

Illiquid Oceans

The risk of liquidity shortages for the expansion of offshore wind energy in Germany

Lisa Ziehm

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Lund University Centre for
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Abstract

The **German transition to renewable energies** has so far been an example of a successful energy transition of a major economy. Even though this transition is criticized for being only a half-hearted solution, it is an important example of the attempt of a major economy to transit towards renewable energies and is therefore worth studying in its own rights. Thus, my aim in this thesis is the identification of obstacles on the pathway towards renewable energies to contribute to a more stable transition to a fossil free economy, as one of the most urgent issues of our time. This research is relevant to the broader question, of whether it could be a suitable strategy to reform the energy sector without reforming related sectors such as the FS.

Focusing on the financial basis of the renewable energy transition, I claim that **the German transition is at risk, as its financing relies on the unstable financial system**. Private capital sources are expected to finance most of the necessary investment in renewable energies. Those capital sources, however, are volatile and instable, as described by **Minsky's instability hypothesis**, which was supported by the strong evidence of the latest financial crisis.

I analyse the financial basis of the German energy transition from a structural as well as a discursive dimension. Both dimensions are consistently embraced by the framework of **Critical Discourse Analysis**, as developed by **Fairclough**, which I apply in my research. I use offshore wind energy as a case which allows me to conduct an in depth problem analysis. My structural analysis clearly showed strong financial linkages between the financial system and key companies operative in the energy transition. Standing on the shoulders of Minsky's instability hypothesis, I follow that those linkages destabilize the energy transition. My discursive analysis pointed to a lack of problem awareness amongst the key agents of the energy transition. Thus, also the importance of risk mitigation is hardly emphasized in their discourse.

The problem of financial instability of the German transition to renewable energies demands a problem awareness that results in **further research and ultimately structural changes**. Acknowledging the interconnectedness between the energy and the financial system is a first step in finding holistic problem solutions. On this note, my research puts sustainability into a new light: By tackling sustainability problems, all connected systems can be changed for a better. It is time to end thinking in trade-offs.

Keywords: *Renewable energie; Energiewende; offshore wind energy; financialization; financial stability; Minsky*

Word count (thesis): 14,000

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As critical realism taught me, this thesis is the product of a complex system of dialectical relationships between structures and agents of which I am part of. Many people, many structures and a mountain have directly or indirectly contributed to this thesis. It is probably impossible to identify and acknowledge everyone and everything that has supported and influenced me during my life and thus contributed to this thesis. However, I made an attempt in the figure below. I am deeply thankful to be part of this little subsystem and excited for the things to come.

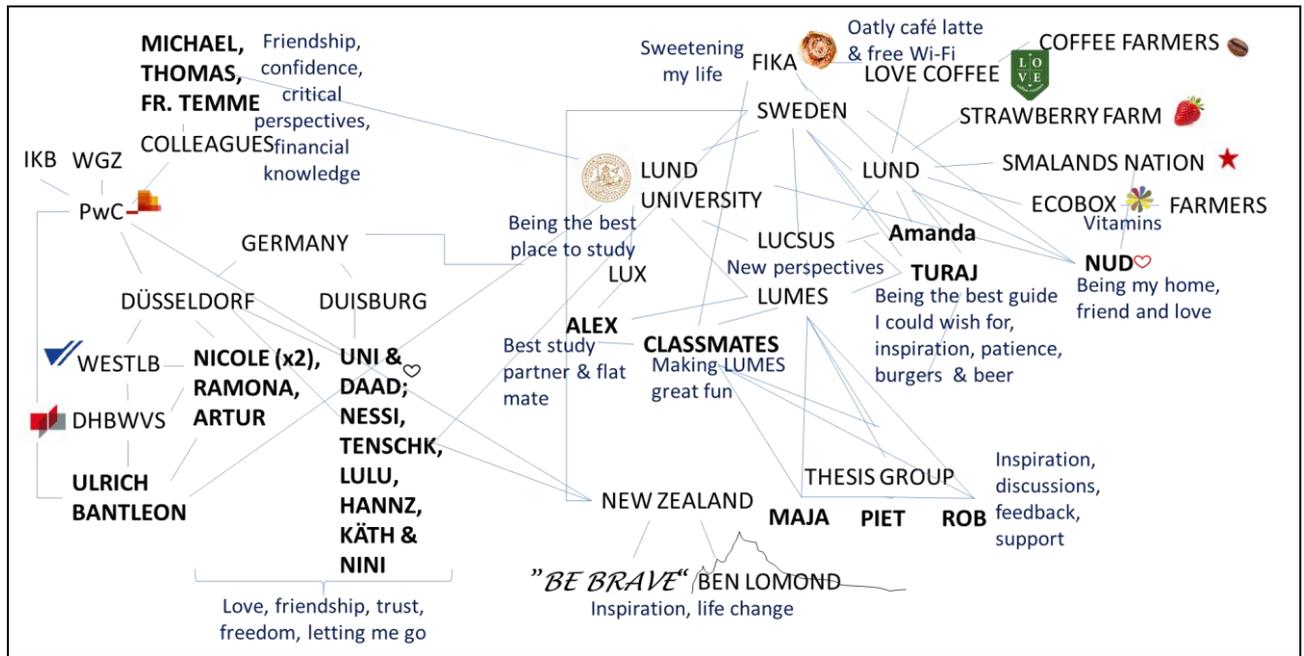


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List of abbreviations & acronyms

CDA	Critical Discourse Analysis
DONG	DONG Energy A/S
EBITDA	Earnings before interest, tax, depreciation and amortisation
EEG	Erneuerbare Energien Gesetz (German renewable energy act)
Energiewende	German term used for the transition from fossil energy and nuclear energy sources towards renewable energies and increases in energy efficiency
EnBW	EnBW Energie Baden-Württemberg AG
EWEA	European Wind Energy Association
FS	Financial system
IRENA	International Renewable Energy Agency
IPO	Initial public offer
Monitoring report	Monitoring report regarding the <i>Energiewende</i>
MW	Megawatt
OECD	Organisation for Economic Cooperation and Development
PFI	Public financial institution
RE	Renewable energies
RQ	Research question
RW	Risk weight
UN	United Nations

Prologue

“We need to remember. [...] The passing of one crisis seems merely to be the prelude to the next” (McNally, 2011, p. 2) This statement is true for sustainability crises as well as for financial crises. Humanity has solved manifold **sustainability** challenges in the past, but every solution had its own drawbacks. The agricultural revolution led, amongst others, to monocultures and the industrial revolution resulted in climate change (Becker, 2014). The same can be said for **financial crises**. Every boom sows the seeds for the next crisis (Minsky, 1986). Solving sustainability and financial challenges can only be successful, if failures of the past are not repeated. We need to remember.

At the same time our world is getting more **complex and interconnected** (Heylighen, Cilliers, & Gershenson, 2006). Solving challenges with silo thinking cannot be successful. It is time for holistic approaches that tackle more than one challenge and take systemic complexity into account. Thus, the **connections** between different elements of our socio-environmental system need to be uncovered.

The need to remember and to discover connections brings me to the idea of my thesis: Partly I base my thesis on my experiences before I started LUMES, which I revisited and interpreted in a new light through the lens of sustainability that LUMES equipped me with. More concretely: Before I started my studies of sustainability science I was a banker and an auditor for financial institutions. I started to work in the financial system just in 2008, i.e. in the middle of the latest financial crisis and my first employer is now liquidated. I have experienced myself what severe liquidity shortages mean for financial institutions and how institutions are affected by systemic market failures. At the first glance one might ask how these experiences are related to sustainability challenges. At the second glance, it seems naturally and necessary to see the connections between the financial system and sustainability challenges and to remember the occurrences of the latest financial crises. One example is the German transition towards **renewable energies that draws financial capital from the financial system**. If financial crises result in liquidity shortages, the renewable energy transition is left high and dry. This connection will be focus of my thesis.

Considering my work within the financial system and my studies of Sustainability Science, my thesis is a very personal work, summing up experiences I made in the last years of my life. I tried to remember these experiences and connect them to each other to deliver a valuable contribution to the journey of our society towards sustainability.

1 Introduction

At the heart of Germany's sustainability policy is the so-called "*Energiewende*", which is to be understood as the transition from fossil energy and nuclear energy sources towards renewable energies ("RE") along with increases in energy efficiency to reduce domestic greenhouse gas emissions (Fischer, Hake, Kuckshinrichs, Schröder, & Venghaus, 2016). The *Energiewende* is criticized for relying upon the assumption that neoliberalism can deliver a technological fix for every problem (Harvey, 2005), as well as for being a half-hearted solution within the paradigm of ecological modernization (e.g. Buschmann, 2013; Christoff, 1996; Dryzek, 2013). Nevertheless, the *Energiewende* is an important example of the attempt of a major economy¹ to transition towards RE and is therefore worth studying in its own rights.

The *Energiewende* is at risk, as it relies on the unstable financial system ("FS"). The German government has estimated that the *Energiewende* requires investments of EUR 550 Billion until 2050 (German Government, 2017b). Private and institutional capital sources (e.g. from banks, insurances and pensions funds) are expected to finance most of the necessary investment (Gatzert & Kosub, 2016; Newell, 2011). The recent financial crisis, translated into an economic crisis, has once again proven the instability of the private capital sources. Although it originated in the United States, the financial crisis caused substantial governmental expenditures in Germany (Greive, 2013; Rüdiger Jungbluth & Heuser, 2011) and led to the collapse of major banks.

My aim is to contribute to a stable energy transition to reach a fossil free economy. I claim that the stability of the *Energiewende* is currently threatened by its dependency upon the instable FS. I arrive at this claim by analysing the financial structure of the *Energiewende* through the lens of Minsky's instability hypothesis (see chapter 2.2). As a post-Keynesian, Minsky builds his theory upon market psychology. He hypothesizes that the optimism of investors and banks towards future cash flows leads to overinvestments based on debt. If assets can't generate the cash flows needed to pay interest and redeem loans, banks have to carry losses from loan impairment, potentially leading to financial crises that likely infect the real economy. In every boom lie the seeds for the next bust (Minsky, 1989; Minsky & Whalen, 1996).

I do not aim to test Minsky's theory. Rather **I base my thesis on the assumption of Minsky's instability hypothesis** and use Minsky's theory to analyse the financial (in-) stability of the *Energiewende*. Minsky's theory was supported by the evidence of the latest financial crisis, which led to a credit crunch, the

¹ Germany is the fourth biggest economy of the world, contributing 4.5 % of the world's GDP (World Bank, 2017).

downturn of investments, and ultimately translated into an economic crisis. This turn of events puts a question mark on many neoclassical economic theories, classical neoliberalism (McNally, 2011; Nowicki, 2012; Radonjić & Zec, 2010), and mainstreamed Minsky's instability hypothesis (e.g. Charles, 2016; Christophers, 2017; Gemici, 2016; The Economist, 2016; Wolf, 2017).

The potential risks emerging from the financial structures might be offset by **awareness of the designers** of the *Energiewende*. Awareness is a discursive element that is in a dialectical relationship with the structures of the *Energiewende*, as I will explain in depth during the course of my thesis. I will analyse not only the structures, but also the discursive awareness of the agents of the *Energiewende*.

On the basis of those considerations I support my claim by answering the following **research questions ("RQs")**:

1. Are **companies** of the *Energiewende* **structurally dependent** on the FS and if so, how?
2. If companies are dependent on the FS, to which degree are the **agents** of the *Energiewende* **aware** of the risk emerging from financial instability?
3. If agents are aware, do they emphasize the importance of **risk mitigation** and if so, how?

The *Energiewende* is at risk when the above factors converge. In other words, when companies structurally depend on the FS, the agents of the *Energiewende* are not aware of this dependency, don't emphasize the importance of risk mitigation in their discourse and consequently do not take structural risk mitigation measures. As shown by my RQs, I engage in a **dialectical dialogue between structure and discourse**. The structural linkages might influence the awareness of key agents of the *Energiewende*. But their awareness and emphasis on risk mitigation might again shape the structural linkages and mitigate instability arising from structures. This brings me to the research paradigm of **critical realism** (Bhaskar, 1975, 1979) and the methodology of **critical discourse analysis** ("CDA", Fairclough, 1992, 2001; Fairclough, 2010), as will become clearer during the course of my thesis.

For my analysis I choose a **case study approach** (see chapter 2.4), as this allows me to conduct an extensive problem analysis within a feasible scope for this thesis. The case of offshore wind energy in Germany is suitable to answer my RQs. This is, because offshore wind energy demands significant financing due to its capital intensity, involved complexity and risk, and the project maturity (Dedecca, Hakvoort, & Ortt, 2016; Gatzert & Kosub, 2016). Financial linkages are more easily identifiable than for example in the solar power sector, where smaller project scales allow financing by private persons. Offshore wind energy can therefore serve as an example of the implementation of big RE projects, comparable to large-scale bioenergy or hydropower projects or installation of large grid systems. The **main agents** are the **German government** as

the designer of the *Energiewende*, and the **companies** that own offshore wind energy parks. I will focus in my analysis on these two agents groups.

1.1 Research aim

The financial crisis has raised questions as to whether the FS can address issues related to climate change (Newell, 2011). Nevertheless, the financing of the *Energiewende* is based on the FS. **I aim to increase the stability of the RE transition to contribute to the transition to a fossil free economy to ultimately tackle climate change. In order to do so, I will assess whether the FS is a stable ground for a transition to RE.** This is relevant to the broader question, of whether it could be a suitable strategy to reform the energy sector without reforming related sectors such as the FS.

The research aim is not only relevant for the German *Energiewende*, but for all energy transitions. Although I agree with the mentioned critique of the *Energiewende*, it is nevertheless a case that can deliver valuable insights into obstacles on the pathway of major economies to RE.

1.2 Contribution to Sustainability Science

With my thesis I contribute to Sustainability Science in three ways:

Firstly, I will explore the use of CDA for the analysis of complex sustainability problems. CDA is **interdisciplinary** as it creates a dialogue between different theories and methodologies through its dialectic approach (Fairclough, 1992). I will study financial structures as well as discourses that give meaning to those structures. As I draw my methods from different disciplines (i.e. economics, social science, linguistics), my research emphasizes the importance of interdisciplinarity in tackling sustainability problems.

Secondly, my research aims to contribute to tackle **climate change**, as one of the key sustainability problems (Rockstrom et al., 2009; Steffen et al., 2015). I will contribute to the **success of RE transitions of developed economies** by identifying obstacles that need to be addressed within this transition. By analysing whether the transition towards RE is possible by reforming solely the energy system, I investigate the **interconnectedness** of our socio-economic system. This investigation contributes to one of the core questions of Sustainability Science, i.e. **how human environmental systems can be managed to reach a**

transition towards sustainability (Kates, 2011) and to the debate about the possibility of reaching sustainability through reforms of the current neoliberal economy (Newell, 2011).

Thirdly, I point out how addressing sustainability issues, i.e. in this case the transition to RE, impacts related social systems, i.e. in this case the FS. Sustainability and financial interests are aligned. This angle puts **sustainability into a new light**. The pursuit of sustainability is not inherently in conflict with other development goals, but can potentially contribute to them. This point will become clearer during the course of my thesis.

1.3 Structure

After introducing the **theoretical and methodological underpinning** I will structure my thesis according to the RQs. To assess whether companies of the *Energiewende* are **structurally** dependent on the FS (RQ1), I will firstly conduct a **literature review** to identify evidence for the structural risks in the academic debate (chapter 3). Secondly, I will analyse **financial linkages of cases of key companies** (chapter 3). If companies depend on the FS, I will assess the degree of the **awareness** of key agents of the *Energiewende* regarding the risks emerging from financial instability (RQ2) and how the importance of risk mitigation measures is framed (RQ3; chapter 4). Bringing structure and discourse ultimately together, allows me to define the **problem of the dependency** of the energy transition upon the FS. On this basis I will discuss which **obstacles** hinder the problem-solving, **who benefits** from the current dependency, possible problem solutions, and the **limitations** of my research (chapter 5). I will end my thesis with a **conclusion** (chapter 6).

2 Theoretical foundation & research design

2.1 Financialization and Minsky

*“Neoliberalization has meant, in short, the **financialization of everything**. This deepened the hold of finance over all other areas of the economy...”* (Harvey, 2005, p. 1). It is therefore crucial to understand the dynamics of financialization and its impact on the economy to solve sustainability problems.

Fetishization of money: In Neoliberalism the purpose of all actions follows the maxim of increasing profits in a manner of instrumental rationality (Weber, 1905). Although not a commodity, money is commodified and traded on financial markets, increasing the likelihood of investment shortages for businesses (Polanyi, 1944). If everything is financialized, then everything is built on the ground of the FS, which is prone to crises as described by Marx, Keynes and more specifically by Minsky. **If this ground breaks, then everything that rests on it likely falls apart as well.** Minsky and Whalen define the power of financial institutions over the economy as **Money-Manager Capitalism** (1989). Minsky’s theory gives answer to the question why FS are an instable ground. As this theory builds the backbone and the underlying assumption of my thesis, I will introduce it within the next paragraphs.

Phases of market upswings sow the seeds for the next crisis as optimism leads to an understatement of risks and to excessive debt financed growth (Minsky, 1986). Due to their willingness to release more credit during optimistic phases, financial institutions play a **procyclical** role in business cycles (Prates & Farhi, 2015). If loans are available at low interest rates and market liquidity is high, then companies are encouraged to **grow financed by debts**. Their leverage ratios², interest sensitivities,³ and bankruptcy risks rise and debt exceeds the capital service border of companies. If assets don’t deliver the estimated cash flows, then companies can’t serve their liabilities and financial institutions face losses, which incurs the risk of **credit crunches and economic crises** (Minsky & Whalen, 1996). New **financial innovations**, such as securitization⁴, lead to further debt expenditure and in the latest crisis rating agencies increased optimism further by optimistic ratings (Prates & Farhi, 2015).

² Leverage ratio indicates how much of the assets of a company are financed by debt.

³ Interest sensitivity indicates the increase of interest expenditures of a company if interest rates increase.

⁴ Securitization describes in short the issuing of financial instruments that reference on a pool of underlying financial instruments, such as loans. Massive defaults of securities initiated the latest financial crisis.

Financial discipline within one sector alone is not sufficient risk mitigation for the described instability dynamics. This is, because the FS is the junction that connects all economic sectors with each other. Crises can spread along financial linkages and through the FS easily from one sector to the whole economic system (Minsky, 1986). The latest **financial regulation** (in the EU mainly Basel III⁵), has so far not been successful in stabilizing the banking sector (Aymanns, Caccioli, Farmer, & Tan, 2016; Schwerter, 2011).

Structural Keynesians and new-Marxists criticize that Minsky's instability hypothesis does not take the whole picture into account by focusing mainly on the FS (Palley, 2010). They claim that the Neoliberal growth model is the underlying driver of crises (Palley, 2010). The existence of financial linkages and financial instability, which can lead to liquidity shortages in the economy, is not questioned. Thus this critique is less relevant for my research, which focuses primarily on instability of the RE transition due to financial instability and only secondarily on the cause of this instability.

2.2 Potential instability of energy transitions

On the basis of Minsky's theory of Money Manager Capitalism, I build a **theoretical model** that underlies my thesis (figure 1). I identify the government and key companies implementing the energy transition as key agents and sources of social power in the case of offshore wind energy. Due to the large project scale of offshore wind energy, the financial capability of civil society is likely exceeded and civil society is not considered in this model.

⁵ Basel III is an international framework for financial regulation, which is transferred into mandatory EU law. Amongst others, Basel III entails higher capital requirements for financial institutions, anticyclical mechanisms (i.e. mechanisms which shall even out market booms and busts), and shall minimize off-balance sheet activities of banks).

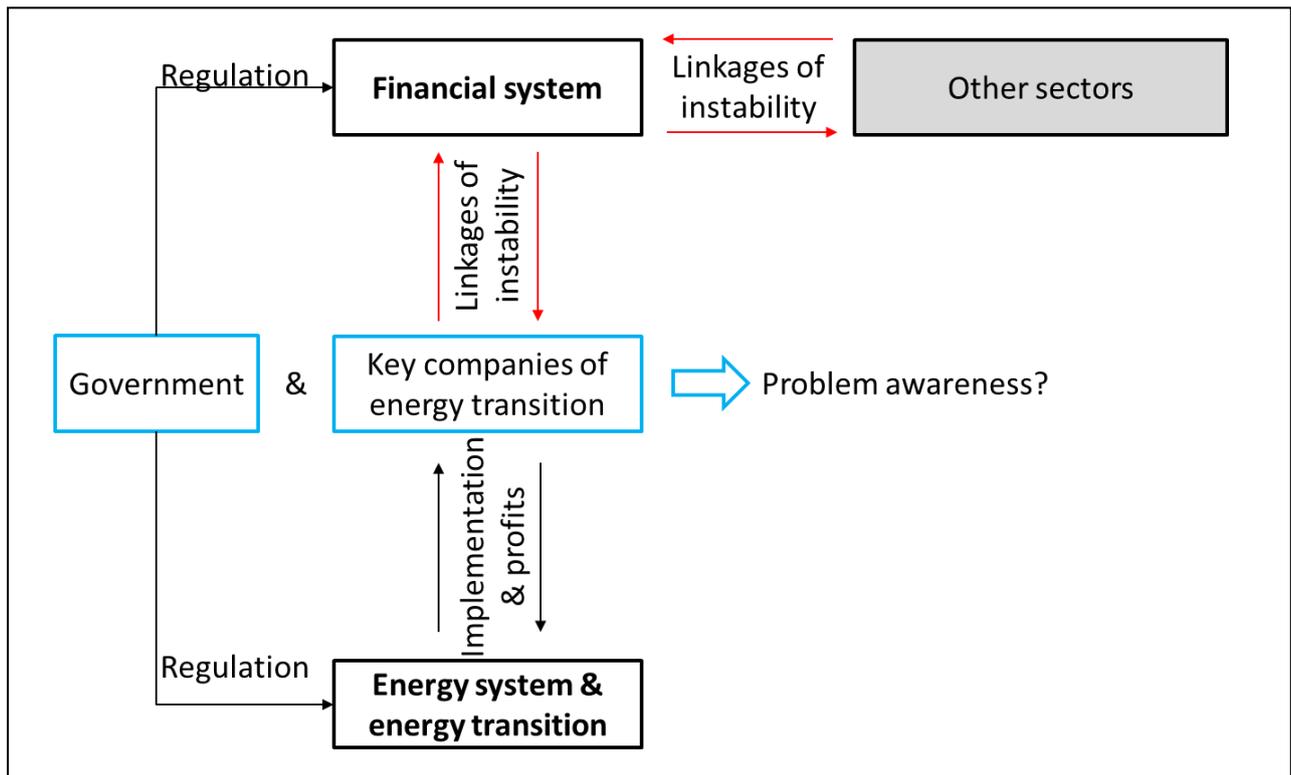


Figure 1. Model of instability (own figure)

Instability of energy transitions can originate in two different ways: Firstly, by excessive debt of the RE sector itself, or secondly by excessive debt of other sectors. Both mechanisms have the potential to destabilize the FS, which might lead to credit crunches that limit the capital supply for energy transition. Knowing and being aware of the described instability mechanisms is the first step towards risk mitigation. Companies can potentially decrease their own dependency upon the FS, or prepare for phases of market distortions. The government can regulate the FS as well as the energy system and align and harmonize the politics of the two resorts.

The model underlying my thesis considers both, **material structures as well as social processes** shaping these structures. This brings me to my ontology and epistemology.

2.3 Epistemology, ontology and normative research

Based on my theoretical model, I acknowledge the need to consider material financial structures **as well as** the discourse of key agents to assess the stability of the RE transition. This approach gives a meaningful role to **structures as well as to agents**. My **ontology** therefore follows critical realism as developed by Bhaskar (Bhaskar, 1975, 1979). Bhaskar acknowledges the existence of a natural, physical world independent from human perception and interpretation of it (Benton & Craib, 2011). The human understanding of this

physical world, however, is influenced by the social processes of **knowledge creation**. Especially an investigation of social problems can't be successful without considering the social world that exists in a dialectical relation with the natural world. This social world consists of relationships between social agents (Benton & Craib, 2011).

Agents are constrained by social structures, but are at the same time the condition for the existence of these social structures, leading to a **meaningful agency** (Benton & Craib, 2011), which at the same time does not neglect the need for systemic social transformation (Collier, 1994).

In terms of epistemology, critical realism does not equalize human knowledge about the world and reality (Benton & Craib, 2011). Science "*can give us real insights into the nature of things*" (Collier, 1994, p. ix). The surface appearance of the world can nevertheless be misleading. Research must infer from the data (Benton & Craib, 2011) and reason in a Hegelian dialectic tradition (Collier, 1994). This inference must consider the role of **discourses**, as social tools to create meaning in non-discursive structures (Fairclough, 1992). Analysing discourses can create insights into the current interpretation of reality and question this interpretation via a self-aware, reflexive process. This allows judging between different interpretations of the world, values and discourses.

Sustainability Science is inherently **normative**, as it aims to tackle socio-environmental challenges (Kates, 2011; Lang et al., 2012). Sustainability Science aims to identify social drivers behind environmental problems and considers therefore the physical as well as the social world. Identifying challenges and problems is closely linked to questions as to which human values shall be preserved and developed through the transition in society towards a desired future state (Kates, 2011). Sustainability Science has a **problem-solving dimension** (Lang et al., 2012) and aims to tackle problems by linking knowledge to action (Miller, 2013), as it follows the critical realist idea that **knowledge alone does not lead to freedom and emancipation** (Collier, 1994).

Considering the general nature of Sustainability Science and the specific problem setting of my thesis, **critical realism is the most suitable ontology and epistemology to serve the aims of my research**. Critical realism acknowledges the **real challenges** in the physical world as well as the importance of the dialectic interplay between social structures and agents for the solution of these challenges. All of this plays an important role in the problem of stable energy transition discussed in my thesis.

2.4 Case introduction

An analysis of social structures, **without tying it to a specific case** and considering the impact of agents could only remain **speculative** (Fairclough, 2010). Thus, I will analyse the relationship between the *Energiewende* and the FS using a case study approach. I will draw my conclusions from the concrete example of offshore wind energy in Germany. The chosen case is suitable to answer my RQs, as offshore wind energy projects need substantial investment.

German offshore wind energy is produced adjacent to the Wadden Sea, the world's longest Wadden landscape with a unique geology and ecology (Müller et al., 2016; Slob, Geerdink, Röckmann, & Vöge, 2016). Installations on a commercial scale are planned (figure 2 and 3; Dedecca et al., 2016). High uncertainties about environmental impacts are linked to the new offshore technology (Kaldellis, Apostolou, Kapsali, & Kondili, 2016; Masden, McCluskie, Owen, & Langston, 2015).

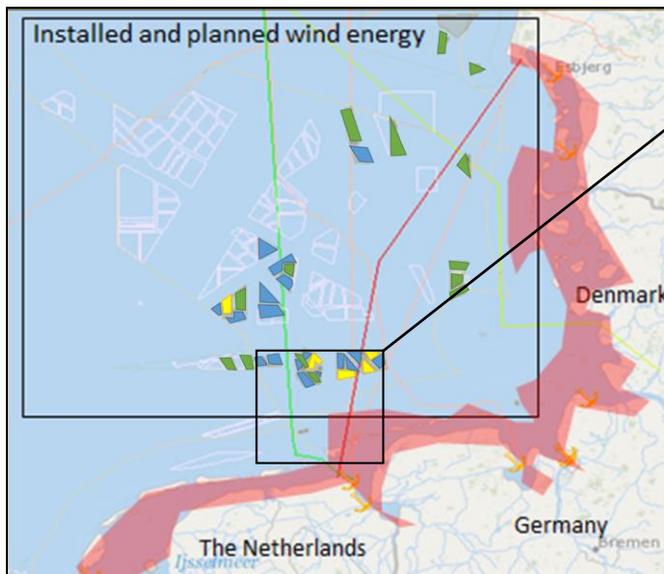


Figure 2. Installed and planned offshore wind parks. Yellow = under construction, green = fully installed, blue = planned, transparent = cancelled. Red area = Wadden Sea protection area (own figure, developed in the basis of 4C Offshore, 2016)



Figure 3. Cables running related to offshore wind energy (own figure, developed on the basis of 4C Offshore, 2016)

2.5 Methodology and method selection

Based on my theoretical model as well as my ontology and epistemology I will divide my research in two main parts: (i) **structural analysis** of the dependence of key companies of the offshore wind energy sector on the FS and (ii) analysis of discursive **problem awareness** of the key agents of the *Energiewende*. As will become clear, I will use a mixed method approach, drawing from quantitative and qualitative methods. I will now introduce the methods used for my research.

2.5.1 Design of structural analysis

I will assess the structural dependence of key companies (RQ1) using the following methods (table 1):

Table 1. Methods RQ1 (own table)

Research question	Methods	Section
Structural dimension, analysis of the wider social practice		
1: Are companies of the <i>Energiewende</i> structurally dependent on the FS and if, how?	<ul style="list-style-type: none"> • Review of academic literature regarding the relationship between the FS and RE transitions, to identify evidence for the structural dependency available in the academic debate; • Identification of key companies that own wind energy projects: Internet research using data from 4C Offshore and project websites; • Qualitative and quantitative analysis of the financing of those key companies on the basis of their annual reports (qualitative sample); • Analysis of the structural political support for the <i>Energiewende</i>. 	3

I will begin my research with a **literature review** to identify potential evidence for the structural dependency of the energy transition upon the FS in the academic debate.

After the literature survey I will **assess the fragility of *Energiewende* in terms of financial instability**. I will **identify the key companies** that own offshore wind parks in Germany, including their geographic origin and their legal structure, as ownership is linked to the power of decision making and absorbing profits (Minsky, 1989). I will use data from 4C Offshore (2016) and from additional internet research to identify the companies that own wind parks. Depending on the identified key companies of the offshore segment of the

Energiewende, I will draw a qualitative sample of companies which I will analyse in depth in the further course of my thesis. I will pick the qualitative sample based the quantitative importance of the companies and differences in their company structure in order to gain insights into impacts of different company structures.

I will use the latest public accessible annual reports of the key companies in my sample to quantitatively and qualitatively analyse their **liability structure**. In this analysis I will draw upon methods and tools from **financial statement analysis**. Considering Minsky's theory of Money Manager Capitalism the main focus will be on the debt-to-equity-ratio indicating the leverage of a company, liquidity of companies and financial liabilities stemming from the FS (Minsky, 1986). Finally I will investigate whether current political instruments reduce instability risks.

2.5.2 Design of Critical Discourse Analysis

The *Energiewende* is an attempt to achieve a **sustainable energy system while holding on to the neoliberal structure of Germany's economy and building the transition upon the conventional FS**. Neoliberal systems have a "*discourse-driven character*" (Fairclough, 2010, p. 13) and similar structures can result in different concrete social processes and actions, depending on the discourse that gives meaning to these structures (Fairclough, 1992). FS are highly complex and interconnected social orders and include social processes (Prates & Farhi, 2015). Analysing possible strategies to reach a sustainable energy system within the neoliberal system can't be limited to a structural analysis, but must also consider the role of discourse.

The set of social relations and structures - as described by Minsky - are filled with meaning by agents and their discourses (Fairclough, 2010). On the one hand, discourses can support the interest of a social group (e.g. the financial industry) by creating and reproducing power relations (Fairclough, 1992). On the other hand, discourses can modify and transform power structures and play an important role in social change. Discourses influence which problem solving strategies get selected and become hegemonic (Fairclough, 1992, 2010).

This perspective implies a meaningful agency: The **agents** of the *Energiewende* can **offset** negative impacts arising from structural financial linkages, if their discourse shows **awareness** of potential instability threats and of the importance of risk mitigation. Looking at both structures and discourses can be a powerful and comprehensive approach to analyse social problems. Structures and discourses impact each other dialectically. Discourse is constituted, but also constitutive.

I will complement the analysis of the structural dimension with an analysis of the discursive awareness of the key agents of the *Energiewende* (RQ2) and of their discursive emphasis on risk mitigation (RQ3) to assess if their discourse can potentially offset structural weaknesses.

Considering my research aim, theoretical model and ontology, CDA, as developed by Fairclough, is the most suitable approach within discourse theories to analyse the problem awareness of key agents. This has three main reasons:

- CDA is a framework within **critical realism** that can **embrace** my **structural** analysis as well as my **discursive analysis** in a **consistent** way: CDA acknowledges that discourse shapes reality in a dialectic relation with material structures. This differentiates CDA from post-structural approaches of discourse analysis (e.g. Foucault) that see only discourses as constitutive for reality;
- CDA acknowledges a **meaningful agency**, which emphasizes the role of agents in shaping structures. Consequently it matters whether the key agents are aware of the potential risks arising from financial dependence; and
- CDA aims to develop "**actions for a better world**" (Fairclough, 2010, p. 14) and acknowledges the possibility of evaluating discourses and the appropriateness of social strategies by reasoning. This is closer to the normative nature of critical realism and Sustainability Science than the post-structural idea of coexisting discourses without the possibility of judging between them.

On the basis of these considerations I will use the following methods to answer RQ2 and RQ 3 (table 2):

Table 2. Methods RQ 2 and RQ 3 (own table)

Research question	Methods	Section
Discursive dimension, analysis of problem awareness		
2 If companies are dependent on the FS, to which degree are the agents of the <i>Energiewende</i> aware of the risk emerging from financial instability?	Linguistic and semiotic analysis of the sections addressing financial instability risks in a) Annual reports of key companies; and b) German sustainability strategy and monitoring report regarding the <i>Energiewende</i> .	4
3 If agents are aware, do they emphasize the importance of risk mitigation and if so, how?	Linguistic and semiotic analysis of sections addressing risk mitigation measures in a) Annual reports of the key companies; and b) German sustainability strategy and monitoring report regarding the <i>Energiewende</i> .	4

In order to analyse the **governmental** discourse I will use the German overall sustainability strategy, as well as the latest monitoring reporting for the *Energiewende*. Both are public available key documents representing the governmental strategy and policy instruments for the *Energiewende*. For analysing the discourse of the **key companies**, I will use annual reports. Annual reports are suitable for my research, as the FS is amongst the main addressees of this reporting (Valeo, 2013; Zanola, 2010). Annual reporting is a key instrument for companies to communicate their self-image, far beyond accounting statements and regulatory and technical information. It is “the corporate voice” (Zanola, 2010, p. 16), and is therefore suitable for identifying the discourse underlying companies' decision making.

One **drawback** of the use of annual reports is that elements of internal discursive communication⁶ are not represented in this external communication tool. This is one of the limitations of my research (see chapter 5.5). The fact that annual reports are audited by an independent third party makes them nevertheless a valuable data source.

⁶ E.g. minutes of board meetings or internal comments that are not public accessible.

Figure 4 demonstrates how CDA can **embrace structural as well as discursive analyses** in a consistent manner:



Figure 4. Dimensions of CDA (own figure, developed on the basis of Fairclough, 1992)

The analysis of relations between discursive and non-discursive elements must consider three dimensions: (i) the wider social practice, including its (non-discursive) material elements and structures, power relations, hegemony and ideology, (ii) the concrete communicative events and texts embedded in the wider social practice that reflect and shape this social practice in a dialectic way, and (iii) the discursive practices, such as text production, distribution, and consumption, which mediate between the two other dimensions (Fairclough, 1992).

According to Fairclough, the analysis of **concrete communicative events** is important, as it gives insights into the concrete outcomes of the interplay between discourses and structures (Fairclough, 1992). With reference to Marx, Fairclough and Graham (2002, p. 19) argue that **language** “*is the only way we have of grasping the diachronics of changing social circumstances*” and furthermore is “*both product, producer, and reproducer of social consciousness, which in turn is in a reciprocally causal relationship with the whole of the human experience.*” In this regard, Fairclough follows Foucault’s concept of language as a social practice from which power emerges (Foucault, 1979).

I will mainly focus on the **social practice and the text level**, as the consumption and production of the analysed texts follows (legally) standardized procedures. All agents follow the same rules of text production, which erases peculiar insights into social change from this dimension.

3 Structural dependency of the renewable energy transition upon the financial system

So far the German RE transition has been **successful** and is often used as a positive example for a major economy transitioning to RE. But if Minsky’s instability hypothesis is right, then this success could be the **boom that sows the seeds for the next bust** (Minsky, 1989; Minsky & Whalen, 1996). Currently interest rates are extremely low and market liquidity is high: investors are seeking for investment opportunities and project scales increase. Voices in academia advocate for lowering regulatory risk weights⁷ for RE investments. *“The stability of banks – which is a unanimous requirement for our finance system - will not be threatened by the RE specific RW”* (Breitschopf & Pudlik, 2013, p. 187). This optimism and boom could end if rising interests lead to the bankruptcy of key companies with high leverage ratios and high interest sensitivity, or if the profits of projects stay below expectations leading to credit impairments at banks. Additionally, general financial crises that don’t originate from the offshore wind energy sector could threaten the stability of the RE transition, for example if credit markets dry out. The structural dependency of the RE transition upon the FS will be the question of concern in the upcoming chapter.

3.1 Literature review on structural dependency

Academic literature acknowledges a general need for finance for the *Energiewende*, but assumes that this finance can be reached by designing RE projects according to the needs of investors. Financial instabilities are not considered. I come to this finding on the basis of my literature review using LUBSearch. I have used all possible combinations of the following terms to identify relevant literature (table 3):

Table 3. Terms used in literature review (own table)

Terms of <i>Energiewende</i>	Terms of FS
<i>Energiewende</i> , renewable energy Germany, energy transition, offshore wind energy	Investment, investors, financial system, financial markets, finance, banking

⁷ Risk weight (“RW”) is a regulatory figure, which indicates how much equity a financial institution has to allocate to its issued loans. The higher the risk weight, the more equity must be assigned. This limits the leverage of financial institutions.

The literature review resulted in **1,641 papers**. I scanned the titles of the papers and if the title indicated relevance for this thesis, I went through the abstract and body of the paper. I identified **18 papers** that address **the relation between financial stability and the investment into offshore wind energy or RE**.

Already in 2012, Carnicer & Peñuelas (2012) noted that the relationship between reforms of the FS and the needed changes in the energy system **must be further researched**. In 2016, however, Hall, Foxon and Bolton (2016) continue to demand a further analysis of the role of financial institutions in the energy transition.

Research has identified a **general correlation between the development of the FS and RE**. The expansion of RE is significantly related to the general investment climate, economic growth (del Rio & Tarancon, 2012; Eyraud, Clements, & Wane, 2013), and the development of financial intermediation positively impacts the total electricity output from RE projects (Fangmin & Jun, 2011; Kim & Park, 2016). During the financial crisis, investors were irrationally exuberant (Bohl, Kaufmann, & Siklos, 2015), and total energy investment declined in 2009 by 7 %, as a backlash of the financial crisis (Kalamova, Kaminker, & Johnstone, 2011). As corporate debt is the main source for wind turbine investments (Corsatea, Giaccaria, & Arántegui, 2014), the lack of finance might have hampered investment.

Cochran, Hubert, Marchal and Youngman (2014) identified the need to **provide finance independent from market cycles** to support the expansion of RE. They identify public financial institutions (“PFI”) as a possible source for this finance. PFIs however refinance themselves usually on the basis of international capital markets and aim to attract private financial resources in addition to the provided public resources. Their independence from market cycles is limited, which is ignored by Cochran et al. Cochran et al instead use strong modality when describing the access of PFIs to financial resources, without mentioning the need of functioning capital markets: *“...the PFIs studied here [including the German KfW] all **have access to high volumes of stable, long-term finance**. [...] In many instances, this ability to leverage low cost funding allows these institutions to provide concessional financing for projects **without the use of public subsidies**”* (Cochran et al., 2014, p. 11).

Ayres et al. (2013) discuss that the **instability of the FS needs to be addressed by political tools** in order to realize a transition to RE. *“Almost nothing has been done to prevent a recurrence as fundamental causes of the crisis”* (Ayres et al., 2013, p. 10). But in the same manner like Cochran et al., Ayres et al. (2013) demand a *“financial incubator”* and *“financial innovations”* (p.11) to attract private investments without the need of public subsidies. Although this is discussed in the light of the latest financial crisis that involved substantial liquidity shortages, the assumption that private financial resources are available is not questioned. The call

for financial innovation is in line with the finding from Pathania and Bose (2014) who found that innovations in finance were crucial in energy transitions.

Johnson (2015, p. 178) notes that *“A discussion on the **current financial sector is beyond the scope of this note** yet it is clear that we have a financial sector out of control, divorced from the real economy and incapable of providing the liquidity at the scale needed to address key sectors of the real economy”* (2017, p. 178). Like Ayres et al. (2013) he states that **financial innovation** can overcome the weaknesses of the FS and contribute to a *“mobilization of private capital”*. Whether this private capital is available is again not discussed. Criteria for financial innovations are not articulated.

Kemfert and Schäfer (2012) problematized that **governmental resources are allocated to stabilize the FS during crises**, while limited resources are available for the support of RE. During the recent financial crisis, governments reduced their support for RE (Creutzig et al., 2014). Additionally, private investors lack access to credit, as shown by the decline of the syndication market in the recent financial crisis (Jacobsson & Karltorp, 2013; Kemfert & Schäfer, 2012). Suggested counter measures are the increase of risk capital (Jacobsson & Karltorp, 2013; Kemfert & Schäfer, 2012), introducing a link between governmental support for the FS and the demand to finance the RE transition (Kemfert & Schäfer, 2012) and strengthening of PFIs (Jacobsson & Karltorp, 2013), as well as governmental subsidies (Gutermuth, 1998). The general research and the suggested solutions lack theoretical approaches and identification of causal relationships that explain the relationship between RE and FS in more depth.

Even less attention is paid to the **stability of RE companies themselves**. Brabänder, Kammlott and Schiereck (2015) found that substantial investment of public energy companies into RE reduces their success. Conrad and Kostka (2017) point out that investments by state-owned Chinese companies, which often have high leverage ratios, bare the risk of an acquisition of these investors by other investors. Both papers, however, don't relate the potential instability of companies to the instability of the FS.

The main themes dominating the remaining, not directly relevant literature are:

- Investment **barriers and risks** related to RE (e.g. Arnold & Yildiz, 2015; Balks & Grasse, 2016; Lüthi, 2010; Salm, Hille, & Wüstenhagen, 2016), often under the assumption of a functioning FS. **None** of the risks identified from the investor point of view are related to **nonmonetary damages or a time lag** in the transition to RE due to a lack of investment capital. Instead all of the identified risks would lead to a diminishment of profits (compare results of Angelopoulos et al., 2016; Balks & Breloh, 2014; Gatzert & Kosub, 2016); and

- **Political instruments** that can attract private investment by reducing risks and investment barriers (e.g. Alishahi, Moghaddam, & Sheikh-El-Eslami, 2012; Häselser, 2014; Kwiatkowska-Drozd & Mazur, 2012; Schuchardt, Hoffjan, & Finger, 2015; Speth, 2013).

Ignorance of the financial instability risk for the RE transition is traceable in several statements in the literature (see following examples):

- *“Financing is potentially a challenge, but the experience so far has been **that funds are always forthcoming for good projects** within stable regulatory environments”* (Genoese et al., 2015, p. 196);
- *“The investment in the renewable energy technology offshore **will grow**”* (Bendfeld, Balluff, & Krauter, 2015, p. 375);
- *“However, since the underlying technologies have been tried and tested over a few years, debt investors **are willing** to invest large sums, and public markets and private equity **will** support the growth of such companies”* (Kalamova et al., 2011, p. 25).

To sum up:

- Literature **provides evidence for a general need for finance** for the *Energiewende*;
- Most commonly research is done under the **assumption of a functioning and stable FS. Minsky’s instability hypothesis is not considered**;
- Extensive discussion therefore focuses on **how to attract private capital**;
- **How companies depend concretely** on private capital is not researched at all; and
- If the general relationship between financial stability and RE is discussed, **theory informed discussions are missing** and solutions are not based on sound theory.

My literature review points to a **substantial knowledge gap** in academia. Research is **fragmented** and does not consider the **interconnectedness** between financial instability and stability of the RE transmission. To ensure the stability of the RE transmission, the linkages between the financial and the energy system need to be uncovered, dependency of key companies needs to be analysed and possible risk mitigation measures must be discussed. To address the identified knowledge gap, I will proceed in analysing the structural dependency.

3.2 Who rules in the German offshore wind energy market?

In this section I will identify the main actors of the German offshore wind energy market. Based on the processes of financialization and Minsky's theory that emphasizes the power of the FS over the economy, I expect that **big companies, which can implement more efficient large scale projects, are dominant in the market.** The reasoning is as follows:

When making investment decisions, **financial institutions** follow the discourse of **financialization**, expressed by the maxim of profitability and **maximization of risk return rates** (Minsky, 1986). Central agents of the FS manage **large portfolios**, which makes bigger companies and projects more suitable investment targets. **Efficiency** of investment management and **familiarity with assets** increases with company and project size (Boyle, Garlappi, Uppal, & Wang, 2012). An upscale in business activities is also **profitable for companies**, as economies of scale can be generated. Consequently, both agents have an interest in (debt financed) growth, continuously increasing company sizes, and project scales, leading to concentration effects. This concentration of market activities increases the systemic risk in the RE sector. **The growth trend I expect on the basis of Minsky's theory is observable in Germany:** Project sizes and need for investment increased in the past ten years and concentration effects dominate the German RE market (Dedecca et al., 2016; EWEA, 2016), creating market barriers for new companies, which lack access to funding sources (Dedecca et al., 2016).

To investigate the market concentration and identify the key companies of the German offshore wind energy market, I collected and mapped data regarding projects and respective investors of these projects (figure 5).

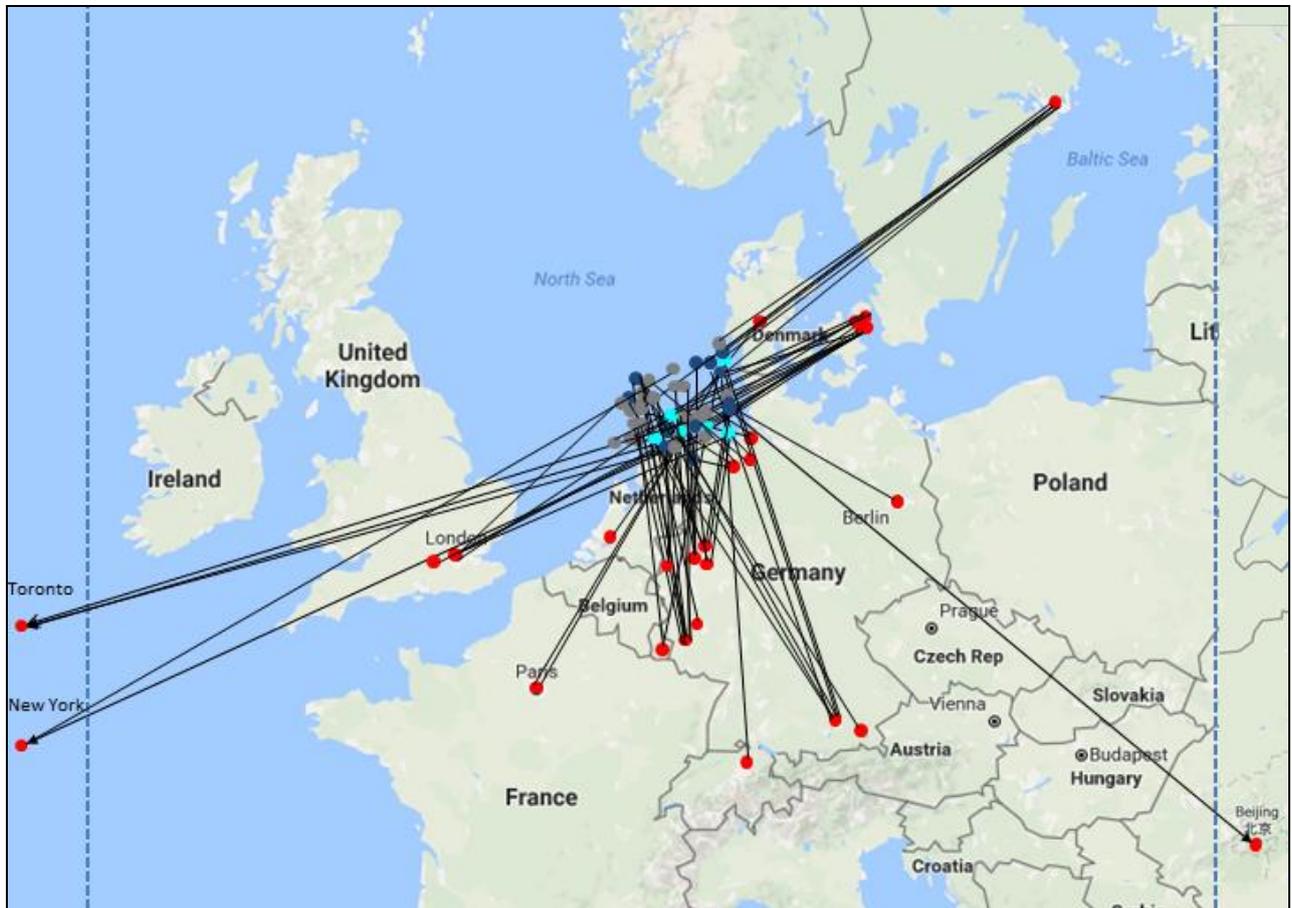


Figure 5. Location of the investors of German offshore wind energy projects (own map, created with data from 4C Offshore (2016) and internet research). Red dots = Location of investor, grey dots = planned wind energy parks, blue dots = installed wind energy parks, turquoise dots = wind energy parks under construction⁸

The German market of offshore wind energy is **centralized**, as expected. The main investor is DONG, followed by EnBW. **The ten main investors** (assessed by the owned megawatts; “MW”) of the German offshore wind energy market hold **73 %** of the installed and planned MWs. 12 % of the projects have local investors (WPD AG, EWE AG and PNE Wind AG), of which only EWE AG (holding 2 % of the projects) is public. **The majority of profits will be absorbed by non-local investors.** The bulk of investors is domestic (56 %) and only 11 % are non-European. Private companies hold approximately 56 % of projects, while companies that have public and private owners hold 13 % of projects (see appendix I).

⁸ I originally prepared figure 5 for the final paper of the course “Water and Sustainability”.

The structure of the investors points towards the **substantial role of private ownership and therefore private financial capital in offshore wind energy**. My results support the concentration effects and superiority of big companies as suggested by Minsky's theory, and described in literature.

3.3 Dependency of key companies

I will analyse the **structural dependency of the key companies** implementing offshore wind energy on the FS. As a qualitative sample I will use the two companies that hold the most offshore wind energy capacity: **DONG and EnBW**. Analysing two companies with different ownership structures can give additional insights into the influence of ownership on financial dependency, while staying within the scope of this thesis.

Minsky's theory suggests that financial dependency can be indicated by a high **debt-to-equity-ratio, less liquidity of companies and significant financial liabilities stemming from the FS** (Minsky, 1986). I will structure my analysis according to these criteria.

3.3.1 Company structure of DONG and EnBW

DONG is a Danish energy company, which is listed at the stock exchange. The main shareholders are the Danish government (50.1 %) and SEAS-NVE (10 %) as public investors, followed by Goldman Sachs (7 %), and the Capital Group (6 %) as private investors, both of which are actors of the FS⁹. The FS has influence on the board, as large shareholders can suggest the election of board members to the annual meeting (DONG, 2017). **EnBW**, in contrast, is a 93 % publicly owned German energy company and not influenced by shareholders of the FS. Although being listed on the stock exchange, the main shareholders of EnBW are the NECKARPRI-Beteiligungsgesellschaft mbH, owned by the German federal state Baden-Wuerttemberg (46.8 %) and OWE Energie-Beteiligungs GmbH, owned by nine counties of Baden-Wuerttemberg (46.8 %).⁹

Major differences between the two companies lay the ownership structure, EnBW's multi-sectoral business model, and EnBW's higher debt-to-equity ratio (table 4). In terms of liquidity EnBW has mainly cash, which is less sensitive to financial instabilities than DONG's financial assets. In contrast to DONG, EnBW aims to limit growth to internal funding capacities. Main similarities lay in the funding sources and the substantial amount of financial liabilities and the general substantial dependency upon the FS.

⁹ The rest is owned by minor investors, as parts of the shares are in the free float.

Table 4. DONG's and EnBW's financial structure (own table; source: DONG, 2017; EnBW, 2017)

	DONG	EnBW
Owners	Danish government (50.1 %), financial investors and minority investors	German federal state Baden-Wuerttemberg and its counties and minority investors
Business model	Operative in the segments Wind Power, Bioenergy & Thermal Power and Distribution & Customer Solutions. Aims to grow business in wind energy significantly.	Operative in the segments Sales, Grids, Renewable Energies and Energy Generation (nuclear energy, coal and gas). The segment of RE generates currently 15 % of the profits, but its share shall increase to 30 % until 2020
Managed assets¹⁰ (as per end of 2016)	EUR 18.2 billion	EUR 38.5 billion
Financial liabilities	EUR 9 billion	EUR 12 billion
Debt-to-equity-ratio (as per end of 2016)¹¹	1.2 (2015: 1.8)	11 (2015: 6.4)
Main funding sources	Operations, debt (hybrid capital and bonds) and divestments	Operations, debt (hybrid capital and bonds) and divestments
Liquidity buffer	Financial assets	Cash
Financial strategy	Future investment is not limited to internal funds. Attractiveness for investors shall be ensured via continuous increase of dividend.	Limitation of investment to retained cash flow.
Dependency upon the FS	Hedging, Refinancing of due debts, viability of partnership model for divestments, financing of future growth, source of equity capital.	Hedging, Refinancing of due debts, viability of partnership model for divestments.

This short comparison points to dependency and instability risks for both companies. I will now discuss the indicators debt-to-equity-ratio, liquidity, and financial liabilities in more depth.

¹⁰ According to the definition for small and medium-sized enterprises of the European Commission DONG and EnBW are large companies, as their total assets exceeds EUR 43 million. As a comparison The assets of DONG equal the investment value of the eleven offshore wind energy projects that reached final investment decision in Europe in 2016 (Wind Europe, 2017) .

¹¹ Typically large stable, public traded manufacturing companies have debt-to-equity-ratios between 2 and 5. Debt to equity ratios larger than 5 to 6 indicate an increased bankruptcy risk (Gallo, 2015).

3.3.2 Debt-to-equity-ratio

The debt-to-equity-ratio is one indicator for the bankruptcy risk of a company and therefore the possibility that the FS carries losses and is destabilized, if the company can't serve its loans. Considering the significant difference in the debt-to-equity-ratio (DONG = 1.2 vs EnBW = 11), **DONG seems to be more stable**. One reason of the significant difference in the debt-to-equity-ratio, however, is the different accounting of **hybrid-capital**¹², which both companies have. DONG accounts its hybrid-capital (EUR 1.8 billion) as equity, while EnBW accounts it (EUR 3.0 billion) as liabilities. If EnBW accounted this capital as equity, its debt-to-equity ratio would be 5.6, indicating a much lower risk. Another reason for the high difference are EnBW's significant losses from its activity in nuclear energy. Although EnBW's debt-to-equity-ratio is higher than DONG's, rating agency's estimate EnBW's bankruptcy risk as slightly lower than DONG's. This is partly due as EnBW is backed by a German federal state. The rating agency Moody's considered the stance of Baden-Wuerttemberg as a valuable asset (Moody's, 2016a)¹³.

In terms of dependency upon a functional FS, **both companies have to refund** their substantial hybrid-capital-bonds, which is usually done **via the FS**. Both companies are dependent on a functional FS to keep their debt-to-equity-ratio stable.

3.3.3 Liquidity of companies

In times of financial crises, companies can draw needed liquidity from own liquidity. The components of the liquidity buffer determine whether the mitigation of liquidity risks is effective. During the recent financial crisis, the value of financial assets diminished significantly, as investors liquidized their assets to raise liquidity. Cash resources are therefore more effective in mitigating refinancing and liquidity risk (Harford, Klasa, & Maxwell, 2014).

¹² Hybrid capital is a mix of debt and equity, that, other than pure equity, needs to be redeemed unless the company's economic situation falls below a defined level.

¹³ Although rating agencies have been party responsible for the latest financial crises due to their wrong rating, the company assessment's of ating agencies can still give a first indication for a company's creditworthiness.

Both companies have substantial liquidity buffers, which they can potentially use to ensure their liquidity in times of financial crises. The **structure of their liquidity buffer, however, is significantly different** (table 5):

Table 5. Liquidity buffer of DONG and EnBW (in EUR; own table, source: EnBW 2017, DONG 2017)

	DONG	EnBW
Cash	EUR 0.4 billion	EUR 4.0 billion
Other financial assets	EUR 2.1 billion ¹⁴	EUR 0.3 billion
Sum	EUR 2.5 billion	EUR 4.3 billion
% of total assets	14 %	11 %

DONG's risk mitigation strategy, which builds mainly on financial assets, might not be effective in times of a financial crisis. Moody's states regarding the financial resources that *"current financial flexibility, and levers available to the company, may prove insufficient to maintain credit quality"* (Moody's, 2016b, p. 1). EnBW's sensitivity to distortions in the FS is lower.

3.3.4 Financial liabilities

If the sourcing of funding relies primarily on the FS, then companies are exposed to the risk that the refinancing of due liabilities or of growth strategies will become impossible during financial crises. Sources of cash inflow and the structure of financial liabilities indicate how a company sources its funding. I will now discuss both indicators.

The main **cash flow sources** of DONG and EnBW are operations, divestments and debt. The following concerns are linked to those cash flow sources:

- Both companies can't fully rely on their **internally generated** cash flow from **operation to finance future investment**. DONG plans to divest from its cash flow generating oil and coal engagements, which raised concerns of rating agencies regarding the stability of the future cash flows (Moody's, 2016b). EnBW's lack of profitability leads to decreased internal cash flows. Nevertheless, EnBW aims to **finance future net investments**¹⁵ entirely by **internal funding by 2020**. In 2016 70 % of the

¹⁴ DONG's financial resources consist mainly of bond portfolios from governments and mortgages.

¹⁵ Net investment = cash relevant investment minus cash relevant divestment.

net investment could be financed by internal funding. As internal funds are volatile, this aim does not lead to a stable RE transition, as will become clear in chapter 4.3.

- Cash flows from **divestments** can only be generated if assets for divestment are available. Both companies aim to divest from parts of their engagement after they finished the construction of wind parks ("**Partnership Model**"). This model requires liquid investors to acquire the sold assets, and therefore requires a functional FS. In 2016 the Danish pension fund PKA, as well as the holding and investment company KIRKBI A/S, purchased shares in DONG's wind parks. DONG invests the divested capital into new construction projects, which requires additional fresh capital. Consequently, the **overall need for investment capital is not reduced** via the Partnership Model.
- If **financing from debt** exceeds internal financing from operations, the debt-to-equity-ratio and consequently the bankruptcy risk rises, also increasing the risk of financial crises (Minsky, 1989). Refinancing via debt requires a functional FS. **Diversification** of funding sources within the FS can't reduce the systemic risk of an overall collapse of the FS, as the performance of financial institutions is positively correlated. The recent financial crisis led to an overall decrease of liquidity in the FS and an overall credit crunch (Gai, 2013). The structure of financial liabilities of both companies points to a historically substantial dependency of both companies upon the FS, with substantial liabilities traced from international capital markets (hybrid capital and bonds and liabilities from derivatives¹⁶; table 6).

¹⁶ Derivatives of EnBW and DONG are mainly hedging instruments to decrease interest and currency risk as well as commodity price risk. Derivatives have usually financial counterparties.

Table 6. Financial liabilities of DONG and EnBW (in EUR; own table, source: EnBW 2017, DONG 2017)

	DONG			EnBW		
	2016	2015	Change	2016	2015	Change
Hybrid capital	1.766,4	1.766,4	0 %	2.989,8	1.987,9	50%
Bonds	2.682,5	3.895,3	-31 %	3.018,3	3.504,3	-14%
Derivatives	924,0	1.270,8	-27 %	1.559,4	2.056,8	-24%
Bank liabilities	541,9	958,1	-43 %	1.455,5	1.588,5	-8%
Trade payables	1.336,5	1.423,1	-6 %	3.193,4	3.523,8	-9%
Other payables	1.719,9	1.842,8	-7 %	139,6	135,9	3%
Sum	8.971,2	11.156,5	-20 %	12.356,0	12.797,2	-3%

DONG's bank liabilities mainly stem from the public owned European Investment Bank and the Nordic Investment Bank. Part of **EnBW's bank liabilities** are against the public European Investment Bank. Public owned institutions might be more stable in an eventual financial crisis due to their backup by governments. Despite this, even those institutions finance themselves with bonds issued on capital markets and are not entirely immune against financial instabilities.

3.4 Summing up structural instability indicators

Academic literature and my **analysis of the German offshore wind energy market** support the claim that private ownership as well as private investment capital play a substantial role in the German offshore wind energy market. Despite this it is hardly discussed in literature, how instability risks emerging from the FS can threaten the stability of RE companies.

My **analysis** has shown that the key companies of the German offshore wind energy market would be highly affected by distortions in the FS (table 7), as DONG and EnBW are **substantially dependent on the FS**. The similarity of exposure to the risk of financial instability is high and the structure of both companies **provides strong evidence for the dependency of the key companies upon the FS**.

Although EnBW has a much higher debt-to-equity-ratio, its financial policy is more conservative than DONG's as EnBW does not aim to finance future growth with debt and has a liquidity buffer that is less sensitive to financial instabilities. This might indicate a decreased risk aversion in private companies influenced by shareholders of the FS.

Table 7. Instability risks due to distortions in the FS (own table)

Indicator (drawn from Minsky)	DONG	EnBW
Debt-to-equity ratio	<p>Medium risk</p> <ul style="list-style-type: none"> • Low debt-to-equity-ratio • Refinancing for hybrid-capital needed in the long term • Shareholders are financial institutions 	<p>Medium risk</p> <ul style="list-style-type: none"> • High debt-to-equity-ratio, partly due to accounting of hybrid capital • Refinancing for hybrid-capital needed in the long term • BUT: Public shareholders that are independent from the FS
Liquidity buffer	High risk (financial assets)	Low risk (cash)
Financial liabilities	<p>High risk</p> <ul style="list-style-type: none"> • Volatile internal cash flow • Divestment depends on functional FS • Majority of financial liabilities stems from FS 	<p>High risk</p> <ul style="list-style-type: none"> • Volatile internal cash flow • Divestment depends on functional FS • Majority of financial liabilities stems from FS

3.5 No political risk mitigation

The **German government** promotes offshore wind energy via the following instruments, which are **insufficient to mitigate the identified structural risk**:

- The RE act (“EEG”), which defines the RE expansion corridor and ensures **subsidies for generated RE**, but not an initial financing of the projects; and
- Funding from the state owned bank KfW. The funding makes up for only a minor part of the needed capital and the majority of the investment capital needed to finance offshore wind energy projects has to be provided by private sources¹⁷. Additionally, as the KfW bases its own financing on the FS, financial instability, as described by Minsky, is potentially relevant for this bank as well, unless the state provides liquidity in crises due to its ownership.

¹⁷ For projects that were partly financed by KfW, KfW’s average share has been 20 % (see appendix II).

Current political instruments are insufficient to mitigate the risk of financial instability of the RE transition. I will now analyse, whether the discourse of the key agents of the offshore wind energy sector shows awareness and emphasizes the importance of risk mitigation.

4 Discursive analysis of the problem awareness of the key agents

In addition to the already analysed structures, the discourse is a second force determining social practices (Fairclough, 1992). The negative impacts arising from the structure might be alleviated by problem awareness of the key agents of the *Energiewende* (i.e. government and/ or key companies). In the upcoming chapter I will present the results of my analysis of the problem awareness of the key agents. The detailed linguistic analysis is attached as appendix III to V.

4.1 Problem awareness of the German government

The German government is responsible for setting up the political framework surrounding the *Energiewende*. In times of financial instability, the German government could be the lender of last resort. I will use political documents to identify **whether** the German government is firstly **aware** of the instability risk of the *Energiewende* stemming from the FS (RQ2) and secondly, **how** it **addresses** the structural risk (RQ3).

The central documents of the *Energiewende* are the **overall German sustainability strategy** (German Government, 2017a) and the **latest monitoring** report regarding the *Energiewende* ("monitoring report"; Bundesministerium für Wirtschaft und Energie, 2016).¹⁸ In summary, the analysis of the overall sustainability strategy and the monitoring report regarding the *Energiewende* points to:

- An **awareness of general financial needs** of the RE transition; combined with
- An **ignorance of instability risk** emerging from financial structures;
- **A lack of coordination** between RE and FS politics; leading to
- **A lack of risk mitigation measures** to address eventual financial instabilities.

I will now explain how I inferred these conclusions.

¹⁸ I analyse both documents in the original language German and translate relevant passages.

Awareness of general financial needs while ignoring instability risks

In the monitoring report the government observes the development of investments for RE. This points to a **general awareness** for the substantial capital needed for the transition. This awareness is also present in other governmental publications (see e.g. German Government, 2017b). Despite this, it is not discussed how the needed capital is provided, and if capital sources are stable. The German government is optimistic about the capability of the FS to deliver the desired RE transition. The government relies on investor's free will to provide the needed capital for the RE transition. This points to the underlying assumption that investors have sufficient access to investment capital. Financial subsidies or governmental investments for the transition to RE are only mentioned in connection with subsidies for research.

The **role of investors** and in providing this investment is **hardly recognized: Passivization** that leaves **investors unidentified** and **ignores the importance of financial stability** dominates governmental communication, as shown by the following example:

The government observed a decrease in investments in 2015. As the expansion of RE remained stable at the same time, the government follows: *"This could be an indicator for reduced costs per installed plant. A reason could also be structural effects, i.e. increased installations of cheaper technologies"* (own translation p.130). The weak modality (*"could be x or could be y"*) indicates that the government did not investigate the cause fully. It is not questioned, why the potential cost reduction did not lead to an increase in the expansion instead. Investors have no agency in this explanation and the development of companies and the FS is not considered. Overall, the governmental reporting lacks a more conceptual and theoretical foundation that goes beyond mainly empiricistic observations and uncovers underlying drivers and mechanisms of developments.

Lack of political coordination leading to a lack of risk mitigation measures

In its sustainability strategy, the German government identified the **general need for REs, economic investments, and a functioning FS as stepping stones towards sustainability**. Despite this, identified causal linkages between those elements are **limited. This points to a lack of political coordination**.

The German government identifies public and private **investment** as one **steppingstone** towards sustainability. Of particular note is that **RE are not under the specifically targeted sectors** for investment. This indicates that the Government assumes that sufficient RE investment is already ensured and thus does not need to be specifically targeted.

Additionally, the **threat of financial crises for investment stability is dismissed**. This is particularly astonishing, as the financial crisis is even briefly mentioned in the context of decreasing investments. But despite of observing diminished investments during the crisis, the government does neither draw any conclusions, nor does it implement risk mitigations for potential future crises. This shows once more the missing conceptualization of observations and points to a substantial lack of risk awareness.

Financial stability is solely mentioned in the context of general economic prosperity. The particular role of the FS in the energy transition is not mentioned. Named regulatory attempts to stabilize the FS, such as Basel III, are neither coordinated with the needs of RE investments, nor fully effective in the mitigation of the systemic risk in the FS (Aymanns et al., 2016; Schwerter, 2011).

In sum, my analysis shows that the German government lacks awareness of the financial instability threats for the RE transition, partly because of an absence of theory and concepts. The lack of awareness leads to **insufficient risk mitigation measures**. The RE policies are based on the assumption of a functional FS.

4.2 Intergovernmental awareness

Similar to the German government, intergovernmental organizations¹⁹ are working under the assumption of a functional FS. The German government references in its sustainability strategy the International Renewable Energy Agency (“IRENA”), an UN organization concerned, amongst others, with analyses of financing for RE.

IRENA (2016) acknowledges the connection between investments and the success of the RE transition, but draws the conclusion that financial risk-return-ratios of RE projects need to be optimised to attract investment. Similar to the academic literature and the governmental discourse, IRENA does neither discuss the access of investors to capital, nor the stability of the FS. This points again to the underlying assumption of a functioning FS. Politics are only important to guide available capital towards RE. Conducted analyses of investment dynamics are a valuable first step to ensure a stable capital flow to RE transitions. Despite this, not much is said about the general stability of the FS or concrete risk mitigation strategies. The **intergovernmental awareness** of financial instability of the RE transition is **low** and **no concrete risk mitigation measures are suggested**.

¹⁹ I refer with this term to the UN organization IRENA.

Table 8. Used key terms in the annual reporting of DONG and EnBW (own table)

Theme	Examples for used key terms	Quantity of used key terms	
		DONG	EnBW
Economy, business and management	Board, business, management, customer, sales, market, prices, investments, assets, portfolio	1,283	5,440
Energy System	Plants, power, energy, offshore, oil, nuclear, generation, farms, gas, grids	849	2,237
Performance and Profitability	DKK, billion, revenue, profit, results, EBITDA, performance, first, high, profit	794	1,388
Development and Growth	Goal, new, higher, increase, transmission, extension, further, target, more, solutions	554	985
Environment	Wind, green	251	Not a key topic
Risk	Risk, risks	120	247
Working conditions	Safety, employees, working	84	102

Dominating topics, as well as the terms used to discuss these topics, **are highly homogenous**. This is partly due to the nature of standardized annual reporting, but point also to a **similar discourse**. Both companies have a strategy that strives for **growth** in RE and an increase in **profitability**. Emphasize on **environmental impacts** of the business of EnBW and DONG is low, although the environment is considered as a key resource by both companies. Climate change is mainly used as a justification for business and growth. All of this is not surprising, considering the purpose of annual reports. A more detailed text analysis is necessary to come to meaningful results.

Both reports are written in an **optimistic and positive tone**, which points to the underlying theme of increasing companies' attractiveness for investors, as typical for annual reports (Valeo, 2013). DONG identified financial capital as one of the "key resources" that can "be preserved by "growing operating profit and increasing investor returns" to "create a robust financial platform for future growth" (DONG, 2017, p. 8). Like DONG, EnBW identifies financial capital as one of the key resources, broken down into equity, borrowed capital, and positive cash flow. Despite this, in 2016 EnBW's "significant activities" for capital preservation were all targeted to external, borrowed capital (p. 14).

Both companies address refinancing risk and the risk of financial instability inadequately. The awareness about instability threats from the FS is low and emphasis on risk mitigation is insufficient. I infer that from the following data:

DONG

DONG does **not mention refinancing risk** among the main risks, but less prominent in the notes. The **risk mitigation** strategy does not address the systemic risk of a collapse of the whole FS. DONG diversifies funding sources and preserves financial assets as a liquidity buffer. Both strategies are inefficient in systemic crises that also lead to a significant decrease in asset prices as discussed in the structural analysis.

The risk of a **collapse of the financial markets** is described as a risk that “*entail[s] a very small probability of having a considerable impact on the Group's finances and/ or reputation.*” (DONG, 2017, p. 47). As the assessed risk is low (“*very small probability*”, comparable to a “*thousand year storm*”p.47), DONG might underestimate the possibility of a financial crisis that has an effect on its business. Due to the low level of risk awareness **no risk mitigation measures** are mentioned. The subjectivation of the risk, which “*entail[s]*” a certain probability leaves the conducted risk assessment unmentioned and presents the estimated likelihood rather as a fact that can be taken for granted.

The limited problem awareness is underlined by an **extreme optimistic estimation regarding financial resources** available in the future:

*“Within the next couple of years we **will likely have excess investment capacity** [...]. We will utilise the investment capacity to pursue value creating investment opportunities. Reducing our farm down activities may be an alternative or supplement to new investment opportunities [...]. However, if value creating investment opportunities do not **absorb** the excess investment capacity we will remain disciplined and return cash to shareholders” (p.15).*

Underlying **assumptions are unarticulated**, such as the conditions for excessive investment capacity or the functionality of the FS. The term “*absorb*” brings the association of a whole flood of available investment capital. One reason that DONG’s management is optimistic about the availability of investment capital might be positive past experiences with the partnership model, although the use of past experience for future evidence is highly contradictory (Taleb & Martin, 2012). It is not investigated which conditions need to be fulfilled to ensure the viability of the model. Additionally the criteria to pick suitable investors with sufficient capital strength and the capacity to maintain the RE projects are left out.

EnBW

Similar to DONG EnBW does **not mention refinancing risk among the main risks**. The risk of a **collapse of the FS is not articulated at all**. **Despite this, EnBW identifies two additional risks linked to financial instability:**

- **Risks** in the partnership model, however not regarding liquidity lacks, but regarding price risks and time delays; and
- **Risk of distortion of financial asset prices** due to volatility in the FS. It is interesting that only EnBW considers this risk, although it holds only 15 % of the amount of financial assets held by DONG (see 3.3.3). One drawback is that EnBW links this risk rather to decreased profitability than to liquidity lacks.

Main difference between both companies lies in the **strategy to finance the growth strategy**: While DONG builds on external funding, **EnBW sets the goal to finance future growth entirely with internal funds** and strives for *“a solid financial position”* and a *“conservative financial policy”* (p. 56). To be able to finance investments with internal funds, EnBW aims to draw liquidity from divestments. The strategy of divestment can only be successful, as long as (i) EnBW has **assets** to divest and (ii) **investors are available** to buy the assets. Despite this, EnBW indicates to have control over a successful divestment, pointing to insufficient risk awareness and low emphasis on risk mitigation.

Interesting is, **why EnBW stresses the importance of financial discipline**. I hypothesize that two motivations are possible:

- EnBW is **aware** that future RE expansion could be threatened by financial instability and therefore emphasizes the importance of internal funding. Main goal is to ensure stable investments in RE (**“Aware Strategy”**); or
- EnBW wants to **minimize funding costs** and to ensure future access to capital markets by stabilizing the debt-to-equity ratio and consequently its creditworthiness and rating. Main goal is to ensure profitability (**“Creditworthiness Strategy”**).

If **internal funds of EnBW decrease**, the underlying reason for the chosen strategy decides about the effect on RE investments, as indicated in chapter 3.3.4 and demonstrated in table 9:

Table 9. RE investment depending on EnBW’s motivation for financial discipline (own table)

	Motivation for financial discipline	
	↓ Aware Strategy	↓ Creditworthiness Strategy
High internal funds	High investments	High investments
Low internal funds	Attempt to finance investments in RE externally (if FS is not in crisis probably successful) > Continued investments in RE	Low investments

In the case of the **Aware Financial Strategy** the RE expansion would only be hindered, if internal funding decreases and the FS is simultaneously in a crisis. This strategy leads to a **risk diversification**. On the contrary, if EnBW follows the **Cost Efficient Financial Strategy**, then the expansion of RE is **still unstable**. I will now discuss which of the hypothetical strategies is more likely underlying EnBW’s acting.

The Aware Strategy-hypothesis is contradicted by:

- **Strong existing other linkages** to the FS that the management does not try to reduce;
- **Lack of management’s awareness** of this dependency, shown e.g. in the management’s conviction that *“the company’s future solvency is secured by its solid financial position”* (p. 59);
- And even more explicit, the statement that *“EnBW aims to limit cash effective net investment to the level of the retained cash flow”* (p.75) to maintain an **investment-grade rating**, which ensures **lowest capital costs**, increases attractiveness for financing partners and provides a *“sufficient and flexible access to the capital market at all times”* (p.55); and
- The absence of the question **whether these capital markets are functional**.

My analysis clearly shows that EnBW follows the Creditworthiness Strategy. It follows that EnBW’s future investment is unstable. Internal funds depend on EnBW’s revenue, profitability and divestment success. All of these are indirectly still linked to the functionality of the FS. The chosen strategy does not reflect awareness regarding instability risks and is insufficient to mitigate risks and stabilize RE investment.

Sum up

Table 10. Summary of DONG's and EnBW's awareness of instability risks emerging from the FS (own table)

Topic	DONG	EnBW
Overall strategy	Growth by internationalization and increase of profitability and cost reduction	Growth and increase of profitability by increased efficiency and focus on (international) RE markets
Main risks associated to RE	Market risks (mainly energy prices, exchange risks and interest, addressed by hedging); development and construction of production assets; regulatory risks in wind power; operation of offshore wind farms and cost of electricity for offshore wind power	Strategic risk in the participation model; EU sanctions against Russia; legal risks, personnel risks; risks of health, safety, security & environment; market prices of financial investments; discount rate applied for pension funds; impairment risks, rating, compliance
Awareness of general funding risk	Yes	Yes
Financial capital identified as a key resource?	Yes	Yes
Financial strategy to ensure funding	<ul style="list-style-type: none"> • Diversification of funding sources • Financial resources (mainly financial instruments) • Partnership model 	<ul style="list-style-type: none"> • Diversification of funding sources (emission of hybrid bonds in 2016) • Cash reserves • Partnership model • Limit of new investments to retained cash flow
Awareness of risk in financial assets for liquidity buffer	No	Yes
Risk of collapse of the FS mentioned?	Yes, but likelihood assessed as low. Consequently no risk mitigation measures mentioned.	No

Table 10 clearly shows that DONG's and EnBW's management are aware of the **general need to secure a stable funding**, especially to ensure their ambitions of international growth and increase of profitability. Despite this, **the risk of financial instability is understated by both companies.**

EnBW has a **more conservative financial strategy** and discourse, expressed in a less optimistic tone when talking about future funding and the aim to keep its creditworthiness stable by limiting future investment. Strong internal cash flows can be a solution to overcome the dependency upon the FS. My analysis, however, has shown that **a conservative financial strategy alone is not sufficient to stabilize RE investment**, as internal cash flows depend on external factors, such as the overall economic situation and the stability of FS. Nevertheless has emphasizing on internal funding (“Awareness Strategy”) the potential to mitigate instability risks partly.

To sum up:

- Both companies acknowledge a **general need** for funding; but
- **don't see FS instability as a major threat** that can decrease future funding sources and consequently limit future investment;
- **EnBW**, as a public owned company, has generally a more conservative financial strategy (as already indicated by the structural analysis). This conservative strategy, however, is not the result of instability awareness and does not mitigate instability risks.

5 Discussion – Merging structure and discourse

CDA is a framework that allows the analysis of the **structural and the discursive dimension** of a social problem. After I have analysed both dimensions separately I will bring them together in the upcoming discussion. In doing so I will follow the main steps of CDA as described by Fairclough (2001):

1. Identification of a **social problem**;
2. Identification of **obstacles** to the social problem being tackled;
3. Who **benefits** from the problem? Do those who benefit have an interest that the social problem is not resolved?
4. Identification of possible problem **solutions**;
5. Critical **reflection**.

So far I have mainly engaged with the identification of the problem (i.e. instability of the RE transition due to its reliance on the instable FS) and obstacles to the social problem being tackled (i.e. limited awareness of the key agents). **I will now summarize, contextualize and discuss my findings and deduct from that the discussion of the remaining steps of CDA.**

5.1 The problem in a nutshell

On the basis of my analysis I can support my initial claim that **the stability of the *Energiewende* is threatened by its dependency upon the FS**. With my research I identified a problem, which is so far almost ignored in the academic debate. Academia acknowledges a general need for finance of the *Energiewende*, but focuses on the question how to attract the needed capital. The underlying assumption is that the FS is functioning. Theoretical informed discussions of financial instability are missing.

The German offshore wind energy **market is centralized**, increasing systemic risks. As only seven companies own more than three thirds of the energy capacity, the bankruptcy of one company can already have significant consequences. **Private ownership and therefore private financial capital plays a substantial role in offshore wind energy.**

My structural analysis suggested that offshore wind energy companies are dependent on the FS and governmental policies don't mitigate this dependency. DONG and EnBW are examples for owners of offshore wind energy projects. Both are structurally dependent on the FS, although the dependency of

DONG as a half privately owned company is higher than of the public owned company EnBW. The similarity between both companies regarding the financial structure is high and the structure of both companies **provides strong evidence for the dependency of the key companies upon the FS**. On the basis of Minsky's instability hypothesis I conclude that **the structural dependency upon the FS indicates a high instability risk for offshore wind energy**.

The **awareness** regarding the identified structural dependency of the **German government** and **intergovernmental organizations** is low: The German government acknowledges the need for substantial financing for the *Energiewende*, but aims, comparable to the academic debate, to provide these investments by increasing the attractiveness of RE. Policies tackling the *Energiewende* are not aligned with policies tackling the sustainability of the FS and limited awareness results in a low emphasis on risk mitigation.

The structural instability risk of the analysed key companies and their discursive awareness about this risk is summed up in figure 8.

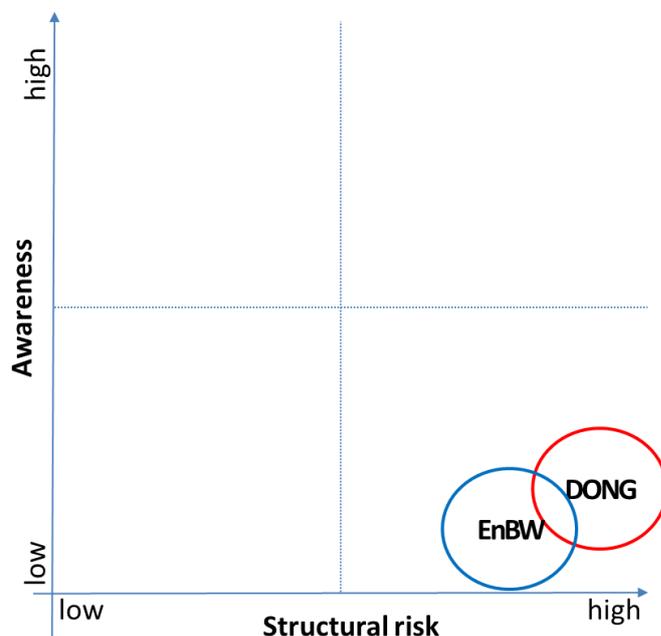


Figure 8. Structural and discursive dimension of instability risks of key companies (own figure)

EnBW as a **public company** has generally a more conservative financial strategy and is structurally less dependent on the FS, but might interestingly be **even less aware of instability risks than DONG**. This might be caused by the possibility of receiving money from public institutions when the FS fails, but more research is needed to back up this claim. The limited problem awareness might be the reason for less

emphasize on the importance of risk mitigation is the discourse and consequently less structural risk mitigation measures. As risk awareness is low, the need for risk mitigation is hardly emphasized.

In a nutshell, the problem consist of

- **(i) financial linkages between the FS and the RE transition, which lead to instability of the RE expansion (RQ1) due to**
- **(ii) instability of the FS (as described by Minsky), and**
- **(iii) an ignorance of the emerging instability risk, leading to a lack of risk mitigation (RQ 2 and 3).**

5.2 Obstacles

The limited problem awareness hinders all analysed agents at finding suitable solutions. Despite this, the limited awareness might be caused by deeper drivers that differ between the agents. I will now briefly discuss those drivers:

The **German government** has so far no alternative, reliable solution that could replace the neoliberal market based approach for the *Energiewende* (Peck, 2014). Even in the after mass of the latest financial crisis, the German government has built the *Energiewende* on the ground of the neoliberal FS. This supports Peck's claim (2014) that Neoliberalism is not dead, but a still active zombie. As Neoliberalism is a hegemonic process instead of a system that exists in a single form, even the latest sever financial and economic crisis did not set an end to the Neoliberal paradigm. Neoliberalism is according to Peck constantly reproducing itself, in its attempt to overcome contradictions. Neoliberalism is never entirely free from contradictions. Environmental challenges caused by Neoliberalism are solved within the Neoliberal paradigm. The Neoliberal Zombie might close the eyes of the government for;

- The contradiction that sustainability shall be reached by reforms in the energy system while ignoring instability risks in the entangled FS; and consequently
- A possible alternative financial base for the energy transition.

Companies depend on the FS within Money Manager Capitalism and lack the power to cut this dependency. My analysis has shown that a conservative financial strategy alone is not sufficient to reach stability. Firstly, companies depend structurally heavily on the FS. Secondly, this structural dependency forces companies according to Minsky to align their discourse to the maxims of profit maximization

opposed on them by the FS. Consequently the discourse of financialization limits their capacity to see their dependency upon the FS more critically from an outside perspective.

Although not being a central agent for the capital intensive offshore wind energy, the **civil society** could potentially tackle the problem of dependency of the *Energiewende* upon the FS, by providing investment capital. However, as investment needs are extremely high, it is questionable whether civil society could deliver sufficient capital. Nevertheless one important role can be to build a movement against the superiority of the FS and ask for more a more stable financial design, if civil society can emancipate itself from the hegemony of the current hegemonic discourse of financialization.

5.3 Who benefits from the problem?

Interest in financial linkages and ignorance of the emerging instability risks

The FS profits from the dependency of all economic sectors upon financial resources, as this offers the possibility of extracting surpluses retained within the economy. Main target for investment has so far been the fossil fuel industry. Considering the phase out of fossil fuels to mitigate climate change, investors are searching for new investment opportunities, such as the subsidised RE sector. The wealth of the financial industry is according to Minsky linked to power that enables it to establish and maintain financial linkages to the economy, including the RE sector.

Interest in financial instability

In how far the financial industry has an interest in financial instability is negotiable. Financial crises can lead to severe losses, but parts of these losses could be socialized in the latest crises. If pre-crisis profits exceed losses during a crisis, the financial industry has an interest in financial instability.

5.4 Possible problem solutions

It would be presumptuous to suggest a concrete solution for the problem on the basis of current findings. The **complexity** of the identified problem clearly demands further research in this area to make sound suggestions for problem solutions. The identified interconnectedness advocates ensuring interdisciplinarity in future research to make sure that knowledge gaps are filled. Figure 9 shows leverage points to break instability mechanisms that could be starting points for future research:

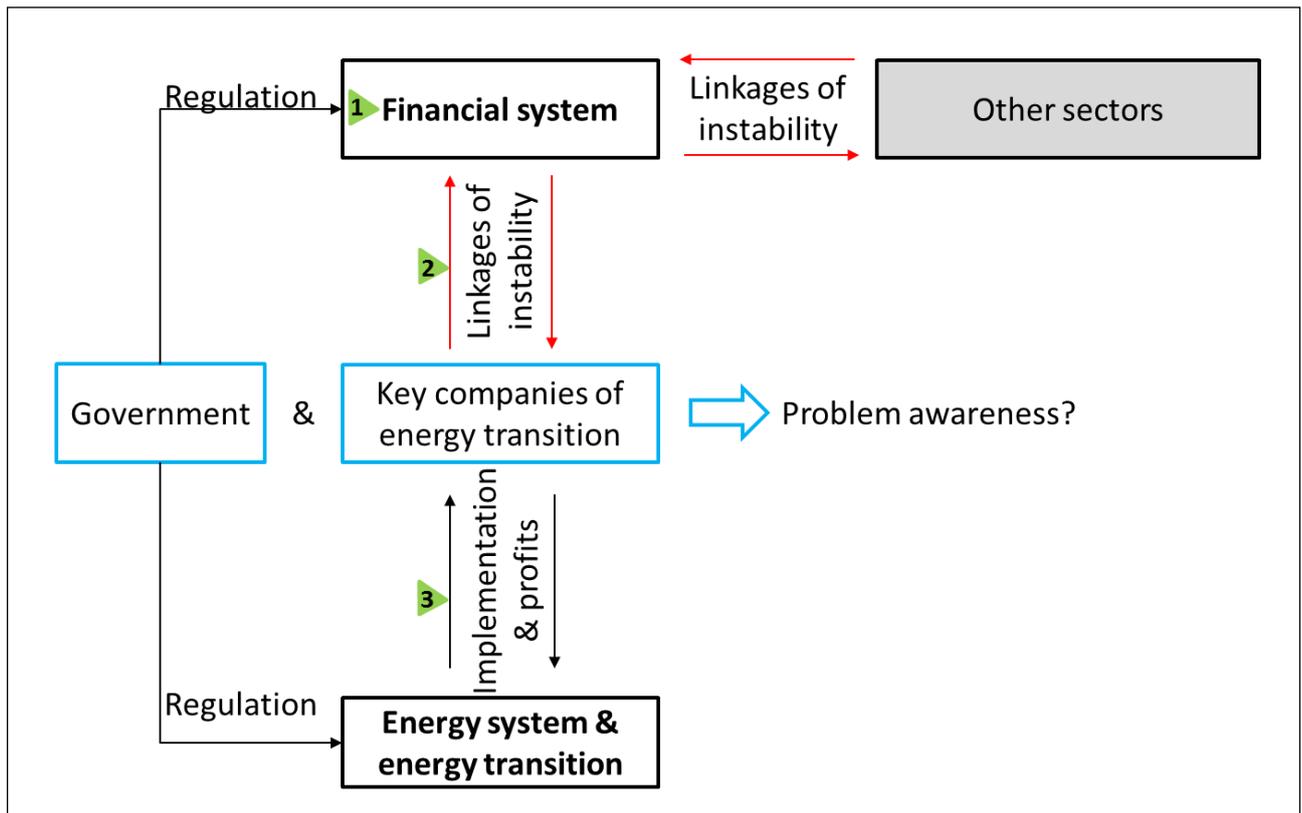


Figure 9. Leverage points to tackle the identified problem (own figure)

Instability mechanisms could be broken by:

1. **Increasing the stability of FS to ensure that it fulfils its task to finance the economy;**
2. **Decrease financial linkages between companies of the RE transitions, for example by developing alternative financial sources or by picking less capital intensive RE sources for the RE transition;**
3. **Build RE transitions not entirely on market solutions and conventional companies. Alternatives could be e.g. RE facilities, which are implemented and maintained by conventional companies, but owned and thus refinanced by the state.**

The first step for all solutions, however, should be to step outside of the discourse of financialization and question the current financial structure of the RE transition to develop creative alternatives. The interconnectedness between the energy system and the FS emphasizes the need for a more interdisciplinary research that translates also in more consistent and coordinated politics.

5.5 Critical reflection & limitations

In my research I could support my claim that **the stability of the *Energiewende* is threatened by its dependency upon the FS**. The following limitations are linked to the **way I performed my research**:

- I limited my analysis to the **case of offshore wind energy**, which is a unique sector due to its capital intensiveness. Although my findings are relevant for all big investment project of the *Energiewende*, a generalization for the entire German energy transition is not possible, as this transition entails also small scale projects, which are financeable by civil society (e.g. solar panels).
- I used **only financial reporting** to identify the discourse of key companies. Those communications might not represent the full discourse and further research should be extended to internal communication, protocols from board meetings or media communications about those companies;
- I did an extensive structural and discursive analysis **for a qualitative sample of two companies**. Although the results from my sample were quite homogenous and delivered a sufficient level of evidence, an increase of the sample size could provide more insights, for example into the influence of ownership structures.

Limitations are furthermore inherent in:

- Basing my thesis on **Minsky's instability hypothesis**. Although the recent financial crisis emphasized the significance of Minsky's theory, there might be other theories that explain reality in a more appropriate way;
- The methodology of **CDA**. Conducting discourse analysis always entails a linguistic analysis that is never entirely free from subjective concepts of the world and presumptions that determine how the analysed texts are read.

6 Conclusion

I aimed to increase the stability of the RE transition to contribute to the transition to a fossil free economy. In order to do so, I assessed whether the FS is a stable ground for a transition to RE. This is relevant to the broader question, of whether it could be a suitable strategy to reform the energy sector without reforming related sectors such as the FS

Using the framework of CDA I engaged in a discussion between structural financial linkages between the FS and offshore wind energy and discursive elements that fill those structures with meaning. My analysis pointed to a **deep interconnectedness between the energy system and the FS, suggesting that the energy transition will be affected by financial crises.**

I wish that I could contribute with my thesis to a higher awareness of the identified problem that leads to an extensive discussion about problem solutions. The identified leverage points should be areas of future research. Despite this, **knowledge and awareness alone does not lead to freedom and emancipation** (Collier, 1994). Thus, I hope that this critical discussion translates in a dialectical way to a more stable financial structure of RE transitions and sets the energy transition free from the power of the FS.

As a researcher within the field of **Sustainability Science** I want to end my thesis with a short reflection on what I have contributed to my field: By showing the deep interconnectedness of the RE transition and the FS I have provided evidence for the need of interdisciplinary research. Solving a problem within Sustainability Science always asks for **holistic** approaches and can **never happen via silo thinking**²⁰. This identified interconnectedness of instability in the financial system and the need to transit to renewable energies puts sustainability into a new light: By tackling sustainability problems, all connected systems can be changed for a better. Sustainability and other development goals are not necessarily in conflict to each other. Thus, the stability of the FS can profit from the transition to RE, if holistic problem solutions are picked. Naomi Klein (2014) would conclude: **This changes everything!**

²⁰ The criticism that Minsky's theory does not capture the full picture (Palley, 2010), the aim to transit to RE puts a question mark on the whole Neoliberal growth model.

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Appendix I: Overview of the German offshore wind energy projects

Table 11. Overview of owners of offshore wind energy projects (own table, based on data of 4Coffshore, 2017)

Owner	Location	Ownership	Number of turbines	RE capacity in MW
Dong Energy AS	Copenhagen	Private & public	314.5	2.005.0
EnBW AG	Karlsruhe	Public	259.0	1.818.8
RWE	Essen	Private	219.7	1.414.1
Vattenfall	Solna	Public	215.7	1.110.5
EON	Düsseldorf	Private	150.2	719.8
WPD Offshore GmbH	Bremen	Private	93.8	647.4
PNE Wind AG	Cuxhaven	Private	88.0	674.0
Ocean Breeze Energy GmbH & CO KG (UniCredit)	Munich	Private	80.0	400.0
Stadtwerke München	Munich	Public	94.5	381,8
Blackstone Group	New York	Private	64.0	384.0
China Three Gorges Corporation	Beijing	Public	56.0	201.6
Trianel GmbH	Aachen	Private	59.2	321.8
EWE	Oldenburg	Public	46.5	211.4
Partners Group	Global	Private	33.0	198.0
Laidlaw Capital Group	London	Private	30.0	252.0
Siemens AG	Munich	Private	26.8	160.8
Kirkbi	Billund	Private	25.0	99.8
Northland Power	Toronto	Private	24.3	149.5
Global Infrastructure Partners LLP	New York	Private	24.3	145.5
PKA A/S	Hellerup	Private	24.1	101.2
Industriens Pensions	Copenhagen	Private	24.1	101.2
China Yangtze Power Co.	Beijing	Public	24.0	86.4
Laidlaw Capital Group*	London	Private	20.1	120.6
PensionDanmark*	Copenhagen	Private	20.1	120.6
Entega AG	Darmstadt	Private	20.0	99.6
Axpo International S.A.	Luxembourg	Private	19.3	96.4
Siemens Financial Services	Munich	Private	18.4	66.2
InfraRed Capital Partners Ltd	London	Private & public	16.5	99.0
Oticon Foundation	Smørum	Private	14.0	56.2
Marguerite Fund	Luxembourg	Public	11.6	41.8
DEME Concessions NV	Zwijndrecht	Private	8.3	49.5
FC Wind 1 & 2	Cologne	Private	8.0	40.0
Esportes Offshore Beteiligungs GmbH	Grabenstätt	Private	8.0	40.0

Laegernes Pensionskasse	Fredriksberg	Private	6.1	36.4
Laerernes Pension	Hellerup	Private	6.1	36.4
CDC Infrastructure (Investment fund)	Paris	Private	6.0	21.6
John Laing Group	London	Private	5.4	33.2
ADEME	Paris	Private	4.1	24.8
GE Energy UK	Bracknell	Private	4.1	24.8
wpd AG	Bremen	Private	4.1	14.7
Elektrizitätswerk Zürich	Zurich	Public	3.9	14.1
ENOVA	Cologne	Private & public	3.0	10.8
Gothaer Leben Renewables	Cologne	Private	1.8	11.1
Sum			2,185.1	12,642.1

Appendix II: Investment share of KfW

The KfW has assigned a total credit amount of EUR 5 billion for financing of up to ten offshore wind energy projects (Bundesministerium für Wirtschaft und Energie, 2017). So far four projects with a total investment amount of EUR 6.2 billion have been co-financed by KfW (total investment KfW = EUR 1.2 billion). This indicates that the average share of KfW's investment has been 20 %, while 80 % of the project investment stemmed from private sources. In future the share of KfW could be higher, as so far only 24 % of the overall credit budget has been used, while four out of ten projects have already been financed. Despite this, private investment likely is also in future the main capital source, considering the increasing project sizes and capital needs.

Table 12. Investment share of KfW (own table, based on data from Bundesministerium für Wirtschaft und Energie, 2017 and 4C Offshore, 2017)

	Size (MW)	Investment KfW (million EUR)	Total Investment costs (million EUR)	Share KfW (%)
Meerwind	288	264	1.200,00	22%
Global Tech I	400	280	1.800,00	16%
Butendiek	288	239	1.300,00	18%
Veja Mate	402	430	1.900,00	23%
Sum	1.378,00	1.213,00	6.200,00	20%

Appendix III: Linguistic analysis German government

Sustainability strategy (German Government, 2017a)

Table 13. Linguistic analysis of Germany's sustainability strategy (own table)

Data	Analysis (inference from data)
<p>The German government aims for an investment ratio above the average of the OECD countries, stemming from public and private investments. However, <i>“the development of the investment ratio declined”</i> during the financial crisis (own translation, p.134).</p>	<p>By subjectifying the investment ratio, the government avoids discussing reasons for the decline, such as the fact that the public investment did not offset the decline in private investment during the crisis. Although the financial crisis is mentioned, no causal mechanism and relations are expressed.</p>
<p>Target sectors for public investments are <i>“the transport infrastructure, broadband expansion, energy efficiency measures, climate change adaption measures. and optimization of conditions for private investments”</i> (own translation, p.135).</p>	<p>Investments into RE are not mentioned, which points to missing links between the policies addressing the RE transition and policies supporting general investment.</p>
<p><i>“The conditions for private investors shall be optimized”</i> (own translation, p.135).</p>	<p>It remains unclear, what the optimization of conditions for private investments will entail, who the private investors are and whether those investors have sufficient financial resources to utilize the improved investment conditions. The important role of the FS for investment is dismissed.</p>
<p><i>“Only a stable financial sector can ensure a sustainable financing of the real economy. Drawing from lessons learned from the global financial and economic crisis regulations for financial markets have been substantially revised since 2007 on a Global, European and national level [...] to increase the resilience of financial institutions and financial markets as a whole. [...] In addition to [...] focus is on the sustainable use of financial resources. More and more investors want to invest their money in sustainable projects and companies”</i> (own translation, p.123).</p>	<p>When talking about the need of a FS, the government describes the need of “the real economy”, not specifying that financing is essentially important for the RE transition as a key element of the sustainability strategy.</p> <p>Through the subjectification of “<i>financial markets</i>” the identification of agents is avoided. It is not discussed who determines the market stability and which role politicians play in this regard. Although the government remains unclear about the definition of a “stable financial sector”, “sustainable financing” and the theoretical model underlying policy considerations, it suggests that politics achieved progress towards “sustainable financing” by</p>

	<p>“substantially” revising financial regulation, without pointing out concrete mechanisms.</p> <p>For a transition towards sustainability the government seems to count on the development of a free will of the investors to support a sustainability transition (“want”). Without identifying the investors, the government seems to assume that investment capital is continuously available to them. Under which conditions this assumption is fulfilled is not discussed.</p>
<p><i>“Sustainability is still a long way from being a normal part of decision making and actions. [...] Sustainability profiles from clients, suppliers, donors and investors should be the basis for financial transactions in the future.” (own translation, p.233).”</i></p>	<p>Although the government is critical itself about the consideration of sustainability in investment decisions, it does not draw regulatory consequences. Instead, a normative claim is made that misses concrete implementation measures. This questions the seriousness of the governmental intention to implement sustainability as an investment criterion.</p>
<p>The following relevant measures to support the transition to renewable energy technologies are named (pp.120, 121):</p> <p>Implemented:</p> <ul style="list-style-type: none"> • Renewable energy act (“EEG”): the act defines the renewable energy expansion corridor via defining amounts for tendered projects, regulates the connection to the grid and ensures a promotion of RE via subsidies paid when selling RE. <p>Planned:</p> <ul style="list-style-type: none"> • EEG-novella 2017: change from cost-based administrative approach to a competitive approach to achieve “<i>cost efficiency of the promotion and ensure that the defined renewable energy expansion corridor will be fulfilled</i>” 	<p>Discussing RE more concretely, the relation to the need for investments and a stable FS is unarticulated.</p> <p>The implemented and planned measures mirror the government’s optimism that competition and subsidies will ensure that the RE targets are met by the market. By using passive voice the government avoids naming the agents that will implement the RE expansion. The optimism that the current political instruments are sufficient to ensure a transition towards RE is also expressed on the homepage of the German economy department in a QA section, in which a strong modality is used: “Does the reform of the EEG ensure that we achieve our renewable energy targets? – Yes.” (own translation, p. 2; Bundesministerium für Wirtschaft und Energie, n.d.).</p>

Monitoring report regarding the *Energiewende* (Bundesministerium für Wirtschaft und Energie, 2016)

Table 14. Linguistic analysis of the monitoring report regarding the *Energiewende* (own table)

Data	Analysis (inference from data)
<p><i>“The EEG is central management tool for the expansion of renewable energies”</i> (own translation, p.19).</p>	<p>The monitoring report is in line with the market solution approach presented in the sustainability strategy. But how the <i>Energiewende</i> is financed and that this financing is relying on a functional FS remains again unmentioned.</p>
<p><i>“The market segment of renewable energy offers high start-up dynamics, especially due to young energy production companies. Furthermore it shows that the start-ups in this segment found with higher revenue levels and more employees [...] and need higher financing volume. [...] The German federal ministry for economics supports start-ups with manifold measures, combined in the initiative “new founders’ period”. This entails also the networking between start-ups and established companies...”</i> (own translation, p. 124).</p>	<p>Financial subsidies or governmental investments for the expansion of RE are only mentioned in connection with governmental support for energy research, although the government is aware of the need for investment. Suggested measures only focus on start-ups, support for already established companies is not considered. Secondly, this approach does not address higher investment costs or support, e.g. by establishing sustainable connections to the FS.</p>
<p><i>“The government observed a decrease in investments in 2015. As the expansion of the renewable energies remained stable at the same time, the government follows: “This could be an indicator for reduced costs per installed plant. A reason could also be structural effects, i.e. increased installations of cheaper technologies”</i> (own translation p.130).</p>	<p>The weak modality (“could be x or could be y”) that is used indicates that the government is unsure about the cause of the decrease in investments. It is also not discussed, why the potential cost reduction did not lead to an increase in the expansion of RE facilities, but to a decrease in investments. The investors have no agency in this explanations and a connection to the development of companies and financial market is not made.</p>
<ul style="list-style-type: none"> • <i>“Motor of the renewable expansion in the long term is the installation of wind energy and PV facilities”</i> (own translation, p.15) • <i>“The renewable energies increase their importance for the German power mix”</i> (own translation, p.17) • <i>“The EEG shall ensure that the expansion targets for renewable energy are met and bring cost efficiency of the further installation via competitive tenders. In this way it [the EEG] makes renewable energies fit for the power market”</i> (own translation, p.17). 	<p>The transition to RE is mainly presented in passive sentences without agency, which ignore the role of companies and the FS.</p>

Appendix IV: Linguistic analysis DONG (DONG, 2017)

Table 15. Linguistic analysis of DONG's annual report (own table)

Data	Analysis (inference from data)
<p><i>“The aim of our financing policy is to ensure the best possible loan arrangements, while also minimizing financing costs, liquidity and refinancing risks. The borrowing activities are diversified among various funding sources and maturities. In addition, we have robust financial resources.” (p.130)</i></p>	<p>The explanations about the financing policy remain broad and universal. Uncertainty arises from the formulation of <i>“best possible loan arrangements”</i>. What is seen as the “best” loan agreement depends significantly on the aims of the financing policy and the risk affinity of the management. DONG states some aims of the policy, however they partly conflict with each other (minimizing financing cost vs. liquidity and minimizing refinancing risk). The longer the maturity of liabilities, the higher the liquidity and the lower the refinancing risk. This is conflicting with the goal of minimizing funding costs, which are rising with increasing maturity. A goal prioritization is not given.</p> <p>The suggested measures of the financing policy are a diversification of funding sources and preservation of financial resources, both with limited effectiveness as shown in the structural analysis. The limitation of the resilience of asset prices financial crises is not problematized. Instead financial resources are misleadingly called <i>“robust”</i>, which indicated that financial resources remain stable when external shocks occur. A strong modality is used (<i>“we have”</i>) which presents the robustness as a given fact with unclear underlying assumptions.</p>
<p><i>“Within the next couple of years we will likely have excess investment capacity [...]. We will utilise the investment capacity to pursue value creating investment opportunities. Reducing our farm down activities may be an alternative or supplement to new investment opportunities [...]. However, if value creating investment opportunities do not absorb the excess investment capacity we will remain disciplined and return cash to shareholders.” (p.15)</i></p>	<p>This passage is written in an optimistic tone about available investment capital. It is not specified under which conditions investment capacity will exceed the needed amount or from which sources the capital stems. In the previous paragraph management states that it plans to increase dividends yearly, which means that potential investment capital from internal funding flows out of the company. This might increase the demand external capital. Nevertheless, the chance of excess investment capital is defined as <i>“likely”</i>. The term <i>“absorb”</i> brings the association of a whole flood of available investment capital.</p>

	<p>This positive framing is supported by two concrete possibilities to use the capital surplus. The “<i>however</i>” of the last sentence puts it in contrast to the previous sentences, indicating that discipline is only needed if no investment opportunities can be identified. Otherwise management can less disciplined invest to create “<i>value</i>”. The quote is written from an instrumental rationality and economic perspective. Investment capital must be used to create value for the shareholders. It is assumed that the reader understands value in financial terms and profitability. Social or environmental values are excluded as possible ends of investments. No criteria to choose investments are mentioned.</p>
<p><i>“Moreover, we are exposed to risks entailing a very small probability of having a considerable impact on the Group's finances and/or reputation. These include, among other things, a 1,000-year storm, fires at or collisions with offshore wind farms, damage to export cables due to anchors being dragged along the seabed, damage to pipes at the Nybro Gas Treatment Plant, power station breakdowns and the collapse of the financial markets.” (p. 47)</i></p>	<p>DONG categorizes the risk of a collapse of the financial markets as a risk that “entail[s] a very small probability of having a considerable impact on the Group's finances and/ or reputation.” (DONG, 2017, p. 47). As the assessed risk is low (“<i>very small probability</i>”, comparable to a “<i>thousand year storm</i>”), no risk mitigation measures are mentioned. The subjectivation of the risk, which “entail” a certain probability hides the risk assessment conducted by DONG to come to the conclusion that the risk is of low profitability and presents it rather as a fact than as an own assessment, which might result in a taken for granted assumption. This passage is the only concrete mentioning of the risk of a collapse of the financial markets, which leaves the risk understated. Notwithstanding the ambiguous financing policy and the insufficient addressing of the risk of a collapse of financial markets, DONG concludes prominently in the management’s overview:</p>
<p><i>“In connection with our divestment of 50% of the Burbo Bank Extension and the Race Bank offshore wind farms in 2016, we again proved the viability of our partnership model to attract capital at the lowest possible cost.”(DONG, 2017, p. 36)</i></p>	<p>The quote is based on the assumption that the functioning of the “<i>partnership model</i>” in the past can be used as evidence for future viability. It is not investigated which conditions need to be fulfilled to ensure the viability of the model, e.g. attract private financial capital and sufficient liquidity in the FS.</p> <p>The purpose of the partnership model is to provide capital “<i>at the lowest possible cost</i>”. In the quote the partnership model is subjectified, deleting the agency of DONG’s management.</p>

	<p>DONG's management relieves itself from the responsibility to pick investors for the constructed wind farms. However, as the investors have decision making power, they determine the long-term sustainability for the projects. The annual report has no traces of such considerations by DONG's management.</p>
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Appendix V: Linguistic analysis EnBW

Table 16. Linguistic analysis of EnBW's annual report (own table)

Data	Analysis (inference from data)
<p><i>“It is our goal over the next few years to once again progressively move from a phase of restructuring and saving to one of growth” (p.3)</i></p>	<p>Like DONG EnBW follows a strategy of growth.</p>
<p><i>“The aim [of the corporate strategy] is to develop a future-oriented EnBW that can remain robust even during the most difficult market conditions and concentrate to an even greater extent on innovation and growth” (p.35).</i></p> <p>EnBW aims to finance the growth and future investments with internal funds, although these funds are volatile, as shown in the recent annual report and strives for <i>“low risk activities”</i> by ensuring, amongst others, <i>“a solid financial position”</i> and a <i>“conservative financial policy”</i> (p. 56).</p>	<p>Although it remains unclear to which market condition EnBW refers, all these quotes demonstrate a financially conservative business model, which is based on the limitation of investments to available internal funds.</p>
<p>Similar to DONG, EnBW identified financial capital as one of the key resources for its business and breaks it down into equity, borrowed capital and positive cash flows. However, the <i>“significant activities”</i> taken into 2016 to preserve the financial capital are all targeted onto external, borrowed capital by raising hybrid capital, redeeming a loan and getting a new credit line (p. 14). The first two identified main stakeholder groups of EnBW are <i>“shareholders and the capital market”</i> (p. 35)</p>	<p>The strategy does not aim to mitigate general dependency upon the FS. Instead financial strategy is focused on maintaining the attractiveness for FS-stakeholders by maintaining an investment-grade rating. Purpose is to ensure access to the FS. This does not point to a general awareness of financial instability.</p>
<p><i>“The key performance indicator internal financing capability [...] represents the most significant performance indicator for the Group's ability to finance its activities internally [...]. The retained cash flow [...] is available to the Group for net investment without the need to raise additional outside capital. (p.28) [...] This new control mechanism will enable EnBW to retain its financial discipline independently of interest rate-related volatility. The goal is a solid investment-grade rating” (p. 25).</i></p>	<p>It is clear that the goal of the financial strategy is to maintain a good rating, not to ensure a stable investment. The rating has the purpose to ensure access to capital markets to lowest capital costs:</p>

<p><i>“With a solid investment-grade rating, we want to:</i></p> <ul style="list-style-type: none"> • <i>offer reliable opportunities for financing partners</i> • <i>be regarded as a dependable business partner in our trading activities</i> • <i>achieve the lowest possible capital costs</i> • <i>implement an appropriate number of projects and thereby maintain the future viability of the company” (p. 56)</i> 	<p>Being attractive for financing partners and maintaining capital costs low is directly aiming to ensure appropriate external funding.</p> <p>The fact that emphasizing internal funding has mainly the purpose to ensure attractiveness for external investors suggests that the goal of internal funding is very unlikely result of instability awareness. The underlying assumption, however, seems to be that the FS is functional and EnBW’s task is to get attractive for external capital.</p>
<p><i>“EnBW has sufficient and flexible access to the capital market at all times” (p.55)</i></p>	<p>The functionality of capital markets is not questioned.</p>
<p><i>“Value added in the Renewable Energies segment decreased in comparison to the previous year to € -95.9 million. [...]. The ROCE [return on capital employed] for this segment was 4.3% with an unchanged weighted average cost of capital of 7.5%. (p. 63)</i></p>	<p>Strong profitability and internal cash flow can be a solution to overcome the trade-off between the limitation of dependency upon the FS and investments. Having a strong profitability, however, is especially difficult in the highly complex and risk intensive field of offshore wind energy.</p>
<p>To maintain an investment-grade rating, <i>“EnBW aims to limit cash effective net investment to the level of the retained cash flow. This will ensure the company retains its high level of financial discipline” (p.75).</i></p>	<p>It is not discussed that a limitation in investment might threaten the success of the <i>Energiewende</i>. Instead, the maintenance of a good rating is prioritized.</p>
<p><i>“Financial management is responsible for [...] optimisation of financing, as well as for guaranteeing a sufficient level of liquidity reserves.” (p. 54) “Main goals of the financial strategy are: (i) secure profitability (ii) high level of financial discipline expressed in the internal funding capability and (iii) raise the value of the group” (p. 26).</i></p>	<p>EnBW’s financial management follows amongst others the goal to ensure liquidity. Similar to DONG a prioritization of the different goals is not given.</p>
<p><i>“EnBW intends to invest €14.1 billion in total by 2020 (based on the reference year of 2012). In this context, the focus will be placed on expanding renewable energies on an industrial scale. [...] In order to obtain the financial</i></p>	<p>To be able to finance investments with internal funds EnBW aims to draw liquidity from divestments. The strategy of divestment can only be successful, as long as (i) EnBW has assets to divest, which might not be given in the long-term</p>

<p><i>headroom required for such extensive investments, we have significantly extended our divestiture programme – involving conventional divestitures, cash inflow from participation models, the disposal of assets and subsidies” (p. 24). [...] “In the future, we aim to achieve an internal financing capability of ≥ 100% each year by, for example, adjusting future participation models so that, in contrast to the EnBW Baltic 2 S.C.S. participation model, potential partners are already participating in the construction phase.” (p 59).</i></p>	<p>and (ii) investors are available to buy the assets. Both conditions are not discussed. Instead, the passage puts the main agency on the management of EnBW “we have significantly extended our divestiture program”. This statement does not include the agency of the counterparties for the divestments and does therefore not discuss the underlying assumption of their investment capability. What happens, if the divestment is not successful, is not stated.</p>
<p>The management concludes that <i>“the company’s future solvency is secured by its solid financial position” (p. 59)</i></p>	<p>This optimistic statement is structured as a fact, using a strong modality. The underlying assumptions are not stated and discussed. It is not questioned which impacts might arise from the strong structural dependency on the FS.</p>

EnBW’s identification of chances and risks is in accordance to the German law more extensive than the one of DONG. I will conduct an in-depth analysis of the identified chances and risks to identify potential traces of awareness:

Table 17. Linguistic analysis of EnBW's chances and risks reporting (own table)

Risks and Chances	Awareness of risk originating from FS instabilities?
<p>Strategic risk in the participation model</p>	<p>Low: <i>“...uncertainties with respect to the realisation of reduced or surplus revenue, as well as to time delays for the completion of these transactions.” (p. 83)</i> Possibility that investors are not available is not mentioned.</p>
<p>Improvements in efficiency</p>	<p>Low: <i>“positive effect on the key performance indicator adjusted EBITDA and thus also on the key performance indicator internal financing capability” (p. 84).</i> The increase of internal funding capability is mentioned as a positive side effect.</p>
<p>EU sanctions against Russia</p>	<p>No</p>
<p>Legal risk</p>	<p>No</p>
<p>Personnel risks</p>	<p>No</p>

Risks of health, safety, security and environment	No
Market prices of financial investments	<p>Medium: <i>“The financial investments managed by the asset management system are exposed to price changes and other loss risks as a result of the volatile financial market environment [...] If these risks lead to a significant or prolonged decline in the fair value of these assets, this must be recognised in the form of impairments [...] In terms of the market prices for financial investments, we currently identify an equal level of opportunity and risk due to the increased volatility on the financial markets. Through corresponding effects, this could have both a positive and negative impact in 2017 and 2018 on net debt”</i> (p. 85).</p> <p>EnBW identified the risk of volatility of asset prices, however this risk of severe systemic decline in asset prices and reduced liquidity in times of financial crisis. Instead effects on the profitability in form of impairment (reduction of accounted asset prices) are mentioned as main risk effect.</p>
Discount rate applied for pension provisions	No
Impairment risks (for equity investments)	No
Rating	<p>Low: <i>“We identify a general risk that the rating agencies may downgrade the credit rating of EnBW if the economic and political conditions deteriorate further or EnBW cannot fulfil the expectations of the agencies”</i> (p. 85).</p> <p>Importance of the financial rating is identified, which is an indication for the importance of credit markets for EnBW. However, the identified dependency does not address the risk of instability, but only limited attractiveness of EnBW for investors.</p>
Compliance	No