Reflections on Discussing, Planning and Designing Energy Systems

Generating Sustainable Energy In a Polyrational Arena!

Till Jenssen

ABSTRACT

The oil spill in the Mexican gulf stirs up long-lasting controversies on how a sustainable energy system has to be designed and reveals various environmental, economic and social conflicts. By introducing two case studies and offering a combination of two explanatory approaches—concept of polyrationality and social arena concept of risk debates—this article seeks to gain a better understanding of energy disputes as well as strategies for creating viable solutions. For discussing, planning and designing a sustainable supply, the author suggests an energy policy that builds upon the catalysis of diverse and opposing interests and attitudes. In short, to generate sustainable energy in a polyrational arena!

Key Words: energy supply, acceptance, conflict management, risk perception

ENERGY CONFLICTS

The oil spill in the Mexican gulf—similar to Brent Spar controversy or Chernobyl and Fukushima disasters—confronts us with the question if our current energy supply is sustainable. In other words: how safe, costly and environmentally-sound should it be? Regardless of the specific incident, conflicts on the environmental, economic and social ambiguities of our energy system are known for various technologies, for instance wind converters (Gamboa/Munda 2007, Devine-Wright 2005), nuclear energy (Renn 2009, Kupper 2003, Throgmorton 1992, Kitschelt

1980) or carbon capture and storage technologies (CCS) (Schulz et al. 2010). Controversies concern both: mega infrastructure projects (Flyvbjerg et al. 2003) as well as small scale technologies (Wüstenhagen et al. 2007). Admittedly, subject matter, degree and persistency differ, but they have in common that a wide spectrum of positions is taken and project developers, residents and politicians often are in persistent disagreement. Using the example of biomass, this is illustrated by Steiner: "Biofuels have been represented by some as a silver bullet to the climate change threat, and by others as a fatal mistake set to destroy forests and increase hunger" (2008).

As decisions on energy conflicts are normally based on evidence, often scientific assessments and counter-assessments are brought into discussion (Kästner/Kießling 2009, Brand/Karvonen 2007, Thompson 1984). Thus, energy conflicts are fragile to fall into the "evidence trap" (Renn 1992, p.190) or "expert dilemma" (Mohr 1996). The topic of social acceptance of energy innovations and energy technologies—especially with regards to regenerative sources—remained largely neglected until the late 1990s (Renn 2010, Wüstenhagen et al 2007: 2684). Since, the interest in it has—especially in academic publications—increased and has been widely acknowledged as a key for diffusing new technologies (Jenssen 2010, Devine-Wright 2007, Jobert et al. 2007, Upreti/Van Der Horst 2004, Wolsink 2010). But, however, it did not really find expression in terms of institutional or entrepreneurial changes (e.g. investment schemes, implementation concepts and energy policies).

Social acceptance (or non-acceptance) of innovative energy technologies refers to the whole process chain of energy provision (mining/harvesting, conversion and waste-management), it concerns various phases (e.g. siting, operation and deconstruction of facilities), includes several actors (e.g. utilities, non-governmental organizations and authorities) and can be distinguished according to different spheres (e.g. economy, social system and politics) (Wüstenhagen et al. 2007, Wolsink 2007). Despite far-reaching implications for project implementation and energy planning, experts frequently confine their interpretations to bilateral patterns: utility meets citizens, polluter vs. environmental protectionist or supporter against opponent. As rightly noted by Schively and Wolsink, in this manner disputes are simplified to the categories LULU (Locally Unwanted Land Use) or NIMBY (Not In My Backyard) (Schively 2007, Wolsink 2000).

This article aims to gain a better understanding of (non-)acceptance

towards energy technologies as well as to identify possible strategies for dealing with it. Specifically, two overall research questions are investigated:

- Which conflicts may arise when discussing, planning and designing a sustainable energy supply?

- Which strategies are promising to achieve sustainable energy solutions?

To answer these questions, I draw on an intensive literature research on conflict management, especially on the theoretical 'concept of polyrationality' and 'social arena concept of risk debates' and aim for a combination of both approaches. Both concepts are then used to analyze two case studies. Even though transition theory is not core aspect of this article, implicitly my topic concerns the questions if and how transition of our energy system is processable. Since Schumpeter popularized the 'Kondratiev waves' (Schumpeter 1939), several concepts on explaining technology innovation and institutional transition have been developed, some of them may be linked with the conceptual approach applied for this article (see section 7). However, I do not aim to provide an 'everything' theory to discuss risk perception, conflict management and transition theory. Rather, I focus on the meso-level of social decisions—networks, communities and organizations—an aspect that was also taken up by transition theory briefly (e.g. Tukker/Butter 2007).

The first case study was carried out previously (Jenssen 2010) and deals with the implementation of a bioenergy plant in Ludwigsburg (Baden-Württemberg, Germany). It is based on six newspaper articles and ten other publications (technical reports, minutes, etc.) as well as 15 personal interviews[1] and notes of a public hearing, both with relevant actors (utilities, local authorities, and residents). The second case study (oil spill in the Mexican gulf) refers to 15 newspaper articles and 9 other documents—just a small sample compared to the large quantity of publications on this topic but certainly enough to conduct solid qualitative research. The purpose of case study analysis is to understand the storylines of both disputes, as well as to seek patterns and variables. The article is structured as follows: the analysis starts with a novel form of analysis. To raise sensibility for actors and their viewpoints (2) begins with the Indian tale 'six blind men and an elephant'. Then, (3) briefly de-

scribes the 'concept of polyrationality' and 'social arena concept of risk debates', introduces their analytical categories and explains their theoretical background. Afterwards, (4 and 5) two case studies are applied, and strategies for producing viable solutions are discussed (6). Finally, (7) gives a summary on the central conclusions.

SIX BLIND MEN AND AN ELEPHANT

The Indian tale of "Six blind men and an elephant" has various versions. The probably most popular version was written by John Godfrey Saxe in the 19th century (Saxe 1992: p.150). It begins:

"It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),
That each by observation
Might satisfy his mind"

All versions of this tale tell the story of either blind men or men in the dark examining an elephant. Each of the men touches a certain part of the elephant (side, tusk, trunk, knee, ear or tail) and draws conclusions from this point of view. After the 'elephant-test', they start to discuss and share their experience. They learn that they conclude differently and opposing. This finally leads to a complete mutual disagreement and an intensive conflict. The last stanza of Saxe's poem ends:

"And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!"

The various versions of the story differ in if and how (violent or not) the situation can be solved; according to Saxe the conflict apparently is not resolved. Figure 1 gives an illustrative overview on the occurrences. Intuitively, the picture suggests that they are all wrong be-

cause they ground their judgment on a detail, whereas 'absolute' reality deserves knowledge of the 'whole picture'. Thus, the blindness or darkness stands for difficulties to reach a sound and solid judgment, and the elephant is the metaphor for reality or truth.

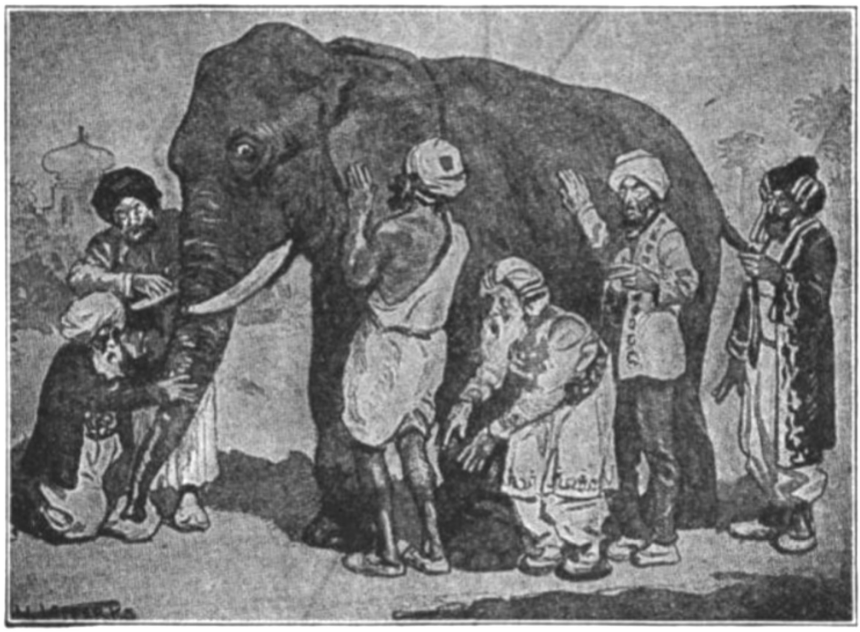

Figure 1. Six blind men and an elephant
Source: Wikimedia Commons

But what exactly is wrong in their findings? With regards to their detailed matter of subject they come to reasonable results, all skills they mention can (at least figuratively) be attributed to an elephant. This raises the question if reality can be understood as something personal, individual, as something relative. People who read this tale will perceive it quite differently. Some may favor the first interpretation (single reality) whereas others may hardly agree and insist that multiple realities exist. Both interpretations are possible and we as the readers decide about the interpretation. In this way, the reading and interpretation of the tale actually reflects much more about the reader than the story.

But reading may also differ with regards to resolving disagreements. Some may stress that the 'force of the argument' as a mechanism

of self organization will ensure the best solution: 'the best argument wins'. Others may argue that 'the loudest voice must not necessarily be the right voice' and that solutions to social conflicts are best if they are consensus based: 'the group finds the best argument'. Further ones will read the tale as a mission or challenge (for the group) to do whatever is possible to improve quality of the 'elephant-test', e.g. by finding means to overcome blindness or becoming more sensuous: 'the best assessment method has to be employed'. In this way, the reading and interpretation of the tale and the associated responses actually reveal if a reader favors an individualistic, collective or regulative handling.

The elephant tale was introduced to raise sensibility for reality (single or multiple reality) and for normatively driven procedures for resolving social disagreements (conflict resolution). Obviously, there are limitations of the elephant analogy. I pick up on this point and it's implications for energy policy in section 7.

RATIONALITIES AND RESOURCES

The following analysis is in large parts based on the 'concept of polyrationality', which can be lead back to anthropologist Mary Douglas (1994, 2002). According to her concept, environmental burdens and opposition are understood as social constructs: "public perception of risk and its acceptable levels are collective constructs" (Douglas/Wildavsky 1983: p.186). The arrangement of such constructs, however, is not arbitrary, but follows distinct patterns. Within this concept they are explained with four rationalities—myths, tribes, cultures or ways of life—which can not replace each other (Davy 2004).

The concept was tested by empirical surveys (Kuckartz et al. 2007, Pendergraft 1998, Wegener/Liebig 1997), expanded to an overall guideline for urban planning (Davy 2008) and applied to various topics, for example siting of a waste incinerator in East Liverpool (Ohio, United States of America) (Davy 1997), regional cooperation in the Ruhr Area (North-Rhine-Westphalia, Germany) (Davy 2004), realization of system innovations in the Netherlands (Tukker/Butter 2005) and flood planning in Germany (Hartmann 2009). Beyond, cultural theory was also discussed in the context of diffusing renewable energy facilities (Jenssen 2010, West et al. 2010) as well as general energy and climate conflicts (Thompson 2003, Thompson 1984).

Concept of polyrationality explains social arrangements by four types of rationality and—instead of calling one actor irrational—assumes that each group acts perfectly rational. Therefore this concept shares similarities with rational choice theory, certainly without relying on pecuniary facts only (Harmgart et al. 2006) and thereby allowing to apply different premises or varying benchmarks (on rationality). This article transfers the concept to the energy sector.

The concept is visualized in Figure 2. It contains of four rationalities: entrepreneurial expansionists, communards, hierarchists and fatalists (Douglas 1994, Thompson 1990). The rationalities refer to the moral concepts of organizations or institutions and reflect four dimensions: the self perception (as an individual or as a collective) and the motivation (as intrinsic or extrinsic). Hence, it is often called grid-group analysis (Limoges et al. 1995).

The entrepreneurial expansionists trust in their own capabilities. They think that a free market allows the highest economic and environmental efficiency and that risks have to be taken. Therefore, they favor market compatible instruments instead of regulatory stewardship. On the contrary, the communards suppose that nature is fragile and affected by various economic activities: they seek to avoid risks and take effective

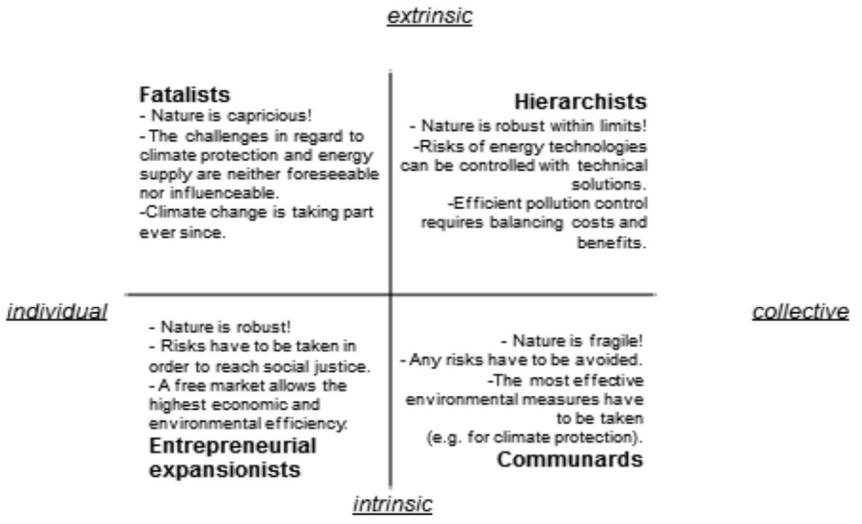

Figure 2. Four Rationalities
Source: Adapted from Davy 1997

measures for environmental protection. The hierarchists assume that risks are controllable and support risk-averse planning controls, government interventions and market restrictions. In turn, the fatalists believe that challenges in regard to climate protection and energy supply are neither foreseeable nor influenceable because climate change is taking part ever since, they are indifferent with regards to governance. For that reason, no emphasis is put on their analysis.

The four rationalities can be found in any country, region or city. They may differ in number and power but they are present, encounter each other and come in conflict. They meet another in the social arena—the symbolic location of political actions (Kitschelt 1980). "Symbolic location means that arenas are neither geographical entities nor organizational systems. They describe the political actions of all social actors involved in a specific issue. Issues can be pending political decisions such as siting of facilities or increased property taxes; social problems such as crime or education; or ideas such as civil liberties, or evolution versus creationism" (Renn 1992: p.181).

'The social arena concept of risk debates' draws back to research in the 1960s (Lowi 1964) and was consolidated and re-introduced to risk research by sociologist Ortwin Renn (1992). It is inspired by the resource

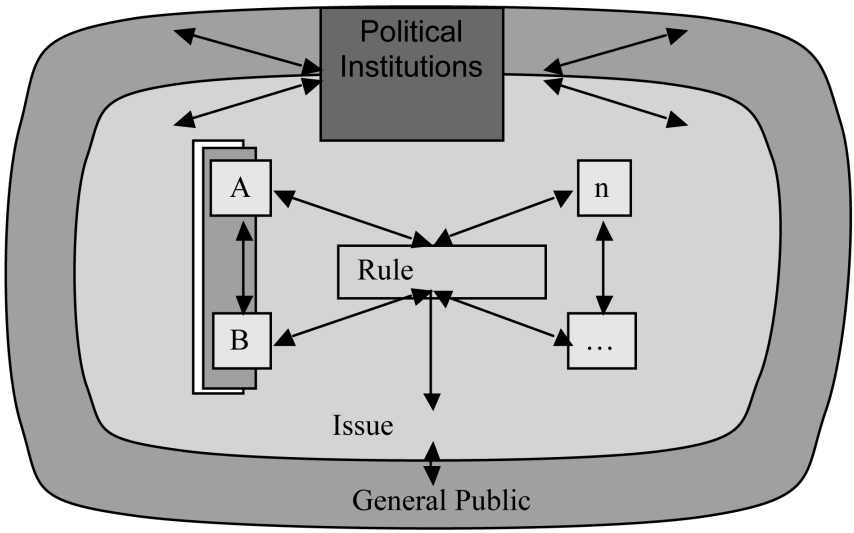

Figure 3. The social arena
Source: Adapted from Renn 1992

mobilization theory and assumes that actors acquire resources and use them to promote their personal goals. Concept of social arena was carried out as an interpretative scheme to various cases such as nuclear technologies (Renn 1991), food production (Maurer/Sobal 1995), flood planning (Wernstedt/Hersh 2002) or chemical industry (Zöller 2005).

The basic idea of the arena concept—which is illustrated in Figure 3—is that actors (A, B, ..., n) aim to maximize their outcome of public-political processes by bringing five resources (money, power, social influence, value commitment and evidence) in the social arena (Ruostetsaari 2010, Zöller 2005, Lomax 2000, Peters 1994). Money represents the probably best known medium of exchange in this world and can help to provide incentives to others, power is the legal right to execute decisions on others and social influence builds on social prestige and trust with others. Moreover, value commitment (as commonly shared values, interests or worldviews) and evidence (in particular derived by science) can be employed (Renn 1992). Whereas the rule enforcer agency takes care of the compliance with formal rules, the issue amplifiers (media in particular) observe the events in the arena and communicate their interpretations to the general public (audience) which can at any time enter the arena.

To be successful the actors need to rule more than one resource. For instance, having money is obviously not sufficient to pass a new law. As resources can not substitute another, actors start exchanging resources: skilled organizers or reputable persons for example might be attracted (with money or prestige) to join a group and defend their cause. In turn, offering money to compensate for disadvantages of new facilities and to increase acceptance[2] can be difficult as "health risks are hard to compensate for" (Wolsink 1994: p.864). Moreover, the second type of exchange may even lead to lead to an "erosion of general public's trust" (Löfstedt 2004: p.37). After all, when trading both resources may be lost: "The arena concept does not picture the actions on stage as a play with a script or actors performing role assignments. Arenas are more like medieval courtyards in which knights have fought for honor and royal recognition according to specified arena rules that determine the conditions for the fight, but leave it to the actors to choose their own strategies" (Renn 1992: p.184). This quote addresses the presence of competitions among actors rather than definite results and implies that the outcome of a social arena is undetermined.

Concept of polyrationality and social arena were developed by

scholars of two disciplines, the ones belong to cultural science and the others to social science. However, the two share similarities. Both have in common that:

- they offer a framework to understand risk perception and associated disputes, and to develop strategies,
- they refer to group responses and the associated individuals are assumed to act rational (albeit not only in pecuniary terms),
- the applied social categories (rationalities or resources) cannot replace another, and
- despite using distinct analytical categories, they fairly acknowledge that actually always a combination (of rationalities or resources) takes place and is required for reaching viable solutions.

Table 1 highlights how both concepts relate to another. The rationalities and their (dominant) resources can be assigned to another. Entrepreneurial expansionists favor money, communards are endued with value commitment and hierarchists predominantly use power. In contrast, social Influence and evidence can not clearly be attributed to one of the rationalities.

The rationality, the perception of the problem and the dominant resource lead to a certain perception on the energy supply which can ideal-typically be addressed with the narrative titles listed in Table 1. Entrepreneurial expansionists prefer an efficient energy supply, communards like a sharing energy supply and hierarchists aspire a structured energy supply. The perception of the others certainly differs significantly from the self perception. The entrepreneurial expansionists are regarded as overemphasizing the economics and being careless, the communards look excluding as they only share with members and the hierarchists seems to be over-regulative and despotic.

BIOENERGY TECHNOLOGIES: GREEN ON GREEN?

When the demand for heating increased in Ludwigsburg (Baden-Württemberg, Germany) and when old heating facilities had to be re-

Table 1. A synopsis on rationalities and dominant resources
Source: altered after Davy 2008, Renn 1992, Thompson 1984

Rationality	Entrepreneurial expansionist	Communards	Hierarchists
Problem perception	Nature is robust: our present supply systems are sustainable!	Nature is fragile: a sustainable future can only reached by radical change!	Nature is robust within limits: present supply is not sustainable; the solution lies in an orderly transition!
Self-perception	Efficient energy supply	Sharing energy supply	Structured and well-ordered energy supply
Perception of the others	Greedy and careless energy supply	Excluding energy supply	Despotic energy supply
Dominant strategy	Transfer of Capital Economic Incentives	Solidarity/Unity Risk Avoidance	Punishment/Compliance Technical Regulation
Dominant sphere	Economy	Social System	Politics
Dominant resource	Money	Value Commitment	Power
	Social Influence		
	Evidence		

placed, the local utility developed a concept for a combined heating and power (CHP) plant fuelled with landscape wood, feeding heat energy to an existing network. The first attempts for this bioenergy plant date back to 2005, when plans for two locations were given up by the local utility because they were situated close to nature reserves and residents opposed it (Spear 2007, Maier-Stein 2007, Schuler Ingenieubüro 2005). After this experience, a consultant was assigned to conduct a siting study by incorporating various factors such as land ownership, planning law, competing land uses, and logistics. In the conclusion of this study, the optimal site for the CHP station was identified at a former warehouse (Stadt Ludwigsburg 2006, TÜV Süd 2006).

Table 2. Energy disputes on a biomass CHP plant

Rationality	Entrepreneurial expansionists	Communards	Hierarchists
Actor	Operator	Residents	Local authorities
Problem perception	Increasing prices for energy carriers	Local air quality	Climate protection
Self-perception	Offering attractive prices for residents and testing innovative technologies	Protests are necessary when health risks such as cancer are rising	Emissions and residents' fears are taken into account adequately
Perception of the others	The operator causes additional particulate emissions and sets people on risk	The initiative acts selfish as it wants to prevent burdens right on its own doorstep	The authorities use non-transparent and top-down planning procedures
Dominant strategies and measures	Cost efficient renewable technologies (biomass) and short pipeline lengths	Publicity campaign	Identification of the optimal site and approval procedures
Dominant sphere	Economy	Social System	Politics
Dominant resource	Money	Value Commitment	Power
	Social Influence		
	Evidence		

Soon after plans were published, a citizens' initiative began to oppose and launched a publicity campaign against it, especially by raising the issue of particulate emissions (Spear 2007). When the intensity of the dispute grew a member of both, local parliament and management board of the utility, declared his doubts and called for conventional technologies—prior to that the management board had decided to build the CHP station without a dissenting vote (Editorial department of LKZ 2007, Verband Region Stuttgart 2006, Editorial department of BZ 2007). As a reaction to the critics, the operator prepared various offers (flyers, a visit to a similar CHP unit, and discussions with energy experts). This included the transfer of information only, but did not imply the opportunity to participate or to influence decisions. However, the citizens' initiative did not lessen its opposition during this process[3] (Citizens' Initiative 2009). A summary on each actor's position is given in Table 2.

From the operator's perspective, the opposition wanted to avoid burdens "in front of their own doorstep only"[4] (Interview) and did not bring the positive environmental effects into balance adequately. For the operator, the resistance was driven by selfish interests using false assertions for mobilizing the public against effective climate protection measures (the CHP-unit; author's note) following the "Floriani-rule"[4] (Interview, author's note: this term is used equivalent to NIMBY in German speaking countries). In turn, the Citizens' Initiative stressed that their "aims are for good local air quality and not the simple avoidance of the CHP-station"[4] (Public Hearing). A letter to a local newspaper referred to the same concern: "This CHP unit will stay for decades, will poison our environment, and will make us humans ill"[4]. (Schulz/Schulz 2007: p.6). Citizens' Initiative argued that particulate emissions were already beyond recognized safety limits and posed serious health risks (such as cancer) to the community. Therefore, everything creating new particulate emissions (the CHP unit) should be avoided (Citizens' Initiative 2009).

Based on a technical report, the municipal council, however, came to the conclusion that emissions of the planned CHP unit would be far below mandatory standards defined by national regulations. The council stated that the "best available filter-technologies should be employed"[4]. (Stadt Ludwigsburg 2007: p.4). If this were to be done, "only irrelevant additional emissions would be created"[4]. (Stadt Ludwigsburg 2007: p.3) and "no relevant risk would occur"[4]. (Stadt Ludwigsburg 2007: p.2). Finally, construction of the CHP plant started (without modifications) in

2008 and operation began in autumn 2009.

The fundamental differences among the actors and their perception of the CHP plant and its risks are illustrated by Figure 4. The picture on the left, designed for the operator, shows an architectural sketch of a beautiful and modern CHP plant seamlessly fitted into its surroundings. The computer animation in the middle—published on the Initiative's web site—reflects a dark and threatening atmosphere that obstructs the view on the city's skyline. In turn, the picture on the right—taken from the siting study conducted for the local administration—suggests that effects on the built environment are "negligible"[4] (TÜV Süd 2006: p.14). It shows the site before the CHP station was erected. In this picture, residential buildings seem to be in quite a far distance and partly covered by bushes and trees. Thus, the facility is meant to be hardly visible for residents according to this picture. By looking at the three pictures, it becomes evident that the actors have different and opposing perceptions of the same CHP station.

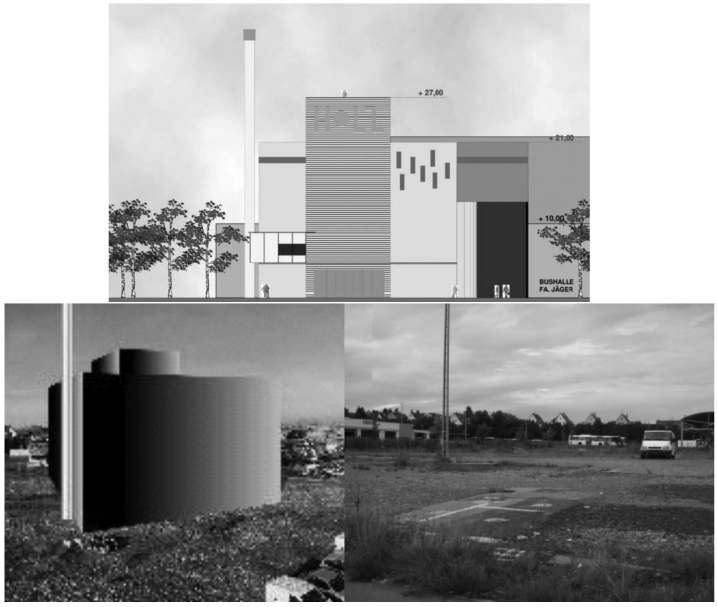

Figure 4. Different pictures of the same CHP-station
Source: B+O Architects 2010, TÜV Süd 2006, citizens' initiative 2009

OIL TECHNOLOGIES—SPILLING TRUST?

The oil spill in the Gulf of Mexico started with the explosion of the oil rig "deepwater horizon" in April 2010 killing eleven men. The resulting fire burned for 36 hours, the rig sank and oil leaked out of the ruptured wellhead. Three month later, the leak was stopped by installing a cap on the wellhead. Within the second largest accident[5] in the history of oil industry 4.9 million barrels of crude oil were released, affecting more than 500 kilometers of Louisiana shoreline and causing severe damages to natural habitats, animals as well as to regional economy (especially fishing and tourism industries) (BP 2011, Goldenberg 2011).

Immediately, disputes on impacts, disaster management and accountability started: "The anger is palpable in the southern Louisiana towns where livelihoods are being slowly and inexorably choked by oil. Pickup trucks with 'BP sucks' scrawled on their panels bounce along the roads" (Goldenberg et al. 2010). But reactions on the oil spill went far beyond Louisiana or the USA: more than 800,000 people worldwide join the "boycott BP" group on Facebook (Facebook 2011) contributing to the predominantly negative echo in social media (especially in the first week after the incident) (Muralidharan et al. 2011) and Greenpeace activists put a "British Polluter" flag on the BP-headquarter in London (Editorial department of The Guardian 2010), just to mention two.

Within the disputes, the involved actors clearly stoke their claims. Though the operators of the oil rig admitted to have missed warning signs (Goldenberg 2010), they also assert that adequate actions were taken: "We have acted to take responsibility for the clean-up, to respond swiftly to compensate people affected by the impact of the accident, and to look after the health, safety and welfare" (BP 2011). The level of expenditure for their respond activities is quantified at $ 17.7 billion (BP 2011). Despite the negative impacts of the oil spill, Jack Gerard, president of the American Petroleum Institute, finds that oil spills are infrequent and Deepwater Horizon is an isolated incident: "The first time anything of this magnitude has ever happened was this particular incident. So we need to put that in context and not cast unfounded aspersions on the broader industry because of this one incident" (McGinnis 2011).

The actions taken were nowhere far enough for others like former labor secretary Robert Reich. He wanted immediate and strict reactions: "no president would allow a nuclear reactor owned by a private for-profit company to melt down in the United States while remaining un-

der the direct control of that company. The meltdown in the Gulf is the environmental equivalent" (Goldenberg et al. 2010). Environmentalists on their part claim to realize a maximum protection for the environment with regards to future activities of oil industry: "Stop drilling for oil in the deep sea"[6](Vorholz 2010).

Government replied sharply, US Interior Secretary Ken Salazar for example made clear that government is committed to punishment and compliance and will "keep our boot on their neck until the job gets done" (Mardell 2010). US-President Obama also toughened his rhetoric when attesting that he talked to oil experts "so I know whose ass to kick." (Editorial department of CNN 2010). In order to implement new safety requirements, the national government issued a moratorium on deepwater offshore drilling (U.S. department of the Interior 2010a). Oil industry and their workers strongly denounced this measure as harmful to their economy (McNulty 2010). Interim, the moratorium was brought to court by oil industry, it was lifted by a judge and then re-issued by government (Broder 2010, U.S. department of the Interior 2010b, Jackson 2010). In October 2010 the moratorium was finally ended by the administration—six weeks earlier than it was supposed to be—and drillers now need to undergo new inspection and permission procedures. Michael Bromwich, director of the Bureau of Ocean Energy Management, adds: "The risks of deepwater drilling have been reduced sufficiently to allow deepwater drilling to resume" (Jones 2010).

The actors also sought to compete for the resource evidence which is not the dominant resource of any of the rationalities as the example of the environmentalists' shows: "We did not send our rainbow warriors to the confederate states, but our best men: reporters and professors from Alaska and Amsterdam, which have great expertise in oil accidents. Their voices were heard in media"[4] (Eberle 2010). However, it turns out that disputes are on both, management of the oil catastrophe and future activities of oil Industry. An overview on perceptions and measures is given in Table 3.

Like in the previous case study, the diametrically opposed views of the different actors can well be illustrated by help of pictures (see Figure 5). The first photo found on the BP-website shows a blue sky, a sparkling sea and a beach with fine sand—a classic motive of a holiday-postcard. Moreover, there are three working men cleaning up a clean beach. The message is clear: remediation is successful, "the beaches are beautiful" (Hannaford 2011) and the region is ready to host tourists again. In turn,

Table 3. Energy disputes on oil spill

Rationality	Entrepreneurial expansionists	Communards	Hierarchists
Actor	Operators	Residents	National authorities
Problem perception	Oil spills are infrequent and Deepwater Horizon is an isolated incident	The oil spill was bound to happen	The oil spill was avoidable
Self-perception	The oil spill helps operators to learn and to improve the safety of deepwater drilling	Anger about environmental damages and job-worries	Anger and worries of industry and people are taken into account adequately
Perception of the others	Systemic management failures by the involved operators	Understanding for anger and worries of the people	Frustration at government's response (harmful to economy or indulging to environmental damagers)
Dominant strategies and measures	Containing the leak Financial compensation	Publicity and research campaign	Facilitating high manpower for cleanup response Moratorium for future oil rigs
Dominant sphere	Economy	Social System	Politics
Dominant resource	Money	Value Commitment	Power
	Social Influence		
	Evidence		

an oil-bonded bird is on the picture in the middle. It emphasizes the negative consequences of human's economic activities and the high risks this puts on defenseless animals. In the internet together with the BP-brand the following is added to the image: "responsible for worst oil spill in history." All in all, it is a harsh accusation of the ecological tragedy. The photo on the right shows a costal guard patrolling Louisiana shore. It is a "pars pro toto" image for the "more than 20,000 people[7] in the region working around the clock to contain and clean up this spill" (Obama 2010). It reflects the public efforts and suggests that government

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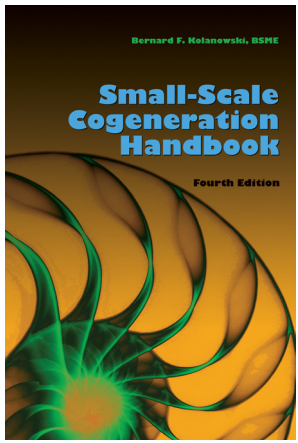

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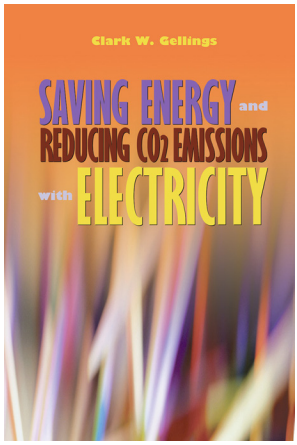

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is fully prepared to respond to the ecological challenge. However, the three images make clear: the actors have different and opposing perceptions of the same oil spill.

Figure 5. Different views on the same oil spill
Source: BP 2011, Restore the Gulf 2011, etiennecoutu 2010

RATIONAL AND POLYRATIONAL ARENAS?

A huge bandwidth of instruments and strategies can be used for designing a sustainable energy future. The applied strategies in the two cases can be systemized in accordance to rationalities and resources: the entrepreneurs go on with their expansionist strategies and favor market-compatible instruments (resource money: e.g. technological pioneer and compensation payments), the communards reduce their demand on nature being a role model to others to do the same (resource value commitment: e.g. publicity and research campaign) and the hierarchists plan and control (resource power: e.g. regulations on filter technologies and moratoriums). The fatalists resign their selves to whatever comes and do not contribute to effective and sensible strategies (Douglas 1994). In the two case studies, all of the strategies were employed as shown in summary-Table 4.

The strategies can be implemented independently or they can be

used consecutively (Tukker and Butter 2007: p.100: "switching between styles"). This may be understood as the insight that complex systems as the energy supply can not be countered with a single governance approach only; strategies need to be chosen according to the specific situation.

But can the strategies also be applied in a concerted interplay and help generating sustainable energy in a polyrational arena? Even though he speaks about different technologies Fatih Birol—chief economist of the International Energy Agency (IEA)—gives us an idea. "Why not real-

Table 4. Synopsis on governance modes in the two case studies

case		**Bioenergy plant in Ludwigsburg**	Oil spill in the Mexican gulf
Issue of energy supply		**Implementation of bioenergy plant**	Environmental protection from past and future oil spills
Issue of disputes		**Prevention**	Aftercare and Prevention
Time scope		**Short to medium term (from siting to construction)**	Long term (regeneration of eco-systems)
Spatial scope of disputes		**Local**	Regional, national and global
Strategies and measures	Entrepreneurial expansionists	**Pricing and technological pioneer**	Financial compensation
	Communards	**Publicity campaign**	Publicity and research campaign
	Hierarchists	**Regulations on filter technologies and siting studies**	Moratorium on deepwater offshore drilling Stricter technical regulations and inspections
Understanding the need for institutional change		**Low:** **Focus on overruling opposition**	Moderate: Focus on compensation and cleanup New standards are established
Outcome		**Bioenergy plant was build without modifications**	Response phase (cleanup) ended New permission and inspection standards are set

izing CCS and renewable energy?" he asked in an interview and continued: "I like any technology that reduces global CO_2-emissions. First of all, one should stop preaching. The operator of a coal power plant and the owner of a wind turbine have much in common: both want to earn money"[4] (Birol 2010).

Table 5 highlights that the statement includes three aspects: the emphasis of cost efficiency ("Both want to earn money," entrepreneurial strategy focusing on resource money), the rhetorical request to stop leading fundamental conflicts and being practical ("First of, all one should stop preaching," communard strategy addressing resource value commitment) and the parallel realization of two technical opportunities ("Why not implementing CCS and renewable energy," hierarchist strategy focusing on resource power). Intuitively or not, his energy policy seeks taking all rationalities into account or to at least not plan to the (overt) disadvantage of other actors[8]. He follows a 'considerate' energy planning policy.

BRINGING THE ELEPHANT IN THE ARENA

"Gray is all theory—the truth lies on the pitch"[9]. This contribution to soccer wisdom can as well be read in context of this article: the actions in the social arena determine whether the energy supply will be transformed towards sustainability or not: the truth lies on the pitch, the truth lies in the arena. In contrast to a sports arena, a social arena sometimes just occurs because actors enter the stage. But the simple occurrence does

Table 5. Rationalities in the energy sector

Statement	"Both want to earn money"	"First of all one should stop preaching"	"Why not realizing CCS and renewable energy?"
Addressee	Entrepreneurial expansionists	Communards	Hierarchists
Dominant sphere	Economy	Social System	Politics
Dominant strategy	Economic Incentives	Solidarity/Unity	Punishment/Compliance Technical Regulation
Dominant resource	Money	Value Commitment	Power

not necessarily make it to a promising place for creating solutions.

The concept of a polyrational arena presented in this article draws on the theoretical concepts of 'polyrationality' and 'social arena'. It combines the strengths of both: the prototypes of group responses and their underlying motivations (polyrationality) as well as the interactions between groups and the social processing of power (social arena). It distinguishes actors and audience, takes media/issue amplifier into account (both like social arena concept) and sees political institutions as an active party on stage designing and authorizing energy systems (like polyrationality). The concept may help decision makers to advance their knowledge about rationalities, to understand their interests and take it as something legitimate, to avoid planning on the costs of other groups as well as to increase searching for creative solutions.

But one should certainly not oversee that the real world apparently looks different from both, the elephant analogy (section 2) and the developed concept (sections 3 to 6). These aspects, in turn, offer starting points for conflict resolution and improved assessments:

1. In contrast to the tale external feedback (by media and science) can be given and can discipline the testers if they exaggerate with their viewpoint too much.
2. Actors in energy conflicts are not blind (as in the elephant analogy) and can gather knowledge about others, build alliances and can change their strategies.
3. Unlike the tale, actors can shape the 'elephant' (i.e. the energy system) and thereby alter conditions (experience, information, etc.) for social decisions.
4. The concept focuses on the meso-level of social decisions but lacks of structural drivers and the individual perspective[10]. Linking it for example with the transition theoretical multi-level perspective approach (Rip/Kemp 1998) may help overcoming this weakness.
5. It stresses 'rationality' very much. Apparently, energy policy is not merely a matter of rational argumentation and the emotional involvement can change the impact of peoples' responses. I use the term rationality not to neglect this but to seek for the rationale behind behavior[11] (Douglas 2002: XI).

This article, however, does not suggest which technology or which mix of technologies is sustainable. But it strongly encourages not just

to 'wipe away' or to 'remove' opposition towards certain technologies, nor to simply persuade 'the others'. It rather advocates taking diverse and opposing opinions and rationalities as a chance for finding accepted, permanent and innovative solutions. Entrepreneurial, communard and hierarchical strategies—or the resources money, value commitment and power respectively—should be applied consecutively and complementary, not exclusively. Certainly, generating sustainable energy in the polyrational arena does not offer 'easy' solutions and requires 'uncomfortable' competitions. But it helps making explicit what often stays implicit and leads the attention to convincement. Of course, the polyrational arena is a balancing act!

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Notes:

1 Interviews were conducted between January 2007 and November 2008. Interviewees were asked to point out the key events of the siting process as well as to comment about the pros and cons of bioenergy technologies on the suggested sites and in general. Quotations from interviews with various actors will remain anonymous and are cited as "(Interview)."
2 To address people whose opposition can be categorized as YIMBY-FAP (Yes In My Backyard-For A Price) (Frey 1996).
3 In the meantime, the initiative has taken down their website.
4 Translation by the author
5 During Gulf War I (1990) 8.0 million barrels of crude oil spilled into the Persian Gulf (Wikipedia 2011).
6 Energy economists certainly object this claim by reasoning that an cost efficient energy supply cannot be reached without using natural oil: "It does not work without oil from deep sea" (Vorholz 2010). In addition, polls show that the majority of Americans currently has stronger worries about energy costs and rather supports offshore oil drilling (Koch 2011).
7 At the height of activities, up to 48,000 persons worked on responding the oil spill (Obama 2011).
8 In a different context Davy resumes similarly: "planners at least can avoid creating spaces of wealth at the cost of the poor (2009: p.254).
9 The word was coined by Alfred 'Adi' Preissler, captain of the team which won the first championship for German football club Borussia Dortmund. It was translated by the author, the original German version is: "Grau is' alle Theorie—entscheidend is' auf'm Platz."

10 Among structural drivers there are aspects as technological development, world market prices, 'external shocks'. The individual perspective includes purchase decisions, comfort needs, etc.
11 The more one uses alternative terms (e.g. myths, tribes, cultures or ways of life), the more the concept allows to be opened up to emotional arguments.

ABOUT THE AUTHOR

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