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Framing uncertainty: The power of expectations

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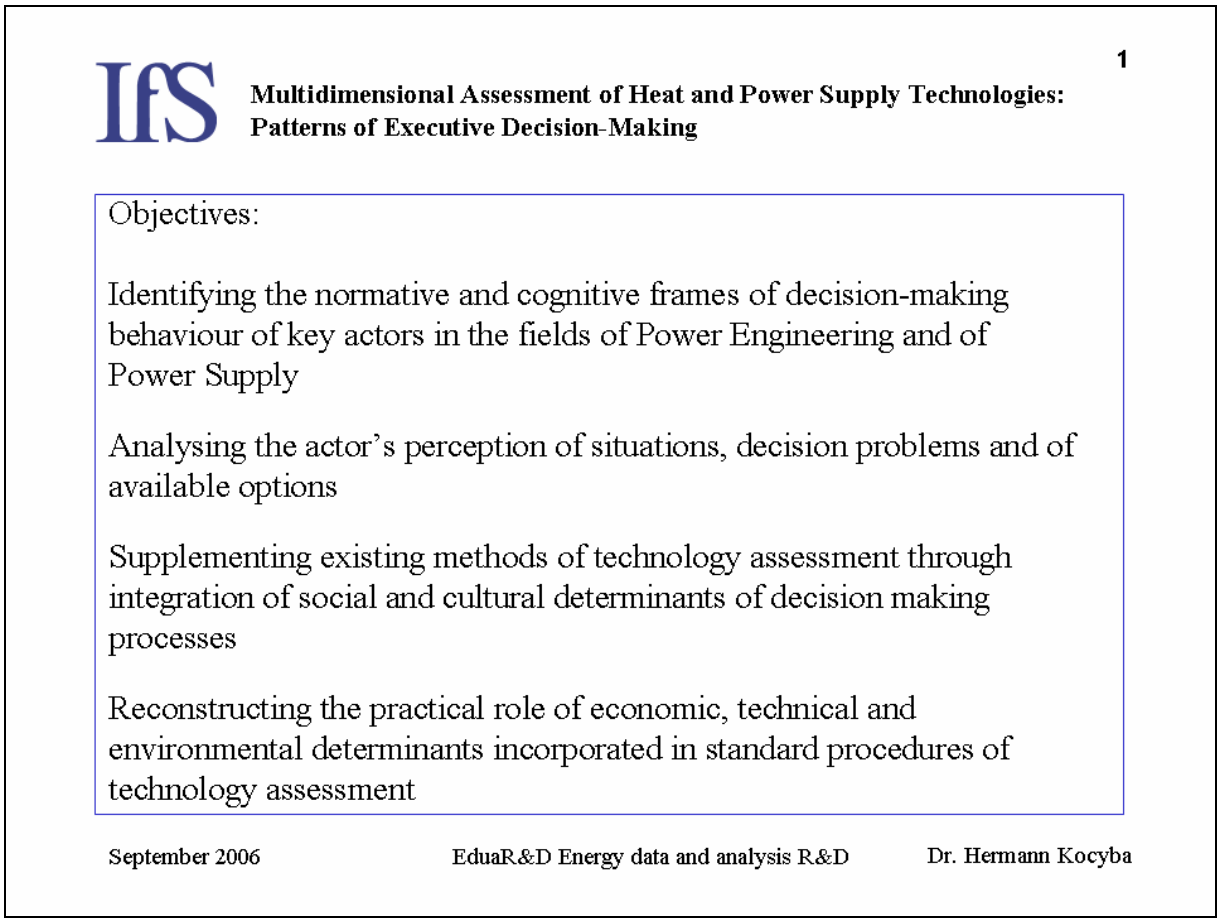
The research-project "Multidimensional Assessment of Heat and Power Supply Technologies" includes a sociological perspective on decision making practices in the field of power generation and power engineering. It is not focussing on social determinants of technology acceptance, but on patterns of decision making. What can be expected from a social analysis of the decision making behaviour of leading executives of power generation and power technology firms?

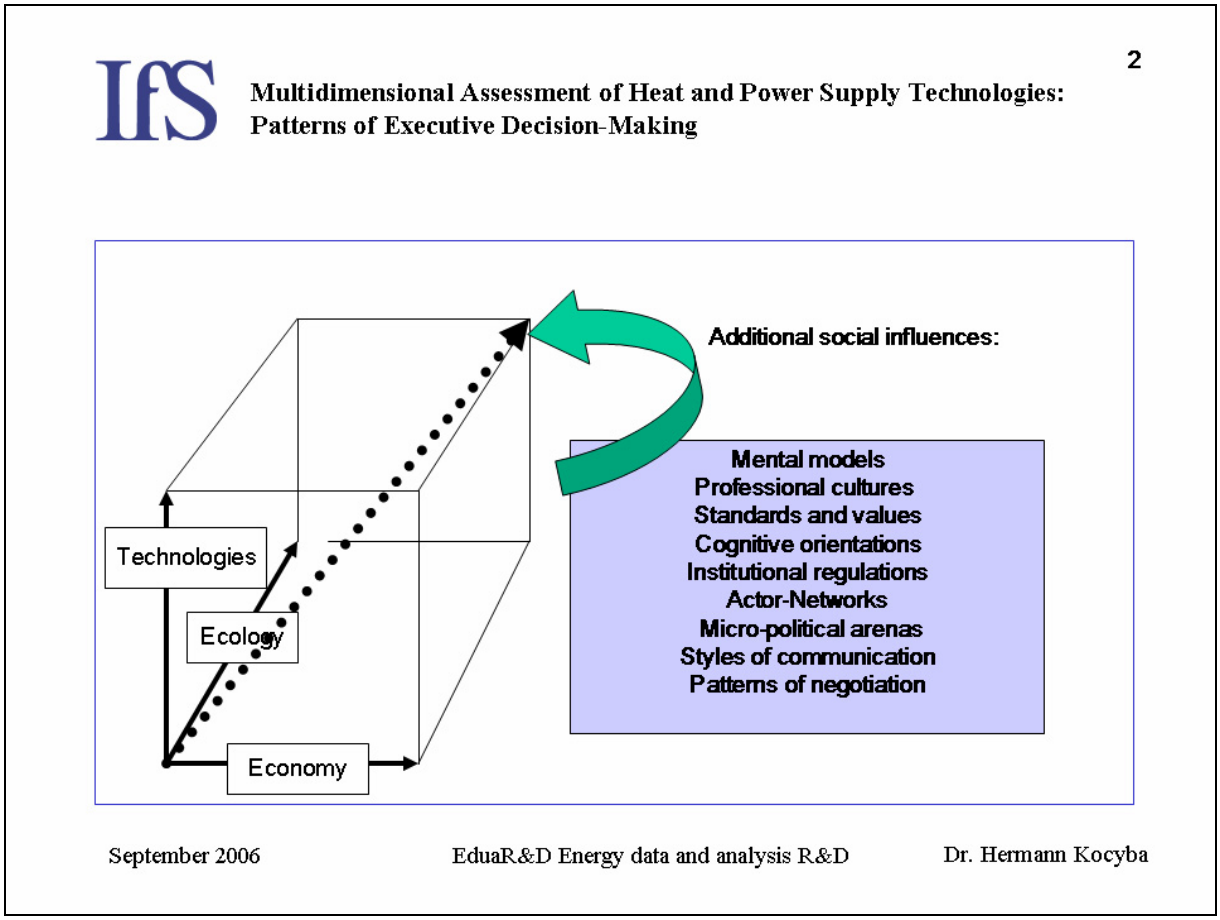


1. Why a social analysis of power engineering?

Power plants and power generation technologies look so overwhelmingly real. Power generation is "heavy duty" and power plants are visible material entities. Even if they are not yet realized as physical objects (like for instance carbon-free IGCC-plants), they can be described in precise technical terms. And you do not need a sociologist to make a gas turbine work. Of course, power supply technologies have very important consequences on social life – as we can very drastically see in those cases in which the networks of power break down or do not function in the expected manner. If the stability and the security of power or heating systems can no longer be guaranteed or if the expected market prices change dramatically, those changes

immediately will have consequences that can be described in political and sociological terms. But if you want to solve these problems, you will ask for engineers or managers, not for a sociologist. So why listen to a sociologist speaking about problems which he is unable to solve?

Of course, there are social movements and political activists that engage in debates on the future of energy supply systems with sometimes quite radical ideas concerning the desirability and the acceptability of specific power generation technologies. From the perspective of technical experts however, this could be regarded as purely external influences disturbing the internal logic, the internal rationality of professional decision making. From this point of view, it is very easy to understand that a former executive manager reacted somehow surprised when he heard about our project: “So you want to explore the non rational features of decision making processes - but what do you expect to find out focussing on irrational aspects instead of rational ones?”



Before presenting some very provisional results of my ongoing research, I want to give you a very short outline of the basic ideas underlying this project, which is not focussing in a dogmatic manner on the supposed “irrationality” of decision processes. Analysing technological knowledge and economic practices, sociology wants to show how rationality works practically. Far from any denunciation of decision practices as being irrational, sociological research wants to offer a more enriched account of practical rationality.

2. Some specific aspects of the power business

Even if today we cannot imagine a power plant without advanced data processing, we all know that it is not a computer firm nor a software house. And even if an important part of the economic activity of a power or heat supplier is based on contracts, returns, investments, cash flows, liquidity etc., a power supply company is not a bank. Power plants and networks do not work without a physical basis. And in some cases, it is just the durability of such physical entities that causes problems (as in the case of nuclear waste). In all power generation technologies, this materiality shapes the way in which business is to be done. When finance is on greed and fear, on random walk and irrational exuberance, then I would not deny that we can find the patterns identified by the research on behavioural finance and the micro-sociology of financial markets in the realm of energy business, too. But there is more than that. We do not only find arbitrage, contracting on property rights, trading futures and options. The energy business is characterised by a very high amount of asset specificity. If you own a power plant or a power network – in principle a very attractive idea in our present days – you cannot easily sell your investment. At least it is more complicated than selling some shares of a well diversified portfolio.

3. Managing uncertainty

As I was told by different interviewees, investments in power technologies are characterised by a specific long term orientation. You may need billions of euro if you want to build a new power plant or a new network to transport energy from offshore wind plants or North African solar plants to Central Europe. Such investments normally have a perspective of some thirty to fifty years, but decisions have to be made without knowing quantities and structures of future demand, without information on availability and market prices of resources, on future systems of regulation and future acceptability of specific techniques as it could be seen in the case of nuclear energy and as it might turn out for instance in the case of CO_2-storage. The investment has to be done without knowing the technologies that will be available in the next decades. And even if we could anticipate the future availability of technologies at least in principle, we would not be able to anticipate the respective prices of the available technological options.

The time-span of uncertainty is more dramatic than for instance in the case of the market for frozen orange juice. Nevertheless, this high-risk long-term orientation has to match to the time horizons of financial markets that normally do not wait decades for returns. Long term strategies have to demonstrate their short-term profitability. The constitutive problem of economic rationality, the problem of uncertainty that makes it necessary to transform uncertainty into calculable risks has dramatic impacts on decision making in the energy sector. Here it is almost impossible to anticipate future from past experience.

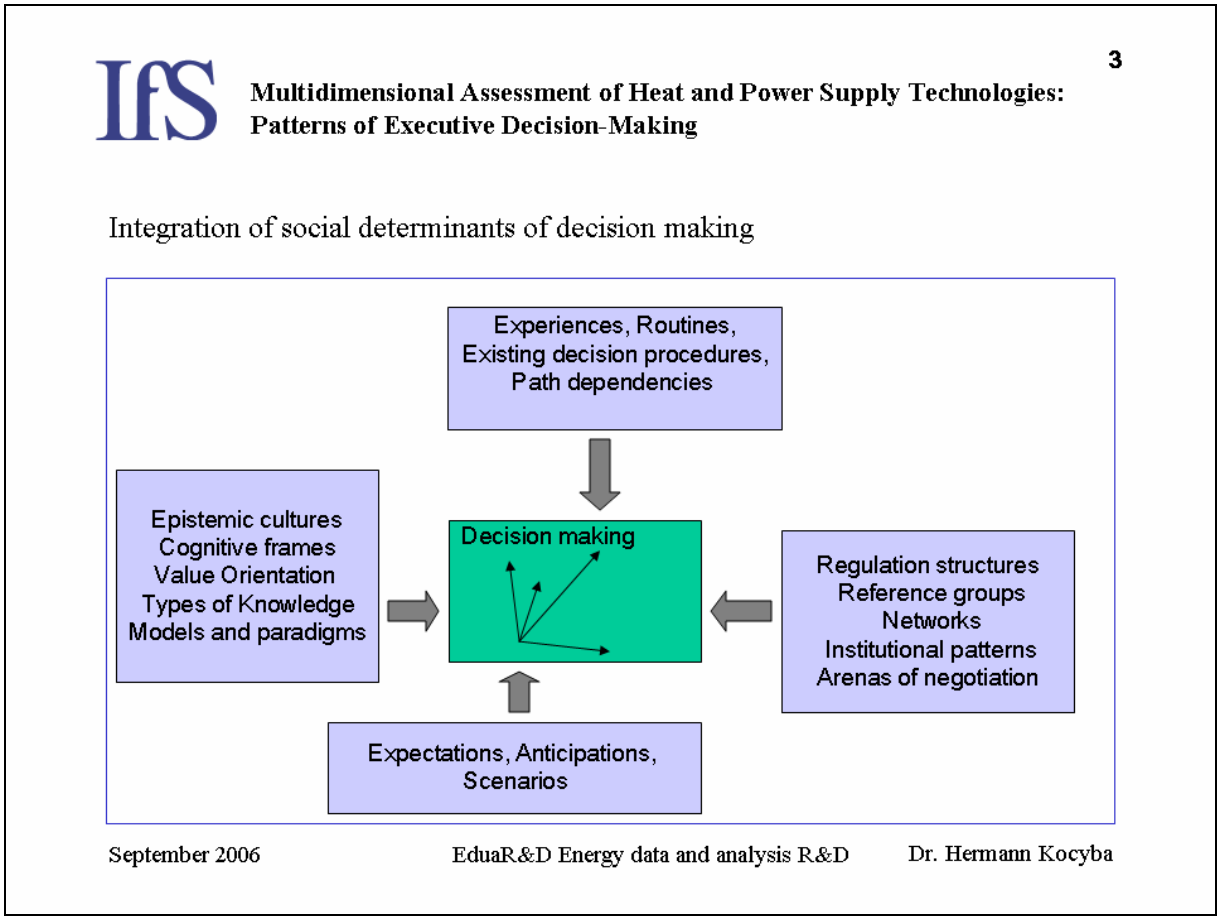
The extreme long-term character of investments in the energy sector makes a reversibility of decisions problematic: if you already spent your billions, it is hard to imagine how to withdraw from such an investment without dramatic losses. Even if every single investor is opting for risk diversification, for a whole power generation company this is not a realistic perspective. It is not the same business as with short-term contracts (which also play an important role in the energy sector). The

reconciliation of long term strategies and of short time evaluation plays a decisive role for decision making. Firms have to invest without being able to anticipate future evaluations. The best they have are expectations based on professional knowledge. But they do not really know future markets, future technologies, future demands or future resources; they do not even know future interest rates or the future profit expectations of their share owners.

On the other hand, decisions cannot wait until we have precise information. Waiting, i.e. a non-decision is itself a decision. We have to decide not to use an option without knowing, whether we will have a better one later or not. If you wait until you can be sure that your expectations are correct, that you do not make a mistake, then you do no longer have an opportunity for making profits: we cannot wait until uncertainty being transformed into calculable risk or even into confirmed knowledge. There is no way to avoid decisions: non-decisions or business as usual are decisions, too, and this may turn out to be very expensive.

4. Bridging the gap

On one side there is no general methodology to bridge the gap between uncertainty and risk, but this is what constitutes the everyday routines of economic decision making. In an unstable world, actors have to constitute domains of stability in order to make decisions calculable. They must be able to construct domains of stability in order to be able to decide in a non arbitrary way without being committed to wait until it is to late for decisions anyhow. Therefore it might be of interest to look how these decision processes actually work.



Reconstructing the stories told about decision making does not mean access to the "real" reasons of the actors or to the causal determinants of their decision making behaviour. But it indicates to which common patterns of justification and to which professional reference frames they subscribe. They at least implicitly refer to a common space of reasons: a partisan of "Green" options may be found arguing exclusively in terms of business school rationality terms whereas the speaker of a nuclear technology company may find it more convincing referring to Green issues like sustainability. The interviewees are not just lying when referring to publicly available patterns of justification; they just use them not in order to inform about their true inner motivations, but in order to indicate the way they believe it should be perceived and interpreted. Asking for authentic motives and reasons might be inappropriate, people acting primarily as agents within a business strategy can describe themselves only in referring to communicated justifications and arguments without being always able to identify their tactical or strategic value.

The core business might be described as bridging uncertainty, as translating uncertainty into calculable risk. The target is not to avoid failures or mistakes, but to commit them in a socially acceptable way. We need some "state of the art" to refer to, at least if we have to explain unexpected disadvantages. And in order to arrive at such a common frame of reference, there are patterns of mutual observation, of interpreting price signals, of engaging in professional associations, lobbying groups etc. These practices serve to stabilize a common horizon of future and to reduce complexity by common practices of closure. They make abbreviations possible, they instruct us how long to wait and when to take a risk. Such closing practices are necessary prerequisites for opening up markets. Closure here is not to be seen in opposition to markets, but as some sort of an enabling condition of "making market". We need shared patterns of expectation to rationally engage in markets; for this purpose it is not necessary, that this expectation really becomes true, but that no actor has a privileged access to the possibility to make expectations true (or false).

5. Some critical observations on current R&D policies

– R&D works as monitoring practice: Power suppliers do not want to develop new technologies but want to buy them when sufficiently developed by technology suppliers and promising attractive returns. They engage in R&D not because they get money by a federal ministry, but mainly because this permits them to monitor possible developments, to observe and to assess the actors in the technology sector and to get some idea about prices. R&D is a source of information together with market signals, professional associations and networks etc. In such cases public funding of R&D activities of technology users may not directly lead to new technologies, but may help to create an infrastructure accelerating the diffusion of new technologies.

– The systemic character of innovations and the necessity of developing an appropriate basis of knowledge that takes into account multiple interdependencies. The systemic character of energy supply technologies makes it necessary to analyse the complex interactions, like for instance forms of possible cannibalism between technologies; even if knowledge about the elements is available, it may be of critical importance to have a deeper understanding of the mutual interdependence of the

interaction of the components. Research has to go on, even if we have already valid knowledge about the elements and components of a specific technology.

– The job is not done, when it has proved that a certain process works in principle; there may be important bottlenecks to overcome on the way to market; scaling up, building pilot plants (and not only demonstration plants): this could be subject of further debate; it is not to make monopolies or to circumvent market evaluation, but it is argued that premature market exposure may lead to suboptimal results which could be responsible perhaps for the Japanese advantage in developing inventions into full fledged innovations. How much market, and when and where is on topic in the debate on public funding of R&D.

– Some executives miss an integrated perspective of the federal ministry's R&D policy which they experienced in the time of nuclear research: a policy that does not only want to do what the companies want, but which is providing new and integrated orientations that may be useful for corporate decision making. It would be useful to get signals on the energy mix of the future to which politics commits itself.

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