Fields of Gold

The Bioenergy Debate in International Organizations

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List of papers

This thesis is based on the following four papers, which will be referred to in the text by their Roman numerals:

Paper I

Kuchler, M. (2010) Unravelling the argument for bioenergy production in developing countries: A world-economy perspective. *Ecological Economics*, 69(6), 1336-1343.

Paper II

Kuchler, M. and Linnér, B-O. (2012) Challenging the food vs. fuel dilemma: genealogical analysis of the biofuel discourse pursued by international organizations. *Food Policy*, 37(5), 581–588.

Paper III

Kuchler, M. and Hedrén, J. (2012) Bioenergy as an empty signifier *Global Environmental Change* (submitted).

Paper IV

Kuchler, M. (2012) Stability rather than change is the order of the day: the case of second-generation biofuels. *Journal of Environmental Policy & Planning* (submitted).

List of acronyms and abbreviations

AR3	3rd Assessment Report of the Intergovernmental Panel on Climate Change
AR4	4th Assessment Report of the Intergovernmental Panel on Climate Change
CDM	Clean Development Mechanism
CO2	carbon dioxide
FAO	Food and Agriculture Organization of the United Nations
GHG	greenhouse gas
GM	genetically modified
IEA	International Energy Agency
IOs	international organizations
IPCC	Intergovernmental Panel on Climate Change
IR	international relations
MDGs	Millennium Development Goals
OECD	Organisation for Economic Co-operation and Development
SPM	Summary for Policy-Makers
WE	world-economy
WEC	World Energy Council
WTO	World Trade Organization
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America

Contents

1. Introduction

1.1. Point of departure

During the last two decades, the idea of producing energy from biomass has become a subject of a rapidly growing international interest among multilateral organizations, governments, private industries, researchers and civil societies. The concept of bioenergy has been, with rising intensity, on lips of experts and decision makers, occupying media headlines and public debates worldwide. Numerous scientific papers, assessments, reports and books have discussed the issue from a myriad of different angles. Various types of biofuel production and utilization patterns have been viewed differently by diverse actors, triggering heated discussions on its legitimacy, necessity and suitability, possible benefits and negative impacts. The debate reached the peak of its magnitude and polarization in the wake of the 2007-2008 world food price crisis, when the United Nations Special Rapporteur on the Right to Food called turning crops into biofuels "a crime against humanity", to which Brazilian president responded that "the real crime against humanity is to discredit biofuels a priori and condemn food-starved and energy-starved countries to dependence and insecurity" (Dawar, 2008). This dissertation is set out to shed light on how the concept of bioenergy is conceptualized and contextualized in a multitude of arguments played out in the international debate.

It is not the first time in a recent history when methods of converting plant matter to fuels have managed to capture people's imagination and fired up their enthusiasm. Already in the early days of the automotive industry at the beginning of the 20th century, production of energy from biomass gained significant interest. Labelled fervently as the fuel of the future, bioenergy was literarily fuelling inventions for new engine prototypes. With technological innovations on the rise, processing biomass to fuels was perceived as a potentially ample source of energy (Kovarik, 1998). However, due to the discovery of cheap and abundant oil, biofuels were unable to compete economically with gasoline or diesel. With the on-going advances in the oil industry, their significance on the energy market was eventually diminished. International interest in bioenergy was once again renewed in the 1970s during the period of oil scarcity, as a result of oil embargo proclaimed by petroleum exporting countries. Of this crisis, Brazil came out as

the only nation that set up a permanent biofuel industry at that time. Otherwise, as soon as oil price and distribution were stabilized, the option of producing energy from biomass was once again marginalised (Bernton et al, 2010).

Nevertheless, in the 1990s the idea of producing modern fuels from biomass has returned on the international agenda with a full force. But contrary to the previous upsurges, now the biofuel rush has been driven by other factors than just technological innovations and oil shortages. In addition to rising global energy demand and the prospect of depleting particularly oil resources, that have forced policy-makers to search for alternative fuels, two more societal challenges have been recently propelling bioenergy production development worldwide. The first one is the risk of global warming caused by greenhouse gas (GHG) emissions from fossil fuel combustion. Whereas the second problem is agricultural crisis that manifests itself in two specific ways: on the one hand, excessive farming and overproduction in industrialized countries and, on the other hand, lagging rural development and food insecurity in poor regions of the world. In result, during the last two decades bioenergy has been continuously depicted as a solution to the three distinct but, at the same time, highly interlinked problems of energy insecurity, climate change and agricultural crisis.

But what makes biomass-derived energy such a complex issue now is not so much a disputable assumption that it could become a win-win-win strategy able to address these three civilizational challenges, but the fact that it has been injected into the global agenda characterised by specific socioeconomic and environmental circumstances which do not necessarily serve only as driving factors. What distinguishes the current world situation from the two previous moments of the 20th century is much higher global energy consumption and rising energy demand, particularly in the developing countries. Simultaneously, environmental impacts, with global warming in particular, can potentially affect land quality and biomass cultivation. Whereas increasing industrialization of the global agricultural sector results in tight correlation between oil prices and the cost of feedstock. In other words, these and other conditions do not only serve as driving factors behind the current increase of bioenergy production but they also pose as obstacles in implementing such a strategy.

Simultaneously, policy-making at regional, national and international levels interacts and interferes with each other while every country implements its own targets and regulations according to internal requirements and expectations. These, in return, prompt transformations of the global energy and agricultural sectors, as well as influence choices regarding climate change mitigation strategies. Therefore, there are reasons to expect that any deliberations on the bioenergy option could create discrepancies caused by conflicting interests,

objectives and outcomes. The most striking example of such a conflict is the controversial food vs. fuel dilemma and the biofuel impact on global agricultural markets, but other visibly contentious issues in the debate include production of biomass-derived fuels in developing regions, the questionable potential of bioenergy to lower carbon emissions and a dubious character of its potential technology development in the future.

Hence, what makes the concept of bioenergy timely to analyse is its highly contested and contingent character, shaped and modified by the international debate surrounding it for the last two decades; its entanglement within the nexus of three complex and problematic issues of energy, climate and agriculture; its comeback to the global agenda characterised by specific circumstances that could pose as obstacles rather than drivers for a sound implementation, in line with specific assumptions and aspirations.

1.2. The subject of analysis

Bioenergy is a broad concept that encompasses various energy sources produced by using different feedstocks and technologies. The common denominator for this energy type is that it is processed from a wide range of biomass material available. At present, the so called first-generation liquid biofuels in form of ethanol and biodiesel maintain the largest share and the most rapid growth among energy sources produced from biomass. Ethanol can be produced from sugar crops (such as: sugar cane, sugar beets and sweet sorghum) and from starch crops (including maize, wheat, cassava and sorghum grain). Sugar extracted from such plant matter is usually processed by using fermentation and the obtained alcohol is distilled (WorldWatch Institute, 2007, pp. 13-17). Biodiesel can be produced from oilseed crops (such as: rapeseed, soybeans, oil palm and jatropha), from other potential sources of plant oil (i.e. sunflower, cottonseed, mustard seed, peanut, coconut, castor oil and waste vegetable oil), as well as from animal fat (i.e. lard and tallow). Oil extracted from feedstocks is processed by combining it with an alcohol (most commonly methanol) in the chemical process reaction called transesterification (WorldWatch Institute, 2007, pp. 17-20). Although still in a developmental stage, requiring more expensive processing technologies and not commercially available, second-generation liquid biofuels could be produced

from forestry and crops residues, fall grasses and municipal wastes (WorldWatch Institute, 2007, pp. 45-53). Another type of biomass-derived energy is biogas which can be obtained from green and municipal waste, manure, sewage and other biodegradable material through the process of fermentation or the anaerobic digestion (Deublein and Steinhauser, 2008). Hence, bioenergy exemplifies a range of various patterns of production, types of feedstocks and technologies as well as forms of energy outputs.

However, rather than studying what are pros and cons of a given option *per se*, I concentrate entirely on *how* bioenergy is conceptualized and contextualized, shaped and transformed in the debate. Limiting my research to only one specific type of biomass-derived energy would bring only a partial image and reduce my analytical potential. Most significantly, the concept of bioenergy reflects a sample of large and complex socioeconomic and political processes currently occupying agendas of a multitude of public and private actors concerned with highly intricate issues of energy security, climate change and agricultural production. Depending on a given context, biofuels can be discussed in the backdrop of energy demand in the developed world, or forwarded as a potential energy option for developing countries. They can exemplify modern technology that helps mitigate climate change or be referred to as traditional forms of biomass burning that pose various risks to environment. In this sense, the subject of my analysis is bioenergy understood as a concept embedded in the network of meanings, discourses and systems of social relations determined by political, economic and environmental factors. The key issue here is that these different aspects are not dissociated but rather interlinked and interacting with each other in the context of the debate. Therefore, I investigate bioenergy as a contemporary phenomenon, a powerful and laden meaning that might serve as agent of change, within a complex and dispersed patchwork of discussions, assessments, expertise, recommendations and policy options.

1.3. The debaters: international organizations

The crucial question arises how I can map this complex and multifaceted debate on bioenergy when it involves such a multitude of actors, voices, opinions and aspects. Aware of the fact that I cannot analyse the entire bioenergy debate, I elucidate only a sample of it. Hence, I focus on deliberations pursued by the specific international organizations (IOs) that, for the last 20 years, have actively participated in the bioenergy debate. The reason behind using IOs as a sample is the assumption that these global institutions consisting of expertise-making, recommendation-providing functions influence and determine outcomes of their members' interactive behaviour (Young, 2002). Furthermore, by posing as authoritative experts and policy-advisors within the scope of their respective agendas, they are capable of affecting not only their members but also other actors in addressing various international issues and facilitating specific problems (Barnett and Finnemore, 2004). Hence, it is of special interest to scrutinize how particular IOs discuss biomass-derived energy within the complex patchwork of policy interactions and requirements.

My choice of institutions is based on the observation that the bioenergy debate constitutes a nexus in which three issues of energy, climate change and agriculture meet and interact with each other. This specific characteristic is visibly reflected in agendas of three major international organizations:

- Food and Agriculture Organization of the United Nations (FAO) that focuses its efforts on agricultural production, rural development and food security;
- International Energy Agency (IEA) concerned with the issues of energy security and international energy markets;
- Intergovernmental Panel on Climate Change (IPCC) – an advisory body that provides scientific assessments regarding climate change mitigation and adaptation;

These three IOs are characterized by distinct objectives, roles and tasks as well as different structures and memberships. Usually, each institution discusses bioenergy within the frames of its specific mandate – either it is energy, climate or agriculture – but each also tends to expand the scope of expertise and refers to two other interrelated issues as well. To illustrate this, FAO's main themes are food security and agricultural production, but when the organization discusses fuels processed from biomass, it also broadly touches upon energy security and

environmental aspects, including climate change in particular. IEA places its focus mainly on energy aspects of biofuels but, simultaneously, discusses them by expanding the agenda to climate change abatement and revitalization of agricultural sector. IPCC follows this pattern in a similar fashion. Besides assessing bioenergy as a potential mitigation option, the panel also evaluates it in the context of energy and agriculture.

On the very surface of analysing the bioenergy debate pursued by the three IOs, it can be observed that the issues of energy, climate and agriculture are strongly intertwined. But the patchwork of discussions, assessments, expertise and recommendations provided by these institutions does not only create this particularly visible ensemble. Therefore, it is necessary to excavate deeper, below the visible facade where lie alternative patterns and subtle dimensions, as well as dislocations and inconsistencies in the way the IOs strive to arrange a coherent and robust meaning of the bioenergy concept.

However, it is important to emphasize that while the role and status of these organizations constitute my main motivation for selecting them as a sample of the bioenergy debate their agency is, however, not the subject of my analysis. It is because my analytical focus is, above all, placed on structure understood here as meaning, on how the concept of bioenergy is shaped and transformed by these IOs in their deliberations. Whereas I am much less concerned with questions of why they do it the way they do, how central is their role in the debate or to what extent they can influence it or its members. Even if my analysis reveals specific patterns of behaviour, such as similarities in the way institutions discuss bioenergy, I arrive to these observations from the point of view of structure (how the meaning is shaped by them) and not agency (why they do it or what is their role in the debate). In this sense, despite operating on large international organizations in the context of a global agenda, the subject of analysis and the preoccupation with structure are the reasons behind my departure from mainstream analytical approaches in the domain of international relations theory (IR). Additionally, in contrast to some contemporary scholars, particularly representing the new institutionalism in IR (Young, 1989), I do not make a distinction between “organization” and “institution” and I use both terms interchangeably.

1.4. Aim and research questions

The primary aim of this thesis is twofold and approached entirely by analysing assessments, reports, policy papers and other types of publications issued by FAO, IEA and IPCC between 1990 and 2010. First, I explore *what* arguments, expectations and projections are forwarded by the selected IOs for and against biomass-derived energy. Based on this mapping of what the organizations say and discuss, I turn to the next step of my primary aim by critically analysing *how* the selected organizations conceptualize and contextualize bioenergy, particularly in relation to energy, climate change and agriculture. Concerned with contention and contingency of the subject of analysis, I focus particularly on contradictions and discrepancies in their deliberations. I organize my research questions around four themes that are distinctively contentious in the debate: biofuel production and utilization in developing countries and the role of the global South in international biofuel trade; production of biomass-derived energy in relation to agricultural system and the food vs. fuel dilemma; bioenergy as a potential win-win-win solution to the challenges of energy insecurity, climate change and agricultural crisis; the future role of advanced biofuel technology as an innovative renewable energy source.

My interpretation of *how* the IOs reason in their process of structuring and modifying the meaning is informed by the implementation of four theoretical lenses. The first one provides the focus on patterns of unequal exchange between the rich and poor countries embedded in the capitalist system. The second and third serve as analytical tools for scrutinizing discourses understood as modes of producing and reshaping meaning. The fourth is concerned with the notion of futurity. Hence, the four research questions are:

1. How is biomass-derived energy production and utilization in developing countries, in particular Brazil, framed by the selected IOs? (paper **I**)
2. How is the discourse on bioenergy production shaped and modified by the IOs in correlation with the conceptualization of agricultural production system? (paper **II**)
3. How is the concept of bioenergy conflated by the organizations as a win-win-win solution to the three challenges of energy insecurity, climate change and agricultural crisis? (paper **III**)
4. How is bioenergy conceptualized by the IOs in their discussions on its future shape and role in the context of innovation and progress? (paper **IV**)

It can be argued that because deliberations of these three selected IOs constitute a sample of the overall bioenergy debate, I explore only on a clipping of a much broader field of various conceptual processes surrounding biomass-derived energy. However, I contend that instead of shedding light on a specific spot while everything else is blanketed in darkness, I rather look at the discussions through the keyhole and can observe more than just a fragment of the whole picture.

Based on results derived from the primary aim, my secondary objective is to reflect upon the conditions of contemporary socioeconomic arrangements that the concept of bioenergy is inserted into. I problematize how the current state of the social structure, embedded in the dominant capitalist system struggling with specific civilizational challenges, is at the same time expressed in and affecting the conceptualization of bioenergy in deliberations of the three organizations. Additionally, by being theoretically inclined, I aim to contribute to the scholarly discussion on the agency-structure aspect of the institutional debate.

1.5. Previous research

Up to date, numerous scientific publications have discussed biomass-derived energy from a myriad of different angles. This substantial and still growing amount of research on bioenergy is mainly placed within the energy-agriculture-climate change nexus. In other words, there are three major aspects of bioenergy that scientists tend to focus on.

The wide range of studies regarding energy produced from biomass covers topics, such as: development of bioenergy production with its potentials and options in various regions of the world (Schaeffer et al, 2005; Tenenbaum, 2005; Wright, 2006), implementation and evaluation of bioenergy projects as potential renewable energy strategies (Domac et al, 2005; Ayoub et al, 2007; Kancs and Wohlgemuth, 2007), as well as issues concerning prospects of bioenergy markets including energy balance, security and competitiveness (Hamelinck et al, 2005; Downing et al, 2006; Farrell et al, 2006; Lewandowski and Faaij, 2006; Altman and Johnson, 2007; Randelli, 2009). Bioenergy is also analysed in the context of global energy dynamics, models and transitions (Yamamoto et al, 2001; Walter et al, 2008; Cruz Jr. et al, 2009; Cornelissen, 2012).

Moreover, biofuels are widely assessed in the context of agriculture and land use activities. Their production is most often evaluated in relation to land-use change and in the context of potential opportunities for agricultural development (Ignaciuk et al, 2006; Haberl et al, 2011; Murphy et al, 2011; Erb et al, 2012). Depending on the region in focus, some researchers study implementation, potential and risks of rural bioenergy projects in developing countries (Demirbas and Demirbas, 2007; Mathews 2007; Peters and Thielmann, 2008; Smith, 2010; Lynd and Woods, 2011; Matondi et al, 2011), whereas others are concerned with scenarios and capabilities for biofuel production in the developed world (Rounsevell et al, 2005, 2006; Korkeaoja, 2006; Al-Riffai et al, 2010; Fischer et al, 2010; Hellmann and Verburg, 2010).

Environmental aspects of bioenergy production and utilization are approached mainly on two fronts. On the one hand, researchers point out various opportunities and benefits of such energy projects for cleaner environment (Borden et al, 2000; Luijten, 2005). Bioenergy is widely studied by scientists particularly when it comes to its role in reducing emissions of greenhouse gases (GHGs) and thus its contribution to climate change mitigation efforts. (Smith et al, 2000; Grogan and Matthews, 2002; Dornburg et al, 2005; Powlson et al, 2005; Silveira, 2005; Ravindranath et al, 2006; Clifton-Brown et al, 2007). On the other hand, however, there has been a growing amount of research exposing negative aspects of biomass-derived energy, especially produced on large scale. Analyses include diversification of water resources and soil erosion (Dias De Oliveira et al, 2005; Simpson et al, 2008; Lal, 2009; Elena and Esther, 2010; Havlík et al, 2011; Wu and Liu, 2012). Since the potential of energy produced from biomass to reduce GHG emissions is a controversial issue, the biggest emphasis is put to study impacts of bioenergy production - such as deforestation and land-use change for agricultural cultivation - and its consequences regarding climate change mitigation efforts (Hill et al, 2006; Crutzen et al, 2007; Fargione et al, 2008; Searchinger et al, 2008).

In overall, scientific research on bioenergy is dominated by technical, environmental and economic approaches. Whereas the majority of researchers assess biomass-derived energy on the ground of its physical dimensions, energy potentials, technological aspects, socioeconomic opportunities and environmental impacts, this thesis does not provide yet another technical insight into its production, life-cycle assessment or market expertise on its cost-efficiency balance. Instead, my contribution is to look at how bioenergy comes into being and how its meaning is shaped in the debate pursued by the international organizations, as well as to explore its conceptual dimensions embedded in and constituted by the current socioeconomic circumstances.

1.6. Outline of the thesis

Chapter 2 provides theoretical framework. In this chapter, first, I introduce perspectivism and interpretation as the basic pre-understanding of my role in the research; second, I position my analytical direction through the social critical theory; and third, I demonstrate assumptions of four theoretical approaches implemented in the study. Chapter 3 describes methodology. This chapter includes an account of selecting empirical materials and processing texts through deconstruction and double reading. Chapter 4 sets the scene by providing a general overview of the bioenergy debate, both outside the IOs and within the discussion pursued by the three organizations. Thus, this chapter serves the purpose of mapping the surface of deliberations, in order to introduce the reader to the problematic of the bioenergy discussion as well as to highlight its contested character. Chapter 5 consists of discussion of results and conclusions, as well as offers a theoretically inclined reflection upon the structure-agency aspect of the debate. Chapter 6 provides a summary of the thesis.

2. Onto-epistemological stance

In this chapter, I elucidate the onto-epistemological framework of this thesis. First, I introduce perspectivism and interpretation as the pre-understanding of my role as a researcher and as the basis for implementing different theories into the study. Second, I introduce critical social theory as my analytical direction in approaching the subject of analysis. Third, I explain my analytical package consisting of four distinct theoretical perspectives that are used in achieving the research objectives: the world-economy, Michel Foucault's genealogy, discourse theory of Ernesto Laclau & Chantal Mouffe, and Fredric Jameson's critical approach.

2.1. Perspectivism and interpretation

The fundamental pre-understanding of my role as a researcher conducting analytical work is influenced by Friedrich Nietzsche's *perspectivism* and *interpretation* (Nietzsche, 1968, 1974, 2007; Babich, 1994; Hales and Welshon, 2000). Based on this outlook, I deploy four distinct theoretical perspectives combining discursive and non-discursive approaches. The rationale behind creating my own analytical package of different theoretical lenses largely stems from the complex, contested and contingent character of the bioenergy concept. Consequently, rather than performing a neutral and context-free study, the motivation is to implement a multi-perspectival framework in order to provide "different forms of context-bound and contingent knowledge" on the institutional debate reshaping the meaning of biomass-derived energy (Jørgensen and Phillips, 2002, p. 155). As Nietzsche (1968) argues, the world "has a differing aspect from every point; its being is essentially different from every point (…)" (568). Hence, I argue that by approaching the problem from only one single theoretical perspective I would diminish the scope of my interpretative possibilities.

On the one hand, perspectivism is a philosophical position that provides a critical reflection upon the *perspectival* and *interpretative* conditions of

knowledge, as well as upon the consequences of such claim about knowledge (Babich, 1994, Schrift, 1990). In "The Will to Power" Nietzsche (1968) writes: "Against positivism, which halts at phenomena—'There are only *facts*'—I would say: No, facts is precisely what there is not, only interpretations. We cannot establish any fact 'in itself': perhaps it is folly to want to do such a thing (…) In so far as the word 'knowledge' has any meaning, the world is knowable; but it is *interpretable* otherwise, it has no meaning behind it, but countless meanings.—'Perspectivism.'" (481). In other words, Nietzsche's argument stands in opposition to positivist approaches which claim that self-sufficient facts can be found in reality (Babich, 1994, p. 39).

According to the philosopher, we do not have means to see the "real" world that would exist outside of our understanding. Nietzsche writes bluntly: "(…) a real world—whatever it may be like—we certainly have no organ for knowing it." (Nietzsche, 1968, 583). Hence, his critique aims to undermine the conviction that objective science can lead to universally valid truths, and to expose science as only an interpretational process, because our conceptual constructions are caught in a prison of our own interests and constraints (Babich, 1994). As Nietzsche (1968) further challenges, "(…) 'truth' is therefore not something there, that might be found or discovered—but something that must be created (…)" (552). In this sense, perspectivism is a reflectional process that questions the limitation of science. The Nietzschean approach is a challenge for and a confrontation with the research activity that strives to provide interpretations, instead of facts and absolute truths (Babich, 1994).

On the other hand, understood as an analytical strategy, instead of asking *what I know* and *what is*, perspectivism allows me to raise a different question: *what I can know*. In this sense, perspectivism is not so much an ontological position but more an epistemological one (Shrift, 1990, p. 145). Hence, in contrast to the ontologically overdetermined approach concerned with the question of *what is*, in this thesis I perform an epistemologically overdetermined thinking that de-ontologizes the subject of my analysis and allows me to pose the *how* question instead (Andersen, 2003). In other words, I do not ask what bioenergy *is*, but *how it is* constituted and shaped in deliberations pursued by the institutions. Asking what bioenergy is would require subscribing specific presuppositions to the subject of investigation, whereas by pre-empting its ontology, I am able to primarily focus on *how* this concept comes into being, that is, *how* it is conceptualized and contextualized as a result of the institutional debate.

However, the question *how* requires interpretation of the subject of analysis and thus certain pre-understandings have to be applied. This is exactly where the

role of theories comes into the thesis. Hence, the priority is put on theoretical approaches, rather than methods. It is because I treat the selected theories as my primary optical lenses through which I interpret the subject of analysis. In other words, these analytical strategies play the role of distinct narratives by providing specific interpretative codes and by allowing me to investigate the concept of bioenergy from different angles. However, it is important to emphasize here that, by prioritizing theoretical approaches, I do not mean that there is less or no attention and rigidness placed on methodology. Furthermore, my prioritization of theory over method does not anyhow presuppose a strong demarcation between both to create a false dichotomy. On the contrary, in my analytical approach they are complementary, because without particular methods I would not be able to execute a proper focus through my theoretical lenses, and the other way around. But no matter how rigid and attentive they are employed in this thesis, it is not methods that foster my interpretations toward specific results, but theoretical perspectives that bring into the research necessary pre-understandings.

And finally, it is important here to demarcate the perspectival stance from constructivist approaches and, most importantly, from relativism. First, the differentiation between perspectivism and constructivism arises with the problem of scientific realism. While constructivism is grounded on the assumption that the "real" is a construct by emphasizing the role of human agency in the creative process, "perspectivism is not committed to any form of anti-realism" and it "understands the process of scientific research as trying to find the most effective interaction between reality and our perspectives" (Kidd, 2013, p. 4). Although, we can come to some understanding and knowledge of reality in itself, it is the identification of reality independently of our perspectives and interpretations that is denied to our cognitive capabilities (Kidd, 2013). In other words, whereas constructivism presupposes that world is socially constructed, for perspectivism the real is interpretative and open to various analytical presuppositions, of which the assumption of socially constructed reality is one among others. In this sense, perspectivism allows me to use both, discursive and non-discursive approaches. Second, perspectivism is a non-absolute stance that opposes relativism (Babich, 1994; Giere, 2006). The fundamental difference between the perspectival and the relative is that the first dares "all perspectives and every destruction including its own" but does not demand any equalisation of its position with other stances, whereas the latter denies a possibility of its own destruction or reduction, but advances only its own equal right to opposed viewpoints (Babich, 1994, p. 56).

Finally, before departing to my choice of analytical strategies, it is important to note that Nietzsche's outlook and influence function in this thesis not only as my onto-epistemological position, but it is also more or less

represented by scholars whose theoretical frameworks I implement in my analysis, namely: Foucault's genealogy and the discourse theory of Laclau & Mouffe. I elaborate on this connection in the respective chapters.

2.2. Meta-theoretical position: critical social theory

Despite my onto-epistemological position moulded by Nietzsche's multi-dimensional outlook of perspectivism, I cannot examine the subject of my analysis from too many opposite theoretical positions. In the backdrop of Nietzschean outlook, Robert Cox (1981) argues that "theory is always for someone and for some purpose. All theories have a perspective (…) There is, accordingly, no such thing as theory in itself, divorced from a standpoint in time and space" (p. 128). Following this argumentation, the indispensable condition here is to present a moderately coherent motivation behind my choice of different theoretical perspectives and locate a position from which *what I can know* acquires a common background. However, aware of differences between assumptions and elements of the selected analytical toolboxes, my intention is not to integrate these theoretical perspectives in any way but to impart them with a joint focus. Hence, the shared point of departure for my analytical approaches is channelled through a meta-theoretical magnifying glass in form of *critical social theory* that enables me to encompass theoretical strategies which, at first glance, appear to be rather disparate.

Critical social theory is influenced by diverse philosophical traditions, but is mostly associated with the critical thought originated in the Frankfurt School and has strong affinities with Marxism by exposing oppression of socioeconomic formations and challenging structures of domination (Viotti and Kauppi, 1999; How, 2003; Devetak, 2005a; Roach, 2008). Generally speaking, the theory stands in opposition to modern positivist social science, arguing that positivism has become a dominant ideology which – through gradual application of objective scientific and technical rationality – has entrapped human beings in the world of impersonal and, simultaneously, disempowering social and political mechanisms (Buckler, 2002, p. 181-182). On the one hand, critical perspective criticizes and challenges positivistic attempts to formulate value-neutral and empirically verifiable truths about social and political life. Similarly to perspectivism, it

rejects the hegemony of a single scientific approach, opting instead for the plurality and emphasizing the importance of interpretation (Price and Reus-Smit, 1998; Jørgensen and Phillips, 2002). On the other hand, it stands in opposition to the given prevailing order by asking how it originates and materializes. As Cox (1981) explains, critical theory "does not take institutions and social and power relations for granted but calls them into question by concerning itself with their origins and how and whether they might be in the process of changing" (p. 129).

More specifically, according to Steven Roach (2008) there are four indispensable premises that are central to critical social theory. First, the approach requires a self-reflective attention to the individual choice of theories and acknowledgment that scientific decisions and directions are rooted in social conditions that shape our motivations and societal knowledge. In other words, critical thought denies the possibility of a value-free, objective social analysis and recognizes that theories are always embedded in a socio-political reality (Devetak, 2005a). Second, the theory places its focus on the changeable character of social structures. As Roach (2008) explains, it seeks "to demonstrate how political power and ideological controls can foster the perception of the permanence of political and economic structures" (p. xvi). By doing so, it reveals and dismantles various forms of domination and injustice that are part of the *status quo* in form of a given social order (Devetak, 2005a). Third, critical perspective has an inter-disciplinary nature expressed in the assumption that social knowledge is not a completed and permanent project, but rather open and prone to changes that affect our ethical responses and responsibilities (Roach, 2008). Fourth, through its integrative exploration of social realm, critical theory offers a larger picture of the whole by allowing us to see interactions between different social, political, economic, discursive, cultural, and so on, processes and dimensions (Cox, 1981; Roach, 2008).

Hence, critical social theory serves in my thesis as a meta-theory, a meta-narrative that plays a role of a motivational compass designating my point of departure and the trajectory through the complexity of the bioenergy debate. The critical stance allows me to reflect upon the choice of my theoretical approaches which are not chosen at random, but are deployed to expose and dismantle the hegemonic structures of the contemporary socioeconomic system that bioenergy is inserted into. By doing so, the critical approach provides an insight into various reciprocities and interactions taking place in the institutional debate that cuts across different scientific, political and socioeconomic aspects. Therefore, the analytical trajectory is set similarly to Foucault arguing: "I absolutely will not play the part of one that prescribes solutions (…) Rather, I concern myself with determining problems, unleashing them, revealing them within the framework of

such complexity as to shut the mouths of prophets and legislators: all those who speak for others and above others." (1991b, pp. 157-158). Paraphrasing Foucault's words, the critical perspective pre-positions my approach by placing the concern not for prescribing solutions, but for determining problems and discrepancies in the bioenergy debate pursued by the institutions. In a reflexive sense, while I realize that I cannot get outside of the conceptual box I am in – the social reality that is constructed by us and constructs us in return – to some degree, critical social theory allows me to position myself in an antagonistic angle towards this box by questioning experts and policy advisors that tend to speak for others and above others.

2.3. Theoretical perspective: world-economy

The *world-economy* (WE) theoretical perspective applied in my analysis of the argument for bioenergy production in developing countries (paper **I**) constitutes part of a broader epistemological framework called *world-systems* (Wallerstein, 1974, 1976, 1979, 1984, 2004; Hopkins and Wallerstein, 1982; Chase-Dunn and Hall, 1993; Chase-Dunn and Grimes, 1995) that is rooted in the Marxist tradition of thought and draws its central ideas from Karl Marx's theory of capitalist accumulation and self-expansion (Hopkins and Wallerstein, 1982; Viotti and Kauppi, 1999).

According to the main assumptions of the WE theoretical perspective, the basic structure that constitutes the ordering principle of the *modern* world-system, which takes the form of a world-economy, is *capitalist* (Wallerstein, 2004). Thus, the structure is deeply situated within the market-based economy that aims at maximizing profit and accumulating capital over a given period of time (Wallerstein, 1979, 2004; Hobson, 2000). The exchange of services, goods and raw materials, necessary to the constituency and functioning of the WE, link together politically and culturally different societies (Chase-Dunn and Hall, 1993). However, due to inequalities present within the capitalist world-economy, particular states can be strong or weak by acquiring and occupying different positions in the system (Chase-Dunn and Grimes, 1995). This is reflected in the so called *core-periphery* dichotomy which, according to dependency theorists, that elaborated the concept in the first place, is achieved through and is the result

of mechanisms constituting the global capitalist market (Wallerstein, 1979, 2004; Hopkins and Wallerstein, 1982). Whereas *core* countries represent a powerful, wealthy, developed and technologically advanced zone, *peripheral* nations are weak, poor and underdeveloped (Wallerstein, 1976, 1979, 2004; Chase-Dunn, 1989). Moreover, the layered character of the WE has an additional zone situated between the core and the periphery. The so called *semi-periphery* is a necessary element of the system's structure because, as Wallerstein (1974) argues, "the middle stratum is both exploited and exploiter" (p. 405). On the one hand, it is a battleground of forces streaming from two opposite directions – core and periphery – and on the other hand it plays a significant role of a stabilizer that allows the capitalist system to persist and function (Hopkins and Wallerstein, 1982; Wallerstein, 1976).

For Hopkins and Wallerstein (1982), "the degree of 'commodification' is sufficient to create *adequate* 'demand' for the production 'supplied' as a result of the degree of '*mechanization*' (…)" (p. 105). The researchers state that "there is a world-wide *continuum* of mechanization of *all* productive processes (including those of agriculture)", what requires a steadily increasing input of energy (Hopkins and Wallerstein, 1982, pp. 57, 104). This constantly rising demand for resources results in *unequal exchange* that is central to the core—semi-periphery—periphery hierarchy. The concept was coined by Arghiri Emmanuel (1972) who argued that the exchange of peripheral products with core products involves the transfer of surplus-value. According to Hopkins and Wallerstein (1982), core populations "benefit from technical progress in the periphery, through the lowered prices for the latter's commodities, whereas peripheral populations suffer from technical progress in the core, in virtue of the relative increase in the real prices they must pay for the core's commodities" (p. 48). Furthermore, unequal exchange prompts relocation of production from rich, powerful and technologically advanced core countries to peripheral regions characterized by cheap labour, land and resources, as well as socioeconomic backwards (Wallerstein, 2004).

The implications of core—semi-periphery—periphery division and unequal exchange, that takes place within this configuration, are also physical because the capitalist world-economy involves appropriation of energy, as well as transformation of land and natural resources into commodities available for purchase on a given market (Hopkins and Wallerstein, 1982; Chase-Dunn and Grimes, 1995; Martinez-Alier, 2007). As Joan Martinez-Alier (2007) bluntly states, "(…) southern regions typically provide materials and energy so that the north can maintain and develop its socioeconomic metabolism" (p. 233). Hence, the phenomenon of unequal exchange embedded within the WE system manifests

itself in two dynamics: *unequal energy exchange* (Hornborg, 1998, 2001; Podobnik, 2002, 2006) and *unequal ecological exchange* (Hornborg, 1998; Martinez-Alier, 2002; Bunker and Ciccantell, 2005; Roberts and Parks, 2007, 2009; Lawrence, 2009).

The unequal energy exchange dynamic emphasizes that appropriation of energy in peripheral regions is an indispensable factor in the continuing process of capital accumulation and a key enabler for technological development in the developed countries (Hornborg, 1998, 2001). In comparison with underdeveloped parts of the world, that are compelled to utilize inefficient and unsophisticated energy carriers, it is technologically advanced and industrially intensive core that possesses access to, controls, and thus represents higher consumption of energy sources (Podobnik, 2002, 2006). This disparity calls for a "green" perspective on unequal exchange because the inequalities embedded within the WE are expected to appear in a global distribution of environmental burdens (Martinez-Alier, 2002; Hornborg, 2007; Weisz, 2007). According to Martinez-Alier (2002), on the one hand "the exports of raw materials and other products from relatively poor countries are sold at prices which do not include compensation for local or global externalities", and on the other, "rich countries make a disproportional use of environmental space or services without payment, and even without recognition of other people's entitlements to such services (…)" (p. 213). The distributional asymmetry reflects different "biophysical metabolism" of the global North and South (Roberts and Parks, 2007, p. 164) and results in the ecological debt that is reflected in the unequal ecological exchange taking place between the system's layers. The ecological unequal exchange arises from two causes. As Martinez-Alier (2002) argues in his elaboration on this double-causality, poverty and lack of socioeconomic power result in local environment and health "to be given away or sold cheaply" while, simultaneously, "the ecological time necessary to produce the goods exported from the south is frequently longer than the time required to produce the imported manufactured goods or services", placing the benefitting north in a position of an ecological debtor (p. 219).

To sum up, the world-economy perspective provides two important components to this thesis: an emancipatory project rooted in the neo-Marxist criticism of capitalism and its forces, and an alternative perspective to the mainstream theories of international relations theory field. From this point of view, and based on the interpretative structures that the WE perspective offers, I am able to analyse and expose potential patterns of domination as well as internal contradictions in the institutional discourse on bioenergy. In this sense, I disagree with Robert Cox's (1981) treatment of the WE approach as insufficiently critical by focusing on aspects that unintentionally maintain the system. On the contrary,

it is not a problem-solving approach that accepts the world as it is, but precisely a critical examination of various systemic contradictions and exploration of dominant structures and ideologies. I borrow my approach from the work of Kurt Burch (1995), who incorporates the concept of modern world-economy within the critical theory by arguing that liberalism – understood here as a hegemonic doctrine of the capitalist world – is built upon the same philosophical foundations that ground the positivistic thought. Hence, the WE perspective, while operating on a structuralist framework, opens up important questions regarding internal contradictions embedded in the system. In a similar fashion Heinz Sonntag (2003) argues by stating that "the critical attitude is the nucleus of what world-system analysts are doing when they engage in research, reflection, and interpretation about the inequities of the human condition" (p. 243).

Because in paper **I** my unit of analysis is bioenergy discussed by the three selected IOs as a commodity, the WE's conceptual framework allows me to elucidate and reflect upon the way the organizations discuss bioenergy as a market product in form of energy produced from biomass. Therefore, my attempt is not to approach the capitalist world-economy from a broader picture, but rather to place bioenergy within its perspective, explore and interpret this entity in the core—periphery, North—South, or modern—traditional dichotomy, through the notions of unequal energy exchange and unequal ecological exchange. The premise of both dynamics is central to problematizing allocation of bioenergy production and the role of developing countries as a biomass supplier to the energy thirsty industrialized core. It is crucial to expose contradictory routes in the institutional debate illustrating how more advanced countries utilize the idea of international biofuel trade to be able to bolster their high levels of energy consumption and meet their defossilization requirements, while simultaneously reinforcing ecological footprint at the expense of societies and environments in the developing regions.

2.4. Theoretical perspective: discourse theory

Based on the assumption that economy, society, technology or environment are "cultural categories" (Hornborg, 2010, p. 239), it is necessary to combine the WE theory with analytical perspectives that reflect upon how they are culturally constituted. Various problems related to these concepts, such as current efforts of decarbonization and defossilization or different challenges connected with global food production, climate change and energy demand, are conditions that "must be understood through the lens of cultural analysis, particularly a cultural analysis of power within the capitalist world-system" (Hornborg, 2010, p. 241). These cultural categories and structures, including the concept of bioenergy, are the results of discursive practices.

According to the assumptions of discourse theory, all objects and actions are meaningful, but these meanings depend on the order of discourse that constructs and constitutes their identity and significance (Howarth and Stavrakakis, 2000). According to David Harvey (1996), discourse "is in itself an institution, a mode of social relating, a material practice, a fundamental moment of experience" (Harvey, 1996, p. 83). In other words, as Howarth and Stavrakakis (2000) explain, discourses "refer to systems of meaningful practices that form the identities of subjects and objects", they are "concrete systems of social relations and practices that are intrinsically *political* (…)" (p. 3-4). Hence, the approach scrutinizes the role of discourse in shaping, reproducing, legitimizing and neutralizing social structures and meanings (Torfing, 1999; Howarth, 2000; Howarth and Stavrakakis, 2000). Among many analytical strategies provided by the broad domain of discourse theory, in the study challenging the food vs. fuel dilemma (paper **II**) I use Michel Foucault's genealogy, whereas in the analysis on bioenergy as a win-win-win solution to societal challenges (paper **III**) I employ discourse approach developed by Ernesto Laclau and Chantal Mouffe.

2.4.1. Foucault's genealogy

Heavily influenced by Nietzsche's intellectual legacy and his specific style of investigation in particular, Michel Foucault adapts this analytical tool in his later works (Foucault, 1970a, 1977, 1978). He expands Friedrich Nietzsche's way of investigation by arguing in his essay "Nietzsche – genealogy and history" (Foucault, 1984) that the genealogical analysis: first, "retrieves an indispensable

restraint: it must record the singularity of events outside of any monotonous finality; it must seek them in the most unpromising places"; second, "it must be sensitive to their recurrence, not in order to trace the gradual curve of their evolution, but to isolate the different scenes where they engaged in different roles; and third, it "must define even those instances when they are absent, the moment when they remained unrealized (…)" (ibid, p. 76).

In the first point, Foucault means that by looking at events in the most unpromising locations, genealogy is not a description of actual events but history of the present designed to outline conflicts and strategies of control that condition discursive formations (Andersen, 2003). According to Jacob Torfing (1999), "genealogy is a method of diagnosing discursive practices from within them" and "the genealogist immerses him- or herself in the myriad of power struggles that shape historical forms of discourse" (p. 91). In other words, the strategy investigates discursive practices of the present by referring them back to the hegemonic conditions and conflicts under which they have been shaped and constituted (Andersen, 2003). Hence, to deploy genealogy in the analysis is not to smatter the grand surface of a particular subject, it is not enough to go below the apparent image visible at first encounter, but rather it is to explore alternative dimensions of uniform ensembles, to seek small details, minor shifts and subtle angles that are caught in complex patchworks of discursive forces capable of forming, reproducing and legitimizing dominant structures in the society (Dreyfus and Rabinow, 1983; Andersen, 2003; Devetak, 2005b).

In the second point, Foucault suggests that by rejecting the linear progression of a given discourse, attention is placed on exposing non-linearity, diffusion, contention and contingency of discursive practices. For Foucault (1984), "genealogy does not resemble the evolution of a species and does not map the destiny of a people. On the contrary, to follow the complex course of descent is to maintain passing events in their proper dispersion; it is to identify the accidents, the minute deviations-or conversely, the complete reversals-the errors, the false appraisals, and the faulty calculations that gave birth to those things that continue to exist and have value for us; it is to discover that truth or being does not lie at the root of what we know and what we are, but the exteriority of accidents" (p. 81). Hence, the motive is grounded in the critical intention with which Foucault, similarly to Nietzsche, employs his inquiry. The genealogical perspective expresses its suspicion and even rejection of the historical ideal of linear curves, grand narratives, theological structures and transcendental changes perceived as the triumph of a value-laden and civilised progress based on presumably unerring reason (Gutting, 2005; Lord, 2006; Downing, 2008). The genealogical inquiry provides an alternative perspective on

the notion of a "linear" development and aims to deconstruct it by exposing discrepancies, contingencies and accidents in the production of meaning (Dreyfus and Rabinow, 1983; Gutting, 2005; Downing, 2008).

In the third point, by identifying absent instances and unrealized moments, Foucault means that genealogy focuses on "what we typically hold to be ahistorical, self-evident, and substantial in order to reveal its rootedness in history" (Mahon, 1992, p. 108). Thus, the approach aims at tracing and inverting processes of conceptualizations that constitute the social reality as well as our thinking based on it as meaningful and natural (Bleiker, 2000; Devetak, 2005b). Genealogy "disturbs what was previously considered immobile; it fragments what was thought unified; it shows the heterogeneity of what was imagined consistent with itself" (Foucault, 1984, p. 82). The genealogical inquiry breaks with conspicuous and apparent while undercutting the ostensible surface of motivations and necessities that ground our knowledge and practices (Mahon, 1992). Hence, Foucault's approach falls into my choice of onto-epistemological stance because, on the one hand, genealogy is perspectival and, on the other hand, it engages with critique of discourses it scrutinizes (Howarth, 2000, p. 72).

The genealogical investigation is deployed in my analysis for the purpose of tracing the present history of the institutional discourse on bioenergy in relation to agriculture and challenging the so called "food vs. fuel" dilemma embedded in the debate (paper **II**). Following Foucault's guidance, the genealogical approach allows me to challenge this taken for granted assumption that, under the notion of biofuel production, agriculture and energy sectors are positioned against each other as mutually exclusive. I inverse this dichotomy by approaching the research question in a non-linear fashion, which means that the analysis is not guided by the factual time, but instead concentrates on discursive formations. To illustrate this shortly, the discursive core, in form of the assumption of synthesizing energy and agriculture sectors into one, is the genealogical tree's trunk of the biofuel discourse. It is constantly present in the debate, either explicitly or assumed as an already accepted point of departure which is not questioned. Whereas whatever grows out of this trunk – branches in form of modifications and dislocations – is articulated at different points and lengths on the time scale. It is because the process of conceptualization takes place in a discursive dispersion, untraceable if one merely focuses on the very surface of the debate. Finally, the genealogical perspective allows me to expose alternative dimensions, identify contention, as well as disturb what is thought consistent within the institutional discourse on bioenergy.

However, the analytical toolbox provided by the genealogical perspective requires some adjustments in order to match the subject of analysis. First, in

contrast to Foucault's investigation of grand topics, such as human sciences and social institutions, the focus of this thesis is fittingly confined in scope on a material entity in form of energy produced from biomass – a powerful concept representing specific political and socioeconomic ambitions. Second, due to the 20-year limit of the study, determined by the activity span of selected IOs, the analysis does not trace earlier processes of discourse formation but instead it is suspended in a moment when bioenergy comes back with full force to the global agenda resulting in an intensive debate. Third, in order to provide "a processual perspective on the web of discourse" (Bevis et al, 1993, p. 194), I utilize Foucault's three criteria of *formation*, *transformation* and *correlation* (Foucault, 1991a, p. 54) that inform my analytical approach in an effort to disentangle and interpret the network of meanings scattered in dispersed texts produced by and under auspices of the organizations.

According to Foucault (1991a), each discourse is subjected to constant alterations as new statements and remarks are added to it. But what individualizes a discourse in the first place is "the existence of a set of rules of formation" for all its elements and operations that are submitted to change (ibid., p. 54). In this sense, I look at the institutional discourse on bioenergy not only as one that undergoes constant changes, with new utterances being attached to it, but also as a discursive formation that is constructed based on specific rules that inform other components of the conceptualization process. If the set of conditions for the formation of discourse can be recognized, it is possible to determine the capability of internal modifications and the threshold of transformations within it (ibid., p. 54). Therefore, by identifying that the biofuel discourse is built on the basic condition of synthesising energy and agricultural markets, a discursive core around which further meanings arise, I seek to trace and unravel transformations of the discursive formation occurring at specific moments and triggering characteristic changes that alter the discursive structure and its components. Furthermore, Foucault (1991a) argues that one can characterize "the set of relations which define and situate it among other types of discourse (…) and in the non-discursive context in which it functions" (ibid., p. 54). In this sense, I look at how the discursive formation of the concept of bioenergy and its transformation correlates with the shape and understanding of food production.

By operationalizing the genealogical inquiry in such a way, I identify three characteristic moments of the discourse on bioenergy in the debate pursued by the IOs. The first one is *consolidation* of the discursive core on which the whole formation is further built upon. In the case of bioenergy it is the desire to synthesize agriculture and energy sectors that constitutes the discursive core. The second is *modification* of the discursive structure, when the core's logic is

protected by disparities and alterations. These modifications are primarily expressed in the argumentations to expand and intensify global bioenergy production. And the third characteristic moment is expressed in *discontinuations*, when it is impossible to further maintain the core's logic due to dislocations arising from various inconsistencies in the structure cracking under the pressure of new challenges including, as indicated in my analysis, the risk of global food crisis and a difficulty of lowering production costs.

2.4.2. Discourse theory of Laclau & Mouffe

Ernesto Laclau and Chantal Mouffe elaborate on their discourse theory in the book titled "Hegemony and Socialist Strategy: Towards a Radical Democratic Politics" (2001) but assumptions and discussions on their analytical perspective can be also traced in their joint article "Post-Marxism without Apologies" (Laclau and Mouffe, 1987), as well as in Laclau's own writings (Laclau, 1989, 1990, 1996, 2000). This analytical perspective is implemented in the study of bioenergy as a win-win-win solution to the three challenges of energy insecurity, climate change and agricultural crisis (paper **III**).

In developing their theory of discourse, Laclau and Mouffe adopt and combine post-structuralist, postmodern and post-Marxist theoretical thoughts. The scholars departure from the post-Marxist tradition by employing the critique of and deconstructing it through the post-structuralist perspective on language and social reality, based on the fundamental assumption that meaning is discursively constructed and, because of the instability of language, it cannot be permanently fixed (Jørgensen and Phillips, 2002). They argue that society as a totality is an impossible project due to its open, heterogeneous and plural character that is determined by the contingency of language and articulation. By rejecting the notion of society as a stable and closed entity, Laclau and Mouffe understand social realm as a field consisting of endless multiplicity of political identities, power relations and antagonistic positions (Best and Kellner, 1991). As Laclau (1990) explains, "the social is impossible without some fixation of meaning, without the discourse of closure" and "the social only exist as the vain attempt to institute the impossible object: society" (p. 92). The impossibility of the *social* is precisely what makes it possible as well as indispensable for the *political* to emerge. In order to explain this interdependence and before departing to a more detailed description of the analytical toolbox provided by the discourse approach of Laclau and Mouffe it is, in my view, important to spell out three basic assumptions of their theory.

First, in contrast to Foucault, whom they also draw inspiration from, Laclau and Mouffe (2001) abandon the line between discursive and non-discursive by arguing that "every object is constituted as an object of discourse" (p. 107). For both scholars the discursive is not just one object among many, "but rather a theoretical horizon" (Laclau and Mouffe, 1987, p. 86). In other words, social realm is entirely encompassed by and a product of discursive processes that are understood not only as language and articulation, but as all social practices (Howarth, 2000; Jørgensen and Phillips, 2002; Andersen, 2003). Hence, Laclau and Mouffe (1987) use the notion of discourse "to emphasize the fact that every social configuration is meaningful", and argue that "it is the discourse which constitutes the subject position of the social agent, and not, therefore, the social agent which is the origin of discourse" (p. 82). Nevertheless, by insisting that there is no meaning outside, in the extra-discursive dimension unknowable to us, they do not deny or contest the reality external to our thoughts, but rather challenge its capability of acquiring meaning independently of discursive processes (Laclau and Mouffe, 1987, p. 82).

Second, by emphasizing the meaningful character of every social configuration, Laclau and Mouffe affirm that any signification is constituted by the relational character of differences (Howarth, 2000). As the scholars explain, "all identity is relational and all relations have a necessary character" within an unstable and unfixed system of differences (Laclau and Mouffe, 2001, p. 106). Differences, or *antagonisms* in terms of Laclau and Mouffe (2001), "are not objective relations, but relations which reveal the limits of all objectivity. Society is constituted around these limits, and they are antagonistic limits" (p. xiv). In other words, social antagonisms occur because of the impossibility of attaining a complete identity by social agents that, in result, require the notion of difference, of otherness they can define against and construct their partial objectivity in opposition to it (Howarth, 2000).

Third, any set of discourses that constitute a particular system of social relations is not only constructed through the presence of antagonisms, but also because of the activation of the political understood as and expressed through the exercise of power. For Laclau and Mouffe (2001), *hegemony* is a political intervention that, to some extent, is able to homogenize and universalize differential identities positioned within various discourses that embroider the social fabric (p. xiii). In order to neutralize conflicting power relations, a hegemonic discourse aims at positioning itself not just as one of alternative articulatory formations, but as the only possible narrative that sutures with its thread the social realm, to such extent that it becomes a common-sense, a norm that cannot be questioned (Smith, 1998; Howarth, 2000; Laclau and Mouffe,

2001). By presenting the fundamental outlook of Laclau and Mouffe on discourse, social and political, it is now possible to outline the main components of their theoretical toolbox.

The open character of the social and articulatory practices arising from the impossibility of attaining the full societal closure constitute, what Laclau and Mouffe (2001) call, a field of discursivity – a boundless and dynamic reservoir that is overflowed with the surplus of meaning in which particular discourses overlap, constantly and inevitably. This surplus of meaning is the result of a lack of perpetually fixed centre and the impossibility to attain a closure of a linguistic moment, while only partial fixation is possible (Torfing, 1999). Thus, all elements of the field of discursivity have the status of floating signifiers that are unable to acquire a complete articulation in a given discursive formation (Laclau and Mouffe, 2001). This is because different discourses struggle to impose new meanings and lay new content and, in result, the character of those signifiers is constantly reconceptualised, reimagined, always partial and unfixed (Smith, 1998; Jørgensen and Phillips, 2002). In this sense, outside any specific discourse bioenergy is a floating character because its meaning is open to constant change and reconceptualization. For example, it can signify traditional biomass burning cook stoves in poor rural communities or a highly advanced process of producing energy from algae. It can be conceptualized as a strategy for armed forces to go green by fuelling their fighter jets with biofuels or as a sustainable development solution for small-holder farmers.

But because of the impossibility of attaining the closure of meaning that is subjected to constant reconfigurations, discourse becomes a dynamic momentum that, through articulatory practices, penetrates this surplus and strives to arrest the flow of floating signifiers around specific privileged points (Laclau and Mouffe, 2001; Andersen, 2003). These privileged discursive centres around which other signs position themselves and acquire their meaning are, what Laclau and Mouffe call, *nodal points* (Laclau and Mouffe, 2001). In other words, nodal points are floating signifiers that, at the occurrence of a particular discourse, penetrating the field of discursivity in order to impose and arrest meaning, are crystallized within the centre of this discourse forming a conceptual formation around it (Smith, 1998; Jørgensen and Phillips, 2002).

To exemplify this theoretical assumption on my subject of analysis, the theory of Laclau and Mouffe allows me to illustrate that the concept of bioenergy loses its floating character when powerful discourses concerned with energy, climate change and agriculture arrest its flow and construct meanings around it. In each of the three discourses, biomass-derived energy becomes a nodal point around which specific conceptual formations are built. In the discourse on

energy, bioenergy holds the promise of securing and diversifying energy supplies. In the discourse on climate change, biofuels are recognized as significant mitigation technologies that can help reduce emissions of carbon dioxide. In the discourse on agriculture, the concept of bioenergy is framed as a key enabler and indispensable factor of promoting rural development.

Nevertheless, no discourse can be fully conceptualized to attain a complete closure, because it always remains in a permanent conflict with other discourses constructing reality in different ways (Jørgensen and Phillips, 2002). This is exactly the case with the three discourses of energy, climate change and agriculture that compete over the conceptualization of bioenergy. Hence, according to Laclau and Mouffe (2001), only a hegemonic intervention has the power to temporarily arrest the meaning, not just around privileged nodal points but across competing discourses. Their differences become partially dissolved as soon as they situate themselves together in opposition to a common discursive outside. It is because in order to combine various discourses competing over a particular meaning, but in opposition to a common antagonistic force, the hegemony needs to cancel differences between them.

According to Laclau & Mouffe (2001), this partial dissemination of discursive identities is acquired through the so called *logic of equivalence*. It is vis-à-vis the oppressive antagonistic forces establishing the limit of social objectivity, that the very process of suturing together different discourses in the equivalent sequence takes place (ibid, p. xiii). By looking at the institutional discourse on bioenergy through this theoretical lens, I observe that the hegemonic intervention, striving to suture the three discourses, is expressed through the capitalist market economy. Fixated on economic growth and accumulation of capital, it recognizes high production costs and price pressure as the antagonistic force that has to be excluded. Hence, differences are partially dissolved and the identity of bioenergy in each discourse equalized by altering the concept's characteristic from potentially feasible solution to particular social challenges into a commodity that has to be feasible economically. In result, however, the identity of each discursive moment in the chain of equivalence becomes internally split (Laclau and Mouffe, 2001, p. 63). To illustrate this, a partial alteration of bioenergy's identity into a product that has to be economically feasible and produced at the lowest cost possible contradicts its nodal position occupied in the discourse on agriculture, where it embodies a solution to rural under-development in poor countries.

This is exactly why a long chain of equivalence, that requires alteration of several identities, results in emptying a particular signification by disengaging it from the totality of a given sequence (Laclau, 1989, 1996). In other words, it is

not a floating character that makes a signifier emptied, but the impossibility of constituting the closure of meaning, due to various dislocations that result from the process of equalizing identities in the chain. Paradoxically, without these disruptions in the formation of meaning, as Howarth (2000) points out, "the social totality would be fully structured and objectivized, and there would thus be no room for hegemonic articulation" (p. 109).

2.5. Theoretical perspective: Jameson's critical approach

Departing from the discourse theory of Laclau and Mouffe, I can eventually proceed to the last perspective which, following the view of cultural theorist Fredric Jameson, is applied as a "critical and diagnostic instrument" (2004, p. 38) through which I scrutinize how the so called second-generation or advanced bioenergy technology is conceptualized by the three international organisations (paper **IV**). More specifically, I insert the subject of analysis into a juxtaposition of two scholarly approaches to the meaning and role of innovation, progress and the future in contemporary capitalist societies. Departing from assumptions on the notion of futurity forwarded by Barbara Adam and Chris Groves (2007), it is Jameson's theoretical lens that I apply in this thesis to problematize and question the concept of second-generation biofuels as an expression of new and innovative technology that carries within itself the promise of change and progress. His perspectives on the late capitalism, Utopia and ideology (Jameson, 1983, 1991, 1994, 2007, 2011) allow me to expose the illusionary character of the future imaginary of advanced bioenergy and, based on my findings, place a counter argument to the assumption made by Adam and Groves (2007) that "industrial capitalist societies are inescapably wedded to innovation and progress" because "change rather than stability is the order of the day" (p. 1).

But first of all, it is important to briefly present Jameson's perspectives on the late capitalism, Utopia and ideology. The reason behind it is twofold. On the one hand, his critical outlook on these three issues is central to his deliberations on the notion of innovation, progress and the future in the contemporary socioeconomic system. On the other hand, his critical argumentations neatly conflate the theoretical positions of world-economy, Foucault and Laclau.

Jameson alludes to theoretical assumptions of the world-economy approach by asserting that the currently dominating socioeconomic system consists of and, at the same time, also depends upon internal contradictions in form of various inequalities. In the "Limits to Capital" (2006), he notes that due to discrepancies and barriers within its own structure, capitalism is forced to generate various differentiations in geographical forms, social relations and institutional arrangements (p. 416). In this perspective, unequal energy and ecological exchanges are precisely two examples of such inequalities as "new distinctions in old guises" that result from "inevitable uneven development of capitalism" (Jameson, 2006, p. 416-417).

Jameson's perspective on the traditional conceptualizations of Utopia (Jameson, 1994, 2004, 2007, 2011) also conflates with and extends the one presented by Foucault (1970b, 1980). For the latter one, "utopias are sites with no real place. They are sites that have a general relation of direct or inverted analogy with the real space of Society. They present society itself in a perfected form, or else society turned upside down, but in any case these utopias are fundamentally unreal spaces." (Foucault, 1986, p. 24). Similarly, Jameson (2007) maintains that, in the traditional sense, Utopia is the site with no real place, something that is not there and it cannot be located, because of our fundamental inability to imagine Utopia itself. Different utopian thinkers and writers have attempted to describe imaginary futures of the societal order, but those visions have always lacked the potential to conceptualize truly alternative projects. The scholar argues that this impotence does not owe to "any individual failure to imagination" but rather it is "the result of the systemic, cultural and ideological closure of which we are all in one way or another prisoners" (Jameson, 2007, p. 289).

Hence, in his attempt to formulate a method for analysing or rather conquering such utopias, Jameson (2011) borrows from the structural inversion provided by Foucault's genealogical toolbox, in order to "change the valences on phenomena that so far exists only in our own present" and "to isolate specific futures in our empirical present so as to read them as components of a different system" (p. 42). In Jameson's view, such an approach would strive to locate radical differences and retrieve signals of otherness. For as the scholar argues, "the ideals of Utopian living involve the imagination in a contradictory project", and not yet another repetition of the present (Jameson, 1994, p. 56).

Finally, Jameson's critical work relates to the theoretical perspective provided by Laclau and Mouffe, more specifically to Laclau's understanding of ideology. According to Laclau (1990), the ideological not only would consist of "those discursive forms through which a society tries to institute itself as such on the basis of closure, of the fixation of meaning, of the non-recognition of the

infinite play of differences" but, consequently, it would also be "the will to 'totality' of any totalizing discourse." (p. 92). Jameson (1983) perceives ideology in terms of a *strategy of containment* that "allows what can be thought to seem internally coherent in its own terms, while repressing the unthinkable (…) which lies beyond its boundaries" (pp. 37-38). In other words, by allowing only for the internal consistency within its own borders or, in Laclau's terms, by aiming at fixation of meaning within the limits marked by antagonisms, a given ideology attempts to supress underlying discrepancies and dislocations of a hegemonic assemblage. And whereas a hegemonic intervention strives to bind competing discourses by suturing them in chains of equivalence, ideology – understood here as either the strategy of containment, or the will to totality of any totalizing discourse – manifests itself in concealing the irresoluteness which prevents a hegemonic force from arresting the meaning. This powerful masking is necessary to project an illusion of the possibility to attain closure of the social. In other words, the role of ideology is to project a misconception that a particular meaning, identity, system or any other social manifestation is totally consistent and coherent by denying and obscuring any internal contradictions.

New distinctions in old guises specific for capitalism, which result from a systemic closure that imprisons our imagination, are characteristic of an ideological grip that represses the alternative and unthinkable, while concealing internal discrepancies by projecting an illusion of closure. Hence, as Jameson bluntly observes (2003), the future "seems to be nothing but a monotonous repetition of what is already here" (p. 76). In this perspective, the scholar problematizes the possibility of inventing the new or projecting the future as something that is not there, because any conjecture is always partially embedded in the present time, as if it was a distorted image of current arrangements seen in a broken mirror. For the shape of future does not only depend on human conceptualizations, but it is also inscribed in the very nature of here and now we are living in. It is because, as Jameson (2007) argues, contemporary capitalist societies require a different awareness of temporality that is rooted in a solid mental construction of past visions. Consequently, the future is not pre-emptied and decontextualized to be able to attract alternative imaginaries and radical changes. Rather, this future is already colonized and populated by familiar ideas and inventions, to the extent that technological progress becomes illusionary and serves only to preserve the systemic, cultural and ideological entrapment.

Nevertheless, Jameson (2011) points out that in the analysis of future imaginaries it is not what can be envisaged or imagined but rather what is unimaginable and unconceivable that the focus should be placed on. It is because, as he argues, utopia "is not a representation but an operation calculated to

disclose the limits of our own imagination of the future, the lines beyond which we do not seem able to go in imagining changes in our own society and world (…)" (Jameson, 2011, p. 23). Hence, by applying Jameson's perspective to my analysis, I concentrate on three aspects of the institutional discourse surrounding second-generation biofuels. First I place my focus on what arguments, according to the IOs, make the advanced bioenergy new and innovative. In this way, I strive to locate components of radical differences and retrieve signals of otherness. Second, I look at how and to what extent second-generation biofuels serve as a technological progress and a promise of change or, in other words, what are the lines beyond which the organizations do not go. Third, by determining the limit of their conceptualization, I expose what is the purpose of associating innovation and progress with advanced bioenergy and whether the notion of new that could bring change is only illusionary.

3. Materials and methods

As I stated in the previous chapter, by asking *how* biomass-derived energy is conceptualized in the debate pursued by the IOs, I perform an epistemologically overdetermined mode of research. Hence, I facilitate my interpretations primarily through my analytical package consisting of four distinct theoretical perspectives. However, this is by no means an indication of downplaying the significance of methodology, which is applied in this thesis to serve two important purposes. On the one hand, it is a tool for managing a vast amount of textual material and, on the other hand, it plays a crucial role in fostering interpretative possibilities of theoretical lenses. Moreover, my choice of methodology depends on the choice of material and the other way around in a reciprocal process. As a result of my study being based entirely on textual material, my methods consist primarily of deconstructing and double reading. Below I present the reasons for operating entirely on written language, demonstrate how I selected the empirical data and explain my methods of analysing texts.

3.1. Between the "inside" and "outside" of the text

The empirical basis consists of publications in form of, reports, assessments, policy papers and other types of documents issued by the three international organizations. Hence, I do not rely on spoken language in form of interviews, observations of dialogues or other communicative processes. There are three reasons behind my decision to rely entirely on the textual material.

First, writing is an indispensable career of thoughts, ideas and signified content (Derrida, 1988b) that, according to Leslie White (2007), serves as "a means of social organization, integration and control", and thus it helps "to order, to systematize" (p. 356). I do not argue here that speech or any other communicative career of signs is inferior to text, but in the case of my research I assign a primary significance to the written language's role in reshaping conceptual structures and especially in perpetuating the overall texture of the

social realm. Second, while other forms of visual communication, such as models, graphs or maps share some characteristics with written language, focusing only on text was a strategy to delimit the empirical data, which otherwise would run the risk of being unmanageable. Particularly due to my epistemologically driven approach, set to scrutinize the subject of analysis from four different theoretical angles, the objective is to not diversify the material but instead to keep it homogeneous, that is based entirely on text, to pave the way for the analytical perspectives instead. Despite this restriction, the selected data was characterized by the required abundance of discussions that put bioenergy in different contexts, and most significantly in relation to the topics of agriculture, energy and climate change. Three, by operating on data derived from the three international organizations constituting large, bureaucratic entities that engage a substantial amount of policy-advisors and experts, it would be problematic to determine and justify which individual or group would be the most suitable for a potential interview.

Despite this delimitation of data, the empirical basis consisting entirely of text has one specific advantage. As Christopher Norris (2002) observes, "writing is the endless displacement of meaning which both governs language and places it for ever beyond the reach of a stable, self-authenticating knowledge" (p. 28). Consequently, one could assume that a given document is a final product of the process of thinking, grouping ideas or assessing knowledge into a single and coherent package. But while written language brings within itself a load of meanings and symbols encapsulated inside the frames of each page, at the same time all texts are part of a broader context. For Jacques Derrida (1976), "there is nothing outside the text" (p. 158), which means that the so called reality is actually a realm of our interpretations and thus "one cannot refer to this 'real' except in an interpretative experience" (Derrida, 1988b, p. 148). In other words, as Martin McQuillan (2001) argues, "one cannot read a text without acceding to its contextual opening" and that all social, political, historical, and many other aspects which affect the text "are already inscribed within the text and we can access them through the text" (p. 38). Thus, documents, reports, assessments and other forms of written language are not detached clippings or autonomous entities, but rather puzzles that are part of the overall texture they constitute and are constituted by.

It is because, as Foucault (1972) observes, "the frontiers of a book are never clear-cut: beyond the title, the first lines, and the last full stop, beyond internal configuration and its autonomous form, it is caught up in a system of references to other books, other texts, other sentences: it is a node within the network" (p. 23). Paraphrasing the philosopher's words, the frontiers of various forms of texts

I analyse are never clear-cut. They are part of the broader system of signifying networks built upon the structures within the organizations themselves as well as beyond them, the whole constitution and representation of the context the IOs operate within. As Foucault (1972) further discusses, the unity of text cannot be regarded as identical in each case, but rather its unity is variable and relative, and "as soon as one questions that unity, it loses its self-evidence; it indicates itself, constructs itself, only on the basis of the complex field of discourse" (p. 23). Thus, I treat documents not as entirely separate texts with clear-cut frontiers, but as part of an overall texture or discursive field. It is also important to add here a reflective note that as a researcher who, following Nietzsche's thought, does not discover truths but rather creates them, I am as much a part of the whole texture as I am an active agent that reshapes and restructures it in the interpretative process.

3.2. Selecting empirical data

The empirical basis for my analytical work consist of legal documents, conference statements and decisions, reports and publications, assessments and research papers, as well as other relevant texts issued by and under the auspices of the three selected international organizations. The empirical data spanning 20 years from 1990 to 2010 and obtained from FAO, IEA and IPCC constitutes the primary source that is analysed in this study. Materials issued by FAO were gathered from its official website (www.fao.org) that includes access to FAO Corporate Document Repository and FAO Publications Catalogue. IEA documents were acquired from its official website (www.iea.org) with access to the agency's Publications and Papers, and from the IEA Bioenergy (www.ieabioenergy.com). When it comes to IPCC, its online database Publications and Data on the official website (www.ipcc.ch) was the source of reports issued under the climate change regime. If specific documents were not available as free materials or not published online in electronic forms, they were purchased and obtained directly from the selected IOs. The collection of primary data was based on the following search terms: "agro-fuel", "agrofuel", "agro-energy", "agroenergy", "bio-fuel", "biofuel", "bio-energy", "bioenergy", "biomass-derived" "biomass energy", "biomass fuel", "biodiesel", "bio-diesel",

“biogas”, “ethanol”, “energy crop”, “energy from biomass”, “first-generation”, “next-generation”, “second-generation”.

Delimiting the scope of analysis by focusing on one specific biomass-derived energy option made it possible to convey a larger picture of deliberations on bioenergy pursued by the IOs. Gathering materials in the first step, by looking at various types of biofuels, their production and use, was not problematic. However, in some documents the concept of bioenergy was the main topic discussed in different contexts and from different perspectives, whereas in others it constituted only a part of deliberations about issues not related to the focus of each analysis. In order to escape dispersion and effectively systematize this vast amount of qualitatively heterogeneous material, an additional dissemination of preliminarily collected data was a necessary step, which was deployed based on the scope of four research questions and in relation to theoretical lenses assigned to them.

In the study analysing the argument for biofuel production in developing countries (paper **I**), the focus is not directed on biomass-derived energy itself and on how the institutions conceptualize its production in general, but on how the bioenergy debate is constructed in the context of developing countries, with emphasis on the role of sugarcane ethanol production in Brazil. Hence, the pre-selected data collection was narrowed down by further scanning of the material, with search terms used to describe or representing developing regions and related to ethanol from sugarcane: “Africa,” “Asia,” “Latin America,” “South America,” “Sub-Saharan Africa,” “Brazil,” “sugarcane,” “ethanol,” “developing,” “underdeveloped,” “poor,” “warm,” “tropical,” “Southern,” “peripheral,” and “non-OECD.”

Similarly, in the paper challenging the “food vs. fuel” debate embedded in the institutional discourse on bioenergy (paper **II**), the focus is not placed on the concept of biofuels itself and on how the IOs construct it, but on the correlativity between the biofuel production and the agricultural sector. Hence, the pre-selected empirical data was narrowed down in scope to extract the specified context by further scanning of the texts based on the following search terms: “agriculture”, “agricultural”, “crop”, “cultivate”, “cultivation”, “farm”, “feedstock”, “food”, “land”, “plantation”, “rural”, “subsidies”, “supply”, and “surplus”.

In the study of bioenergy conceptualized by the IOs as a solution to the challenges of energy insecurity, climate change and agricultural crisis (paper **III**), the full attention is given to support the main argument that the biofuel concept is sutured by the hegemonic thread of the capitalist economics concerned with the aspects of price and cost of production. Consequently, the primary compilation of

texts was scrutinized again on the basis of such terms, as: “cost”, “cost-effective”, “cost-efficient” and “price”.

And finally, in the paper that scrutinizes the way international organizations conceptualize second-generation biofuels (paper **IV**), it was necessary to dissect the advanced bioenergy technology from the general discussion on biomass-derived energy. Therefore, the collection of primary data was narrowed down with the following search terms: “advanced bioenergy”, “advanced biofuels”, “first-generation”, “next generation” and “second-generation”.

3.3. Deconstruction and double reading

I base my textual analysis on Jacques Derrida’s approach of deconstruction (Derrida 1972, 1976, 1988a) which is “an impossible method” (McQuillan, 2001, p. 3), because it does not presupposes specific sets of rules or fixed criteria. For Derrida (1989) “deconstruction is inventive or it is nothing at all, it does not settle for methodological procedures, it opens up a passageway, it marches ahead and leaves a trail (…)” (p.42). In this thesis, I develop my own mode of reading and analysing text that aims at fostering four theoretical perspectives in the interpretational process. In other words, the textual strategy that I outline here, allows me to interpret strictly in connection with analytical focus of theoretical toolboxes presented in the previous chapter.

Deconstruction is, simply speaking, Derrida’s invitation to the act of reading itself, “it is a situation or an event of reading”, and thus one text can have many interpretations because “each deconstruction is unique and singular to the text it reads and to the moment in which it reads” (McQuillan, 2001, p. 6). Nevertheless, such an activity of reading, as Norris (2002) explains, “remains closely tied to the texts it interrogates, and which can never set up independently as a method or system of operative concepts” (p. 31). Thus, it is a process dependent upon written language, entirely engaged in reading text and thinking about it or, to put it the other way around, it is the activity of reading that opens the way to deconstruction (Critchney, 1999). Moreover, deconstruction aims at showing how texts put forward irreconcilable and contradictory positions. Gary Hall (2002) explains that “it is rather an enactment of a certain problematizing

reading, a reading which, rather than just imposing pre-established ideas and concepts, is open to the difference and alterity of the text" (pp. 2-3).

Hence, this textual practice is a mode of reading that aims to locate the point of otherness by radically disrupting the stability that is taken for granted (Critchley and Mooney, 1994, p. 446; Devetak, 2005b, p. 168). In other words, the purpose of deconstructive reading is to unsettle a given narrative in order to expose how text undermines its own structures and notions it asserts, or conceptual hierarchies it relies upon (Culler, 2007; Zehfuss, 2009). This is achieved, as Gerasimos Kakoliris (2009) points out, by situating deconstructive reading "in the gap between what the author 'commands' within her text and what she does not 'command', that is, what takes place in her text without her will" (p. 178), or between what the author wishes to say or declares and what the text describes without the author's wish to say it (p. 181). These two interlaced layers or moments of reading distinguish the deconstructive approach as a textual practice in form of double reading (Derrida, 1976, 1988b; Critchley, 1999, p. 23). The strategy of double reading consists of the first moment in form of a reconstruction of a given text or, more precisely, a commentary repetition of it, and the second moment that, through this process of repetition, departs from the commentary mode in order to open up a text to its obliqueness and blind spots (Critchley, 1999, 2008; Derrida, 1988b).

The first moment of reading is a repetition of a text's dominant narrative, through which a researcher establishes how a particular text achieves consistency and cohesion. While, without a doubt, it is actively interpretative to some extent, the first step "reflects a minimal consensus concerning the intelligibility of texts, establishing what a given text means for a community of readers" (Critchley and Mooney, 1994, p. 444). In the case of my analysis, I refer to it as the reading process that allows for registering and comparing the surface of what is generally put forward by the international organizations, what each of them commonly states and discusses regarding the concept of bioenergy, what goals and actions are proposed and what kind of arguments or pros and cons are suggested for it. Hence, the first moment of reading is set to recognize and correspond to this minimal intelligible consistency of what a given text or texts are about or what the IOs communicate through them, in relation to each research question I pose, but without focusing a theoretical lens on it yet.

Whereas the second moment of reading, which cannot arise without the first commentary one, aims to destabilize the stability of text's structuration and concentrates on revealing its conceptual tensions and contradictions (Critchley, 1999; Kakoliris, 2009). In other words, the task of the second reading is to put pressure on points of internal instabilities in order to locate discrepancies,

inconsistencies and silences hidden under the surface of masking intelligibility (Devetak, 2005b). In this analysis, the second moment of reading was carefully carried out in order to look into "depths" of a given text, below the surface of the debate pursued by the IOs. It was achieved by organizing my secondary reading around specific words, expressions or themes in order to trace their logic and investigate where they slip the grip of the presumed stability, depending on the research question and the theoretical toolbox assigned to it.

To illustrate this, in the paper concerned with biofuel production in developing countries (paper **I**), my second moment of reading was organized around the three themes: modern vs. traditional bioenergy differentiation, international biofuel trade and Brazil as the role-model ethanol producer. Additionally, to strengthen the interpretative capability of the world-energy perspective which is not in itself designed to analyse meaning, the textual method of frame analysis (Goffman, 1974; Klotz and Lynch, 2007) was implemented to reveal repeatable patterns and templates, similarities and overlaps between specific expressions and terms used by the organizations in the analysed documents. In the paper challenging the food vs. fuel dilemma (paper **II**), my second moment of reading was organized around inverting the antagonistic juxtaposition of energy against agriculture sectors in order to trace the institutional discourse by assuming precisely the opposite and, in result, destabilize the textual intelligibility. In the paper analysing bioenergy as an empty signifier (paper **III**), the omnipresence and assumed obviousness of the aspects of price, cost and cost-effectiveness in the discussions on biomass-derived energy, constituted the IOs' blind spot which had to be reversed in the secondary reading. Finally, in the paper scrutinizing the conceptualization of advanced biofuels (paper **IV**), the second moment was organized around the theme of first vs. second generation bioenergy differentiation and the notion of innovation. Hence, in contrast to the first moment of reading characterized as reproductive, the second moment of deconstructive practice contained a critical, productive reading (Kakoliris, 2009, p. 180).

4. Context

This chapter serves the purpose of a contextual background to my analysis. It provides two important overviews. The first subchapter briefly illustrates the debate taking place outside the three selected institutions and is focused on liquid biofuels for transport, as they best exemplify a highly contested character of the concept. The second subchapter is a brief introduction to the organizations and to their debate on bioenergy. I outline main aspects, arguments and concerns regarding biomass-derived energy that each organization discussed within its own agenda during the period between 1990 and 2010. My depiction of internal debates also serves here as an example of the first moment of reading the material, set to register and compare the surface of what is generally put forward by the three IOs, without submitting it to any theoretical lens.

4.1. The case of liquid biofuels for transport

The on-going global debate on bioenergy is tainted with a consistent complexity and polarization of opinions and expertise. Various controversies surrounding especially liquid biofuels for transport have been under the spotlight due to the global food price crisis, rising oil demand as well as growing concerns regarding climate change (Bernton et al, 2010; Smith, 2010; Matondi et al, 2011). Up to date, most research papers and reports have highlighted production of biomass-derived energy in mainly two countries, the United States and Brazil. Particularly Brazilian sugar-cane ethanol has attracted increasing attention as the role model for developing countries in cultivating biomass for liquid fuels (Luhnow and Samor, 2006; Smeets et al, 2006; Goldemberg, 2007; Bernton et al, 2010, pp. 139-160).

Producing crop-based fuels such as ethanol and biodiesel is not a new idea (Kovarik, 1998; Bernton et al, 2010), but interest in the-first generation biofuels has increased worldwide due to energy insecurity triggered by rising oil prices, efforts to mitigate climate change and the wide availability of biomass feedstock

that could potentially meet a significant share of future energy requirements for transportation. Furthermore, the heated debate on current biofuels has been driven by escalating concerns particularly over global food shortages and environmental challenges, such as deforestation in tropical countries (Runge and Senauer, 2007; Dawar, 2008; Carlson, 2012). Liquid biofuels were almost non-existent in the global energy market until the first oil crisis of the 1970s that forced most industrialized countries to look for alternatives to imported oil. Among nations motivated to seek fuel substitutes were the US and particularly Brazil. By now, the US and Brazil have become the biggest biofuel producers and they currently dominate in the world ethanol production (Steenblik, 2007; WorldWatch Institute, 2007; BP, 2012).

Since the 1970s, however, global ethanol production has been expanding insignificantly, whereas only between 2001 and 2006 it noted a two-fold increase. World biodiesel production was launched later and started from a lower level than ethanol but expanded nearly six-fold during the same time period. In global terms, ethanol production jumped by 13% between 2004 and 2005 and world biodiesel production capacity doubled during the same period of time (Steenblik, 2007). These numbers clearly illustrate the rapid growth of interest in processing fuels from biomass at the beginning of the 21st century. Currently, modern biofuels are most widely used for transport. There are two types of liquid fuels produced from agricultural crops: pure ethanol, ethanol blended with gasoline, and biodiesel blended with conventional diesel. At present, global biofuel use in transportation accounts for a very small fraction of the whole gasoline and diesel consumption (WorldWatch Institute, 2007).

One key area that liquid biofuels are forwarded is energy security. The escalation of crude oil prices (Jaffe and Manning, 2000; Klare, 2004) and a steady growth in energy demand and consumption, particularly in developing nations (Podobnik, 2006; EIA, 2007), pose as core problems for energy security and consequently for industrial production and economic exchange (Rogers Jr., 2000; Podobnik, 2006; Ayers & Warr, 2009). The perceived challenges in oil prices and rising energy demand have heightened interest and investment in bioenergy globally. According to proponents, bioenergy could contribute to the diversification of energy resources and bring much broader group of countries into the biomass-derived fuel market (Bradley and Baumert, 2005; UNCTAD, 2005). In particular, liquid fuels produced from crops have been labelled as a substitute or addition to petroleum-based fuels in transportation (Childs and Bradley, 2006; Steenblik, 2007; WorldWatch Institute, 2007). Such strategies would lead to the goal of energy security by lowering pressure on the oil market

and reducing oil dependency (Greene, 2004; Farrell et al, 2006; WorldWatch Institute, 2006; Goldemberg, 2007; Goldemberg and Guardabassi, 2009).

In contrast, some analysts point at the potentially negative effects for energy security of liquid biofuels (Shapouri, 2002; Pimentel and Patzek, 2005; Akinci et al, 2008; Pimentel, 2008). At present, fuels processed from biomass are less energy efficient than conventional fuel. A litre of ethanol contains about two-thirds as much energy as a litre of gasoline, whereas biodiesel contains 88-95% as much energy as diesel fuel (WorldWatch Institute, 2007). Another significant obstruction for the current biofuel production potential to achieve the aim of energy security is that it takes energy to produce bioenergy (Cutler et al, 2006; Akinci et al, 2008; Pimentel, 2008). Furthermore, liquid fuels processed from biomass are able to compete with petroleum on the fuel market only if oil prices stay high. Paradoxically, however, oil prices tend to impact highly industrialized agricultural production, making cultivation of biomass for energy more costly. Consequently, biofuels loose a competitive advantage over petroleum, due to high production costs juxtaposed with oil's domination on the energy market (Pimentel et al, 2007; Staniford, 2008; Randelli, 2009). Hence, the main goal is to lower the price of biofuels at the pump. To achieve this, governments particularly in developed countries tend to provide a strong support for bioenergy incentives in form of subsidies as well as policies on tariffs and other trade regulations (Hebebrand and Laney, 2007; Murphy, 2007; Kutas et al, 2007; Steenblik, 2007).

Liquid fuels produced from agricultural crops are also widely framed as a solution to such environmental problems as local air pollution and especially a global issue of climate change. Since combustion of such fuels releases carbon that was earlier sequestered from the atmosphere by growing biomass, it is expected that they are able to reduce GHG emissions and, thus, help mitigate global warming (Marshall and Greenhalgh, 2006; Goldemberg et al, 2008; Al-Riffai et al, 2010). Furthermore, some experts point out that using biofuels in transportation could improve air quality in urban areas (McCormick et al, 2006; Hulsey and Coleman, 2006; Goldemberg et al, 2008). However, carbon-neutrality of biofuels is a controversial issue, because production of ethanol and biodiesel requires land-use changes for agricultural cultivation and energy inputs for processing. These two activities, that are prerequisites of the first-generation biofuel production, could become a substantial source of GHG emissions and thus undermine climate change mitigation efforts (BiofuelWatch, 2007; Sachs, 2007; Fargione et al, 2008; Searchinger et al, 2008; Lapola et al, 2010; Havlík, 2011). For example, Fargione et al (2008) argue that land clearing for production of crop based biofuels could lead to a "biofuel carbon debt", what researchers

call the amount of carbon dioxide released during the first 50 years of converting native habitats to croplands. Ethanol and biodiesel blends could also result in emissions of nitrous oxides (contributing to ozone depletion) and other health-risky pollutants (Westerholm et al, 2008). Similarly to the case of measuring biofuel energy performance, these life-cycle calculations and environmental impacts vary among researchers (Dufey, 2006; Scharlemann and Laurence, 2008).

Finally, some experts and researchers suggest that bioenergy can strengthen the agricultural sector in both developing and industrialized countries and thus become a solution to the problem of rural underdevelopment. It is argued that processing fuel from crops can be a window of opportunity for struggling rural communities in developing countries by creating and providing jobs, increase farm incomes and strengthen rural economies through higher prices for biofuel feedstocks, which potentially would yield increasing profits in agricultural areas (Schoonover and Muller, 2006; Jordan et al, 2007; WorldWatch Institute, 2006, 2007; Peters and Thielmann, 2008). Meanwhile, biofuel production has been serving as a tool to reduce food surpluses in developed countries, because their industrialized and heavily subsidized agricultural sectors produce too much, thus the bioenergy strategy is implemented in order to maintain the same level of production and utilize excesses when needed (Kutas et al, 2007; Steenblik, 2007).

Contra arguments by some observers, voicing concerns that biofuels may have an impact on agricultural markets, include it being one of the factors driving world food prices. In the discussion on food vs. fuel dilemma (Runge and Senauer, 2007), first-generation biofuels are considered by some observers as the key element in displacing crop production, changing land-use patterns in agriculture and influencing global food prices, especially when food and energy have become increasingly intertwined in the global market (Morton et al, 2006; Staniford, 2008; Pimentel et al, 2009). Moreover, even if there is enough global land to maintain food security and expand production of biofuels, as some observers suggest (Mathews, 2007; Sachs, 2007), climate change uncertainties and weather related risks have to be seriously taken under consideration in the bioenergy strategy implementation, particularly in developing countries that are least vulnerable to global warming impacts (Pereira de Lucena, 2009; Ebinger and Vergara, 2011; Schaeffer et al, 2011).

As it can be observed, calculations regarding benefits and risks of biofuel production vary among experts and researchers, depending on how the processing of biomass to liquid fuel is assessed, what factors and stages of production are included, as well as what synergies can be made with other energy production, for instance, biogas, etc. (Pimentel and Patzek, 2005; Dufey, 2006;

Farrell et al, 2006; WorldWatch Institute, 2006; WorldWatch Institute, 2007). In order to successively substitute the current oil used mainly in transportation with alternative fuel processed from agricultural feedstocks, there is a need for a large-scale biofuel production that would be implemented globally. Reports point at tropical and sub-tropical regions as better suited for ethanol and biodiesel production, due to favourable climatic conditions, high yields, availability of cheap land and low costs of labour (Johnson, 2007; Mathews, 2007; WorldWatch Institute, 2007; Gilbertson et al, 2007; Junginger et al, 2008).

However, introduction of large-scale production of biofuels to meet a growing energy demand for transportation requires serious improvements in agriculture efficiency, mostly in developing countries. Such a strategy could lead to negative environmental and socioeconomic impacts (Giampietro et al, 1997; Doornbosch and Steenblik, 2007; ActionAid, 2008, 2010; Lal, 2009; Matondi et al, 2011). It would involve changes in agricultural practices that might result either in reduction of employment opportunities as a result of mechanization, or exploitation of farm workers (Giampietro et al, 1997; Patel, 2008; Phillips, 2007; BiofuelWatch, 2007). Large plantations of feedstocks, that require high quantities of water for irrigation could divert fresh water resources from essentially important food production (Dias De Oliveira et al, 2005; Kojima and Johnson, 2005; Simpson et al, 2008). Implication of industrial crop monocultures for liquid fuel might result in loss of genetic and biological diversity, also due to the increasing use of genetically modified (GM) crops (Childs and Bradley, 2006; Santa Barbara, 2007). Extensive use of fertilizers and pesticide for cultivation of some feedstocks might cause soil and water contamination (Dias De Oliveira et al, 2005; Santa Barbara, 2007; WorldWatch Institute, 2007; Simpson et al, 2008).

On the other hand, small-scale schemes developed by rural communities might bring energy and profit for local livelihoods, because farmers are more likely to benefit if they are more involved in the refining stages of biofuel processing and utilization (UN DESA, 2007). Whereas a large-scale production, that involves capital intensive business, could result in industry concentration and ownership consolidation, pre-empting small farmers and depriving them from benefits (Morris, 2006; ActionAid, 2008, 2010). Finally, given the sustainable development challenges to liquid fuels produced from biomass, the future shape of global biofuel market with different standards and certification rules can have a profound impact on the state of food security in years to come (UN-Energy, 2006; Gilbertson et al, 2007; WorldWatch Institute, 2007; Dam et al, 2008).

4.2. Institutional debate on bioenergy

4.2.1. Food and Agriculture Organization

Set up in 1945 as a specialized agency of the United Nations, FAO is the key international organization concerned with a broad area of food and agriculture, including the issues of forestry and fisheries. Serving both developed and developing countries, its mandate includes the objectives to increase agricultural productivity, stimulate rural development, combat the problems of achieving global food supply and nutrition as well as harmonize policies and distribution of farm goods. Above all, the major task of FAO is to provide information, research, statistics, policy expertise and technical assistance to its 191 member nations. The organization issues regular reports and yearly assessments on the global food and agricultural situation, including its flagship publications: Agricultural Outlook, The State of Food and Agriculture and The State of Food Insecurity. Additionally, FAO hosts, coordinates and promotes various sorts of meetings on international and regional levels, during which particularly poor nations are given a possibility to raise their voices and concerns regarding food security and rural development (Bennett, 1995; Karns and Mingst, 2004).

But despite the efforts to eradicate hunger and stimulate global agriculture, since 1970s the agency's performance has been the target of a strong public criticism streamed from member nations, other food-related international bodies, and farm movements. The wave of critique has been mostly concentrated on the question of the organization's relevance by scrutinizing its practices and exposing lack of effectiveness in achieving its main objectives. Particularly an increasing influence of corporate and industrial agriculture in FAO's provision of expertise and assistance has been the biggest concern among the critics (Pilon, 1988; The Ecologist, 1994; GRAIN, 2004; ETC Group, 2008).

Between 1990 and 2010, FAO discussed the concept of bioenergy not only in the context of its agricultural agenda, but also within the two other interlinked topics of energy and environment. Nevertheless, rural development and food security remained the focal point of the organization's deliberations on biofuels. Therefore, it comes as no surprise that FAO considered bioenergy as a potential solution to and a driver of rural development. In the agency's view, the production of biomass for energy could benefit agriculture, particularly in developing countries, by creating new employment and income opportunities in

rural areas, reducing poverty and, in result, alleviating food insecurity (FAO, 2005, 2006, 2007, 2008b,c). For example, at its thirty-second session held in 2006, the Committee on World Food Security under FAO stated in a positive tone that "economically, socially and ecologically sustainable bio-fuel production offers a potential alternative to meet increasing fuel demands, offer novel development opportunities and become an avenue for mitigating chronic food insecurity in some regions" (FAO, 2006, p. 3).

However, FAO only recently shifted its focus on biomass-derived energy as a potential threat to food security. The organization's concern over the influence of biofuel production on world food prices was growing since 2006 and moderately articulated mostly in its Agricultural Outlooks (OECD/FAO, 2006, p. 23; OECD/FAO, 2007, p. 10, 17; OECD/FAO, 2008, p. 11, 16). Eventually the problem became a key topic on the agenda during the High-level Conference on World Food Security held in 2008 (FAO, 2008a,b,c,d). Expressing its concern over the potential impact of biofuels on food security, FAO had a tendency to balance between various pros and cons. For example, according to the Committee on World Food Security, biofuel production could threaten the availability of adequate food supplies "if land and other productive resources are shifted away from food crop cultivation", but the Committee continued later in the document that biomass could supply about 25% of global primary energy demand by 2050 "without significantly undermining the availability of food" (FAO, 2007, p. 11).

In another example, according to FAO production of bioenergy could drive up commodity prices compromising food access for low-income food buyers, but at the same time the agency concluded that "higher commodity prices could mean higher incomes for producers, with positive implications for their access to food" (FAO, 2007, p. 11). On the one hand, FAO assumed that the increased use of agricultural commodities would strengthen relationship with energy prices and boost volatility of food prices, particularly for low income consumers but, on the other hand, the organization pointed out that development of a domestic bioenergy sector in oil-dependent countries could reduce expenditures on petroleum imports (FAO, 2007). Despite the difficult situation on the world food market in 2008, the same pattern of balancing between positive and negative aspects of biofuel production was followed during the 2008 High-Level Conference where biomass-derived energy was one of the most important topics on the agenda (FAO, 2008a,b,c,d).

FAO discussed biofuels also in the context of energy because it considers access to it an important requirement for achieving agricultural development, alleviating poverty and, in result, reducing food insecurity in poor regions of the world. According to the organization, "there is a close correlation between the

quality and quantity of food produced, transformed and consumed and the quality and quantity of energy used to power agricultural production" (FAO/WEC, 1999, p. 45). Therefore, FAO linked bioenergy strategy with rural development through the Millennium Development Goals (MDGs). In a view of the agency, modern types of bioenergy are a clean and safe source of power that could help meet energy requirements of MDGs and thus contribute to agricultural development, reduction of poverty and alleviation of hunger in developing countries (FAO/WEC, 1999; FAO, 2000, 2005, 2007). In its document from 2008 High-level Conference on World Food Security the institution stated that "bioenergy, in its various forms, has potential to help meet, at least in part, growing energy demands" (FAO, 2008c). Thus, the organization perceived bioenergy not as a goal but rather as a solution to achieve the aim of rural development, focusing these efforts almost entirely on developing nations.

Finally, by acknowledging that the increase in bioenergy production could cause negative environmental effects, including deforestation and land clearing that result in GHG emissions (FAO, 2008b,c), FAO's deliberations were focused on a broadly understood sustainability of cultivating and processing biomass for energy. For example, in 2008 the agency emphasized that in order "to develop the full potential of bioenergy, growth has to be managed in a sustainable way to meet requirements related to the economic, social and environmental dimensions of sustainability" (FAO, 2008b, p. 6). According to FAO, "when sustainably produced, bioenergy can provide a carbon-neutral or even carbon-reducing source of energy" (FAO, 2007, p. 10) contributing to climate change mitigation efforts through GHG emissions reduction (FAO, 2005, 2007). Furthermore, the organization supported the idea of developing countries registering bioenergy projects under the Clean Development Mechanism (CDM) of the Kyoto Protocol (Jürgens et al, 2004), as well as advocated better inclusion of bioenergy activities in CDM that could, in return, offer additional incentives for biofuel production in general (FAO, 2005). Hence, for FAO bioenergy could help mitigate climate change by reducing GHG emissions, particularly through CDM schemes, but only if the production pattern would follow a sustainable path.

4.2.2. International Energy Agency

IEA was established in 1974 as an autonomous branch of the Organization for Economic Cooperation and Development (OECD), in response to the 1973 oil crisis that induced major energy consuming, industrial countries to set up a platform for cooperation regarding security of oil supplies. At the time of its

creation, the agency's fundamental purpose was to stimulate the common effort of its members to reduce oil dependence, through conservation of energy and guidance on alternative technologies, as well as by coordinating rationalization of global energy markets and stabilization of international energy trade (Katz, 1981; Scott, 1994). Since the 1970s, however, IEA went through serious alterations necessary to adjust to the changing energy situation worldwide. The organization's initially narrow focus on mainly oil issues has been substantially broadened to encompass within its scope three aspects of sound energy policy, the so called "3Es": energy security, economic development and environmental protection. Despite its membership limited to only high-income OECD-countries, since 1970s this intergovernmental body has transformed into a highly influential organization concerned with global energy governance (Florini, 2011).

Currently, IEA has two major objectives. First, it continues to manage and advance mechanisms for coping with disruption of oil supplies in its member states. Second and most importantly, the agency serves as a key expert in energy markets, policies and technologies, while advising not only its members but also other major energy consumers and producers, such as China, India and Russia. Hence, the main objectives of IEA include promoting alternative and renewable energy sources, supporting international cooperation on and transfer of energy technologies, developing statistical and research data on global energy systems and markets, providing policy analysis and recommendations, as well as publishing reports, assessments and road maps. Its flagship annual World Energy Outlook includes long-term energy projections and scenarios, statistical information, technological support and policy advices.

But despite being widely recognized as the key organization with broad and authoritative expertise on energy issues, its undeniable influence has also raised criticism and controversy. IEA has been accused of having a strong bias towards conventional sources, in particular oil (Macalister and Monbiot, 2008; Murray, 2009), which was most recently revealed by inaccuracy and misinterpretation of oil data in the 2008 World Energy Outlook (Aleklett et al, 2010). To some critics, the agency's lack of acknowledgment of the peak oil issue was the main reason behind providing questionable assessments of future oil production capacity. Others alleged that due to its close ties with oil industries, IEA published misleading data on purpose (Murray, 2009; Florini, 2011). Nevertheless, the oil controversy has exposed the agency as an influential expert that is not only vulnerable to the pressures of multiple interpretation and shortage of data, but also entangled in the network of competing national and corporate interests.

The main aspects of bioenergy that IEA discussed during the 1990-2010 period were energy production and utilization, implementation and deployment

of biofuel activities in member countries as well as commercialization of such energy systems on the international level. By providing information and guidelines on global bioenergy trends and technological aspects of biofuel production, the organization focused mostly on liquid fuels for transportation, as it was the fastest growing sector of energy produced from biomass during that period. Apart from its energy-dominated agenda, IEA also addressed bioenergy options in the context of climate change and agriculture, but the organization perceived biomass mostly as a renewable source of energy with a potential to diversify world energy sources by displacing gasoline and diesel (IEA, 1994, 2004, 2006b, 2007; IEA Bioenergy, 2007).

With its objective to monitor and analyse global energy markets, IEA recognized a strong correlation between prices of conventional fossil fuels and energy produced from biomass, and that particularly higher oil prices are an encouragement for faster deployment of liquid biofuels for transport (IEA, 2006b, p. 237). Nevertheless for IEA, one of the most difficult problems regarding bioenergy technology is its relatively high cost that significantly lowers the ability to compete with fossil fuels and other energy sources. For example, according to the World Energy Outlook issued in 2006, biofuels were more competitive with conventional petroleum-based fuels due to the increase in international oil prices but, as the agency noted, "further reductions in costs will be needed for biofuels to be able to compete effectively with gasoline and diesel without subsidy" (IEA, 2006b, p. 386). In this perspective, IEA widely discussed the potential to achieve a sufficient cost-effectiveness of biofuel, while meeting energy demand in developed countries. The organization concentrated on various options that would help lower the cost of bioenergy production and effectively commercialize it on the energy market. In the view of IEA, one way to lower to the cost of biofuels would be to subsidize its production (IEA, 1994, 2004). The agency also emphasized the importance of developing an international biofuel trade which would not only enable important cost reductions but also standardization and certification, and thus allow securing a sustainable biomass production around the world (Heinimö et al, 2007; IEA, 2004, 2007; Solberg et al, 2007).

During the last two decades, IEA considered energy produced from biomass to be carbon free and yielding environmental advantages, particularly through significant contributions to GHG reduction efforts (IEA Bioenergy, 2007). For example, in 2007 the organization concluded that "especially large reductions are estimated for ethanol from sugar cane and from cellulosic feedstocks" (IEA, 2007, p. 13). Moreover, biofuels could also help reduce air pollution in urban areas (IEA, 1994, 2004). Simultaneously, IEA recognized that the level of

effectiveness in reducing GHG emissions by biofuel production "depends both on the type of crop used and on the system used to grow it", and that pollution levels do not have to be necessarily lower in case of intensive crop systems (IEA, 1994, p. 14). Similarly to FAO, the agency emphasized that bioenergy should be produced in a sustainable manner, particularly if it is deployed to play an important role in reducing GHG emissions (IEA Bioenergy, 2007).

However, the sustainability criteria was also used by IEA in the context of securing the existence of sufficient biomass resources and establishing a well-functioning biomass market that are essential to achieve sustainable, as well as reliable and lasting biomass supplies (IEA, 2004). In a view of the organization, sustainable biomass production could also lead to sustainable management of natural resources (IEA, 2007). Interestingly, IEA attached the sustainability criteria to bioenergy or its production and trade (e.g. "sustainable biomass", "sustainable bioenergy", "bioenergy produced in a sustainable way", "sustainable biomass market", "sustainable international trade", etc.), but not to biofuel utilization and demand (IEA 1994, 2004, 2007).

According to the agency, bioenergy projects could enhance agricultural development, increase local employment and raise a purchasing power in rural communities (IEA, 1994, 2004). The organization stated that, thanks to bioenergy activities, "revenues from biomass and biomass-derived products could provide the key lever for rural development and enhanced agricultural production" (IEA 2007, p. 2). For the organization, bioenergy technologies could increase agricultural land use efficiency and spread energy supply options worldwide, especially that due to its versatile character, biomass can serve as an energy source for heating purposes, electricity generation and transportation (IEA Bioenergy, 2007). Nevertheless, IEA envisaged the biggest potential of biomass production for utilization in the transportation sector, especially due to the growing interest of such fuels in the industrialized world (IEA 2004, 2006a).

Discussing potential options to lower the cost of biofuel production, the agency suggested that developing countries could have better conditions to cultivate and process biomass cheaper than in industrialized nations. The institution mentioned such positive factors as higher crop yields due to warmer climates, availability of cheap land, as well as relatively low cost of labour (IEA, 2004). Simultaneously however, IEA recognized that rising food demand "will compete with biofuels for existing arable and pasture land" and thus "constrain the potential for biofuels output", but according to the agency "a partial solution could be higher agricultural yields" (IEA, 2006b, p. 385). Biofuel were also considered to help reduce food surpluses in developed nations because their industrialized and heavily subsidized agricultures cause overproduction. In this

sense, the bioenergy strategy could maintain the level of production by utilizing excesses when needed and process them into liquid fuels for transportation (IEA, 1994).

4.2.3. Intergovernmental Panel on Climate Change

IPCC works as a scientific body of the United Nations Framework Convention on Climate Change (UNFCCC). It was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) in order to synthesize scientific knowledge on climate change and to assess potential responses to it. Even if the panel does not conduct its own research, it is regarded as an authoritative expert on the issue of global warming. It occupies a privileged position in building scientific consensus and informing the process of negotiating climate change agreements (Axelrod et al, 2005; Elliott, 2004). Every 6 years, IPCC publishes an influential assessment report in which it assesses physical risks and potentials of global warming, reviews mitigation and adaptation strategies, as well as draws attention to and discusses socioeconomic aspects of climate change. Each of four such major assessments published up to date has been prepared by three working groups organized around the themes of physical science, socioeconomic and natural vulnerability, and mitigation options.

Despite its prominent role in the climate change regime, the panel has been criticized for lack of a balanced representation of scientists from poor and rich countries in conducting its syntheses (Roberts and Parks, 2007) and for controversial content with incorrect, insufficient or even outdated data in the assessment reports (Romm, 2006; Bagla, 2010; Pielke 2010).

In the time frame between 1990 and 2010, bioenergy was gaining a growing attention of IPCC. The panel's latest 4th Assessment Report (AR4) published in 2007 discussed biofuel production most extensively, particularly in the context of potential strategies for mitigation efforts. In comparison to the 3rd Assessment Report (AR3) from 2001, where bioenergy had been mentioned briefly as one of renewable energy technologies (IPCC 2001, p. 30), the topic was elaborated in AR4 issued 6 years later (IPCC 2007a,b). The report included various tentative predictions on the potential of biofuels, particularly regarding their role in GHG emissions reduction. The scientific body emphasized climate vulnerability of energy produced from biomass but mostly focused on commercial aspects of biofuels, including cost-effectiveness and competitiveness of such a strategy. IPCC did not place its main interest in the issues of food security and rural

development, but deliberated whether agricultural practices could help mitigation and adaptation through bioenergy production (IPCC, 2007a, p. 755; IPCC, 2007c, p. 22).

Above all, IPCC evaluated bioenergy for its critical role in climate change mitigation efforts (IPCC, 2007a, p. 288, 305, 326). In the Summary for Policy Makers (SPM) of the Working Group III on Mitigation, the scientific body labelled biofuels and "dedicated energy crops" as "key mitigation technologies and practices currently commercially available", whereas second-generation biofuels were described as "key mitigation technologies and practices projected to be commercialized before 2030" (IPCC, 2007c, p. 10). Moreover, IPCC put "biofuel blending in transportation" into a category of "policies, measures and instruments shown to be environmentally effective" (IPCC, 2007c, p. 20; IPCC, 2007c, p. 16). The panel affirmed that "modern biomass" could be carbon neutral and thus play a significant role in reducing GHG emissions, particularly in transportation (IPCC, 2007b, p. 218, 288, 344). As the scientific body placed its focus on ways to mitigate climate change cost-effectively, it assessed bioenergy as a substantial abatement strategy that could have a large effect on the economic cost of stabilization (IPCC, 2007b, p. 172, 209, 213, 342). On the other hand, IPCC also stated that the well-to-wheel reduction in GHGs by biofuels was uncertain and difficult to estimate due to complex calculations (IPCC, 2007b, p. 343). Interestingly however, the scientific panel considered modern biomass energy as a solution to adaptation as well (IPCC 2007a, p. 288, 561). Bioenergy could contribute to adaptation measures through allocation of agricultural land, thus, as IPCC noted, "crops that become less economically viable under climate change can be replaced profitably by bioenergy crops" (IPCC 2007a, p. 544).

IPCC also examined research on impacts of global warming on bioenergy strategy and recognized that climate change could disturb supply of biomass (IPCC, 2007a, p. 367), by affecting area of production and shrinking arable land currently suitable for cultivation (IPCC, 2007a, p. 481). The scientific body noted that the potential of biomass energy was climate-sensitive and suggested that "a shift to bioenergy production would reduce CO2 emissions but increase exposure to weather and climate" (IPCC, 2007a, p. 755). Simultaneously, however, the panel stated that "global warming may increase the yield potential" of some crops (IPCC, 2007a, p. 288), making biofuel a substantial option. Nevertheless, IPCC concluded that "biofuels have the potential to replace a substantial part but not all petroleum use by transport" (IPCC, 2007b, p. 326) and, largely relying on reference scenarios and estimates of IEA (IPCC, 2007b, p. 304, 326, 343, 365-366), the panel suggestively projected "potential worldwide increased use of

biofuels in the transport sector assuming successful technology development and policy measures" (IPCC, 2007b, p. 366).

Similarly to the other two agencies, IPCC situated its concern around commercial aspects of modern bioenergy and discussed whether such technological options could be competitive on the energy market. IPCC focused on cost-effectiveness, economic competitiveness and other commercial aspects of modern bioenergy as a potential mitigation and adaptation option (IPCC 2007c, p. 13). The scientific body discussed such issues as "commercial maturity" and "commercial realization" of biomass energy strategies, as well as their "commercial significance", "market potential", "economic competitiveness", "commercialization barriers", "production potential", "production costs" and "cost reduction opportunities" (IPCC, 2007b, p. 272, 276-277, 289, 342-344). The cost-effectiveness of bioenergy was crucial in the view of IPCC because of the general problem of bringing down the overall mitigation costs. The IPCC report referred to ethanol production in Brazil as an example of economically competitive and energy efficient biofuel production that could be replicated in other regions of the world (IPCC, 2007b, p. 342-344).

Due to its mandate focused on climate change aspects, IPCC did not substantially discuss whether bioenergy could bring benefits to rural communities or affect food security. Rather, the panel placed its attention on how agriculture could contribute to mitigation efforts and adaptation measures through cultivation of biomass for energy, as well as how to make rural practices more efficient when it comes to abatement (IPCC, 2007b, p. 519). According to the SPM of the Working Group III, agriculture could make a significant contribution at low cost by, among others, producing biomass feedstocks for energy use (IPCC, 2007c, p. 14). This supposition was based mainly on the example of Brazil (IPCC, 2007b, p. 341-342, 344, 522). At the same time, IPCC suggested that "improving agricultural efficiency in developing countries is a key factor (…) to exploit the large potential for bioenergy" (IPCC, 2007b, p. 511). Moreover, the panel made a general assumption that "large-scale production of modern bioenergy crops, partly for export, could generate income and employment for rural regions (…), but noted that "these benefits will not necessarily flow to the rural populations" (IPCC, 2007b, p. 522). Nevertheless, the scientific body assumed that Latin America, Sub-Saharan Africa and Eastern Europe "are promising regions for bioenergy" where such a strategy could be developed at low production costs (IPCC, 2007b, p. 511).

5. Discussion of results and conclusions

By de-ontologizing the subject of my analysis as the point of departure and implementing four distinct theoretical perspectives, the aim is to analyse *how*, in the debate pursued by FAO, IEA and IPCC, the concept of bioenergy comes into being, while inserted into a particular socioeconomic configuration and equipped with specific roles, meanings and suppositions. Consequently, I put emphasis on investigating the structure, whereas the role of IOs and thus the issue of agency is not my major concern. However, it is not my intention to downplay the importance of agency, while promoting the significance of structure. Rather, based on my results I argue that the sample of the institutional discussion on bioenergy demonstrates alternative aspects to this dichotomy. Hence, in this chapter I do not only discuss and conclude my analytical findings, but I also position and problematize the results within the structure-agency problematic.

5.1. What does the sample say?

What does the sample of the debate on bioenergy, pursed by the three selected organizations, tell us if we look below the general surface of their deliberations and critically analyse them by using the four theoretical lenses? Are there any problems and discrepancies present in the framework of the debate's complexity, or does the discussion represent a stable and coherent chain of arguments?

5.1.1. Bioenergy production in developing countries

In paper **I**, guided by the assumptions of the world-economy theory, I analyse how the selected IOs argue for bioenergy production in developing countries. The WE perspective allows me to expose three specific phenomena in the way the institutions conceptualize and contextualize the issue: unequal energy

exchange, unequal ecological exchange, and the role of a semi-peripheral Brazil as an exploiter and being exploited.

According to the suggestion forwarded by the organizations, developing countries should switch to more efficient, clean and commercial bioenergy labelled as *modern*, that is further antithetically juxtaposed with inefficient and polluting types called *traditional* (paper **I**, p. 1338). This particular recommendation appears to be built on two rationales. On the one hand, the IOs express their awareness that population and economic growth in the global South prompts increase in the use of conventional energy careers, especially fossil fuels (ibid, p. 1338). Simultaneously, the agencies also observe that, due to the abundance of plant matter in tropical and subtropical areas, biomass will continue to be a significant source of energy for peripheral regions. Hence, it is presumed that developing countries would be much better off if traditional biomass energy production and utilization were replaced with advanced and more efficient technologies (ibid, pp. 1338-1339). On the other hand, the introduction of modern bioenergy in the global South is perceived by the IOs as paving the way to establish international biofuel trade, that would involve and potentially benefit developing countries in particular (ibid, pp. 1339-1340).

However, the key question is to what extent the switch to advanced biomass-derived energy could actually benefit peripheral regions, as it is maintained by the IOs. By looking at the institutional debate through the WE theoretical lens, I contend that the argument for replacing traditional biomass burning with modern biofuels in developing countries exemplifies unequal energy exchange (ibid, p. 1339). The switch constitutes not only a narrow energy choice, subordinated to developed nations striving to keep their control over conventional resources. More importantly, such a change would also require a significant transfer of technology and know-how, as well as substantial investment, pushing peripheral regions further down into dependency from the industrialized core.

The inequality embedded in the institutional debate and inconsistency of argumentations pursued by the IOs are even more visible in the way the organizations discuss the potential establishment of international biofuel trade with developing regions as the main producer. The agencies maintain that, due to the low cost of crop, land and labour, the global South could become a cheap source of biofuels to meet the growing energy demand in the North. But simultaneously they also argue that international trade could benefit poor rural communities and foster economic development in the periphery. It is, however, questionable how poor farmers could actually benefit by producing biomass fuels

as cheaply as possible for the rich core that is unable to run its capitalist economy on expensive energy (ibid, p. 1340).

Moreover, based on the WE theoretical assumptions the discrepancy in argumentations of IOs manifests unequal ecological exchange (ibid, p. 1339). Not only are developing countries encouraged to switch to modern and less carbon intensive biomass energy, even though they are not required by the Kyoto Protocol to reduce their GHG emissions. But within the international trade framework, they are perceived as the main producer supplying energy and carbon intensive developed nations with large quantities of cheap biofuels. This would imply exploitation of land and biomass resources in the global South, prompting various negative environmental impacts and consequences.

Concomitant with unequal energy and ecological exchange is the role of semi-peripheral Brazil as an exploiter of the periphery and simultaneously being exploited by the core (ibid, pp. 1340-1342). On the one hand, its large and cost-effective biofuel production is depicted as an innovative economic activity able to help the country to develop and potentially advance in the layered structured of the WE. In this sense, Brazilian ethanol serves in the debate as a template that could be transferred and applied to other developing countries, for the purpose of establishing a flow of low-cost biomass fuels for transportation within the global market scheme. On the other hand, however, the international success story of Brazil's biofuel production would not take place without the core countries requiring cost-effective measures to deal with their oil dependency and global warming concerns. Therefore, I argue that even if the needs of developed nations temporarily create a socioeconomic niche for developing countries, the IOs' promotion of the Brazilian model not only exemplifies yet another adjustment to the core's expectations but it also signals that, rather than benefit, the periphery would be submitted to exploitation of its poor rural regions and to dependency on external resources (ibid, p. 1341-1342).

5.1.2. Bioenergy discourse in relation to agricultural system

In paper **II**, Foucault-derived genealogical analysis is used to parse and scrutinize the IOs' discourse on bioenergy in relation to agricultural system. The study is particularly motivated by the objective to challenge the food vs. fuel dichotomy and invert it to unfold an alternative perspective on the issue, in form of the food vs. *food* dilemma.

The main observation made in the analysis, on which I build upon further arguments, is that the bioenergy debate advanced by the organizations is rooted

in the concept of synthesising agriculture and energy markets (paper **II**, p. 583). In other words, it is not the juxtaposition of both sectors, as the food vs. fuel dichotomy would suggest, but the notion of merging them that constitutes a necessary precondition for the biofuel discourse. Most importantly, throughout their debate the institutions do not question this core assumption but instead consolidate it in three striking ways.

First, by arguing why the integration of both markets should take place, the IOs point out various socioeconomic benefits of which the most commonly mentioned in the discussion are: provision of rural employment, income generation and revitalization of agricultural sector. In this sense, bioenergy is perceived as a new product opportunity that can stimulate economic development in rural regions (ibid, p. 583). Second, by indicating where and how the synthesis should take place to assure the feasibility of the biofuel option, the IOs maintain that, with careful planning and efficient management, there is enough arable area required for production, especially if biomass cultivation could take place on set aside, surplus, marginal or abandoned lands (ibid, pp. 583-584). Third, the organizations solidify the conceptualization of combining agriculture and energy sectors by referring to specific terms, such as "energy crop" and "energy plantation", that suggest a new market opportunity and diversification of end-use products (ibid, p. 584). Hence, the IOs strive to depict a comprehensive vision of bioenergy production, because if the concept is set to embody the agriculture-energy synthesis, there have to be positive reasons and motivations to implement it.

At this point, the discursive formation of argumentations appears to be coherent and stable. But the almost complete conceptual structure starts cracking under the pressure of internal conflicts and discrepancies derived from two main problems in the implementation of biofuel option in developed countries. The first one consists of physical limitations expressed in land shortages and unsuitable climate, which partially leads to the second problem in form price pressure and the inability of costly biofuel production to compete with oil. Despite these disadvantages, the institutions do not question the feasibility of the agriculture-energy merge, but instead strive to protect the discursive core by applying to it specific modifications and adjustments.

On the one hand, the IOs suggest that intensification of agricultural production, achieved through crop yield increase, large-scale cultivation and biotechnological enhancements, is one way to combat natural constraints and particularly lower the cost of biofuels (ibid, p. 584-585). But this, in turn, would imply a magnitude of serious changes necessary to implement to the global agricultural system. On the other hand, the institutions argue that another way to

by-pass physical limitations and process fuels from biomass cost-effectively is to expand the production to developing countries, which not only have better suited natural conditions than industrialized regions but, most importantly, offer cheaper land, labour and feedstocks (ibid, p. 585).

However, modifications in form of intensification and expansion of production trigger a chain of consequences that collide with arguments provided by the IOs to motivate the merge of agriculture and energy markets. It is particularly the requirement of the large-scale cultivation pattern that poses the biggest challenges and makes the promise of socioeconomic benefits invalid. With increased mechanization of production, implementation of mono-cropping that highly depends on artificial fertilizers and pesticides, and concentration of land ownership, large-scale schemes would benefit only a narrow group of farmers who are able to produce surpluses and have better access to land and resources (ibid, 585-586). But despite various contradictions and dislocations, that make it impossible for the organizations to achieve a complete closure of their argumentations, the core assumption of synthesising agriculture and energy markets is not questioned. Instead, several subsequent modifications and adjustments are added to patch the bifurcations (ibid, pp. 585-586).

In the light of the 2007-2008 food price crisis, which casted serious uncertainty and confusion on deliberations regarding the feasibility and role of bioenergy options, the IOs find themselves having a difficulty with determining whether the increase in biofuel production affected global commodity markets and particularly food security in developing countries. But the organizations, so persistent in advancing the discursive core of agriculture-energy synthesis, continue readjusting their stances on the biomass-derived fuels which, in turn, results in directing the discussion into speculations about the unknown future (ibid, p. 586). On the one hand, FAO uses the "time scale" argument suggesting that, while in the short term the increase in biofuel production poses threat to food security, in the long term it could benefit poor farmers and boost rural development. On the other hand, IEA focuses the attention on a presumably more efficient and less controversial second-generation bioenergy technology waiting around the corner, but without certainty when it could replace current production patterns.

Consequently, with no end of production in sight but continuously affecting the global food security, conventional biofuels remain a temporary concept that, in the debate pursued by the organizations, becomes a significant key carrier for policies supporting industrialized, market-oriented production of food. Thus, the agricultural sector is penetrated by the pressure of further transformations requiring large-scale cultivation schemes, mechanization and fossilization of

rural practices, concentration of land ownership as well as implementation of biotechnological enhancements. All these measures are necessary to proceed with the amalgamation of agriculture and energy markets under the disguise of bioenergy, but at the same time they also have serious implications for the understanding and conceptualization of essential food production. Hence, I argue that contrary to the food vs. fuel, the concept of bioenergy exemplifies the food vs. food dilemma (ibid, pp. 586-587).

5.1.3. Bioenergy as a win-win-win solution? – An empty signifier

In paper **III**, guided by the assumptions of discourse theory developed by Laclau and Mouffe, I argue that in the institutional debate, due to the low-cost pressure enforced by the hegemonic system fixated on economic growth and accumulation of capital, the concept of bioenergy becomes emptied of signification and constitutes a futile solution to the challenges of energy insecurity, climate change and agricultural crisis.

In a given field of discursivity, bioenergy can mean many different things to a variety of actors and thus it is open to change and redefinition. However, when viewed in the backdrop of the three challenges of energy insecurity, climate change and agricultural crisis facing current capitalist societies, it loses its floating and unfixed character to occupy privileged positions by conveying specific meanings in these three discursive fields respectively (paper **III**, p. 7).

In the discourse concerned with energy issues, the floating character of bioenergy is arrested by the organizations that conceptualize it as a renewable energy source able to substitute fossil fuels, particularly oil in the transportation sector. Thus, the concept becomes a nodal point around which the plausibility of an energy carrier derived from abundant biomass and requiring only modest adjustments to the current socioeconomic system holds a promise of securing or diversifying energy resources and meeting rising energy demand (ibid, pp. 8-9). When the concept of bioenergy enters the discourse on climate change, the IOs position it as a nodal point that acquires the meaning of a renewable energy capable of significantly reducing GHG emissions. By assuming its theoretical potential to be low- or even zero-carbon, the institutions depict bioenergy as one of the key climate change mitigation options (ibid, pp. 10-11). In the discourse on agriculture, the institutions equally assign to the concept of bioenergy a role of an indispensable factor prompting rural economic development. As the nodal point, biomass-derived energy is redefined into a new product opportunity able to

increase feedstock demand, create employment, generate income and, in result, revitalize agricultural sector (ibid, pp. 12-13).

At a closer examination of the institutional debate, the analysis reveals that to discuss bioenergy as a potential strategy to help solve the challenges of energy insecurity, climate change and agricultural crisis simultaneously, a specific level of equivalence in the conceptualization is required. The chain of equivalence is achieved by suturing the three nodal points with the hegemonic thread of the capitalist market economy, which presupposes the necessity of cost reduction and cost-effectiveness. Hence, through the process of commensuration the concept is reproduced from the potentially feasible solution to specific problems into the *economically feasible* commodity that is set to successfully compete on the market with other energy resources (ibid, p. 14). In other words, what conflates the three discursive positions of bioenergy is the persuasive assumption that in each case it has to be done cheaply and whether biofuels are an efficient option to face the three societal challenges is of secondary importance. It is because the desire to preserve economic growth and the accumulation of capital, embedded in the contemporary system, requires cheap solutions in the first place (ibid, pp. 15-17).

However, the long chain of equivalence extends not only to the cost-effectiveness of bioenergy in form of a final product, but to any other aspects of production and utilization, transferring the price pressure to feedstocks, land, labour and processing technology in particular. In result, all alterations, necessary to apply for establishing a sequence of compatibilities in line with economic feasibility, cause internal distortions and discrepancies (ibid, p. 17). In other words, the identity of bioenergy, which is now sutured by the hegemonic thread of capitalist market economics, contradicts the three nodal positions occupied by bioenergy in the discursive formations of energy, climate and agriculture. It is because production of biofuels based on economies of scale entails problematic issues that call into question the extent to which the bioenergy option can serve as a feasible solution to the three societal. Hence, the concept of biomass-derived energy becomes emptied of signification (ibid, pp. 17-18).

5.1.4. An innovative energy option? – Second-generation bioenergy

In paper **IV**, following Jameson's critical perspective on the future, progress and innovation, I scrutinize how the second-generation bioenergy is conceptualized in deliberations pursued by the three international organizations. Based on my findings, I conclude that the way the IOs portray advanced biofuels exemplifies a

syndrome of an ideological stranglehold that projects the illusion of the new and innovative, while striving to stabilize the current socioeconomic system.

Similarly to the traditional vs. modern dichotomy discussed in paper **I**, the identity of the second-generation bioenergy technology is built on the antithetical juxtaposition with first-generation biofuels (paper **IV**, pp. 7-10). The IOs maintain that, in contrast with currently available conventional fuels processed mainly from food and feed crops, the advanced energy production from cellulosic feedstocks has a greater capability to not only significantly reduce carbon emissions (ibid, pp. 7-8) but, most importantly, to also lower the risk of competition with other agricultural outputs, particularly food and feed (ibid, pp. 8-10). Even though the feasibility of the second-generation bioenergy is speculative, because it is not yet available on a commercial scale, by creating a sharp differentiation from inefficient and controversial first-generation biofuels, the organizations populate the future with the vision of a new and innovative technology that would alleviate land and food competition, simultaneously meeting energy demand and helping reduce carbon emissions.

If contemporary biofuel options resulting with negative impacts can be replaced by new and innovative technologies offering a possibility to process a much wider variety of feedstocks more efficiently, this would suggest intention of change as soon as the second-generation bioenergy is available to apply on a commercial scale. But a closer examination of the institutional debate reveals that the advanced cellulose-derived technology waiting around the corner, to alter current production patterns and reduce their negative impact, is perceived rather as an upgrade and continuation of both, old and new types (ibid, pp. 10-12). It becomes clear that the second-generation bioenergy is not developed to replace first-generation biofuels, but instead the discussion pursued by the organizations reflects the desire to keep both options in coexistence, as it would strengthen the overall biofuel market. Hence, the presumed progress is only illusory, whereas the emptied future, supposedly populated by the new and innovative, is actually subject to a total colonization by practices and notions of the present.

Based on my findings, I conclude that the role of innovation attached to the conceptualization of the second-generation bioenergy is not an indication of progress towards a new and radically alternative, but the complete opposite. The problem with advanced biofuels is that, while they could provide better carbon emissions reduction and alleviate competition with other agricultural outputs by being produced from a wider range of cheaper biomass, such as crop residues, the necessary technological processes are costly and make it difficult for this option to compete commercially with other energy sources. This is precisely where the key role of innovation comes in, that is to make production of second-generation

biofuels cheaper, and whether they are radically new or not is of a secondary importance (ibid, pp. 12-14). Hence, the promise of future price reductions in advanced bioenergy production technologies serves as an epitome of new and progress. It is because the critical desire of the contemporary industrial capitalist societies is to stabilize the system, challenged by the energy insecurity, climate change and agricultural crisis, as cheaply as possible. In this sense, the role of new and innovative, attached to the concept of second-generation biofuels, is to avoid any radical changes and to maintain the status quo cost-effectively (ibid, p. 15).

5.2. Why the bioenergy rush?

Why has the promotion of biomass-derived energy been so significant and noticeable in the deliberations pursued by the three international organizations during the last two decades?

On the surface level of the institutional debate, the reasons are three and rather straightforward. It is due to the three-dimensional plausibility of the bioenergy concept as a win-win-win solution that is continuously evoked in the discussions, despite the risk of various limitations, uncertainties and obstacles surrounding its implementation. In other words, the reason behind the bioenergy debate coming back to the global agenda can be rather quickly explained by arguing that, in the light of contemporary societal challenges, such fuels have the potential to meet energy security and provide renewable energy resources, help mitigate climate change by significantly reducing GHG emissions or revitalize agricultural production and rural communities. Without a doubt, these are very powerful motivational factors that trigger the interest of various state and private actors as well as drive the ongoing institutional debate. One could go even further in argumentation by contemplating in the line of James Smith (2010) who suggests that "biofuels fire the imagination of policy-makers, entrepreneurs, researchers and governments because of the possibility of being all things to all people" (p. 6).

However, based on my results I contend that energy insecurity, climate change or agricultural crisis are only recurring reasons behind the current bioenergy rush. I argue that the primary motivations are embedded within

requirements of the current socioeconomic circumstances and arrangements. The concept of bioenergy exemplifies a situation in which radical alterations of the system itself or its fundamental assumptions are not anticipated, but rather any occurrence of change is limited only to internal modifications of particular components within the current structure. In this sense, a potential implementation of biomass-derived energy production and utilization is, colloquially speaking, an easy way out. It is because such a strategy does not carry with it a necessity to radically alter the system, but only to refurnish it internally by further intensification and expansion, in line with the systemic frames and requirements, as it is the case with industrial agricultural production exemplified in paper **III**.

The concept of bioenergy production is attractive and thus desirable because it is perceived as a suitable and easy to apply patch able to temporarily fix current challenges, without much to change internally while, simultaneously, becoming a "new" product opportunity, either as a new agricultural output or as an innovative technology. Hence, based on my results, I contend that in a situation when "the crisis is but a regular 'phase' in the process of capital accumulation (…) alternating with 'prosperity", as Peter Osborne (2010) explains, the current biofuel rush epitomizes "a phase that renews the conditions of accumulation" and it is a syndrome of "both a normalization and a vaporization of crisis as a means of production of the new, at the level of pure temporal form, in which what appears to capital wholly quantitatively (a return to the production of surplus value) is experienced qualitatively, as newness itself" (p. 24). These tendencies are particularly visible in the way the organizations conceptualize bioenergy in discussing the transition from traditional to modern biomass-derived energy in developing countries (paper **I**) as well as in relations to agricultural production (paper **II**) and in the context of technological innovation (paper **IV**).

5.3. Why the bioenergy fuss?

If bioenergy is perceived as a suitable and easy to apply patch that could help solve specific societal challenges without the need to change much internally in the socioeconomic system, why do all those contradictions and discrepancies in the debate take place? Why is the concept so contested and controversial? Where does this fuss come from?

According to David Harvey (1996), "the accumulation of capital provides a set of master-narratives in relation to which innumerable other narratives get defined (…) We fail to pay attention to these master narratives at our peril for to ignore them is to ignore a vital set of social processes through which situatedness gets defined" (p. 286). It is precisely the specific situatedness defined by the omnipresent master-narratives of the contemporary hegemonic system that makes it difficult to apply the biofuel option without creating the whole fuss. Ironically speaking, the way the organizations strive to insert the concept of biomass-derived energy into the current socioeconomic frames reminds pushing a square-shaped figure through a triangle-shaped hole. And it is the concept of bioenergy that has to be reshaped in order to fit into specific rules and circumstances. Moreover, the capitalist system is not a static and stable structure, but a dynamic and continuous process operating in certain frames that values and devalues, defines and redefines everything that is subordinated to it and thus results in internal social transformations (Harvey, 1996). Hence, with the adjustment of the bioenergy conceptualization comes the whole set of social processes that are necessary for further internal modifications in the socioeconomic system, let it be exploitation of developing countries (paper **I**), intensification and expansion of agricultural production (paper **II**), or development of cost-effective technologies (paper **IV**).

The fundamental rule, that the conceptualization of biofuel production and utilization has to comply with, is defined by market economy entirely fixated on economic growth and accumulation of capital. As argued particularly in paper **III**, bioenergy is promoted as a solution to energy insecurity, climate change or agricultural crisis, but whether it can actually be a feasible and efficient solution is of secondary importance. In all four instances (paper, **I**, **II**, **III**, **IV**), the cost imperative and the logic of market economy are the main drivers shaping the bioenergy discussion and the outcomes of it. Biofuels have to be cheap or at least cheaper than the price for oil, especially if they are set to substitute gasoline and diesel as well as successfully compete with other energy sources on the market. Thus, the cost imperative dictates everything else, spreading its transformative powers to every type and stage of production and utilization. The pressure on cost supplants all other meanings of the bioenergy concept and, instead, puts in its place a meaningless image full of empty promises and false assumptions. It is an image based on abstraction in form of the notion of price which, as Hornborg (2001) argues, embodies a "socially negotiated exchange relationship between human beings" and therefore it is pointless to look for its correlation with the material world (p. 47).

Perhaps in an alternative socioeconomic arrangement, that would not be constrained by the cost pressure due to the fixation on economic growth and accumulation of capital, the biofuel option could not only fit without a necessity of adjusting it but, most importantly, to also function without causing various discrepancies, while providing benefits to more than just a few and privileged. In other words, it is not the concept of bioenergy that is futile *per se*, but it becomes vain when inserted into the current socioeconomic circumstances and arrangements. Paradoxically, the illusionary easiness of implementing biofuel options exposes internal discrepancies of the hegemonic capitalist system.

5.4. Reflections on the structure-agency problem

In a famous response to Kenneth Waltz's (1979) canonical "Theory of International Politics", that represents the neorealist school of thought of the IR theory, social constructivist Alexander Wendt (1999) observes that "the 'agent-structure' problem has become a cottage industry in sociology, and increasingly in IR" (p. 26). One of the most important theoretical debates in the domain of IR, the agency-structure dilemma is concerned with the question of to what extent the structure affects and constraints the behaviour and role of actors against to what extent actors are able to attain autonomous power in pursuing their activities and choices (McAnulla, 2002; Viotti and Kauppi, 1999). In conventional terms, structure is composed in terms of meaning and refers to the context broadly understood as socioeconomic, political and cultural settings, whereas agency means the ability and capability of an actor to conduct actions (Hay, 2002). The interrelation between these two components is the key insight into the phenomena of human-social interactions (Friedman and Starr, 1997).

In the next two sections, I distil my findings by examining specific aspects of the structure in the institutional debate on bioenergy. From this perspective, I proceed to problematizing the results by discussing the agential aspects of the international organizations in the way they conceptualize and contextualize biomass-derived energy.

5.4.1. Structure: the systemic paradox

Wendt (1995) maintains that social structure is "composed of intersubjective understandings" and "exists only in process" (p. 73-74). Furthermore, the scholar argues that social structures are objective and that "this objectivity depends on shared knowledge" (Wendt, 1995, p. 74). By looking at this problem through the post-structuralist lens, however, I contend that social structures are not and cannot become objective because of the impossibility of attaining the systemic closure. In this view, the social is not totalized or formed by stable meanings but rather it is dynamic and contingent precisely because of a multitude of intersubjective understandings that, in a continuous process, strive to conflate their positions into a coherent assemblage. Hence, using Foucault's terms (1983), "where the determining factors saturate the whole there is no relationship of power" (p. 221), for power (or political) can be exercised only in an unsaturated field of unfixity and dispersion. Or referring to the discourse theory of Laclau and Mouffe (2001) again, any given composition of shared knowledge streamed from intersubjective positions is unable to totally attain the closure by striving to arrest the flow of meaning within the limits marked by antagonisms. The incorporation of particularly post-structuralist perspectives results in exposing two interesting aspects of the structure that demonstrate a paradoxical characteristic of the institutional debate on bioenergy.

On the one hand, based on my results I observe a tendency for a *systemic entrapment*, with which I mean a moment when the concept of bioenergy, while inserted into the contemporary socioeconomic structure, is inevitably constrained by its hegemonic arrangements and rules. In other words, any conceptualization of the biofuel option pursued by the IOs has to comply not only to some fundamental assumptions of the hegemonic system, most notably economic growth and accumulation of capital (paper **III**), but to its contemporary circumstances and arrangements, such as: the imperative of price and cost-effectiveness (paper **I**, **II**, **III**, **IV**), energy and ecological inequalities between particular regions (paper **I**), defossilization and decarbonization requirements (paper **I** and **III**), industrial patterns of agricultural production (paper **II**), and reliance on technology and innovation as means to progress (paper **IV**).

However, keeping in mind the post-structuralist perspective that assumes dynamic rather than static character of the social, various internal contradictions arise. These dislocations appear because of the inability to attain the systemic closure. Jameson (2006) observes that "there is, in the long run, no out resolution to the internal contradictions of capitalism" (p. 414), for discrepancies are precisely required by the hegemonic capitalist system to attain its "eternalization"

(Osborne, 2002, p. 24). Even if particular segments of the structure remain more stable and persistent than others, it is because of the efforts to keep them protected from collapsing by, continuously applying a conceptual patches and reinforcements (paper **I**, **II**, **III**, **IV**). Paraphrasing Jameson (2006), it appears that the only solution to the internal contradictions of the system is its constant self-modification and re-adjustment.

This points me to the second observation of a tendency for a *closure attempt*, with which I convey a moment when the institutional debate strives to arrest the meaning around the shaky concept of bioenergy and struggles to stabilize it in a way that it can actually appear as a consistent, coherent and, most importantly, plausible (or sound) win-win-win solution to the three challenges of energy insecurity, climate change and agricultural stagnation. Thus, the process of re-shaping the internal structure begins by intensifying some of its components and re-arranging others around. To illustrate this on the most notorious example traced in my results, the cost imperative – this irritatingly omnipresent and continuous attempt to achieve cost-effectiveness and reduce price of production almost at any possible front – which also embodies accumulation of capital and economic growth as the current system's fundamental assumptions – results in internal contradictions that require most serious modifications (paper **I**, **II**, **III**, **IV**). In order to adjust the concept of bioenergy to this particular systemic rule, specific patches and fixes have to be applied, such as: establishment of crop cultivation in regions that can provide cheaper feedstocks, land and labour as it is the case with developing countries (paper **I**); intensification and spatial expansion of crop production which prompts changes in the entire agricultural sector (paper **II**); or technological improvements in biomass processing that are labelled as innovative and carrying the promise of progress (paper **IV**). However, all these reinforcements, conceived as necessary to attain coherence and stability of the concept, prompt corresponding changes in other segments and aspects of the structure.

Such applied, internal transformations either exacerbate old contradictions or create new discrepancies in the system. They result in exploration of developing countries rather than providing them with potential benefits and, consequently, aggravate unequal energy and ecological exchange (paper **I**). Moreover, other modifications advanced by the institutional debate prompt serious structural changes in the agricultural sector (paper **II**), such as: further mechanization and fossilization of production, introduction of large-scale cultivation patterns and biotechnological enhancements. These, in return, transcend the conceptualization of food and feed production. Even technological improvements are perceived not a as way to create new and innovative, but rather

to adjust the biofuel option to the systemic requirements and lower the cost of biomass processing (paper **IV**). Hence, any attempt to attain the conceptual closure of the biofuel option results in various internal transformations that require further patches to stabilize the systemic structure, which consequently exacerbate old or create new internal discrepancies.

Based on my analytical findings and deliberations presented here, I conclude that the way the three selected IOs conceptualize biomass-derived energy option, by inserting it into the contemporary socioeconomic structure exposes a paradox in which bioenergy is suspended between the systemic entrapment and the closure attempt. Most importantly, however, these two particular tendencies are mutually accelerating and, consequently, the biofuel concept triggers further intensification of internal contradictions within the system, whereas the possibility to reach a potential closure fades away.

5.4.2. Agency: the catalyst of stabilization

According to Barnett and Finnemore (2004) international organizations are "active agents of global change", because "they develop new policy ideas and programs, manage crises, and set priorities for shared activities that would not exist otherwise" (p. 156). The scholars argue that multilateral institutions function as global authoritative bureaucracies that provide expertise in form of a specialized knowledge on specific topics. By doing so, global agencies "exercise their power as they constitute and construct the social world" (Barnett and Finnemore, 1999, p. 700) and thus they are "potential catalysts for political change" (Haas and Haas, 2002, p. 581). Consequently, this "expertise not only makes IOs authoritative but also shapes the way these organizations behave" and in order to be perceived as authorities, they have to make their actions consistent with their expertise (Barnett and Finnemore, 2004, p. 24).

Simultaneously, however, global agencies have particular designations and aims that are focused on finding methods of fulfilling specific objectives and obligations. These, in return, determine and shape what kind of solutions and options are proposed and forwarded. Most importantly, despite their alleged expertise, institutions often fail to provide solutions that can actually function efficiently and solve problems (Barnett, Finnemore, 2004; Murphy, 2005). Furthermore, Oran Young (2002) maintains that "regimes are problem driven, but framing issues to be addressed by specific regimes is a social process that is not determined entirely by objective characteristics of the relevant problem" (p. 113). Hence, a horizontal interplay between international institutions, that frame

and forward the same issues in particular and not always objective ways, can have different consequences. Young (2002) further argues that "as the scope of issues encompassed by a single international arrangement expands, opportunities for interplay with separate regimes decline but internal complexities associated with the operation of the arrangement grow and vice versa" (p. 115).

In light of these deliberations on the agency in IR theory and the role of organizations, I reflect upon what are the potential motivations behind the IO's substantial expansion of their expertise bounded by specific agendas. In other words, I contemplate on what are the intentions that prompt each institution to exceed the scope of its specialized knowledge. Moreover, this particular chain of thought opens up a possibility of discussing the likely reasons behind the IOs' behavior in pursuing their discussions on bioenergy the way it appears in my results, and what factors presumably determine their agency. Whether the institutions are structure-driven, aiming at change or contingent, and whether their agency should be apprehended not only as the part of but also restrained by a current socioeconomic system, is a matter of further discussion in this part.

The main observation that arises from analyzing the way the international organizations conduct their discussions is a striking similarity in how they form, modify and forward the concept of bioenergy. In each analytical case presented here (paper **I**, **II**, **III**, **IV**) their lines of reasoning forge uniform ensembles that are devoid of any explicit discrepancies or radically alternative perspectives. Instead, these conceptual patterns overlap easily and in consequence conflate argumentations into powerful messages. In other words, not just one agency, but all three speak with a similar voice. It is particularly puzzling if one takes under consideration the fact that these organizations fulfill different objectives and agendas or represent disparate memberships, and thus operate within distinct institutional arrangements. One way to explain this specific occurrence is that, experts in each own respective field, the agencies influence each other's perspectives due to the overlapping characteristics of the concept of bioenergy, which brings the issues of energy security, climate change and agricultural production under one umbrella. Indeed, the institutions have a tendency to refer to each other's assessments, reports, policy papers and other relevant publications, especially in situations where they are required to strengthen their position on issues that extend the scope of their agendas.

However, I argue that relying on the three-dimensionality of the bioenergy concept as the main reason behind this phenomenon can only provide an explanation to the occurrence of the similarity in which the concept of biomass-derived energy is forwarded as a potential win-win-win solution, whereas characteristic chains of equivalence go even further. Apparently, striking

similarities extend to how the institutions view the developing world's role in the bioenergy production (paper **I**), as well as how they form and modify the biofuel discourse in relation to agriculture (paper **II**). Apart from channeling the win-win-win solution to the three challenges, the IOs also equivalently suture the notion of bioenergy by the hegemonic thread of market economy (paper **III**), whereas the imperative of cost-effectiveness imposed on the concept is visibly traceable in all four instances (paper **I**, **II**, **III**, **IV**). Furthermore, all three institutions exhibit a uniform argumentation reflecting policy consensus that is not only build on the developed world's requirements but also fundamental to perpetuating energy and ecological inequalities, and the mainstream notion of industrial agriculture embedded in the capitalist system (paper **I** and **II**). Finally, the organizations tend to similarly refer to and discuss the role of technological innovation as the means to achieve cost reductions in the production of second-generation biofuels (paper **IV**).

These visible tendencies point me to the rather puzzling conclusion that in fact the institutions do not act as active agents of global change. On the contrary, the IOs pose as active agents of stabilizing the contemporary socioeconomic system. In order to achieve the closure of the structure as a whole, they strive to adjust the concept of bioenergy to the hegemonic configuration and apply necessary internal modifications in line with systemic requirements. In other words, I argue that, in case of the institutional debate, it is neither the concept of bioenergy itself nor the socioeconomic system encompassing it that are static and overdetermined, but precisely the opposite. It is the organizations that aim to determine the shape of the structure due to its internal unfixity and instability. By forwarding specific policy options and recommendations, it is the IOs that strive to arrest the meaning and exclude alternative, outside the premises of conceptual frames that they try to perpetuate by repressing radical and unthinkable. In other words, it is precisely the tendency towards and potentiality for the structure's objectivity and totality, even if never unattainable, that constitutes a permanent objective for the three IOs, particularly if these organizations represent the interests of actors that desire a continuation of the status quo.

6. Summary

Since the beginning of 1990s, the concept of producing energy from biomass has, with rising intensity, occupied attention and attracted interest of policy-makers, private industries, researchers and civil societies worldwide. While it does not represent a novel idea, because modern biofuel production has been known and developed since the automotive industry first emerged, its current revitalization and comeback on the agenda has sparked a new and polarized debate between its proponents and opponents. The highly contested and contingent character of the bioenergy concept, its entanglement in the nexus of three problematic issues of energy insecurity, climate change and agricultural crisis, as well as its injection into current socioeconomic arrangements and environmental circumstances, is what makes it timely to analyse. But instead of providing yet another pros-and-cons overview, technical insight to production patterns and life-cycle assessment, this study offers an investigation of how the concept of bioenergy comes into being, how its meaning is reshaped and reproduced.

The thesis sheds a light on the state of international debate on bioenergy by looking at deliberations of three major global institutions: Food and Agriculture Organization of the United Nations (FAO), International Energy Agency (IEA) and Intergovernmental Panel on Climate Change (IPCC). This selection is based on the main observation that the bioenergy debate embodies a junction of three interrelated issues of energy, climate and agriculture. The primary aim of the thesis is to analyse and expose how, within the 1990-2010 period, the concept of bioenergy is conceptualized and contextualized in assessments, reports, policy papers and other documents issued by FAO, IEA and IPCC. The secondary aim, based on results derived from the primary objective, is set to problematize and reflect upon currently dominating socioeconomic arrangements that the concept of biomass-derived energy is inserted into.

The research questions are organized around four distinctively contentious issues in the debate: biofuel production in developing countries and the role of Brazil as a role-model (paper **I**); bioenergy production in relation to agriculture and the food vs. fuel dilemma (paper **II**); bioenergy as a win-win-win solution to the three societal challenges of energy security, climate change and agricultural crisis (paper **III**); and the future role of the second-generation biomass-derived energy technology (paper **IV**). The four research questions are investigated by deploying discursive and non-discursive analytical approaches in form of four

theoretical perspectives: the world-economy providing the focus on patterns of inequality between rich and poor countries embedded in the capitalist system (paper **I**); Michel Foucault's genealogy set to expose internal discrepancies and contingencies in the formation and modification of a given discourse (paper **II**); the discourse theory of Ernesto Laclau and Chantal Mouffe which assumes the structural unfixity and undecidability of the social that prompts the necessity of the hegemonic force and the occurrence of antagonisms (paper **III**); and Fredric Jameson's critical approach concerned with the notions of innovative and progress as well as with interpreting visions of the future (paper **IV**). The study is entirely based on the textual material, which is analysed by implementing the methods of deconstruction and double reading.

The results in paper **I** point to three specific phenomena in the way the three organizations discuss the role of bioenergy in developing countries. The first is unequal energy exchange embodied in the suggestion of replacing traditional biomass burning with modern biofuels – a narrow energy choice subordinated to the industrialized nations, and in the argument that peripheral regions could become a cheap source of biofuels to meet the growing energy demand of the core. The second phenomena is unequal ecological exchange that manifests itself in exploitation of land and biomass resources in developing countries, as a result of establishing large-scale production of cheap biofuels for the carbon intensive developed world. The third is the role of semi-peripheral Brazil as an exploiter and being exploited. On the one hand, Brazil serves as a production template that could be applied to other developing countries and, on the other hand, it exemplifies yet another adjustment to the requirements of the developed world.

The results in paper **II** show that the bioenergy discourse advanced by the IOs is built on the premise of synthesising agriculture and energy markets. This core assumption is further consolidated by the organizations in three ways: by pointing to socioeconomic benefits, such as rural development and revitalization of agriculture; by indicating where and how such integration should take places; and by referring to particular terms suggesting a new product opportunity. But this almost complete conceptual structure cracks under the pressures of physical limitations and the high cost of biofuel production. Thus, the organizations strive to stabilize the meaning by applying two specific modifications in form of intensification and spatial expansion of agricultural practices that are assumed to help combat natural constraints and especially lower the cost of production. However, these adjustments trigger various contradictions and dislocations that collide with arguments provided by the IOs to motivate the merge of agriculture and energy markets in the first place. The institutional debate illustrates that the concept of bioenergy becomes a significant key carrier for policies supporting

further industrialization and intensification of agriculture wordwde, which would include large-scale cultivation, mechanization, fossilization and biotechnological improvements. This, in turn, has serious implications for the understanding of essential food production and calls for critical assessments of current biofuel policies from the food vs. food dilemma.

The results from paper **III** demonstrate that bioenergy occupies a privileged position in three discourses that are visibly present in deliberations pursued by the IOs. In the discourse on energy, the concept poses as a renewable energy source able to substitute fossil fuels and help meet the energy demand. In the discourse on climate change, biofuels acquire a capability to reduce GHG emissions and help mitigate climate change. In the discourse on agriculture, biomass-derived energy is conceptualized as a new product opportunity able to prompt rural development and revitalize the agricultural sector. But at a closer examination, the chain of equivalence between these three privileged positions is achieved by suturing them with a hegemonic thread of the capitalist market economy, which implies the requirement of cost-effectiveness. Consequently, the concept of biomass-derived energy is transformed from the potential solution to specific problems into the economically feasible commodity that has to be cheap in order to successfully compete on the market with other energy resources. The chain of equivalence based on the pressure of price reduction, however, results in emptying the concept of bioenergy from signification.

The results from paper **IV** illustrate that in the debate the IOs populate the future with the vision of second-generation biofuels conceptualized as a new and innovative technology able to alleviate land and food competition, as well as help meet global energy demand and substantially reduce carbon emissions. However, a closer examination of deliberations reveals that the advanced bioenergy waiting around the corner is perceived as just an upgrade of conventional biofuels and a continuation of both patterns of production. Thus, the presumed progress appears to be illusory and instead the future is colonized by the practices and notions of the present. Whereas the role of technological innovation attached to the concept of the second-generation bioenergy is to lower the cost of production and make the option cheaper. In this sense, the new and innovative serve as a way to avoid any radical changes and maintain the status quo of the dominant socioeconomic system cost-effectively.

The overall conclusion is that, while bioenergy appears to be an easy and thus attractive patch that could to help solve current societal challenges without changing much in the socioeconomic structure, its implementation exposes internal discrepancies of the hegemonic capitalist system. The institutional debate illustrates that the conceptualization of biomass-derived energy has to comply

with the rules of market economy fixated on economic growth and accumulation of capital. Hence, whether bioenergy could actually function as a feasible solution to energy insecurity, climate change and agricultural crisis is of a secondary importance. It is its economic feasibility expressed in the pressure on cost-effectiveness that matters the most but, at the same time, causes serious discrepancies in deliberations pursued by the organizations.

The results point me to two central conclusions. On the one hand, bioenergy is inevitably entrapped by the rules and arrangements of the hegemonic system which, in turn, cause internal contradictions. On the other hand, the institutional debate attempts to stabilize the shaky conceptualization of bioenergy, so that it can appear consistent and plausible, even if the possibility of reaching a potential closure of meaning fades away with more contradictions on the rise. Finally, the results also show that the way the three international organizations discuss biomass-derived energy exemplifies the objective to reach the closure of meaning and adjust the concept of bioenergy to the hegemonic system.

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