the steering wheel" (Kahn 2009: 11), whereby actors actively restrict their capacity for action in order to achieve a better negotiating position vis-à-vis other actors.

We discuss the mitigation efforts in each of the three countries and the ways in which the actors in each case demonstrate the "disabling the steering wheel" strategy: Brazil's increasing investment in its bioethanol industry, Costa Rica's prevalence of hydropower, and Colombia's under-utilisation of clean development mechanism (CDM) markets. The empirical evidence shows that in all three cases, the actors have chosen to reduce their decision-making capacity and thus signal a commitment to past behaviour so as to reach their best strategy

(e.g. continuing with criticised projects, in the Brazilian case). In order to focus on the research question, we set aside several relevant discussions (the controversial production of bio-ethanol worldwide, the efficiency of alternative methods of energy production, and the effects of such projects on local communities) due to the amount of literature that would be involved.

This paper is organised as follows. In Section 2 we review the literature and theory on how mitigation policies relate to the metatheoretical approach and the game model. In Section 3 we apply the model to the three cases – Brazilian bioethanol, Costa Rican renewable energy, and Colombian CDM – under analysis. In Section 4 we discuss the main results in order to explain the outcomes of the mitigation initiatives. Finally, in Section 5, we make concluding remarks on the “disabling the steering wheel” strategy and offer suggestions for future research on the topic.

## **2 Theory: Disabling the Steering Wheel as a Climate Change Mitigation Strategy**

In their efforts at mitigation and adaptation, countries respond differently to the problem of climate change (Fisher et al. 2007; Khan and Roberts 2013; Moser 2012). We define mitigation as the “actions that reduce net carbon emissions and limit long-term climate change” (Fisher et al. 2007: 225). Adaptation, which is defined as “actions that help human and natural systems to adjust to climate change” (ibid.: 225), is another strategy for responding to climate change. As a result of the uncertain nature of both strategies, another important field of research focuses on the unpredictability of the effects of climate change (Yohe et al. 2004).

There is a fundamental debate on the hierarchy and complementarities between mitigation and adaptation (Mora et al. 2013; Moser 2012), and the adaptation strategy is more broadly accepted than the mitigation strategy (Bierbaum et al. 2013). This is due in part to the failure of mitigation strategies (Khan and Roberts 2013). However, the research indicates that adaptation alone might not be sufficient to ensure sustainable development (Mora et al. 2013). An examination of the deficient enforcement of mitigation initiatives shows that it is necessary to take into account the broad political support for those initiatives found at the level of international agreements but which demonstrate limited local adoption. For example, 172 countries signed Agenda 21 to improve the mitigation strategy worldwide (Ivanova 2013: 2); however, the local adoption of the agenda has attained very little success (Death 2011). An exception is the Kyoto Protocol, which has been the only instrument with compulsory measures for emitters, especially developed countries. The uncertainty about the future of this compulsory commitment has been ongoing, and some prominent emitters have withdrawn from the agreement (e.g. the United States, Canada, New Zealand). The Kyoto Protocol has effectively been prolonged until 2020, as a result of extensive discussions at the end of the Durban Conference (Pérez de las Heras 2013).



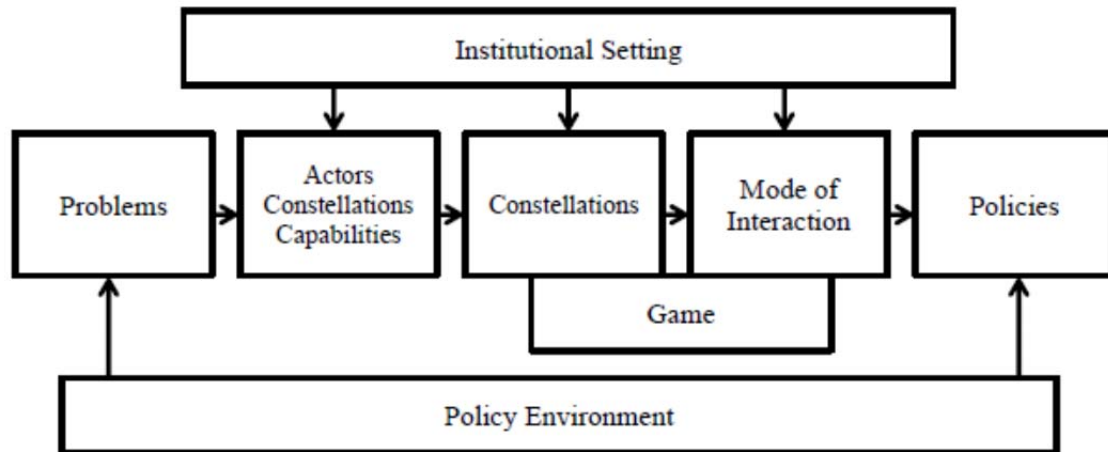
The climate change literature has forecast a very likely scenario of increasing temperatures and changes in the rainy seasons for the whole of Latin America (IPCC 2013: 1264). Currently, Latin America holds important mitigation potential (Grubb 2003), as do other developing countries (Schiermeier 2012). At the same time, emerging powers such as Brazil, Russia, India, China, and South Africa (BRICS) are defying the international governance system because they do not feel that they are as responsible for climate change as the developed countries, which have historically had high emission levels (Gouvea and Montoya 2014). These new global players or BRICS countries have been building coalitions with smaller developing countries (for a detailed explanation, see Hurrel and Sengupta 2012). Therefore, secondary powers like Colombia and small states such as Costa Rica have also been key global players in the implementation of sustainable policies and practices (Chazdon et al. 2009) and from the perspective of the ecological footprints of nations (e.g. Sutton and Costanza 2002). They represent a critical voice for worldwide cuts in greenhouse gas emissions based on countries' differentiated responsibilities (Grubb 2003).

Mitigation strategies have increased the potential for conflicts between companies, governments, international organisations (Death 2011; Fomerand, 1996; Hurrel and Sengupta 2012), and indigenous groups (Bank 2009). Governments have agreed at the time of the declarations and have proclaimed profound future transformations and radical measures, especially when the future has been longer than their electoral terms; however, they have often failed to initiate concrete mitigation strategies with measurable improvements (Khan and Roberts 2013). International organisations (such as the United Nations Framework Convention on Climate Change, UNFCCC) have been criticised by different actors, particularly by researchers, for their roles as coordinators who bring the various actors together but keep the status quo in place (Death 2011; Fomerand 1996; Hurrel and Sengupta 2012), whereas the conflicts with the companies have been related to carbon leakage (Droege 2011). Companies have seen mitigation strategies as a distortion of the markets and a disadvantage in comparison with their competitors in other countries (carbon leakage), who have not been subject to the pressure of mitigation. The conflicts between the institutions in charge of mitigation and indigenous peoples have related to land rights and how these groups have been involved in determining the mitigation strategies (Bank 2009).

Given this context, we use an ACI approach to connect the cases of mitigation under study here. The social sciences have long produced sociological and economic theories that contradict each other. One of the many responses to these contradictions, which Scharpf (1997) describes as an "invitation to engage" (Scharpf 1997: 36), is the theory of ACI. The objective of the ACI approach is to detect the set of interactions that produce policy outcomes. In other words, ACI separates the idea of policymaking into multiple steps. Within this framework, the actors are defined as "individual and corporate (agents) that are actually involved in the policy process and whose choices will ultimately determine the outcome" (Scharpf 1997: 43). Furthermore, each actor has specific capabilities, perceptions, and prefer-

ences, and the description and analysis of an actor constellation is based on these categories. Figure 1 illustrates the relationship between the various components of this ACI approach.

**Figure 1. Actor Centred Institutionalism (ACI)**



Source: Scharpf (1997: 44).

The ACI explains the development of a problem in a policy. The mode of interaction captures the influence of the institutional design on the process of creating a policy. It is composed of actors' strategies and the institutional setting that influences each actor's behaviour. As empirical research has shown, most policies have emerged from the interaction of several actors – for example, bicameral parliaments, syndicates, lobbyists, and parties that have formed coalition governments.<sup>2</sup> The most important instruments in the interaction process are the given rules, which provide the institutional framework for actors and their capabilities (Scharpf 1997), prescribing or incentivising certain forms of policies (Scharpf 2000).

In this case, the most important factor influencing our decision to use ACI was that ACI fits well with our research question, which integrates the constellations of actors (in this case to compare the various problematics), and enables the application of the “most dissimilar case” as a method of comparison.

This study draws on the game theoretical model, which addresses the relationship between the actor constellation and the modes of interaction, proposing that the actors are involved in a game called “chicken” (Rapoport and Chammah 1965). Approaching the game as a combination of a specific actor constellation with a specific mode of interaction can be done in various ways and results in the game having independent explanatory power (Scharpf 1997: 44).

The chicken game is a well-researched model (DeCanio and Fremstad 2013; Robinson and Goforth 2005) and examines conflict from the perspective of two players. The game is

<sup>2</sup> For more examples, see Scharpf (2000).

particularly renowned in the political science area for modelling the kind of confrontation where participants have an incentive to avoid the adverse fate of the worst equilibrium using different strategies. A famous analogy is provided by a scene in the 1955 movie *Rebel without a Cause* (Rapoport and Chammah 1965), in which James Dean and another young driver each race a car towards the edge of a cliff, competing to see who will be the first to stop or turn – in other words, to see who will chicken out. Similar scenes can be found in other movies or television series. Of course, neither character wants to die, but the question is who is going to chicken out first and why? In the simplest form of the game, it is not possible to know who will chicken out first; in fact, it is possible that both characters are equally likely to chicken out.

We have adapted this game to the cases under analysis according to the principle of parsimony, although other initial conditions and details can be added for more complex studies (DeCanio and Fremstad 2013). For this paper, we apply a 2x2-order game. In more abstract terms, we assume that there are two constellations of actors. Both actors have incentives to turn in order to avoid the worst position, which would result from deciding to continue to speed ahead (Table 1, bottom right). The best possible solution is for both of them to turn at the same time, which would lead to the highest amount of satisfaction (Table 1, top left). However, this solution is not stable, as each driver is tempted to go just a little further than the other, a scenario that would lead to one of the equilibrium positions (Table 1, top right or bottom left). Both of these positions are second-best to the optimal solution of both turning at the same time (see the cases for an example). These second-best equilibrium solutions are the stable solutions because they mean the actors do not have incentives to go just a little further than the other since it would be dangerous to adopt the worst solution.

**Table 1. Chicken Game Payoff**

	Turn		Speed	
Turn		3		4
	3		0	
Speed		0		-1
	4		-1	

*Source:* Authors' adaptation of Robinson and Goforth (2005) and DeCanio and Fremstad (2013).

In fact, this game has two stable solutions (top right or bottom left). However, one can extend the game to make it more interesting. One can assume that the drivers are able to rip off their steering wheel in such a way that they cannot turn (Rapoport and Cammah 1965), making credible the threat that they are not going to chicken out. The one who makes this threat in the most convincing way will win, because the other player is going to be afraid of turning to avoid the worst solution. Ultimately, each player should always follow the contrary strategy of the opponent in order to improve the output. This represents the “conditional choice” of the game, while the well-known model of the prisoner’s dilemma proposes an unconditional

strategy (Rapoport and Cammah 1965). This “conditional choice” is the necessary requirement for using the chicken game as a model here. It is relevant because traditional models assume the fixed and individual character of the preferences, an assumption that is not necessary in the chicken game (Stirling and Felin 2013) because one actor influences the preferences of the other. The key argument regarding the chicken game is that actors have to follow the strategy of the opponent to improve the outcome for themselves. Such a confrontation is based on the use of threats (e.g. disable the steering wheel) to avoid the most adverse fate. This is different from the prisoner’s dilemma game, where all actors decide on a second-best option that adheres to the same strategy (defeat) since the best option is too risky.

In the chicken game, both actor constellations have incentives to “turn” in order to avoid the disaster that would result from continuing to speed ahead (the bottom-right solution in Table 2), which we call “business as usual.” The best possible solution is to turn at the same time, or reach a compromise, which leads to the highest level of satisfaction (top left). However, this solution is not stable, as each actor is tempted to go, or to carry out business as usual, just a little longer than the other actor. As such, they do not take either the optimal position (top left) or the worst one (bottom right); they take one of the two that are second-best (bottom left or top right) to the optimal solution, but better than the worst decision (bottom right).

Occasionally, international actors and network efforts have succeeded in persuading states in favour of international environmental cooperation. However, as we have argued, in the short term the optimal strategy for the actors is to reduce their own capacity for action, meaning that the most credible threat, using game-theory terminology, is to “disable the steering wheel.” In this analysis, the definition of “disabling the steering wheel” (Kahn 2009) is as follows: actors actively restrict their capacity for action in order to obtain a better negotiating position vis-à-vis other actors.

In this paper, climate change mitigation refers to the reduction of anthropogenic greenhouse gas (GHG) emissions. The use of low-emission energy sources, emissions reduction through carbon markets, and climate engineering represent typical examples of mitigation. For our research cases (Brazilian bioethanol, Costa Rican renewable energy, and Colombia’s clean development mechanism), we analysed two typical sources of mitigation strategies and one mechanism to promote projects to further sustainable development.

The first case study analysed the bioethanol sector as a mitigation strategy in Brazil. The overall impact of biofuels, including their impact on climate change, has been discussed in the UNFCCC fora. The role of biofuels is important in Brazil’s overall climate change governance as they contribute to the reduction of GHG emissions in the country by replacing fossil fuel derived energy sources (UNFCCC 2008). Several studies support the idea that one of the most relevant features of sugarcane bioethanol is its contribution to climate change mitigation (CONCAWE 2007; ESMAP 2005; IPCC 2008). Thus, the benefits of bioethanol compensate for the environmental costs of its production.

Costa Rica's goal of achieving carbon neutrality in the next decade is another mitigation strategy. Some studies have proposed that it is possible for a country to be carbon neutral through the offsetting of carbon emissions and the implementation of clean-energy strategies (Evans 1999; Zimmerer 2011); solar, geothermal, wind energy, biomass, and small hydroelectric projects are alternative sources of renewable power (MINAET 2009). At the same time, Costa Rica's governments have encouraged the country's citizens to use decentralised solar power systems and energy-saving devices for domestic and industrial use (Nandwani 2006). This mitigation policy in Costa Rica is the second case study.

Our third case study focuses on the clean development mechanism (CDM), which was introduced as part of the 1997 Kyoto Protocol. Basically, this mechanism allows industrialised countries to trade emissions with emission-reduction projects in developing countries that promote sustainable development (UNFCCC 2008). Although Colombia is not among the countries obliged to reduce emissions, Colombian enterprises have developed CDM projects (Cadena and Haurie 2001; Volcovici 2011). These projects have been financed by the Colombian government and are also going to be funded by the sale of carbon credits.

### 3 Analysis of the Cases

This study hypothesises that the national and international actor constellations play a chicken game with regard to decisions to either "turn" and compromise or "speed up" and continue with business as usual. To illustrate this, the study adopts the comparative approach known as the most dissimilar cases method (Sartori 1994). With this method, the variables are divided into dependent and independent variables. The dependent variables are the policies that Brazil, Costa Rica, and Colombia have established as market-oriented climate change mitigation strategies. The actors, actor constellations, modes of interaction, games, and institutional settings are the independent variables.

Comparative methods have been used for a long time in social science investigations. They are based on the logic of selecting the "most similar cases" or the "most dissimilar cases" (Collier 1993; Sartori 1991; 1994). Under the former approach, the most similar cases are selected and the different outputs are analysed as a function of the differences between the cases (Collier 1993; Pzerowski 1987). Under the latter approach, cases are selected that differ from each other but produce the same output. We use the most dissimilar cases logic.

Using this comparative methodology of dissimilar cases, we explain how the three cases in our study differ and which independent variable best explains the outcome in the form of mitigation strategies. Each of the three countries has a long-standing tradition of carbon mitigation policies and illustrates one typical type of mitigation strategy. Although the countries differ in terms of most of their fundamental characteristics (including size, political organisation, forms of mitigation, etc.), they do demonstrate a similar mode of interaction with other national and international actors in implementing their mitigation strategies.

At the same time, we find that in all three cases the relationship between the actor constellations and the modes of interaction follows the “disabling the steering wheel” logic – which we refer to as the “game.” The different constellations of actors play in a similar way, even though all the other variables are different. What is interesting is that for all actors the optimal strategy is to reduce their own capacity for action, meaning that the most credible threat is to “disable the steering wheel.” This strategy justifies Brazil’s increasing investment in research and development within its bioethanol sector, the limited development of renewable energy alternatives in Costa Rica, and the under-utilisation of CDM markets in Colombia as climate change mitigation strategies.

### ***3.1 Case A: Brazil’s Increasing Investment in Bioethanol***

Brazil’s bioethanol sector, an offshoot of the sugarcane industry, has received increasing support from the Brazilian government as part of a national strategic development plan for a sustainable future, the reduction of CO<sub>2</sub> emissions, and energy security (BNDES and CGEE 2008). More than anything, as Goldemberg (2013) points out, ethanol in Brazil has been seen as an instrument of national independence. Worldwide, the increased use of petroleum, together with concerns about climate change, has led to demands for the reduction of CO<sub>2</sub> emissions and for alternative energy sources not based on fossil fuels. Brazil considers bioethanol to be a potential means of meeting these demands. However, although Brazil, like the European Union, has adopted various policies designed to stimulate and support the biofuel industry (BNDES and CGEE 2008; Bomb et al. 2007: 2258), the numerous criticisms of biofuels from policymakers and environmental institutions worldwide have acted as an important constraint in the market (Vadrot and Pohoryles 2010).

#### *3.1.1 The Game*

From the perspective of the chicken game, the Brazilian government’s heavy investment in bioethanol can be interpreted as an attempt to “disable the steering wheel” in order to further the development of the industry. There is a lack of agreement between the actor constellation at the national level, which wants to expand the national sector and promote an international market (BNDES and CGEE 2008; MAPA 2006), and the international actor constellation, which has recently emphasised its opposition to the sector mainly due to concerns related to land use and food security (Vadrot and Pohoryles 2010). The international actors are unable to put much pressure on this sector in Brazil through sanctions against it, as the national industry is successful and quite independent from the international market. There is thus a political, economic, and environmental dilemma within the institutional setting of the Brazilian bioethanol industry.

### 3.1.2 *Actor Constellation and Modes of Interaction*

Brazil's massive bioethanol industry is made up of ethanol producers (the sugarcane industry), technology developers upstream in the value chain (biotechnology companies and crop technology developers for machinery, land use, and agricultural solutions) and downstream in the chain (flex-fuel vehicles and fuel-storage and distribution-technology developers), energy multinationals (biomass importers and exporters, financiers, and consultancies), sustainability certifiers, and aviation and automotive companies. Environmental groups are also involved. At the international level, governments, policymakers, multinationals, environmental groups, and civil society are the main players. These international actors – especially governments, policymakers, and environmental institutions – have criticised the production of biofuels worldwide in relation to a range of issues including land use and availability, the environmental consequences, fuel versus food, the monoculture regime, water, deforestation, and so forth (Berndes et al. 2003; Goldemberg et al. 2008; Vadrot and Pohoryles 2010). Brazilian bioethanol remains the subject of heated debate between national and international constellations. In addition, there is a lack of agreement among the international actors involved due to their differing priorities and economic, scientific, and environmental opinions on the development of an international biofuels market: “it is difficult to make a conclusive judgment on this issue. There is widespread disagreement among experts” (Vadrot and Pohoryles 2010: 362).

### 3.1.3 *Policy Output*

By supporting the sector in spite of international criticism, Brazil has been “disabling the steering wheel” with regard to its bioethanol industry. This can be observed via a number of collaborative initiatives between the government, universities, autonomous research institutes, environmental groups, and the private sector to promote technology development and innovation in the industry (Nyko et al. 2010; Sorda et al. 2010). Evidence of the great amount of bioethanol technology developed in Brazil through the cooperation of different actors includes the impressive productivity gains of 3 per cent per year over the last 30 years, a 51 per cent increase in agriculture productivity for sugarcane in different regions of Brazil between 1977 and 2009 (Goldemberg 2013), and the second-generation technologies that are currently under development: “over the past 10 years, investments in R&D in this area have been massive” (do Lago et al. 2012: 2). Although biofuels are viewed with great concern outside the country, Brazil offers numerous incentives for the development of its bioethanol industry, including fuel production and consumption based heavily on this biofuel. This demonstrates the country's autonomy and sovereignty when it comes to its energy sector and national priorities.

## 3.2 *Case B: Costa Rica and Sustainable Renewable Energy*

In early 2007, Costa Rica announced its plan to achieve carbon neutrality by 2021, primarily as a commitment to offset, reduce, and/or avoid domestically generated carbon emissions, and also as part of its goal of becoming the first carbon-neutral economy in the world

(MINAET 2009). Of all possible sectors, the electricity subsector is the most likely, technically, to become carbon neutral, given that nearly 90 per cent of the electricity in Costa Rica is currently generated from renewable sources, with 80 per cent generated by hydropower. The construction of large hydroelectric projects or dams is foreseen as the main strategy for reaching carbon neutrality by 2021 (MINAET 2010). It must be noted that this carbon-neutrality approach involves energy-supply risks, environmental problems, and social conflicts that compromise its sustainability in the long term, as Carls and Haffar (2010) and Beck and Martinot (2004) have pointed out.

### 3.2.1 *The Game*

In the case of Costa Rica, the country is restricting its potential for action by under-utilising the potential of alternative technologies in electricity production. As part of the carbon-neutrality initiative, energy and environmental authorities have committed to ecological land use, which means increasing a given area's potential to fix carbon (planting trees) or preserving natural carbon stocks (forests, soil threatened by destruction), rather than a clear strategy for the introduction of alternative renewable energy sources. In terms of renewable energy technologies, larger hydroelectric dams and other projects that threaten the ecological balance in river basins and natural protected areas prevail. Even though Costa Rica has demonstrated good performance in starting renewable energy projects, the funds for their implementation are scarce. Although the international actor constellation has access to the profitable international financial market, it is reluctant to subsidise or finance sustainable renewable energy projects that require new technologies (Hein et al. 2011; de Lemos 2006; Suding 1996). In terms of the game, the international actors are employing the "disable the steering wheel" strategy by limiting financing and thus impeding the introduction of alternative renewable technologies. Eventually, the national actor constellation will also disable the steering wheel, affirming a future commitment to large hydropower projects as long as the cost of the alternatives does not decrease. The chicken game will thus result in limited financial resources for sustainable renewable energy options.

### 3.2.2 *Actor Constellation and Modes of Interaction*

Costa Rica's national actor constellation is made up of the Ministry of Environment, Energy and Telecommunications, electricity producers (public and private), electricity consumers, and environmental and indigenous organisations. The international actor constellation comprises multilateral banks and international financial organisations, such as the World Bank and the Regional Development Bank, together with development cooperation and advocacy groups, such as the United Nations Development Programme (UNDP) and the Energy and Environment Partnership Central America (EEP). Both constellations recognise that support for conservation and sustainable renewable energy is the best strategy for achieving a low-carbon society. For instance, the rural electrification projects supported by the UNDP and a



pilot project of the main electricity provider and the Costa Rican government have encouraged citizens to utilise decentralised solar power systems and energy-saving devices for domestic and industrial use (Arias 2013; Fajardo and Rodríguez 2011). However, the cost of renewable energy sources is still high and the majority of funds from international financial organisations are directed to large hydroelectric dams (ICE 2009). The under-utilisation of new technologies – or the prevalence of hydropower – remains the stable equilibrium.

### 3.2.3 *Policy Output*

The last few decades have seen continued growth in Costa Rica's conventional energy capacity, particularly larger hydroelectric projects (ICE 2009). The payoffs of the game have led to two possible strategies, with the danger being that Costa Rica may follow the cheapest options for energy production – large hydroelectric projects or fossil fuel sources – while international institutions continue to impose restrictions and financial conditions, thus leading to less mitigation. Governments and global organisations that sanctioned protected-area conservation in the 1990s today face challenges in the form of constraints to further energy development in natural protected areas and indigenous territories (Durán 2012). Both trends in energy production and natural conservation represent a challenge not only to carbon neutrality but also to “Costa Rica's long-standing image and nearly iconic status as a conservationist green republic” (Zimmerer 2011: 93) and could constrain more complex pathways of protected areas and interactions of the protected areas with land use and resource development (Evans 1999).

## 3.3 *Case C: Colombia and the Clean Development Mechanism (CDM)*

The clean development mechanism (CDM) was introduced as part of the 1997 Kyoto Protocol, which imposed reduction targets on polluter countries (Grubb 2003). Although Colombia was not one of the countries required to reduce emissions, the national actors wanted to develop CDM markets (Cadena and Haurie 2001; Volcovici 2011). Even though the country has put much effort into doing so, it has not been able to obtain the support of international bodies (part of the international constellation) when it comes to the approval of projects. The number of approvals has been very limited – as of 2011 20 per cent of 157 projects had been approved, with 6 per cent of them producing carbon credits – and problems and methodological critiques have abounded (Volcovici 2011). As Flues et al. (2010) argue in their analysis of CDM Executive Board decisions, these problems have not just been technical in nature but also political. For example, the nationality of employees may influence the approval process.

### 3.3.1 *The Game*

The chicken game is evident between the national actor constellation (national authorities, foundations, and employers' associations) and the international actor constellation (UNFCCC). The national authority approves the projects and the government makes efforts to strengthen the mechanism's credibility and attract new projects, but the latter have had a

low rate of approval at the international level. The international constellation controls access to the profitable CDM market, and the key barrier to approval is the “additionality requirement” (Volcovici 2011; Sheinbaum et al. 2011) that each project must meet before a CDM is issued. The potential emitter must prove that (1) the project is not part of a future state investment plan or government policy plan and that (2) the emitter will be able to implement the project with the financial benefit resulting from the monetary value of the CDM (Cadena and Haurie 2001; Flues et al. 2010). Thus, the system creates an incentive for the government to hold back aid for certain sectors and to wait to make the projects eligible for CDM in the future, when low-carbon needs are more pressing and reductions are better rewarded (Sheinbaum et al. 2011). The result has been that the Colombian national constellation has saved those projects with the highest mitigation potential for the future, disabling the steering wheel by under-utilising Colombia's mitigation capacity.

### 3.3.2 *Actor Constellation and Modes of Interaction*

The actors are divided into two groups. The first is the national actor constellation, made up of the Ministry of Environment and Sustainable Development, pro-market interest groups in the form of foundations (like Fundación Natura, CAEMA Colombia), and employers' associations (such as Consejo Empresarial Colombiano para el Desarrollo Sostenible [CECODES]). The second group, the international actor constellation, consists of the UNFCCC, the United Nations institution in charge of issuing CDM allowances. For a review of the decision-making process, see Flues et al. (2010).

### 3.3.3 *Policy Output*

As with the other cases, the Colombian national constellation is “disabling the steering wheel.” Because the international constellation has made the approval process for CDMs more difficult, the national constellation has been postponing projects for the future, when the need for CO<sub>2</sub> reductions will be more urgent and therefore more profitable. The conflict has thus been shaped by the interaction between the national and international constellations with regard to access to the CDM market (Volcovici 2011).

## 4 **Discussion: Bringing the Cases Together**

The chicken game explains a substantial part of the policy output in the form of mitigation strategies (Brazilian bioethanol, Costa Rican renewable energy, and Colombia's clean development mechanism). The two types of actor constellations are, on the one side, the Latin American national constellations and, on the other side, the international constellation, made up of international organisations and foreign governments. Each national actor constellation is made up of the government and private actors such as companies, non-governmental organisations, and foundations, which normally act together with the government. The interna-

tional constellation includes institutions that deal with the environment, such as the United Nations Environment Programme (UNEP), as well as foreign foundations, foreign governments, and policymakers. Both types of constellation have incentives to “turn” in order to avoid the disaster that will result from continuing to speed ahead (the bottom-right solution in Table 2), which we will call “business as usual.” As already discussed, the best possible solution would be to turn at the same time, or reach a compromise, leading to the highest amount of satisfaction (top left). However, this solution is not stable, as each actor is tempted to go, or to carry out business as usual, just a little longer than the other actor. As such, they do not take either of the equilibrium positions (top right or bottom left).

The two equilibrium solutions of the game offer the theoretical explanation for how Brazil, Costa Rica, and Colombia have come to decide on their strategic initiatives concerning sustainability. As in the original game, extending the game – by allowing the drivers to rip off the steering wheel such that they cannot turn, or reverse their policies, thereby making credible the threat that they are not going to chicken out (Rapoport and Chamamah 1965) – has more explanatory power. The actors could go ahead with their criticised projects, as in the Brazilian case, or they could slow down their mitigating strategies, as in the cases of Costa Rica and Colombia. The difference between these cases and the original game is that each actor utilises the “disabling the steering wheel” strategy in a different way.

This explanation is based on the assumption that Latin American countries have the capacity for mitigation and recognise the need for emissions reduction as an opportunity for development in the region. For the Latin American governments, “disabling the steering wheel” means stopping any mitigation projects and keeping them as assets as long as the international organisations do not widen their criteria for entry to the profitable market of compulsory emissions reduction. This is why we call their approach of reducing or suppressing innovation in mitigation strategies “business as usual.” Proceeding with criticised projects, as in the case of bioethanol in Brazil, is another form of business as usual.

Another important assumption of this paper is that international organisations have the power to provide access to the financing of mitigation strategies but do not want to subsidise an industry or a government initiative. Furthermore, they impose an additional condition, in the form of the “additionality requirement” (Sheinbaum et al. 2011), on Costa Rica and Colombia. It is also assumed that both the national and international actor constellations are homogeneous groups with convergent positions within every constellation. However, we are aware that there are differences, for example, between national governments' positions and those of environmental or indigenous organisations regarding the expansion of renewable energy projects such as dams or bioenergy crops.

The results of the game lead to the two-corner resolution of the game, with the danger being that the national constellation limits its capacity for reduction while waiting for an increase in the price of mitigation, while the international constellation hangs onto its right to buy compulsory global CO<sub>2</sub> reductions in a world that is mitigating less than possible or

necessary (Table 2, bottom right). National authorities want to use their mitigation initiatives as leverage for development (subsidies), while international organisations do not want to subsidise these projects, as the “additionality requirement” shows (Flues et al. 2010). If both drivers threaten to rip off the steering wheel, the one who does it in the most credible way wins. In other words, by reducing the possibility of compromise each actor only attains a second-best solution.

**Table 2. Chicken Game Payoff for Mitigation Strategies**

	Compromise		BAU*	
Compromise		3		4
	3		0	
BAU*		0		-1
	4		-1	

*Source:* Authors' adaptation of DeCanio and Fremstad (2013).

*Note:* \*Business as usual.

The analysis of the cases reveals that the strategy of “disabling the steering wheel,” according to which a country actively restricts its capacity for action so as to achieve a better negotiating position vis-à-vis international actors, is present in all three cases. Differences exist at the level of the constellations (in Costa Rica, for example, UNEP and the banks play an important role) and in terms of the problem addressed (namely, Brazil's increasing investment in its bioethanol industry, the prevalence of hydropower in Costa Rica, and the failure of the CDM markets in Colombia). The conflict, however, exists at the same level: between the national and international actor constellations. Table 3 summarises the cases.

**Table 3. Summary of the Cases**

	Brazil	Costa Rica	Colombia
Case	Bioethanol	Sustainable renewable energy	CDM markets
Game	Disabling the steering wheel through heavy investment in research and development	Disabling the steering wheel in energy policy by affirming future commitment to large-scale hydro projects	Disabling the steering wheel through under-utilisation of mitigation potential
Actors, Constellations, and Modes of interaction	National constellation has strong commitment and incentives from different players to develop bioethanol, while international actors are reinforcing their criticisms of the sector.	National constellation wants to achieve carbon neutrality at a lower cost, while international actors are limiting financing, thus creating barriers to the use of alternative renewable technologies.	National constellation is committed to the market, while international actors are narrowing the CDM approval processes.
Policy Output	Increasing investment in bioethanol	Prevalence of hydropower	Under-utilisation of mitigation investments

## 5 Conclusion

Our findings show that Brazil's increasing investment in its bioethanol industry, the limited development of alternative sources of renewable energy in Costa Rica, and the under-utilisation of the clean development mechanism markets in Colombia all correspond with the chicken game's "disabling the steering wheel" strategy. When using this strategy, actors actively restrict their capacity for action in order to obtain a better negotiating position vis-à-vis other actors. The study has used the "most dissimilar cases" method of comparison to connect three instances of climate change mitigation in Latin America: bioethanol in Brazil, renewable energy in Costa Rica, and the clean development mechanism in Colombia (a large, a small, and a middle-size country). This paper follows the logic of game theory and the actor centred institutionalism framework to answer the question of how Brazil, Costa Rica, and Colombia came to decide on their climate change mitigation strategies, which are based on market-oriented policies.

Although the "steering wheel" strategy is manifested in different ways in each country, what is similar in all three cases is the tendency for the actors to signal their commitment to continue acting in line with their past behaviour. Brazil has been "disabling the steering wheel" with regard to its bioethanol industry by supporting the sector in spite of international criticism. Costa Rica is disabling the steering wheel by affirming a future commitment to carbon neutrality through large-scale hydropower projects in response to limited financing for projects using other types of renewable energy. By postponing its CDM projects until a time in the future when the need for CO<sub>2</sub> reductions is more urgent and therefore more profitable, Colombia is also applying the above-mentioned game strategy.

This means that the more the international actors disagree with how mitigation projects are being developed in Latin America and the longer it takes for national and international actors to reach a consensus on mitigation, the less likely it is that the countries studied here will stop and/or alter their current mitigation strategies. The short-term solution to these dilemmas is summed up by the game theory as a corner solution signalling increased investment in bioethanol, the prevalence of large hydroelectric projects, and the under-utilisation of mitigation investments. A high level of convergence exists among these countries in terms of their engagement within the overall global climate change framework and their mitigation goals. Therefore, it may still be possible for the national and international actors involved in the mitigation attempts in Brazil, Costa Rica, and Colombia to find common ground and to move towards a low-carbon economy.

Our empirical evidence shows that the three countries differ with regard to most variables – for example, population or industrial development – but are similar in terms of their conflicts with the international actor constellations, as all three have chosen to adopt the "disabling the steering wheel" strategy. Although most actors (in the national and the international constellations) agree on the overall goal of fostering sustainability and reducing CO<sub>2</sub> emissions by investing in mitigation initiatives such as an increased share of alternative types

of renewable energy, they have not yet reached a consensus regarding the best strategy for achieving carbon neutrality and sustainable development. Neither traditional financial and market measures nor innovative instruments such as the CDM are enough to bridge the gap between the national and international actor constellations in the cases analysed here.

Our results highlight the importance of balancing national and international interests when mitigating climate change impacts and reinforce the fact that central to the debate is not only an environmental problem but also, and mainly, a political problem. National actors have far more complex identities and more ambivalence regarding the climate change framework than international institutions assume (e.g. UNFCCC, Intergovernmental Panel on Climate Change, International Monetary Fund, World Bank, and networks of experts). A foundation of mutual interest and agreement such as that illustrated by the payoffs of the chicken game has yet to be reached; such a compromise solution would optimise the global benefits. Our three cases show that sustainability criteria, not only regarding CO<sub>2</sub> mitigation but also with respect to land use, indigenous rights, or environmental conservation, can be overshadowed by the international and national actors. According to our findings, actors are likely to move away from the compromise solution when the international actor constellation decides to follow a more restricted approach, thus unintentionally reinforcing national policy goals (increased bioenergy crops, the achievement of carbon neutrality using conventional electricity technologies, or the postponement of mitigation projects). Since the national and international actors' capabilities, as well as the components of their respective policies, are different, both parties signal disagreement with the mitigation strategy by reducing their own capacity for action – meaning that they adopt the strategy of “speeding” or “disabling the steering wheel” as the most credible threat.

The methodological approach applied in this study and the actual debate analysed have brought the three empirical cases together within the framework of a common research question. The most dissimilar cases method assumes that almost all of the observed and unobserved variables exhibit differences. In the cases under analysis, the modes of interaction between the actors in the three different cases converge in one strategy: signalling commitment to action in line with past behaviour. This represents a great challenge to the forthcoming 21st Conference of Parties of the UNFCCC in the achievement a new climate agreement in 2015 (Paris) and demonstrates the relevance of the ongoing debate.

To that end, further research could focus on investigating the same cases using different variables, analysing other countries on the continent to assess whether or not the data is similar, applying the same game model in other comparative studies in the region, and assessing the extent to which local communities are incorporated into project decision-making. The results of this paper are in accordance with the literature on multilevel conflict among actors, public choice theory on bureaucracy (Niskanen 1971) or the principal–agent problem (Vaubel 2006). In addition, the methodology used here could be applied to other cases with other policy outputs.

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