Politics

Till Neuhaus

Risk-Distribution among Public and Private Actors in the United States' Nuclear Sector

Master's Thesis

GRIN

Bibliographic information published by the German National Library:

The German National Library lists this publication in the National Bibliography; detailed bibliographic data are available on the Internet at http://dnb.dnb.de .

Imprint:

ISBN: 9783668961128

This book at GRIN:

https://www.grin.com/document/470715

Till Neuhaus

Risk-Distribution among Public and Private Actors in the United States' Nuclear Sector

GRIN Verlag

Inhalt

1. Introduction

This work will try to answer two central questions: Firstly, this work will try to find out when which kind of risk in the field of nuclear energy was perceived as relevant by politics and the industry and whether a shift concerning this risk perception can be identified. Secondly, it will be attempted to clarify the question which of the involved actors – public or private – had and still have to cover the different risks. The division into public and private actors results from the circumstances that nuclear energy was not created out of the industry's desperate search for a new energy source (cf. Basalla 1988: 167) but the historical fact that nuclear energy was a state-sponsored technology transfer from the military sector into the civil sector of energy production.

This work can be divided into six different blocks: 1) Introduction, 2) Risk and Risk Evaluation, 3) The Role of Nuclear Energy in the United States, 4) The Entanglement of the Public and Private Sector, 5) Risk Distribution among Private and Public Actors in different Fields of Nuclear Energy, and 6) Outlook on Potential Future Research. As it can be deduced from this itemization, this works becomes gradually narrower and leads to the main corpus of this work – the fifth block on risk-distribution among private and public actors in different fields of nuclear energy. The sections mentioned above and their relevance for this work will be present in the following.

In the section concerning risk and risk evaluation it will be tried to lead over to the theoretical basis of this work. The section however starts with "The Changing Nature of Risk", in which the general risk discourse will be discussed and it will be shown that risk has developed from a purely natural to a technological phenomenon and, in its later perception, is perceived as a hybrid threat of the two aforementioned, in which natural disasters unveil the weaknesses of mankind's constructions and the catastrophes become significantly more disastrous – as seen in Fukushima. After the introduction of this relatively abstract risk discourse, the technological process of creating nuclear energy and its risks will be presented. Especially the latter mentioned will serve, at the end of this work, as an additional basis for comparison. After having discussed potential risks of nuclear energy, the following section will argue that classic risk evaluation (risk probability multiplied by the potential damages) comes up short in the field of nuclear energy and nuclear matters in general. The key problem is that the necessary variables, the probability as well as the damages, cannot be calculated adequately. Out of the necessity to follow another, and more practical, theoretical approach, risk-based regulation (cf. Black 2013, cf. Black/Baldwin 2012, and cf. Black/Baldwin 2010) will be presented at the end of this section, which will also serve as the theoretical basis of this work. To not have an exclusively legal focus in this work – and perhaps missing out on various occasions – the perspective of the risk-based regulation will be complemented by the so-called *proceduralization* (cf. Black 2000), which also allows taking more indirect forms of regulation (subsidies, tax-cuts, etc.) into account.

After having introduced the theoretical framework of this work, the third section will try to evaluate the relevance and importance of nuclear energy for the United States. Section three starts with a rough historical overview over developments concerning nuclear energy in the United States. The historical overview on the amount of reactors will be followed by a sub-section on geopolitical consequences and risks which were created by the spread of nuclear technology. As this kind of risk can only be handled by the state, it is discussed separately in this work. Following the section on geopolitical consequences, economic aspects of nuclear technology will be discussed. The majority of all energy producing sectors is unprofitable in completely deregulated and unsubsidized markets; however, nuclear energy is a special case as the technological risks are significantly higher compared to traditional sources of energy. To justify the exposure to such risks, the profits or potential profits of nuclear have to be significantly higher than of other technologies (cf. Renn 1982: 38). As multiple researchers have shown, the profitability of nuclear energy is heavily depending on the amount of public subsidies (cf. Meyers 1977: 26/27) and as soon as those subsidies are no longer given, nuclear energy's profitability no longer exists (cf. Tamplin/Gofman 1983: 49) – a result the MIT could confirm in 2003 (cf. 2003: ix). Morone and Woodhouse asked the question why "[t]he United States has invested more than 200 billion in an industry that is psychologically unacceptable to a majority of citizens, politically unacceptable to most elected officials, and economically unacceptable to utility companies" (1989: 29). George (1978: 39) states that the AEC – the commission responsible for the regulation and promotion of nuclear energy – recruits its members almost exclusively from former or active top-rank industry staff. On the basis of this observation, George concludes that nuclear energy was a vehicle to transfer public money into private companies – whether this observation can be confirmed or not will be discussed in the following section, which focuses on the entanglement of private companies and governmental regulation and promotion commissions. The insights from this section will help to understand risk-distribution schemes in the main part of this work.

In the fourth section of this work, the entanglement of politics and private actors will be looked at. The focus will be set on the change of organizations (from the AEC and JCAE to the ERDA and NRC and from there to the current model of the Department of Energy and the NRC). Further, the regulatory performance of the installed organizations will be discussed. Generally speaking, this section tries to deepen the understanding how regulation was organized in the United States. The central problem concerning regulation of sophisticated technology is that politics try to find a solution for a technological problem. However, the regulation of technology "requires expert knowledge which often resides solely within the industry" (Slayton/Clark-Ginsburg 2017: 1). This section aims at understanding which kind of political solution the United States has chosen to overcome this information gap.

After having gained insights on the regulatory picture, the main part of this work can tackle the question of the actual risk-distribution. Nuclear energy introduces a variety of risks – ranging from economic risks (R&D, production, construction, operation) to the case of hazards and disasters. With the help of risk-based regulation focusing on the past, it will be attempted to identify resource distribution schemes. This analysis will take place in three different sectors concerning nuclear energy and its production. Firstly, the R&D, the construction, and operation of reactors will be looked at and it will be tried to find out when which kind of actor had to cover which kind of risk and whether shifts in those constellations could be observed. This part strictly follows the technological innovation (LWR, HTGR, and LMFBR) and will show how the different actors involved reacted to market fluctuations and other risks. The second section will take a closer look at the nuclear supporting industry (mining, enrichment, reprocessing, and waste storage). All of those industry branches used to be organized by the state and were later partly privatized. The organization and degree of privatization, as well as risk-distribution among public and private actors, differ immensely depending on the sector. This will be analyzed in this sub-section. The last section in chapter 5 will focus again on nuclear power plants, this time with a special interest in security issues. Since the late 1970s no new reactors projects were realized. The security situation was distinctively different in the 1970s than it is today. As a result, many reactors lack much needed upgrades and protection. This sub-section will analyze which security measures were upgraded as a result of newly arising threats and who had to cover the costs for these upgrades. After having worked on these three areas (R&D and construction, supporting industry, security), it will be tried to draw conclusions on the basis of prior results and it will be attempted to answer the question whether certain trends and tendencies in risk-distribution among private and public actors can be observed and identified. At the end of this work an outlook on potential future research in the field of nuclear matters will be given.

2. The Changing Nature of Risk

"Risk is the potential for realization of unwanted, negative consequences of an event" (Rowe 1977: 24). Kates and Kasperson follow a similar approach when they state that "[…] risks are measures of the likelihood of specific hazardous events leading to certain adverse consequences" (1983:7029). But then again risk has been defined as the probability (or probability distribution) of positive and negative consequences, which can occur when a certain action or incident has been realized (cf. Renn 1984: 97). By those definitions, risk is not a fixed value but only a probability with which certain events and their consequences, negative as well as positive, may occur. Those three definitions already show that risk has always been a contested term and was negotiated and defined countless times. All three definitions have in common that they assign a certain probability to an event. The assignment of probabilities to different outcomes differentiates risk from uncertainty[1] (cf. Knight 1965/1921). It can be stated that information about the world plays a crucial role in decision-making and the risk discourse. However, not only knowledge is crucial for the risk discourse but also the question of agency. Some scholars differentiate between risk (chosen by oneself) and danger (chosen by someone else) (cf. Rescher 1983: 6/7). But even without active decision-making, risk and danger has been mankind's companion ever since as "[t]here will always be crisis, catastrophes and uncertainty" (Müller 1994: 372). For ages, the main causes of risk were produced by human environment itself as humans were depended on climate and fertile soil (cf. Renn 1984: 30) and so "natural phenomena such as earthquakes, storms, floods, or tsunamis" but also droughts were uncontrollable and God-given (Macamo/Neubert 2012: 82). However, perception of mankind's impotence can only be uphold until mankind developed mechanisms to foresee, to control, and to mitigate the impacts of those disasters (Renn 1984: 29). One promising attempt to foresee, control, and mitigate risks was the development of technology. Some scholars argue that the development of technology enabled humans to thrive beyond their insufficient and limited God-given physical abilities (cf. Ropohl 1980: 3). However, it has to be acknowledged that technological progress is a source for improvement of life quality but simultaneously a thread to it as well (Douglas/Wildavsky 1982: 194). Over time, the scholarly perception of risk was shifting from exclusively natural disasters to "[…] accidents of a more technical nature" (Macamo/Neubert 2012: 82). Ulrich

[1] Later publications split the term uncertainty into two sub-categories, ambiguity and unawareness. Ambiguity is there defined as the knowledge about different possibilities without the corresponding probabilities whereas unawareness is understood as only incomplete knowledge about the different possibilities in the first place (cf. Svetlona/van Elst 2013: 44).