From green to black emissions in Brazil?: The energy policy transition of an emerging oil exporter

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Abstract
Energy security and self-sufficiency have been the main goals in Brazilian energy politics for decades. This has resulted in massive investments in hydropower and biofuels to decrease the country’s dependence on imported oil and gas. The renewable energy matrix has given Brazil a climate-friendly reputation internationally. The country’s active participation in international climate negotiations and the past decade’s successful reductions in emissions from deforestation caused optimism among Brazilian environmentalists. However, with escalating offshore petroleum production Brazil is now almost self-sufficient with oil, and Brazilian fossil fuel emissions are increasing. At the same time the causal relationship between traditional hydropower and deforestation causes environmental concerns. New, conflicting interests between climate and energy policies are emerging. This paper explores how the changing energy situation in Brazil influences the drivers and barriers of domestic climate and energy policies. Employing the advocacy coalition framework for policy change analysis, the paper analyses how a climate change advocacy coalition has tried to change energy policies in Brazil through entering the previously closed energy policy subsystem. The analysis contributes to explaining why the supply of low-carbon policy solutions has been weaker in the energy sector than in other emission sectors in Brazil and discusses the political feasibility of increased mitigation of energy emissions towards 2020.

Paper presented at the FLACSO-ISA joint international conference
23-25 July 2014, Buenos Aires

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1 Introduction

Few countries are associated with as many environment and climate related issues as Brazil. Since before the Rio Summit in 1992 the Amazon rain forest, with its known and yet unknown ecosystem services, has been a symbol of all that is at stake if human development continues without consideration of environmental and climate effects. Renewable energy development with hydropower and biofuels gave Brazil a clean reputation among environmentalist, but when deforestation was converted to CO₂ emissions and entered the greenhouse gas (GHG) accounting at the beginning of the 2000s, Brazil’s aggregate GHG emissions tripled and drew domestic and international attention to Brazilian mitigation politics.

National focus on deforestation and implementation of forest regulations led to large reductions in deforestation and emissions between 2004 and 2012, and the Brazilian government could again raise its voice as a low-carbon economy. Meanwhile however, emissions from the energy sector in Brazil have grown steadily and the growth is expected to increment after 2020, with a tripling of energy emissions by 2030 if energy policy priorities are not changed (La Rovere et al. 2013). The self-image of a low-carbon energy nation is challenged.

Following Sabatier’s (1988) advocacy coalition framework this paper studies climate and energy policymaking through analysing the policy subsystems of climate change and energy in Brazil. In climate policymaking worldwide, the energy sector is the main target of mitigation measures and in many countries the climate change and energy policy subsystems have been intertwined for years. The Brazilian case is different; the overlap between the two policy areas has been limited since climate change advocacy coalitions have concentrated mainly on deforestation and land-use change. Recent research on energy emission trajectories and possibilities for new renewable energy solutions in Brazil challenges the core concerns in the energy subsystem, as a demand for energy policy change is emerging within the climate change subsystem. Current energy policy decisions have a large impact on Brazil’s post-2020 emissions, and a policy change towards prioritising low-carbon energy solutions will be necessary if Brazil wants to keep the image of a low-carbon economy.

Mitigation in the energy sector is relatively cheaper and easier in Brazil compared to other countries, but there is so far little research on why Brazil lags behind other countries in prioritising low-carbon energy solutions. In this paper I explore how a climate change advocacy coalition has tried to change energy policies in Brazil through entering the until now closed energy policy subsystem. Through analysis of climate and energy advocacy coalitions in Brazil this paper traces the inter-connection of climate and energy policy processes and analyses the political feasibility of mitigation of energy emissions towards 2020.
This paper is structured as follows. Section 2 outlines the analytical framework and section 3 gives a short overview of Brazilian climate and energy data. Section 4 presents the analysis and findings, and the conclusion is presented in section 5.

2 Advocacy coalition framework

Following Underdal (2000), I assume that there are some generic forces that can be found in policy processes across political systems and regime types. Policymaking is essentially a choice between policy change and status quo. But policy changes depend on a demand for change; sufficient support is needed in order to place the policy change on the political agenda. Policymakers then decide whether to supply a change or to keep the status quo (Underdal 2000:60). Demand and supply of policy change is however not a one-way process where demand necessarily leads to supply. Each political system have regulations and practices for channelling societal policy demand to decision-makers, but demand for policy change can also come from decision-makers themselves or from the administrative apparatus that implement political decisions.

What determines demand and supply in the Brazilian context? Hochstetler and Keck (2007:19) emphasise the importance of networks in Brazilian politics; networks of organisations and individuals connect with policymakers and aim to push their agenda through the political channels and get inside-information from politicians and bureaucrats. The networks are described as “complex interactions among formal and informal processes, between actors in the state and those in civil society organizations, and among people working in different parts of the state bureaucracy” (Hochstetler and Keck 2007:228).

For a systematic analysis of the networks within energy policymaking in Brazil I use Sabatier’s (1988) advocacy coalition framework (ACF). I find this framework useful in the Brazilian context since it takes into account the mixture of formal and informal policymakers and how these form coalitions based on core beliefs. Sabatier (1988) argues that to understand policy change one needs to have a time perspective of at least a decade. This study analyses the link between climate and energy policy in Brazil from Lula da Silva’s first government in 2002 to the current government of Dilma Rousseff and the likely policy trajectories towards 2020.

Instead of focusing on one political institution or one policy in analysing policy development, ACF sees the policy subsystems as the most useful units of analysis. “A subsystem consists of actors from a variety of public and private organizations who are actively concerned with a policy problem or issue, such as agriculture, and who regularly seek to influence public policy in that domain” (Sabatier 1998:99). Within each subsystem actors are grouped in advocacy coalitions depending on their core
beliefs. In addition to sharing normative and causal beliefs, the members of the advocacy coalition engage in “a non-trivial degree of co-ordinated activity over time” (Sabatier 1998:103). Each subsystem normally has one to four advocacy coalitions.

ACF was originally a response to the focus on “iron triangles” in the literature on public policymaking; the iron triangle framework was seen as too narrow to include all the important actors in policy processes (Sabatier 1988). Iron triangles refer to highly institutionalised subsystems where the actors have a high degree of converging interests, decision-making processes are closed and the opportunities for outsiders to participate in policymaking are few (Kjellberg and Reitan 1995:77).

In addition to core beliefs the actors in an advocacy coalition have beliefs on secondary aspects of the policy, these secondary beliefs are easier to change through information and learning than the core beliefs. Within an advocacy coalition there is usually more room for disagreement on secondary aspects than on core beliefs (Sabatier 1988). Major changes in the core of governmental policy programs are infrequent; most policy changes are in the secondary aspects, such as introducing new implementation measures and budgetary allocations (Sabatier 1998). Where advocacy coalitions are in conflict over policy development, Sabatier (1988:133) argues that policy brokers mediate between coalitions to find a reasonable compromise. Policy brokers are mainly interested in reducing conflict and getting a policy decision.

The findings and analyses in this paper are based on data from field work in Brazil between August 2013 and February 2014, including twenty interviews with key informants and participant observation of climate policy debates, as well as available documents and previous research1.

2.1 The advocacy coalition framework and climate change

Using ACF is especially interesting when it comes to climate change mitigation policy since this policy area is relatively new in many countries and is more on top of than in addition to other policy areas. Most countries already had energy policies, industry policies, forest policies etc. before climate change mitigation was added to the domestic political agenda. Depending on which sector that produces GHG emissions, mitigation policies will be within the policy sector where emissions are; there is no climate change mitigation without policy change in other subsystems. The energy policy subsystem was already well-established in Brazil before the climate change advocacy coalition emerged.

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1 Since the paper is still a draft the interviewees are anonymised at this stage, full consent to use names and quotes will be requested before publication. I am very grateful to all my informants for finding time in their busy schedules to meet me and share their experiences, thoughts and information.
The advocacy coalition framework has been used to analyse several energy and climate policy processes in developed countries, mainly the United States and Europe (see Sabatier 1998:100-101 for an overview). It is not immediately evident that the same framework will be useful in a developing country context, but Stensdal’s (2014) successful use of ACF in analysing Chinese climate policy shows that the framework is applicable across regimes and political systems.

ACF’s focus on policy development over time, coalitions between civil society and formal decision-makers, policy brokers, and policy-oriented learning within coalitions is in accordance with the findings in previous studies of drivers and barriers in Brazilian climate politics (e.g. Hochstetler and Keck 2007, Carvalho 2010, Hochstetler and Viola 2012).

According to Hochstetler and Keck (2007) an analysis of policymaking in Brazil needs to take into account that the policy process continues after the policy decision has been made. The involved actors have to keep their demand through the processes of follow-up and implementation “because the completion of one stage [in the policy process] does not guarantee progression to the next” (Hochstetler and Keck 2007:18).

Studies by Carvalho (2010), Hochstetler and Viola (2012), and Viola and Franchini (2012) show how a climate change advocacy coalition was important for the policy change towards higher focus on policy implementation to reduce deforestation in Brazil from 2004, and the adoption of a climate law in 2009. Although they do not use ACF in their analyses, they all point to the alliance of NGOs, scientists, bureaucrats and politicians in the Ministry of Environment (MMA), and green congress representatives as the main driving force behind the climate policy changes.

Despite the climate change advocacy coalition’s success in achieving a major policy change through the climate law, the focus on mitigation in the energy sector that was originally included in the law, was later vetoed by the president when he signed the law. So far there has been little research on the drivers behind these vetoes and what they mean for current climate policy development and the possibility for future mitigation in the energy sector. By using ACF in analysing the demand for climate and energy policy I explain why the supply of low-carbon policy solutions has been weaker in the energy sector than in other emission sectors in Brazil.

2.2 External factors

Several external factors influence policymaking in the subsystems. The ACF model differentiates between external system parameters and external system events. External system parameters are expected to be stable and slow-changing and are summed up to be 1) basic attributions of the problem area (good), 2) basic distribution of natural resources, 3) fundamental sociocultural values
and social structure, and 4) basic constitutional structure (rules). External system events are 1) changes in socioeconomic conditions, 2) changes in public opinion, 3) changes in systemic governing coalition, and 4) policy decisions and impacts from other subsystems (Sabatier 1998:102).

The Brazilian political system of “presidentialism by coalition” has some basic constitutional structures and practices that regulate demand and supply of policy (Santos and Pegurier 2011). Sabatier (1998:120) outlines differences found between separation of power systems and parliamentary systems in applied ACF research.

Brazil has a mixture of these systems. On the one hand Brazil has tripartite separation of power through the senate and the chamber of deputies in congress and the directly elected president. On the other hand the congress has representatives from more than 20 political parties and the president needs to negotiate and get support from a coalition of parties to gain majority. Brazilian policymaking is judicialised and dominated by law-making that binds consecutive governments, like in the United States, but Brazilian laws are often “framework laws” that are followed up by decrees and policy programs from the government, like in parliamentary coalition systems (Sabatier 1998:120).

The climate policy process is an example of how the policy process has several stages and documents of different legal status. The climate law in 2009 was a follow-up of the national climate change plan from 2008. In 2010 President Lula issued a decree outlining sectorial plans for implementation of the climate law. The sectorial plans were then written in the relevant policy subsystems for each sector.

3 Brazilian climate and energy data
3.1 Greenhouse gas emissions
As seen in figure 1 Brazilian greenhouse gas emissions² have decreased dramatically with the reductions in deforestation. After two decades of peak years, deforestation is now down to one third of the emissions. Energy emissions have more than doubled the past twenty years and energy is the fastest growing emissions source.

² Scientists are uncertain and disagree on how to best measure and report emissions from agriculture and deforestation. In this chapter I use the emissions data presented by SEEG where other GHGs are translated to CO₂ equivalents based on global warming potential. The Brazilian Government’s has not published official data after 2010, so I use SEEG to get recently updated emissions data from all sectors. All SEEG data are available online through URL: [http://seeg.observatoriodoclima.eco.br/](http://seeg.observatoriodoclima.eco.br/) [accessed 10 July 2014]
Brazil is the world’s fifth largest country and there are large differences between Brazilian regions, cities and rural areas. Full energy supply is a political goal and Brazil has more natural energy resources than most other countries. However, the vast differences between the scale and infrastructure needed to supply enough energy to megacities such as São Paulo, and the long-distance infrastructure needed to transport affordable electricity to remote Amazon areas, makes energy policy and planning challenging.

More than 80% of Brazilian electricity is hydropower. Brazil has the world’s third largest fresh water reserve, but since the water systems are relatively flat, most of the hydropower is generated through construction of large dams, the largest being the Itaipu dam on the border with Paraguay. Hydropower is a renewable energy source, but the climate change coalition argues that hydropower in Brazil is far from low-emission electricity. The first objection is that the vegetation that is covered by water when large areas are dammed up produce methane emissions. Secondly, the infrastructure needed to build a dam causes legal and illegal deforestation in the area, as much as 80% of deforestation in the Amazon is in connection with infrastructure projects such as roads and dams (interview with research NGO, 2013).

*Million tonnes CO₂ equivalents by global warming potential

3.2 Energy resources

Figure 1 Brazilian GHG emissions in MtCO₂e GWP*
The second largest electricity source is natural gas. Brazil started oil and gas production in 1938, but the production has not been enough to satisfy domestic consumption. In 2007 the Brazilian government announced new pre-salt petroleum reserves off the east coast. New deep-water petroleum technology makes these reserves technically and economically feasible to extract. In 2009 Brazil announced self-sufficiency in oil, and the country is expected to become a net exporter of oil in 2015. So far the natural gas from the pre-salt reserves is used by the petroleum companies for production purposes, so Brazil still depends on imports of natural gas.

Southern Brazil is the only Brazilian region dependent on coal for electricity production. The coal there is of low quality and expansion of electricity generation with Brazilian coal is unlikely. With the increase in exports of agricultural products to Asia the past decade, cargo ships returning from Asia has started to import cheap coal for power generation in Brazilian port-cities. Environmentalists in congress are worried this could expand, and suggested legal changes to ban incentives for the participation of imported coal in electricity generation are likely to pass (interview with politician, 2013).

Following the international oil crisis in 1973, the Brazilian government intensified the production of biofuels. Ethanol from sugar cane is mixed in petrol for small vehicles and biodiesel is blended with regular diesel for large vehicles. Many small cars have natural gas motors or flex fuel motors that can run on any ethanol/petrol blend. Biofuels from sugar cane constitutes around 15% of Brazil’s energy use, while another 10% of the energy is derived from other biomass.

During the privatisation wave in Brazilian politics in the 1990’s almost all state-owned companies were privatised, but the petroleum company Petrobras and the electricity company Electrobras were kept national. Both have later been part-privatised, but the state is still majority shareholder in both companies.

Table 1 gives an overview of Brazilian energy supply by energy source. The increased share of fossil energy from 1990 to 2013 and the doubling in energy supply explain the growing energy emissions in figure 1.
Table 1 Domestic energy supply by source

<table>
<thead>
<tr>
<th>Energy source</th>
<th>Amount in Mtoe</th>
<th>Share in %</th>
<th>Amount in Mtoe</th>
<th>Share in %</th>
<th>Amount in Mtoe</th>
<th>Share in %</th>
<th>Amount in Mtoe</th>
<th>Share in %</th>
<th>Amount in Mtoe</th>
<th>Share in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydropower</td>
<td>20.1</td>
<td>14.2</td>
<td>30.0</td>
<td>15.7</td>
<td>32.4</td>
<td>14.8</td>
<td>37.1</td>
<td>15.2</td>
<td>37.1</td>
<td>12.5</td>
</tr>
<tr>
<td>Sugar cane</td>
<td>19.0</td>
<td>13.4</td>
<td>20.8</td>
<td>10.9</td>
<td>30.1</td>
<td>13.8</td>
<td>44.4</td>
<td>18.2</td>
<td>47.6</td>
<td>16.1</td>
</tr>
<tr>
<td>Wood and charcoal</td>
<td>28.5</td>
<td>20.1</td>
<td>23.1</td>
<td>12.1</td>
<td>28.5</td>
<td>13.0</td>
<td>24.6</td>
<td>10.1</td>
<td>24.6</td>
<td>8.3</td>
</tr>
<tr>
<td>Wind and other renewables</td>
<td>2.1</td>
<td>1.5</td>
<td>4.4</td>
<td>2.3</td>
<td>6.3</td>
<td>2.9</td>
<td>9.2</td>
<td>3.8</td>
<td>12.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Total renewables</td>
<td>69.7</td>
<td>49.2</td>
<td>78.2</td>
<td>41.1</td>
<td>97.3</td>
<td>44.5</td>
<td>115.4</td>
<td>47.3</td>
<td>121.5</td>
<td>41.4</td>
</tr>
<tr>
<td>Petroleum and derivatives</td>
<td>57.7</td>
<td>40.6</td>
<td>86.7</td>
<td>45.5</td>
<td>84.6</td>
<td>38.7</td>
<td>92.4</td>
<td>37.9</td>
<td>116.5</td>
<td>39.3</td>
</tr>
<tr>
<td>Natural gas</td>
<td>4.3</td>
<td>3.0</td>
<td>10.3</td>
<td>5.4</td>
<td>20.5</td>
<td>9.4</td>
<td>21.1</td>
<td>8.7</td>
<td>37.8</td>
<td>12.8</td>
</tr>
<tr>
<td>Coal</td>
<td>9.6</td>
<td>6.8</td>
<td>13.6</td>
<td>7.2</td>
<td>13.7</td>
<td>6.3</td>
<td>11.6</td>
<td>4.7</td>
<td>16.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Uranium</td>
<td>0.6</td>
<td>0.4</td>
<td>1.8</td>
<td>0.9</td>
<td>2.5</td>
<td>1.1</td>
<td>3.4</td>
<td>1.4</td>
<td>3.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Total non-renewables</td>
<td>72.3</td>
<td>50.8</td>
<td>112.4</td>
<td>59.1</td>
<td>121.4</td>
<td>55.5</td>
<td>128.6</td>
<td>52.7</td>
<td>174.7</td>
<td>59.1</td>
</tr>
<tr>
<td>Total energy supply</td>
<td>142.0</td>
<td>100</td>
<td>190.6</td>
<td>100</td>
<td>218.7</td>
<td>100</td>
<td>243.9</td>
<td>100</td>
<td>296.2</td>
<td>100</td>
</tr>
<tr>
<td>Energy supply per capita</td>
<td>0.958</td>
<td>1.088</td>
<td>1.192</td>
<td>1.274</td>
<td>1.467</td>
<td>1.088</td>
<td>1.192</td>
<td>1.274</td>
<td>1.467</td>
<td>1.088</td>
</tr>
<tr>
<td>Energy supply per GDP unit</td>
<td>0.123</td>
<td>0.128</td>
<td>n.a.</td>
<td>n.a.</td>
<td>0.132</td>
<td>n.a.</td>
<td>0.127 (in 2010)</td>
<td>n.a.</td>
<td>0.132</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

*a includes imported hydropower  b Million tonnes of oil equivalent  c toe per inhabitant  d toe per 1000 USD

4 Energy and climate policy development in Brazil

4.1 Advocacy coalitions in Brazilian climate policy

Climate change is a relatively new subsystem in Brazilian politics. Smaller climate change subsystems existed within the subsystems of foreign affairs and environment before, but climate change as a subsystem where all actors interested in climate policies operate on the same area of policy debate emerged during Lula’s first government when Marina Silva was Minister of Environment.

The climate change subsystem was established as climate change mitigation was put on the domestic political agenda by a growing climate change advocacy coalition. Similar to what Stensdal (2014) finds in the Chinese case, local, national, and international NGOs are the first core members of the climate change advocacy coalition in Brazil. The coalition emerged as scientists working in Brazilian...
NGOs started lobbying to get GHGs from deforestation and land-use change included in countries’ official aggregate GHG emissions (interview with NGO, 2013).

The NGOs in the coalition are diverse, from local indigenous community groups to the Brazilian branches of large international NGOs like Greenpeace and WWF. Research NGOs such as the Amazon Environmental Research Institute (IPAM) and the Amazon Institute of People and the Environment (Imazon) were important in connecting core forest policy concerns in civil society to the climate change agenda.

From 2003 to 2010 the climate change advocacy coalition was strong and included NGOs, scientists, journalists in leading national news networks, and persons in high administrative and political positions in the government, mainly in MMA. The climate change advocacy coalition share the core beliefs that the mitigation of environmental degradation and climate change should be prioritised in all policy decisions and that Brazil has better capacity and opportunity to make such priorities than many other countries.

Another advocacy coalition emerging from the policy subsystems of forest and agriculture is the agribusiness advocacy coalition that became the main opponent of the climate change advocacy coalition in the climate policy debate. This coalition consists of landowners, farmers and agribusiness companies as well as the bureaucracy in the Ministry of Agriculture and the “bancada ruralista”, a cross-party block that represents rural interests in congress. The members share the belief that stricter forest and agriculture regulations and control restrict private property rights and jeopardises food security and the possibility to make a living in Brazilian agriculture. This coalition is dominated by traditional and conservative thinking that goes back to the settler culture and the rural-urban cleavage in Brazilian politics, the coalition’s motivation is a mixture of economic interests and food security concerns.

The climate change advocacy coalition would normally have a weaker possibility than the agribusiness coalition to change policy in Brazil. However, when the climate law was adopted in 2009 external system events worked in favour of climate policy change. First of all the upcoming COP15 negotiations in Copenhagen received much media coverage in Brazil, the involved experts expected a new international climate agreement in December 2009, and the Brazilian public was strongly in favour of domestic climate policies (Hochstetler and Viola 2012). Secondly, the presidential candidates running against Lula’s designated successor Dilma Rousseff in the 2010 elections, the Brazilian Social Democratic Party (PSDB)’s José Serra and Green Party’s Marina Silva, could demonstrate much better climate results than Rousseff, and Lula wanted to strengthen the Labour Party (PT)’s and Rousseff’s climate image through the new climate law (Hochstetler and Viola 2012).
After the adoption of the climate law, the revisions of the Brazilian forest code under Rousseff’s government in 2012 was a setback for the climate change coalition and showed how the agribusiness coalition still has a more institutionalised power basis than the climate change coalition (Viola and Franchini 2014). Their inclusion in the climate change subsystem has nevertheless had a learning effect on the agribusiness coalition, the coalition is positive to more research on low-carbon agriculture and effective production methods to minimise the need for more deforestation, and welcomes such initiatives as long as food security and economic profit is taken into account (interview with bureaucrat, 2013). The policy process towards the low-carbon agriculture plan (the ABC-plan) that was presented in 2012 was one of the most inclusive of the sectorial climate policy processes. But there are still large differences between the climate change and agribusiness coalitions on how a sustainable Brazilian forest policy should look like.

The Brazilian climate law was one of the first comprehensive climate laws in the world, clearly stating that Brazil should be a low-carbon economy. The low-carbon aim was not disputed in the climate policy debate, but the articles calling for investments in new renewables and a gradual phase-out of fossil fuel energy were vetoed after protests from the Ministry of Mines and Energy (MME) when President Lula signed the law. MME argued these articles were in conflict with energy security goals, in addition to being unnecessary since Brazil already had one of the world’s cleanest energy matrices (Government of Brazil 2009).

From 2003 to 2010 the ministers of environment, Marina Silva and Carlos Minc were active members of the climate change advocacy coalition and the coalition had strong support in MMA. With the entrance of Izabella Teixeira as MMA minister in 2010 the coalition lost its stronghold in MMA (Viola and Franchini 2014). Teixeira is a technocrat more than a politician and she does not push the climate agenda in the government in the way Silva and Minc did. During Rousseff’s presidency MMA’s budgets have been cut and there have been significant reshuffles in the staff. Former MMA bureaucrats that now work for other ministries or outside the government are still important members of the climate change advocacy coalition, but with less influence on climate policymaking than before.

4.2 Energy policymaking

The energy policy subsystem in Brazil is a mature subsystem that has grown and consolidated since modern nation-building in the 1950s and 60s. The core beliefs and concerns within the subsystem have been institutionalised in a highly regulated sector. All energy policy decisions are taken on the federal level between actors that have been in the subsystem for decades. These actors share a core belief that is closely connected to the overall political aim of economic growth and development;
energy security is of vital importance to Brazil and self-sufficiency in energy supply is the best way to attain security.

Energy policymaking in Brazil resembles an iron triangle. The subsystem is highly institutionalised and there are few public debates on energy policy. The Ministry of Mines and Energy (MME) have close formal and informal connections to the different actors in the electricity and petroleum sectors. “The energy sectors do not need a lobby; they have the MME to do all the lobbying for them” (interview with bureaucrat, 2013). The National Council for Energy Policy (CNPE) is led by MME and has members from several government ministries, the large energy companies, large engineering companies, and the national energy regulators. All national energy policy is decided by CNPE. According to the law, CNPE is supposed to include independent energy experts and civil society representatives, but these actors are currently not represented in the council (interview with NGO, 2013).

Since the core beliefs in the energy subsystem are closer to an iron triangle structure than an advocacy coalition structure, I will refer to the actors in the sector sharing core beliefs as the “energy establishment” in the rest of this paper. The energy establishment includes MME, current president Rousseff, the national energy companies Petrobras and Electrobras, large engineering companies such as Odebrecht, the national Energy Research Company (EPE), the leadership of the National Electric Energy Agency (ANEEL) and the National Agency of Petroleum, Natural Gas and Biofuels (ANP) and energy politicians from the largest parties in congress.

Table 2 gives an overview of the advocacy coalitions that are active in climate and energy policymaking in Brazil. The dimension of “degree of institutionalisation” is introduced in the table to take into account the different connections these coalitions have to formal institutions and formal decision-making. The following sections further analyses the coalitions’ influence on changes in climate and energy policy.
Table 2 Advocacy coalitions in Brazilian climate and energy politics

<table>
<thead>
<tr>
<th>Advocacy coalitions</th>
<th>Core beliefs</th>
<th>Members</th>
<th>Subsystem</th>
<th>Degree of institutionalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change</td>
<td>Mitigation of environmental degradation and climate change should be prioritised in all policy decisions and Brazil has better capacity and opportunity to make such priorities than many other countries</td>
<td>- Environmental NGOs - Green politicians - Climate scientists - Environment bureaucrats - Journalists</td>
<td>- Climate change - Energy - Forest and agriculture</td>
<td>Low</td>
</tr>
<tr>
<td>Energy</td>
<td>Energy security is of vital importance to Brazil and self-sufficiency in energy supply is the best way to attain energy security. Brazil has one of the most renewable energy matrices in the world</td>
<td>- Energy bureaucrats - Energy companies - Large political parties - President Rousseff - Energy regulators - Engineering companies</td>
<td>- Energy</td>
<td>High</td>
</tr>
<tr>
<td>Agribusiness</td>
<td>Stricter forest and agriculture regulations and control restrict private property rights and jeopardises food security and the possibility to make a living in Brazilian agriculture</td>
<td>- Landowners - Bancada ruralista - Farmers and ranchers - Ministry of Agriculture</td>
<td>- Climate change - Forest and agriculture</td>
<td>Medium</td>
</tr>
<tr>
<td>Car industry</td>
<td>The car industry is of vital importance for employment and economy in Brazil, average Brazilians should be able to buy cars made in Brazil</td>
<td>- Car producers - Labour unions - Car buyers - Ministry of Transport</td>
<td>- Energy - Transport</td>
<td>Low</td>
</tr>
</tbody>
</table>

4.3 Energy and climate change mitigation

Since deforestation and land-use change were the main emission sectors in Brazil during Lula’s government, the climate change advocacy coalition used most of its efforts to implement a policy change in this sector and getting this change legalised through the climate law. Fossil fuel emissions are a much smaller part of Brazil’s carbon footprint than the case is for other large countries, so mitigation in the energy sector was not a large part of the climate policy debate in 2009.

2009 was also the year Brazil reached its long-time goal of self-sufficiency in oil supply, and the optimism in the oil sector was high. The energy establishment had been against mitigation targets for Brazil throughout the climate policy debate, and President Lula acted as policy broker when he signed the climate law in January 2010, supplying a law with the mitigation targets demanded by the climate change advocacy coalition, but also accepting the suggested vetoes from MME on the energy articles in the law.
Two sectorial plans under the climate law cover energy emissions from electricity and transport sectors. These sectorial plans do not show any signs of policy change, they are mainly renaming of already existing policies. The “energy plan” is a mildly modified version of already existing energy plans. The “transport and urban mobility plan” is a merger of two existing plans; the cargo plan for moving more long-distance transport from road to rail and rivers, and the human transport plan that was launched in connection with the planning of the 2014 Football World Cup and the 2016 Summer Olympics, not originally a mitigation plan. The interest to innovate and invest in new low-carbon solutions has been miniscule in both energy emission sectors.

During Lula’s second and Rousseff’s current presidencies MME has been headed by the Brazilian Democratic Movement Party (PMDB). PMDB is the largest party in the Brazilian congress and is dominated by conservative and traditional values with a nationalist and growth-focused view on natural resource development. The energy establishment’s resistance to include climate change concerns in their portfolio is enhanced under PMDB’s leadership in MME (interview with NGO, 2013).

As seen in table 1 40-45% of Brazil’s energy use is renewable. The share is slowly declining, but the energy establishment aims to keep it above 40%. The climate change advocacy coalition argues that this is a business-as-usual aim that will be possible to attain even if energy emissions triple since the energy establishment does not count the indirect emissions from new hydropower.

Electricity-production concessions are given after open bidding rounds. In the bidding rounds electricity prices and energy security decide which projects that get concessions, and the current government is unwilling to introduce subsidies to promote new renewables (interview with diplomat, 2013). Wind power conditions are however excellent in several parts of Brazil, and with rapid development of new wind power technology the past years, wind power plants have won several of the last electricity bids in Brazil.

Most of the planned new renewable energy is nevertheless new hydro. The large Belo Monte dam in Northern Brazil has been one of the most controversial concessions. According to EPE estimates Brazil’s energy need is expected to double the next ten years, the energy establishment therefore prefers large new energy projects. New renewables like wind and solar are seen as too small, too instable and too expensive to meet future needs (interview with diplomat, 2013).

The climate change coalition has mobilised strongly against Belo Monte, something that has led to environmental evaluations and large reductions in the original project. Despite the delays Belo

Monte is still being built, but now with significantly reduced electricity generation potential, which increases the need for even more projects to cover the expected energy need. The energy establishment argues that the climate change coalition’s resistance to new hydroelectric projects leads to a growth in fossil electricity generation in Brazil (interview with diplomat, 2013).

The climate change coalition argues that the energy establishment is stuck in their focus on new, large energy projects and unwilling to take into account new and innovative solutions (Interview with former bureaucrat, 2014). They argue that the economic interests of the construction companies and the electricity companies lead these actors to always favour new, large projects with hydro, nuclear or fossil in their advices to the government since they earn much more from such projects than from smaller wind and solar projects or energy efficiency (interview with NGO, 2013).

The petroleum sector is where the climate change advocacy coalition has had the least success in changing policy. The vetoes in the climate law were mainly to protect the development in this sector. Offshore petroleum exploration and production is highly specialised and the actors in MME, ANP, Petrobras and the Brazilian universities that are involved in these activities have cooperated for years and many are former colleagues. Petrobras is seen as one of the most competent, efficient and internationally competitive companies in Brazil and the societal demand for a decrease in petroleum activity is very small.

The ties between the government and Petrobras, between President Rousseff and Petrobras CEO Maria das Graças Silva Foster, are tight, but the climate change coalition sees the government as a greater barrier to policy change in this sector than Petrobras and the other oil companies. Both Petrobras and the regulator ANP have become much more politicised than the intention was when the current sector structure was introduced in the 1990’s (Interview with bureaucrat, 2013). The politisation has increased during Rousseff’s presidency; she is personally involved in petroleum policy decisions (Interview with petroleum sector, 2013).

The environmental regulations around petroleum activities are already relatively strict in Brazil, and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) works actively with the sector to ensure compliance. The work-load on IBAMA delays projects and is a much larger concern for petroleum companies than the environmental or climate regulations themselves (interview with petroleum sector, 2013). The petroleum companies have the economy and capacity to adjust to environmental regulations and if any future policy leads to less demand for oil in Brazil, they can easily sell their pre-salt light crude in the international market. The main threat to an increase in offshore oil and gas production in Brazil is a fall in international oil prices.
Future success and growth in the petroleum sector is connected to political goals of energy independence, eradication of poverty and energy for all, so it has been impossible for the climate change advocacy coalition to make climate change mitigation a priority above other concerns in the petroleum sector.

When it comes to the use of oil and gas in Brazil, there is less disagreement between the climate change advocacy coalition and the energy establishment, but actors from outside the energy subsystem have more influence on these decisions.

The energy establishment believes that the liberal competition where the best offer wins that is implemented in the electricity sector, should also be implemented for vehicle fuel in Brazil. With liberal policies and current oil prices ethanol and other biofuels would be very competitive in the Brazilian market and the share of fossil fuel for transportation and thermoelectric power generation would decrease. While the oil companies and the liberal bureaucrats in MME would like Brazil to export petroleum to maximise profits, the natural resource nationalists in government and congress would like to use the oil domestically to attain other political goals.

As a macroeconomic tool to control inflation the government has put a cap on petrol prices. When petrol and ethanol prices are close, people prefer to buy petrol, and Brazil is close to losing self-sufficiency in petroleum since petrol use is increasing. Petrobras has to cover the difference between the market price and the cap. The cap has led to losses for Petrobras and for the ethanol industry and together with the climate change advocacy coalition these two industries are demanding policy changes to end the cap on petrol prices. The Brazilian electorate is however sensitive to inflation and the government will continue to control the prices they can to avoid inflation, at least until after the elections.

The government’s policies to reduce the impact of the global financial crisis are directly in conflict with the sectorial transport and urban mobility plan under the climate law. Financial packages to the car industry and increased incentives for Brazilians to buy more new cars have been the main policy tools to boost economic growth during the crisis. The climate change coalition sees these polices as extremely short-sighted, but increased purchasing power is popular with the voters. An advocacy coalition within the transport subsystem consisting of Brazilian car producers, the car industry labour unions, the Ministry of Transport and the general public demand for cheap cars, acts as a barrier to mitigation measures in the transport sector.

The amount of cars and buses in Brazilian cities leads to severe air pollution and constant traffic jams. Public transport in the cities is the responsibility of the local governments. The high turnover in
political and administrative positions makes it difficult to implement and follow up large infrastructure projects, and vertical and horizontal corruption in the construction process causes delays and low-quality results (interview with scientist, 2013).

The energy establishment and the climate change advocacy coalition agree that more sort- and long-distance transport should be moved from small entities such as cars and trucks to rail and waterway systems with high capacity and low emissions. The plans to get there have resulted difficult to implement even though the public demand for better public transport is large. The need for cooperation and coordination between a myriad of local governments and private transportation companies makes it a slow-moving process where very few of the policy goals have been implemented.

Another area where the core beliefs of the climate change coalition and the energy establishment support the same policy measures is within biofuels. Current high international sugar prices have led to a decrease in ethanol production in Brazil, but ethanol and other kinds of biofuel are still a priority for the government. Brazil wants to increase production and exports of biofuels and rejects the view that biofuels compete with food production (interview with diplomat, 2013). The minimum amount of biofuels to be blended in diesel and petrol in Brazil has been increased slightly in 2014, and ANP hopes that new technologies for second generation biofuel production from agricultural waste will increase both domestic use and exports of biofuels (interview with bureaucrat, 2013).

4.3 Energy policy trajectories towards 2020

Despite the iron triangle structure in the energy subsystem and the energy establishment’s belief that Brazil’s energy sectors is already low-carbon, the climate change advocacy coalition has some window possibilities for energy policy change towards more mitigation. In accordance with Sabatier’s (1988) assumptions, it is difficult for the climate change advocacy coalition to achieve policy changes that are in conflict with the core beliefs of the energy establishment. The largest possibility for low-carbon solutions is in the cases where it is enough with changes in secondary aspects of the beliefs; where mitigation measures can satisfy the core beliefs of both coalitions.

The best possibility for further low-carbon energy development in Brazil is within biofuels. Despite decreasing domestic and international attention to Lula’s “ethanol diplomacy” from 2006, ethanol and other biofuels can meet both the climate change coalition’s aim of Brazil taking more international responsibility for climate change mitigation, and the energy establishment’s aims of enhanced energy security, self-sufficiency and low energy prices. There is little evidence that biofuels
in Brazil threatens food production and as long as the production does not cause deforestation, increasing the replacement of fossil with biofuels will be one of Brazil’s main low-carbon solutions.

The climate change coalition wants to increase the use of biomass also in electricity generation, as a back-up to restored hydropower and new wind and solar power (interview with NGO, 2013). The energy establishment sees natural gas as a more likely balance fuel to new and existing hydro, and policies especially targeting new biomass projects are unlikely to be launched by the current government. Investments in shale gas and other unconventional fossil resources are more likely (interview with bureaucrat, 2013).

Hydropower is the most controversial issue between the climate change coalition and the energy establishment. The climate change coalition sees new hydro as a deforestation driver, while the energy establishment sees it as renewable, low-carbon energy. None of the sides seem willing to take in information from the opponent and change their beliefs. This conflict is expected to continue and lead to less, or at least slower development of new hydroelectric plants in Brazil. Unless there are simultaneous (unexpected) increases in energy efficiency and price drops in wind and solar energy, the lower than expected hydropower development will probably lead to higher fossil use in electricity generation towards 2020, at least if the current government continues.

Subsidies to increase wind and solar energy are unlikely. MME, which is in charge of electricity concessions, has a strong technical and bureaucratic body. “The people working there are competent and open to discussions, but they are absolutely liberal, they want free competition and low prices, they all think the same and they often win debates” (interview with bureaucrat, 2013). Competitive wind power is increasingly entering the Brazilian energy matrix and future technological breakthroughs could make wind and solar able to out-conquer fossil in electricity bids, but only if they meet the lowest-price criteria.

With the planned inclusion of three new Amazon cities in the national electricity grid from 2015, the use of diesel generated electricity will decrease significantly, but the grid capacity will have to be enhanced. The smaller new-renewable projects cause challenges for the grid development, there are currently wind power plants that cannot deliver their power to the grid. Grid development is a hurdle for energy efficiency in Brazil and active government investment decisions and smart grid developments are needed if Brazil wants to mitigate through energy efficiency.

External system events can open possibilities for policy change. A new government after the October 2014 election can give a new political leadership in MMA or MME that is willing to prioritise the low-carbon solutions that already exist in Brazil. Currently 70% of new energy investments in Brazil are in
fossil fuel solutions, especially in the petroleum sector (interview with NGO, 2013). Since the Brazilian petroleum sector is highly competitive with good adaptive capacity, some of the petroleum investments can instead be invested in new renewables without harming the oil production. Brazil has world leading wind and solar resources that are not being used, and a new government may be willing to take this information into account and implement measures to increase growth in new renewables. The lack of investments in wind and solar will make Brazil less competitive in relation to China and India in the long run (interview with scientist, 2013).

Changes in the export market for biofuels could also make Brazil a larger exporter of low-carbon solutions, at the same time reducing the country’s future financial dependence on the petroleum sector. In Europe the “food versus fuel” debate has hindered Brazilian exports of ethanol and biodiesel, but better research on this topic and enhanced information to the environmental advocacy coalitions in Europe may open the European market.

Finally, there has been little focus on emissions from the petroleum sector in the Brazilian climate policy debate. The petroleum sector has not needed to be a strong opponent to mitigation policy in Brazil. This will probably continue. The climate change advocacy coalition is not ignorant of the emissions from the sector, but the sector’s large revenues make it difficult to change policies here. To prevent an increase in domestic oil and gas use might be more realistic, but if Rousseff wins the election and continues in coalition with PMDB, the focus on national control and benefit of the pre-salt resources is likely to continue, maybe even to the disadvantage of Petrobras.

All actors involved in energy policymaking agree on the need for mitigation measures in short- and long-distance transportation. Unlike the energy plan, the transport and urban mobility plan contained some real policy changes, but the implementation has been meagre. With the current government’s incentives to the car industry, the emissions from the transport sector have increased and will continue to grow. Smaller pilot mitigation projects in this sector will continue, but the sector is not open to implement large changes unless it feels political pressure from the government. Such pressure is currently absent.

**5 Conclusion**

This paper has used the advocacy coalition framework to analyse the drivers and barriers to climate change mitigation in the Brazilian energy sector. The climate change advocacy coalition is demanding such mitigation, but the energy establishment is resistant to changes. So far there has not been a transition towards prioritising low-carbon solutions in Brazilian energy politics.
The energy establishment’s resistance to new low-carbon solutions is explained through its core belief that Brazil already has a low-carbon energy sector where the introduction of new renewables would harm energy security and increase energy prices. As shown in the above analysis, the climate change advocacy coalition has nevertheless been able to enter the energy subsystem and involve in energy policy debates. The coalition has been somewhat successful in changing the implementation of hydropower expansion in Brazil. The increased focus on hydropower from environmental regulators has led to less profit and energy production from new hydropower plants at the same time as natural gas and wind power are increasing their shares in the electricity matrix. Updated climate impact and life cycle assessment research is however necessary to determine whether this development has had a positive or negative effect on energy emissions.

In former conflicts over climate policy change between advocacy coalitions, the president has acted as policy broker. President Lula was the policy broker between climate and energy interests in signing the climate law, and President Rousseff was the policy broker between climate and agriculture in signing the revised forest code in 2012. However, Rousseff comes from the energy establishment; she shares the establishment’s core beliefs. It is therefore unlikely that she will act as policy broker to find a compromise between business-as-usual and low-carbon priorities in energy policymaking. The core beliefs of the energy establishment are challenged by the climate change advocacy coalition, but the former is not open to learn from the information the latter provides.

It is still relevant to talk about iron triangles in Brazilian policymaking, but the advocacy coalition framework makes it possible to identify how new actors use windows of opportunity to change policies in a highly institutionalised policy subsystem such as energy. As in the forest and agriculture subsystem, the best opportunities for the climate change advocacy coalition to enhance mitigation of energy emissions lies in the follow-up of already existing policies. Without changes in the government however, the Brazilian energy policy trajectories will continue to be close to the “business-as-usual without mitigation”-scenario. As long as deforestation does not increase, all current government actors, from the Minister of Energy, to the President and the Minister of Environment, share the belief that Brazil is already a low-carbon economy.

This study has confirmed the findings of Hochstetler and Keck (2007) that policy changes in Brazil must be studied beyond the actual adoption of the policy; advocacy coalitions need to follow up the implementation of policy changes if they want the actual change to materialise. The low degree of institutionalisation in the climate change advocacy coalition becomes a weakness in the follow-up of implementation. The climate law was an important policy change in favour of the climate change
advocacy coalition, but other advocacy coalitions have been successful in restricting the implementation.

To study advocacy coalitions in the climate change and energy subsystems in Brazil, I added the dimension of “degree of institutionalisation” to the analysis. Informal connections are just as important as formal connections in relations between members of advocacy coalitions in Brazil. The “non-trivial degree of co-ordinated activity over time” (Sabatier 1998:103) can be kept between individuals even though political and administrative positions are frequently reshuffled. In the energy subsystem these shifts are usually within the same subsystem, for instance from the EPE to Petrobras or from ANEEL to MME, the core beliefs of the advocacy coalition thus becomes highly institutionalised and hegemonic within the subsystem. The climate change advocacy coalition is much less consolidated within the formal system. The informal connections are there, but with the shift from Minc to Teixeira in MMA, individuals within the coalition in MMA were spread to institutions where their core beliefs were new, weakening the coalition’s influence on climate policy implementation. It would be interesting for further research to compare the case of Brazil with climate change advocacy coalition in other countries where energy policy change has been the core of the debate in the climate change subsystem since the beginning, and also to follow how the relationships between Brazilian advocacy coalitions develops towards 2020.
6 References


