

# Controversial futures—discourse analysis on utilizing the “fracking” technology in Germany

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**Abstract** There is an ongoing controversy in many European countries about the use of hydraulic fracturing, commonly known as “fracking”, to extract shale gas. This article argues that the political regulation is strongly influenced by the story lines and images of the future related to this technology. Using a discourse analytical approach based on Maarten Hajer’s research, several documents ranging from media publications to legislative documents were examined. The results show that hopes for “a golden age of gas” and the fear of water pollution play a key role in the discourse. Story lines referring to these two conflicting images of the future form the basis for three main coalitions struggling to dominate the public and political discourse. Traces of these story lines can even be found in the legislative process on “fracking” in Germany. Based on the findings, a conclusion is presented with an evaluation of the potentials and problems of discourse analytical approaches in futures research.

**Keywords** Discourse analysis · Story lines · Discourse coalitions · Hydraulic fracturing · Images of the future

## Introduction

Hydraulic fracturing, commonly also known as “fracking”, is a technology to extract natural resources such as natural gas and crude oil. After perforating dense rocks by drilling, vast quantities of water mixed with sand and chemical additives are injected under high pressure [1]. This opens up fissures in the rock, through which the formerly enclosed gas or oil is then extracted. Combined with horizontal drilling methods, hydraulic fracturing enables accessing of natural resources,

which previously could not be extracted by conventional methods.

The increasing use of hydraulic fracturing in the U.S. was pushed by former president G.W. Bush’s decision to ease restrictions on water safety for drilling companies [2]. The low gas prices in the U.S. and the promising opportunities to gain new sources of energy have contributed to an internationally growing interest in this technology. At the same time, fears about possible risks and damages associated with “fracking” have risen.

There is an ongoing controversy in many European countries about using hydraulic fracturing. While Great Britain’s prime minister David Cameron supports the use of this technology, the French president Francois Hollande has renewed the country’s ban on “fracking” in 2012. Only recently, in January 2014, the European Commission has adopted recommendations for minimum principles for the extraction of shale gas in the EU member states [3]. Up on this date many member states including Germany have not introduced any specific laws to regulate the use of this technology.

Germany wants to reduce its CO<sub>2</sub> emissions drastically and abandon its nuclear energy production by 2022. Since natural gas-fired power plants are considered a necessary addition to the fast growing field of renewable energies, the importance of natural gas is supposed to increase in the following years. Natural gas accounts for more than 20 % of primary energy consumption in Germany, while more than 80 % of the gas is imported from other countries, primarily Russia, Norway, and the Netherlands [4].

The German Federal Institute for Geo-sciences and Natural Resources BGR (Bundesanstalt für Geowissenschaften und Rohstoffe) estimates that Germany may gain around 0.7 to 2.3 trillion cubic meters of natural gas from potential shale gas reserves that are accessible only by utilizing “fracking” [5].

The extraction of soil resources in Germany is regulated by the Bundesberggesetz [6]. Currently, this federal law does not

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explicitly regulate the use of hydraulic fracturing. Different drilling companies have already acquired concessions for potential shale gas reserves, but none have obtained permission to begin exploring these reserves yet [1].

This article argues that the political regulation is widely influenced by the story lines and images of the future linked to this technology. These images form in dynamic discourses that mainly occur in expert groups, public discussions, and general media coverage over time. Assuming that politicians cannot ignore public discourses in their decision making, the influence of these assumptions on the future should be discussed and analyzed.

This article focuses on three main questions: Firstly, how can discourse analysis theoretically be used as a method in futures research? Secondly, which story lines and discourse coalitions can be identified in the German discourse on “fracking” and what are their effects on legislative processes? And thirdly, reflecting the results of this research: what are the potentials and problems of the discourse analytical approaches in futures research identified?

Up until now, the discourse on “fracking” in Germany has not been analyzed systematically. Combinations of discourse analysis and futures research as well as their necessary theoretical foundations have not yet been explored. This research can therefore provide new insights in various aspects concerning theoretical and methodological questions and the possible future of hydraulic fracturing in Germany.

### Combining discourse analysis and futures research

The term “discourse” is in broad use in many scientific disciplines ranging from linguistics to sociology. Although the theoretical background and methodological approach may differ, this indicates that discourse analysis could be an appropriate method for investigating different subjects without being restricted to the perspective of a single scientific discipline alone. The mainly interpretative methods of discourse analysis and the possibility to integrate both quantitative as well as qualitative data could serve as an additional advantage for interdisciplinary futures research aims.<sup>1</sup>

When using discourse analytical approaches in futures research, some possible difficulties should be taken into consideration: Researchers cannot examine discourses from the outside but are always part of the subject. The analysis can never claim to be objective but is influenced by the conscious and unconscious discursive patterns which shape the researcher’s thinking. This epistemological problem is enhanced when this method is combined with futures research.

<sup>1</sup> Evidently, it depends on the specific research question whether discourse analysis should be applied and if so, which approach is appropriate.

According to Popp, futures research consists of dealing with potentially frightening uncertainties of future developments in individual and social contexts [7]. This can cause anxieties in the mind of the researcher, which influences the way of applying certain research methods. The results of a discourse analysis on future developments and scenarios, at the same time, cannot be falsified in the same way as a discourse analysis of past debates and discussions. They themselves are a contribution to an ongoing process which can easily change. Since it is impossible to avoid this problem, especially in futures science, there must be a reflection about one’s own attitude and relation to the research question chosen and their results, as Popp states [7]. Therefore, it should be mentioned that skeptical reports about hydraulic fracturing in the U.S. have been the starting point for developing this research question.

Another challenge is the vast number of discourse analytical approaches which have quite different theoretical foundations as well as methodological implications [8]. Since the aim of this research is focused on the effects of discourse on political decision-making, a discourse analytical approach derived from the field of political sciences should be chosen. As will be shown below, an approach with a special focus on the role of actors, media and linguistic aspects was needed. These criteria are met by Maarten Hajer’s approaches that follow the tradition of Foucault’s discourse analysis.

To apply discourse analytical methods, a precise definition of the terms and methods is required. Hajer defines discourse, “as an ensemble of notions, ideas, concepts, and categorizations through which meaning is ascribed to social and physical phenomena, and that is produced in and reproduces in turn an identifiable set of practices” [9].

As meaning does not exist before being ascribed to something in a social process, the result of a discursive process can be characterized as being contingent. Futures research is based on the assumption that futures are contingent, too. In addition, future is thinkable only as a linguistic construction [10].

Following these assumptions, discourses not only shape our understanding of the present but also influence what can be considered as possible, probable, and desirable developments in the future.

Combining discourse analysis and futures research could allow us an insight on how images of the future are being shaped today and how they influence our understanding of future and present decision-making. Images of the future cause an effect on our thinking and acting beyond the present, as Rubin states: “Human orientation towards the future is based on making these mental images [images of the future] a part of reality and then directing their actions and decision-making along the lines drawn by these images” [11].

By creating meaning and images of the future, discourses become constitutive criteria for common understanding of reality and future possibilities. As Rubin says, “Just like

conflicting values and worldviews, images of the future can include contradictory elements even in an individual mind, let alone in social groups, communities and society” [11].

From a futurist point of view, the debate about promoting hydraulic fracturing in Europe can be described as a competition among different possible future scenarios and developments. The result of the discourse on “fracking” could possibly be that the technology is considered irrelevant, threatening or advantageous and profitable. The dominant meaning ascribed to it in public and political discourses determines its future. It is worth noting that even the existence of a public and political discourse on this technology is not self-evident, let alone its outcomes.

From a socio-scientific point of view, the influence of conflicting futures in discourses is especially interesting for the energy sector. Decisions and actions taken in this area require long-term planning based not only on statistically enhanced assumptions, e.g. about energy demand, but also on normative goals such as the reduction of CO<sub>2</sub> emissions and protection of the environment. In addition, infrastructural decisions in the energy sector cannot be changed in a short period of time and therefore have long lasting effects on the future [12].

Therefore, it is compelling to analyze which ideas and concepts become dominant in the German discourse on hydraulic fracturing. Since discourses take place in many different societal and political fields at the same time, it is impossible to examine them as a whole. Based on theoretical considerations, a data corpus must be selected.

## Methodology and data corpus

Story lines, ideas, concepts and other linguistic elements in discourses structure debates, establish connections between actors and form a pattern in these discourses. Following Hajer, “Discourse analysis is the method of finding and illuminating that pattern, its mechanisms and its political effects” [9]. To identify key elements of the discourse, two theoretical concepts developed by Hajer are applied: story lines and discourse coalitions. According to Hajer, story lines are “a condensed sort of narrative that links an event to one or more discourses and thus provides the basis of ‘discourse coalitions’” [9].

Story lines may be interpreted in different ways by different actors; it is not necessary to find an explicit consensus about their meaning. On the contrary, its ambiguity can benefit different actors to make their own story line without entering in conflicts with other actors. It will be proven in this paper that this happens in the case of “fracking” with the issue of water safety. As Hajer puts it, “...a storyline is also often found to ‘guide’ a policy process over a period of time: it allows actors to develop the story, to change it according to

new insights or to fill in the blanks over time” [9]. Discourse coalitions are defined as, “...the ensemble of particular storylines, the actors that employ them, and the practices through which the discourse involved exert their power” [9].

Using the concepts of story lines and discourse coalitions, several dozen of documents ranging from print media publications to legislative documents were examined to identify story lines and discourse coalitions. The selection of the data corpus follows the idea that political action and media cannot be seen as separated fields, but are “fundamentally intertwined” [9].

As a first step, print media publications were the main subject of analysis. Print media plays a key role in creating and reproducing story lines and images of the future. Furthermore, “...they also present an important arena for contestation for all those—scientists, consumers, policy-makers, producers—who seek to impose their interpretations of reality on others” [13]. Three leading newspapers in Germany (Frankfurter Allgemeine Zeitung, Süddeutsche Zeitung, Tageszeitung Taz) with different political views were analyzed.<sup>2</sup> 274 Articles<sup>3</sup> published from January 2010 to June 2013 containing key words such as “fracking,” “shale gas,” or “unconventional gas” were collected and examined.

In the second step, main actors were identified in the articles and analyzed more profoundly by examining their own publications, e.g. press releases, homepages etc. These publications provide more profound insights on the main discourse coalitions.

Lastly, documents released by the German federal government (Bundesregierung), the federal council of Germany (Bundesrat) and the federal parliament (Bundestag) were examined. The main focus of this step was to find out whether story lines applied by different coalitions could also be tracked in legislative documents. This should show the influence of discourse coalitions and the discourse on political decision-making and identify dominant subjects in the political discourse. In the following sections, the main results are described and analyzed.

## Story lines and discourse coalitions

Most of the press articles about “fracking” were published during the first half of 2013. In this period the federal government discussed a draft federal law on hydraulic fracturing which clearly intensified debates on the potentials and risks of this technology [14]. This political process has also been a major occasion for different actors to position themselves in

<sup>2</sup> A list of all examined press articles including title, authors and date of publication is available on request.

<sup>3</sup> 132 articles by Frankfurter Allgemeine Zeitung, 85 articles by Süddeutsche Zeitung and 57 articles by Tageszeitung taz.

the public debate on “fracking”. In addition, the federal elections held in September 2013 contributed to the growing public interest in political discourses.

Before describing the identified story lines and discourse coalitions, it should be mentioned that most of the analyzed press articles do not distinguish between the utilization of hydraulic fracturing for different sources of energy or in different geological formations. In the German context, “fracking” is mainly specified as a technology to extract natural gas from shale reserves.

Depending on their own political views, the newspapers give more or less room to different coalitions. This shows that news media are not neutral for discourses and should be seen as actors, too. For example, the *Frankfurter Allgemeine Zeitung* cites more representatives of gas and oil companies while the comments on hydraulic fracturing written by journalists of *Süddeutsche Zeitung* or *TAZ* clearly show a more skeptical attitude towards “fracking”. However, actors of all coalitions are cited in all analyzed newspapers.

Six main sets of story lines can be found in the press articles selected for the data corpus. Based on the story lines, three main discourse coalitions were identified which struggle to impose their view of the technology on policy makers and the public in Germany. Looking at their activities beyond the press articles, it is obvious that economically powerful actors such as ExxonMobil have exceeding possibilities to spread their arguments, e.g. financing research or marketing campaigns, than citizens’ initiatives [15], [16]. In this paper, their methods and practices cannot be further analyzed, though it would be interesting to investigate these aspects more in detail [8].

The first story line is about the expectations for vast new sources of energy that may be generated in Germany by using “fracking”.

The descriptions oscillate between two very different poles. On one hand, German shale gas reserves are described enthusiastically as precious treasures and are associated with images of the historical Gold Rush or the Golden Age, potentially becoming sources of new prosperity and lower gas prices. On the other hand, prognosis’ about estimated shale gas potentials are presented almost like facts. To underline this, numbers from reports of the International Energy Agency (IEA) [17] or the German Federal Institute for Geo-sciences and Natural Resources BGR are cited [5]. As Liesmann mentions, prognosis as a special version of future scenarios unfold a powerful impact in the economic and political field because they are often bound to lead decisions and actions into a certain direction [18].

The second story line treats the feared decrease in competitiveness for the German economy. It is argued that German industries will have problems facing North American competitors because of the low prices for energy in North America. Whether use of hydraulic fracturing in Germany could

alleviate this problem remains unclear due to the relatively small amount of resources that could be extracted here. Still, continued abstinence from “fracking” in Germany or Europe will worsen the foothold for German industries. This partly contradicts the great expectations discussed in the same news media.

The first and second story lines serve as basis for the first identified discourse coalition. It consists of actors who support the utilization of “fracking” in Germany. Not surprisingly, gas and oil companies such as ExxonMobil, Shell, or chemical companies such as BASF as well as the Federation of German industries BDI (Bund der Deutschen Industrie) can be found among the actors who appear in the newspapers as interview partners or cited supporters of the technology. They publish scientific studies, political position papers, handouts or websites, which explain their position. Their set of story lines refers to hydraulic fracturing as a key technology to extract new sources of energy, which are relatively less damaging to the climate. To strengthen these arguments, they cite the prognosis about the extractable amounts of shale gas published by the German Federal Institute for Geo-sciences and Natural Resources BGR. They also underline the loss of competitiveness and innovation potentials if “fracking” is banned in Germany.

Especially gas companies stress that they can keep potential risks under control and that they have already shown this in other countries and even inside Germany since “fracking” has been used in the country since the 1960s [16].

The third set of story lines describes “fracking” as a risky technology, threatening natural water resources, health, and the environment.

Descriptions of possible negative impacts can be found in almost every article on “fracking” in the data corpus. The technology is attributed to risks and potential damages ranging from chemically contaminated ground water and earthquakes up to the destruction of the landscape. Not only the environment but also human health is considered to be at risk if “fracking” causes ground and drinking water contamination. The chemicals used for hydraulic fracturing, are repeatedly referred to as being harmful, toxic, and carcinogenic.

The language used to describe possible negative consequences of hydraulic fracturing is quite strong and frightening, e.g. when “fracking” risks are compared to nuclear catastrophes or the technology is depicted as brute, dirty, forceful, and toxic per se. This negative future scenario is illustrated by reports about damages attributed to “fracking” in U.S. such as burning water taps, which became a highly symbolic image, emphasizing the negative impacts of the technology. These images are often taken from the documentary “Gasland” by Josh Fox [19]. The release of this film has been the first occasion for news coverage of “fracking” for many German media. There are only a few voices, almost exclusively in the *Frankfurter Allgemeine*

Zeitung (FAZ) that put these negative scenarios into question by positioning them as irrational fears.

The fourth set of story lines depicts the debate on “fracking” as a conflict between citizens and big profit-seeking enterprises. To understand this, it is important to mention that unlike in the U.S., natural resources like gas and oil do not belong to property owners but to the state (county) that distributes drilling rights to companies [6]. The opposition to “fracking” is mainly described as regular citizens standing up against ruthless corporations. Following this story line, the protesters represent most of the German society. Parallels are drawn to other social controversies such as carbon capture and storage (CCS) or the construction of a new railway station in Stuttgart (Stuttgart 21). At the same time, the lack of transparency and participation rights in the regulation of natural resource extraction in Germany (Bundesberggesetz) is linked to this critique.

Especially in the Frankfurter Allgemeine Zeitung, a few skeptical voices mention that many citizens lack experience and knowledge about hydraulic fracturing and that the level of technophobia in Germany is increasing dangerously, threatening future economic and social prosperity.

Based mainly on the fears of potential risks and partly on the criticism of profit seeking corporations, two more discourse coalitions formed. The first one consists of those who do not want “fracking” to be used in Germany at all. The actors range from local citizens’ initiatives to main federal environmental NGOs such as BUND or Greenpeace. They warn about potential damages to the environment and human health and depict the supporters as nontransparent, profit-seeking and ruthless. Many local citizens’ initiatives have originated only recently. Mainly they are situated in areas where companies have already acquired rights to explore potential shale gas reserves in the future, if they get drilling permission by local authorities. These initiatives have quickly managed to unite in a bigger organization (named Interessengemeinschaft Gegen Gasbohren) that exclusively dedicates its activities to the protest against “fracking” [20]. They and other NGOs use symbols such as red hands or burning water taps to enhance their protests. Together with the main German environmental NGOs, IG Gegen Gasbohren have published a draft law to prohibit “fracking” in Germany [21].

The third discourse coalition can only gradually be distinguished from the second one. The actors also see hydraulic fracturing as a potentially risky technology and speak about possible water contamination, but they do not demand a prohibition of “fracking” in Germany. They rather claim that more research and risk assessment should be done, before the utilization of the technology may be taken into consideration. Many politicians from all political parties in Germany can be found in this coalition as well as scientific institutions such as the German Advisory Council on the Environment (SRU),

unions, or interest groups from food, beverage and agricultural industries.

Interestingly, the image of possible water contamination mobilizes many different actors. Story lines related to water risks form the basis for vast discourse coalitions involving actors that rarely fight for the same goals with other subjects, e.g. major interest groups of the food sector, brewing companies and environmental NGOs or citizens’ initiatives.

One could argue that these coalitions would never exist without the common image of the negative future that is associated with “fracking”. In fact, most actors involved in the discourse on “fracking” do not have direct experiences with this technology but found their bearing on different story lines which contain images of possible, (un-) desirable futures of utilizing “fracking” in Germany. These images determine their actions, especially if they think that these possible futures can be influenced by what they do in the present.

The fifth identified set of story lines links hydraulic fracturing to questions of its influence on the climate.

Since natural gas is widely considered to be the least damaging of all fossil energy resources, some declare that natural gas extracted by using hydraulic fracturing could contribute to a reduction of CO<sub>2</sub> emissions. This interpretation is also implied by the first discourse coalition which tries to link “fracking” to the relatively positive image of gas.

On the other hand, some articles depict the increasing utilization of “fracking” as a main reason for decreasing coal prices which indirectly contributes to more CO<sub>2</sub> emissions. Other articles express that in the process of hydraulic fracturing, more methane and other gases are released uncontrollably than in a conventional extraction processes. These aspects are also discussed by the second and the third discourse coalition. Until June 2013, there was no dominant meaning established in the news media about whether hydraulic fracturing is to be seen as rather positive or negative for the climate.

The question why we still need new natural resources to fulfill our demand of energy does not play a major role in this debate. The fact that the story line about possible effects on the climate has not been a key element in the formation of discourse coalitions underlines this interpretation.

The sixth identified set of story lines focuses on the possible geopolitical effects of hydraulic fracturing. It describes this technology as a “game changer” that will revolutionize the international energy markets and cause major shifts of power in international politics. However, consequences of different discussed scenarios remain quite unclear. Reports about the possible energy independence of the U.S. or the geopolitical implications of large potential sources of shale gas and oil reserves in Argentina or China do not play a major role in the formation of discourse coalitions or the legislative process

about using “fracking” in Germany. It seems that these developments are perceived to be beyond the influence of actors in Germany.

Contemplating the results obtained in the analysis of story lines and discourse coalitions, some characteristics of the discourse on “fracking” in Germany can be distinguished:

Although powerful “fracking” supporters such as the BDI articulate that the technology has already been used multiple times in Germany without causing problems or public attention [15], the “fracking” technology is mostly depicted as something new that needs further evaluation of its potential chances and risks. Consequently, “fracking” has become a subject of intense public and political debates over the past few years. The increasing number of publications highlights the dynamic of the discourse in the first half of 2013.

All identified story lines underline that “fracking” has a high potential to enable big changes. The characteristics of these possible changes are described as conflicting images of the future. To illustrate these possible scenarios, experiences and reports from the U.S. are transferred to Germany, although the geological as well as the legal circumstances of these two countries are very different.

Mainly two images of the future can be identified as the polarizing elements of the discourse on hydraulic fracturing in Germany: Are we entering a “Golden Age of Gas” [17] or are we putting our water resources at unpredictable risks?

As Hajer stresses: “Those who are able to impose their interpretations of reality on others gain substantial control over political debates, no matter what their institutional position is” [9]. It is therefore important to figure out whose story lines tend to dominate the discourse in Germany. Resuming the analysis of discourse coalitions, it is obvious that there are many more societal actors who associate “fracking” with negative future scenarios than actors who act in favor of its utilization.

According to opinion polls, the majority of the German public has made up their minds during the debate in the first half of 2013: A survey conducted in March 2013 showed that around half of the respondents in Germany claimed that they had never heard of “fracking” [22]. Only 2 months later, after intense media discussions about the draft laws presented by the government, in May 2013, opinion polls in Germany showed that two-thirds of the respondents reject the utilization of “fracking” and only 10 % answered that they do not know this technology or had no opinion about it [23]. The results obtained for Germany in the open EU Consultations on unconventional fuels point in a similar direction [24]. This indicates that negative associations with “fracking” have already become dominant in the German public. This can be interpreted as a result of the discourse on the technology.

But do the conflicting images of the future in the discourse about utilizing “fracking” in Germany also influence the legislative process?

## Traces of the discourse in the legislative processes

Already in 2011, the federal parliament initiated a consultative process on possible effects and necessary regulations of hydraulic fracturing [25]. By that time, there were only a few media articles about the technology, mainly reporting about “fracking” in the U.S.

In the beginning of 2013 the Bundesrat passed an initiative requesting the federal government to pass a law on “fracking” with specific criteria for the utilization of the technology [26]. In both cases, the initiatives were launched by parliamentary groups of the Social Democratic Party (SPD), the Environmentalist Party (Bündnis 90/Die Grünen) or the Left Party (Die Linke) or by federal states (Bundesländer) governed by these parties. The initiative by the majority of the federal states (Bundesländer) in the Bundesrat stresses the need for more research on hydraulic fracturing. The Bundesrat expressed that the technology should not be utilized until the potential risks have been profoundly assessed and water safety is guaranteed.

The federal government by Conservatives (CDU/CSU) and Liberals (FDP) started discussing a draft law on hydraulic fracturing in January 2013. The draft law from the federal government consists of two parts: One was drafted by the Federal Ministry of Economics and Technology and was supposed to become part of the Bundesberggesetz which regulates the extraction of natural resources. It refers to the high potentials attributed to hydraulic fracturing in developing new domestic energy resources but also mentions issues of water protection from possible contamination [14]. The other part was drafted by the Federal Ministry for the Environment, Conservation of Nature and Nuclear Safety, and should have become part of the law on water resources (Wasserhaushaltsgesetz). It stresses possible risks and negative impacts on the environment, especially water, which should be addressed when hydraulic fracturing is used. The draft law prohibits hydraulic fracturing in sensitive areas, e.g. drinking water protection areas [14].

After almost 5 months of internal debates and intense media discussions, newspapers reported in June 2013 that the federal government will not pass a law on hydraulic fracturing before the federal elections in September 2013.

Story lines about the risks for water can clearly be found in the legislative process on the federal level, especially in the initiatives of the Bundesrat and the Federal Ministry for the Environment, Conservation of Nature and Nuclear Safety. The specific formulation of the government’s drafts suggests that the image of “fracking” as a risk scenario for human health and the environment has become an unquestionable truth in the political discourse. At the same time, some story lines of the supporters can still be traced in the draft law written by the Ministry of Economics and Technology. This suggests that even if the coalitions against “fracking” have successfully established their interpretation of “fracking” in the public discourse, the influence of the supporters remains

visible in the legislative process. It is important to see that factors like direct lobbying or the elections in September 2013 and the political developments in the federal states (Bundesländer) might have played an important role, too.

Interestingly, it is hard to find members of the German parties who openly express strong support for “fracking”. Even the former minister of economics and technology Dr. Philipp Rösler who is often depicted as a supporter of the technology speaks rather cautiously about it in public [27]. The only clear exception is the German Member of the European Commission, Günther Oettinger, who has been interviewed several times in the analyzed press articles. He warns the German public and politicians that a future without hydraulic fracturing would be disadvantageous for German industries and for the prosperity of the country.

The definition of “fracking” as a novelty can be interpreted as a main reason for political institutions to react to it by formulating new regulations. This is not a natural consequence but a result of the discourse itself. Considering that it has not been a regulatory problem to use hydraulic fracturing in Germany before, the impact of this discourse becomes evident. It is worth mentioning that some drilling companies like Wintershall have declared that they will voluntarily abstain from utilizing hydraulic fracturing in Germany for the time being [28]. Although there is no coercive legal reason in the current regulation which could stop drilling companies from acquiring permissions to explore possible shale gas reserves [29], no permissions have been issued during the last 2 years. As one interest group of the gas industry puts it, this can also be seen as a result of the negative image of “fracking” created in the public debate [30].

The conflicts over “fracking” are sometimes related to a general discourse on the increased demand for public participation and transparency in political and economic issues. However, the draft federal laws do not contain major changes to make the Bundesberggesetz more transparent or participatory.

As of today, hydraulic fracturing is not regulated by a special law, but the newly elected government has announced that it will draft a law in 2014. The developments of the discourse examined here suggest that it will probably not allow “fracking” in Germany, unless the discourse gains new dynamics. In fact, many politicians have argued that there is not enough scientific expertise to properly evaluate the risks of the technology. New publications such as a study announced for June 2014 by the Umweltbundesamt (UBA) could provide an opportunity for actors to change the existing story lines, e.g. concerning the potential risks for ground water contamination.

## Conclusions and outlook

This paper has emphasized key elements that structure the discourse on “fracking” in Germany. The dominance of

negative images of the future associated with “fracking” suggests that the technology will not be introduced to extract shale gas in Germany in the near future. The results presented here give only a first overview. For further research, it would be interesting to analyze some aspects more profoundly, e.g. the effects of strong symbols like the burning water tap on discourses about technologies. Examining the linguistic characteristics of discourses on technologies and the cultural and historical roots of the metaphors and symbols used may help to explain the patterns of discourses. As Blumenberg puts it: “The metaphor comes first, giving access to the higher levels of abstraction in which it increasingly conceals itself as a point of orientation, and into which it finally disappears” [31].

As the example of the discourse on using “fracking” in Germany shows, discourse analysis proves to be a very interesting method for futures research. It allows the researcher to analyze how societal images of the future are being created and in which way they influence political decision-making. In case of the “fracking” discourse in Germany, negative scenarios, especially about water contamination, have contributed to the formation of large discourse coalitions. Their story lines have become dominant in the public discourse as well as the legislative processes.

By emphasizing these patterns, researchers can also help to find blind spots in the discourse, criticize assumed truths about the future, and point out alternative future scenarios which may not have been part of the discourse yet [32]. It should be noted again that conclusions about “blind spots” of course contain normative statements about what might be missing from the point of view of the researcher. Looking at the results of this particular research without comparing it to discourses in other countries, it is a difficult task to identify topics about “fracking” which have not been mentioned in the three examined newspapers or other parts of the data corpus. Nevertheless, some aspects can be mentioned here: Unlike in the U.S., the creation of new jobs or increase of public revenue by “fracking” have not played a major role in the German discourse yet. Even the effects of hydraulic fracturing on energy prices for consumers have not been discussed in this discourse although this topic has played a major role in news media and politics at the same time.

It is interesting to note that hydraulic fracturing is very rarely associated with positive or negative impacts of conventional gas drilling. In fact, predictable consequences of the installation of new dwelling sites like increased traffic or land consumption are rarely mentioned in the examined press articles. Story lines on risks and possible damages focus mainly on negative impacts on water and soil due to chemicals used in the process and the possibilities of accidentally escaping gases. In contrast, climate change or the question why we still need new natural resources to fulfill our demand of energy do not play a major role in this debate. This can be viewed as a

sign of unwillingness to change the status quo in our socio-economic system facing climate change.

The results of the European Commission's Consultation on "unconventional fossil fuels (e.g. shale gas) in Europe" indicate that there are big differences in the perception of "fracking" inside the European Union [24]. To compare the results presented here to discourses in other European countries may contribute to explain these differences and help to understand more deeply which discursive patterns take effect in the different countries.

Despite these interesting insights, the combination of discourse analysis and future research also proves to be problematic for several reasons. As mentioned above, there are different theoretical approaches in discourse theory and analysis as well as a degree of ambiguity about the precise methodological application of the concepts of discourse analysis. Although Hajer's theoretical concepts proved to be suitable for this research design, and to further develop discourse analysis for futures research, it is worth examining other theoretical and methodological approaches. The diversity requires a disclosure of the theoretical foundation for the research process to ensure traceability to criticism and classification of the knowledge gained. But in the scientific debates on future research epistemological discourses are rare [7]. If discourse analytical methods should be integrated in future research, a more profound critical examination of the underlying principles and assumptions of a combined approach are necessary. However this remains a difficult task due to the fact that theory building in future science has yet to be further developed [33]. Without reflecting and developing its own theoretical foundations, futures research takes the risk of adapting approaches of discourse analysis in a superficial and epistemologically unsatisfying way. Not only concerning research methodology, but also in terms of the communication of the results, this problem must be addressed. Since experts who deal with future issues are often considered to have "latent mystical-magical" powers [7] they should resist the temptation to present their results as perceived truths about "the future," but instead make clear and transparent how they obtained their results and which identified factors shape different futures.

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