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**The Dynamics of Framing  
in Transactional Space**

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**The Dynamics of Framing in Transactional spaces: The co-creation of worth, calculative devices and calculative agencies in the Danish wind power market**

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# **The Dynamics of Framing and Transactional spaces: The co-creation of worth, calculative devices and calculative agencies in the Danish wind power market**

## **Introduction**

Wind power generated electricity offers a unique vantage point on the nature of markets and the specific organizing processes by which markets become constructed, configured, and contested. Modern Wind power generated electricity emerged in Denmark after the first oil supply crisis in 1974 when various entrepreneurial actors responded to that situation and saw wind power as one possible solution to ‘the’ problem. Today wind power is globally the fastest growing energy technology and supplies significant amounts of energy in countries like Denmark and Germany, in Denmark wind power generated electricity supplies 20% of annual electricity consumption. Although the trajectory of wind power institutionally and materially is much more robust today than 25 years ago very few thought that this technology had such a future. In the context of the 1970s with modernization and emerging nuclear power, many evaluated wind power as a relic from the past, some imagined opportunities (doomed as unrealistic), but nobody imagined that wind power should become one of the important ‘weapons’ against the CO<sub>2</sub>-related climate change at the turn of the century. However, confronted with emergent technologies outside the existing evaluative frames and institutionalised categories, it is not about being right or wrong from an objective epistemology, but about what epistemologies are used to frame the potential worth of a potential new energy technology.

In fact wind power shared a lot with Edison. Like Edison’s electricity system some 100 years earlier, the wind power electricity emerged outside the traditional energy sector’s network of techno-economic and institutional arrangements (innovations meets institutions). Like Edison’s electricity system, wind power electricity was ‘misfit’, and its existence as a market technology depended upon the ability to create its own new network of techno-economic and institutional arrangements or to find ways to ‘break into’, become linked to and transforming the existing network. Either way, the market for wind power electricity was not pre-existing, and did not emerge from some mysterious process. On the contrary, the transactional space facilitating market exchange of wind power electricity was constructed by work and investments that involved multiple actors who mobilized actor-worlds, designed artifacts, technical devices, metrologies and legitimate claims, that jointly created a calculative frame inscribed in new and changed existing institutional arrangements (rules

for exchange/control/property rights). This process entailed institutional entrepreneurship and path creation dynamics in order for new calculative agencies as buyers and sellers of wind power to emerge (see Figure 1, 2 and 3).

Like Edisons 'networks of power', wind power has since 1975 'rolled out into' many markets such as Germany, Spain, China, India and is the worlds fastest growing energy technology. However, this path of development or diffusion is not 'natural', but intimately linked to the establishment of transactional spaces and calculative frame based on national techno-economic and institutional arrangements, as well as the ratification of the Kyoto-protocol. However, this paper only analyses the making of a market for wind power electricity in Denmark from 1974-1999.

Theoretically this paper proposes the idea that markets are emergent outcomes of organizing processes where transactional spaces and calculative/economic agencies become configured and temporarily stabilize. The outcomes are neither efficient, neutral nor natural, but constitutes a techno-economic and political order, that favours certain groups of firms and actors, also labelled entry barriers. The framing of calculative agencies is never linked to the agencies themselves, as their capacity to frame depends upon actors being equipped with calculative devices, as well as rights, reponsabilities, the construction of (worth) dimensions of merit of the technology, knowledge claims on 'nature' such as wind regimes, as well as 'will the material artifact 'work' according to certain standards, etc. that become articulated within the frame. This links the capacity to frame to an extended network of associations and includes 'research, testing and science' and legislative artefacts, accepted classifications – that are inseparable from 'political' coalitions which may comprise of politicians, industrial organizations, media, professional, grassroots/civic society etc..

### **The conception of the market in theories of technology evolution**

Various new theories on the evolution of technologies such an technology management literature, evolutionary economics, social construction of technological systems, and actor-network theory have also strived to understand how to conceptualise the market – or better the selection process. One strand of research assumes that the market value some functionalistic techno-economic parameters (Utterback 1996). Contrary to this view, this paper argues that competition among technologies does not happen on the basis of 'natural-functional-price-performance-characteristics' and 'pure market forces' (Hargadorn et xx 2001). Another strand focus on the role of users in shaping rate and direction of technical change (von Hippel 1982, Rosenberg 1982, Bijker and Pinch 1987), and yet

another strand sees technology evolution as a co-evolution of institutions and technological artifact (Dosi 1982, Nelson & Winter 1982, Tushman & Rosenkopf 1992, Nelson 1994?). However, within the co-evolutionary view an important dividing line between perspectives relates to the relevance of making a distinction between social dynamics versus technological factors involved in making the selection, as well as how these valuation processes are conceptualised. The literature on constructivist sociology (Callon 1986, Bijker 1987, Latour 1987, Garud & Rappa 1994, McKenzie 1995, Kreiner & Tryggestad 1997) argues that the distinction is impossible and that the social and technical are mutually shaped through socio-technical mediations. This paper builds upon the constructivist and institutional sociology in understanding how the historicity and spacing of any technology is linked to the commodification of its output, i.e. how reference is made to a potential market as well as how it ends up being involved in economic exchange. As McKenzie (1995) states “the winner is the one that gets chosen”, but this still leave us with the problem of explaining how the ‘market’ chooses. Just as Schumpeter states that the term ‘entrepreneur’ (creator personality’ only provides a name, a possible locality, but not an explanation of the emergence of novelty (Schumpeter, recently discovered never published article ‘Development’ from 1932:p7, [www.schumpeter.info](http://www.schumpeter.info)).

### **Theoretical perspectives on markets as transactional spaces**

Within the economics discipline there are great controversies about how to think about the market (Swedberg 1994). Opposing the neoclassical view of the market has been a dominant trajectory within economics, i.e. Austrian and evolutionary economics, as well as economic sociology (Swedberg 1994). White (1981) and Baker (1984) showed that the neoclassical tenets about social independency among economic actors was a condition for a market did not hold, as signalling and knowing the others influenced prices. However, already in 1936 Coase asked, if markets made so fantastic effects, why do firms exist? There must be some advantage to keep to transactions within the firm rather than using the market mechanism. His answer was that transactions costs matters, and that institutions facilitating exchange matters. Thus, following Fligstein (1996) and Coase (1988) institutional economics and economic sociology should not only be preoccupied with an argument against neoclassical assumptions, but rather engage in empirical research into how markets as institutions facilitating exchange come into being.<sup>1</sup>

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<sup>1</sup> Coase criticized in 1988 general economics for not taking all the institutional conditions for exchange serious

In a broad sense this paper builds upon different insights from three institutional theorists that differ on some dimensions, but also share some important insights about how we should understand markets. The theorists are Coase (1988), Fligstein (1996) and Callon (1998, 1999) and despite some differences they share some insights that can be mobilized to advance a sociological and institutional understanding of markets.

They share that 1) markets are institutions, and 2) the term ‘market’ refers to situations where ‘certain commodified things’ are exchanged between a buyer and a seller for some money (or other generalized medium). They all point out that it takes an intricate set of ‘rules’, ‘laws’, ‘machinery’, ‘classifications’, ‘metrologies and calculative devices’ to enable such economic exchange. In this regard there are important differences concerning how these come into being, i.e. the specific work and investments and the specific nature of their performance.

Thus, they differ in the way they conceptualise the processes by which these conditions are organized and negotiated. Coase does not conceptually open to the black box of getting the institutions organized and transformed, while it is key for Fligstein and Callon, who see the institutions of markets as outcomes of contested negotiation processes. To both Fligstein and Callon agency processes and entrepreneurship are important in relation to making and breaking institutionalized arrangements, but their notion of agency and entrepreneurship is very different as Fligstein has a quite mainstream notion of the actor as a human being, whereas Callon would see

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....”when economist speak of market structure it has nothing to do with the market as an institution but refers to such things as the number of firms, product differentiation, and the like, the influence of the social institutions which facilitate exchange being completely ignored.” (Coase 1988:8)

Coase continues by emphasizing that institutions are more important in the modern economy

“I refer to commodity exchanges and stock exchanges. These are normally organized by groups of traders (the members of the exchange) which owns (or rents) the physical facility within which transactions take place. All exchanges regulate in great detail the activities of those who trade in these markets (the times at which transactions can be made, what can be traded, the responsibilities of the parties, the terms of settlement, etc.), and they all provide machinery for the settlement of disputes and impose sanctions against those who infringe the rules of the exchange (my insert, this is to deal with overflows, PK).

It is not without significance that these exchanges, often used by economist as examples of a perfect market and perfect competition, are markets in which transactions are highly regulated (and this quite apart from any government regulation that there may be). It suggests, I think correctly, that for anything approaching perfect competition to exist, an intricate system of rules and regulations would normally be needed.

Economists observing the regulations of the exchanges often assume that they represent an attempt to exercise monopoly power and aim to restrain competition. They ignore or, at any rate, fail to emphasize an alternative explanation for these regulations: that they exist in order to reduce transaction costs and therefore to increase the volume of trade.” (Coase 1988: p. 8-9)

agency as emergent and distributed through the intermediaries that makes a network, and not only humans may be actors with agency properties – even though non-humans do not have intentions, they may still be ‘author’ of consequences (Callon 1991). Following this, Fligstein and Callon differs on role of materials, instruments, texts and work and investments that goes into making actors, actor worlds, settle conflicts and achieve legitimacy and meaning. Further, Fligstein seems more ‘abstract’ in his approach to ‘markets as politics’, and does not depart in the question as to how a specific exchange becomes. In this regard the strength in Callon’s approach is that it does not take the seller, the buyer nor calculative behaviour for given. Indeed, with ‘calculative agency’ as the key term Callon departs in the exchanging entities, homo economicus, and is preoccupied with how these specific entities emerges as outcome of a framing and equipping process, that include an intricate set of operations and investment in ‘rules’, ‘laws’, ‘machinery’, ‘metrologies and calculative devices’ to enable the framing and such economic exchange. This perspective build among others on the tradition of sociology of accounting which demonstrates that profits cannot be measured without and accounting standard or metric, and that these standards and practices emerge and change in controvercial processes (Miller 1998).

Concerning empirical studies, there are not many using this perspective ..... (McKenzie (1995) use the term etno-accountancy to call for more studies into this phenomena, never studies are Beuenza & Garud 2003, Tryggestad and Skærbæk 2004, Beuenza & Stark 2004, Menuenza & Callon 2002,.....)

### **The Dynamics of Framing and Transactional spaces**

Callon mobilizes Goffmans concept of frame to understand how economic actors such as seller, buyer, or regulator organize their identities and world views regarding the worth of an exchange (Callon 1998). The framed economic exchange involves an acceptance of possible states of the world or properties of a given commodity, relative to certain effects/outcomes of entering an exchange or not. Thus, the framing of a market exchange may entail the negotiation of a contract in which the actors sort out the conditions and terms of the trade, or it can be the implicit contract between a customer with preferences framed according to a product like Coca Cola, organic milk or

specific German car brands<sup>2</sup>. However, as Coase mentioned not anything can be traded, in fact what can be traded depends upon certain institutions.

All exchanges regulate in great detail the activities of those who trade in these markets (the times at which transactions can be made, what can be traded, the responsibilities of the parties, the terms of settlement, etc.), and they all provide machinery for the settlement of disputes and impose sanctions against those who infringe the rules of the exchange (my insert, this is to deal with overflows, PK). Coase 1988:8)

Thus, the capacities to 'sell' and 'buy' are not intrinsic properties of humans, and homo economicus is not a natural entity, but a rather cultivated entity. Therefore we build upon Callons (1998) idea that calculative agencies emerge and are mediated through socio-technical devices, tools and inscribed in institutional arrangements. (Granovetterian social embeddedness) – configuring ontologies).

To 'sell' and 'buy' mostly requires that a lot of premises are sorted out outside the narrow context of the exchange, such as property rights, classifications of chemicals and threshold values, labour work hours, if global warming is considered an externality problem or not, who has rights to use the electrical grid to transport electricity etc.. If these are not settled then the involved actors have to invest resources and work to produce these clarifications and premises in order to constitute a transactional space. Overflowing is defined as the articulation and problematization of issues in relation to the outcomes that was not framed at the outset (Callon 1998ab). It can be simply that the milk was sour or expiration date passed, or it can be more complex that the car is a 'Monday-car' with recurring failures that never show when the car is in the garage, or the more well-known overflow when air pollution is made a non-desired side-effect of producing and consuming a product. The framing/overflowing problematic is not only related to new innovations, but is related to the whole career of the commodity where properties can be problematized (Apparadui 1986).

Departing in Coase's observations that institutions are important for (any) transactions this paper proposes to open the black boxes of 'making and performing institutions of market exchange'. We suggest that the making of transactional spaces for any commodity is seen as a hybrid enterprise. Moreover, we see market transactions as emergent outcomes, and emphasizes how framing processes are discursively mobilized and become inscribed – and instituted - in material

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<sup>2</sup> Preferences are not intrinsic but interactive emergent and mediated in socio-technical processes through interacting with other people and/or interacting with a car you test-drive, a Coke bottle or a red Coke sign, the yellow 'M' in McDonald sign, the 'organic milk symbol on a bottle of milk' which signals to me that the higher price is justified. In that way the whole material arrangement of good in supermarkets and retail to 'stimulate preferences' and weaken the resistance becomes in focus (Callon & Munieza 2002)

objects, laws, framing devices, local norms, legitimate resources, ideologies, identities and properties of actors.<sup>3</sup> This view confers to but extends Coase's notion of the 'machinery'.

Callon mobilizes Goffmans concept of frame to understand how economic actors such as producers, sellers, buyers, or regulators organize their world views/understandings of the worth of the exchange (Callon 1998). A major point is that in Goffmans theatre the action within is not 'only social interaction', but is inscribed in and mediated by the physical structure of the building, the material arrangements of the scenes, signs etc.. Similarly, framing denotes and is founded on more materialized bases than generic rules for action than in 'social' sociology and much institutional theory.

From this perspective a transactional space comprises its own networked 'territory' of actor-types (identities, actor-worlds, rights, responsibilities), commodified things, calculative devices, legitimate claims, metrologies and valuation processes, materializations (switching costs, money income), and circulating materials. Due to the mixed materials in the heterogeneous assemblage, it may be seen as a 'networked territory', an almost physically 'conquered space', with a 'robustness' that is not easily opened or broken by new entrants, as they have to break the materials, problematize, dissolve or redefine the connections (associations) inherent in making the existing regime of worth. (The monopolists situation is one typical extreme form of calculative agency as well as the idea of perfect competition).

We may conceive of a stabilized transactional space for certain commodified goods as a temporary end result of framing processes, where many contributing elements have been institutionalised as black boxed, invisualized or inscribed in legislative artefacts and legitimate claims. Thereby stability and predictability in any 'transactional space' is not a natural property of a 'market', but a product of the stability of the embedding dimensions of the net-worked arrangement. From this conception market change may be conceptualized as 'openings' (controversies) in some of the embedding dimensions of the stabilized transactional space. Stabilization in a transactional space is not based on shared cognition, shared meaning or interests as the key uniting force (as in Garud & Rappa 1994, Powell & DiMaggio 1991??): But rather the stability is based on the translation processes in which enough shared space (interessements) may be created to enrol and align different actors in a network (Callon 1991, similar to Weick 1979, March 1994 – that shared goals not pre-condition for organizations to exist)..

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<sup>3</sup> My own abbreviation of this into the '4M's – Meanings, Materials, Money and (Wo)-Men – who become associated in networks that create technologies as well as markets. (Karnøe 2000, ATV-report)

Transactional spaces are never neutral, their emergent ordering reflects controversial processes, and inevitably “They favour certain groups of firms.” (Fligstein 1996:660). This view differs from the form of path dependency arguments where path dependency is seen as a deteriorated form of market because the context of the argument is an idea of a free market with open choices (David 1984, David et al 1988).

From a transactional spaces perspective path dependencies and possible lock-in are outcomes of processes where actors through progressive decisions become more and more trapped in networks of their own making, from which they may neither have the desire nor resources to escape (Callon 1998:48). It must also be remembered that such institutionalised lock-ins where the ‘past becomes constituted in the future’ can be seen as both assets and liabilities for existing technologies (Kreiner 199x) for new coming technologies. Therefore an interest in path creation processes are important to understand the dynamics of transformation and change in networks (Garud & Karnøe 2001, 2003). Path creation refers to processes of deviations from existing orders, and specifically the entrepreneurial processes whereby human agencies set in motion processes whereby intermediaries are mobilized and become associated to constitute new visions of possible states of the world, as well as new socio-technical networks.

We see the organizing of these institutional arrangements as an ongoing process of mediation where all sorts of framing devices are mobilized and inscribed by humans – and in turn supplies humans with the material for our construction and re-construction of that networked world.

The specific proposition of this paper is the constitution of transactional spaces and therefore a market is ongoing and is not a ‘once and for all’ institutional closure. On the contrary, based on the wind turbine study, it is argued that so-called continuity in the transactional space for wind power electricity depends upon the transformation, substitution and re-engineering of properties of the calculative agencies, calculative devices, the associated world states, and the justifications used to knit the different elements of the calculative frame together. We will mobilize Thevenot et al (2003) notion of justifications as an important device to knitting and weaving (‘gluing’) together coalitions over time. It is argued here that multiple or *bundles of justifications* at any point in time enhances coalition building as bundles (more than one) of justifications helps to build ‘shared spaces’ among diverse actors (or networks of longer and more diverse materials, Latour 1987), but not necessary shared meanings or interests. Shared meanings and interests may be a resulting outcome from engaging in the organizing process of a transactional space, but it not to be seen as a premise for beginning the interaction. The many weak ties and associations may generate

surprising robustness, until more permanent irreversibilisation. It is argued here that this dynamics contributes to the robustness of a regime of worth for any technology, here wind power. Further, over time justifications may shift and be subject to substitutions in content and ranking. This coalition building is indeed heterogeneous engineering, in involves ongoing translations to bring so many different entities together that constitutes a calculative framing.

Transactional spaces and the involved elements of a calculative frame only exist in action, therefore the arrangement and the associated worth of a product like wind power electricity is always emergent and dynamic. It is in the very process of consummating or performing the elements of the frame, that unexpected overflows to the frame may be identified and articulated. This may problematize existing properties of elements and their associations, and dealing with them may require a re-working and re-negotiation of the elements and associations that constitutes a calculative frame in a transactional space (micro-level agencies and their translation of these elements/entities/devices in their local framing process). Complete framing is impossible and overflowing is the norm as Callon states. Critical moments are to be expected as with Mad cows disease, nuclear power accidents, when ‘something does not go the way it used to or was expected to’, and becomes problematized. Bolthansky & Thevenot

### **Analytical dimensions of the paper – configuring calculative agencies, calculative devices and making wind power part of value chains–**

Specifically the paper will illustrate the gradual and contested character of the institutionalisation processes associated with making a market for Danish wind power from 1974-1999. Empirically the analysis shows how calculative agencies are co-created with calculative devices, rights and responsibilities, as criteria for evaluating the worth of wind power electricity + justifications for aligning the coalition of actors.....

See below how existing value chain of electricity production are configured (fig. 1 and 3), and see in figure 2 2 options for how wind power could become linked into electricity chain – either by connection A or connection B.

As figure 3 shows there are several markets in this value chain and this empirical analysis only studies M 2 and M 1a.



Figure 1: The Danish electricity system before wind power was introduced: Utility Power Plant, electric Grid, Transformers, and end users.

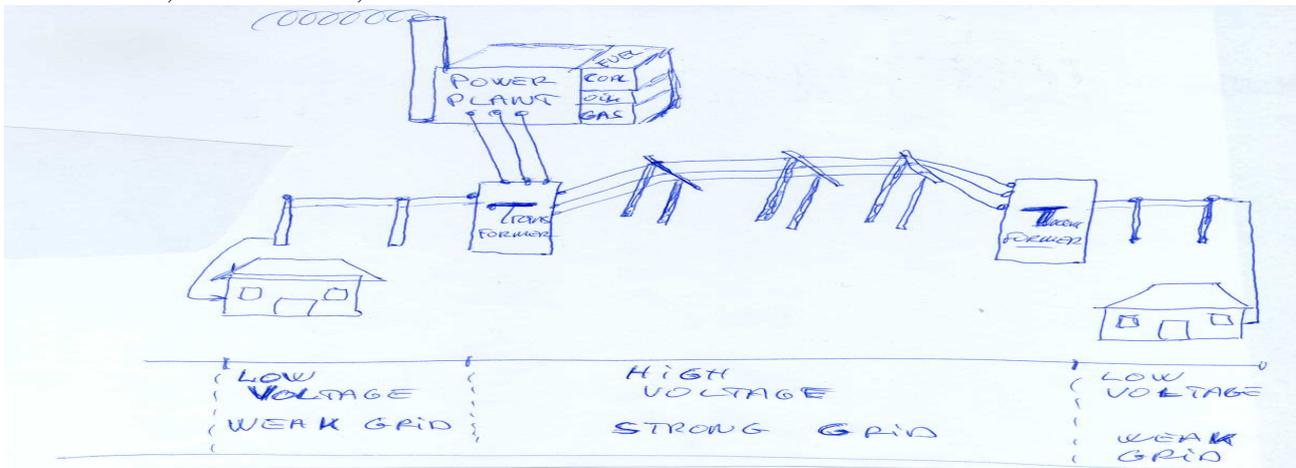


Figure 2: How to invest in a wind turbine and get value or worth out of the power it produces? Strategy A – selling to utilities or B – own consumption of the electricity?

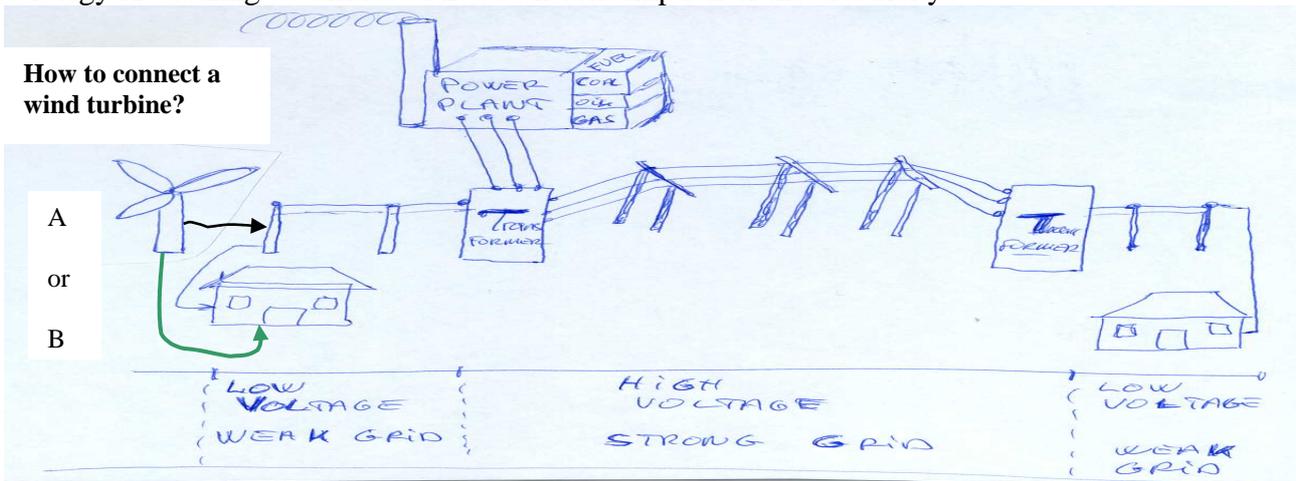
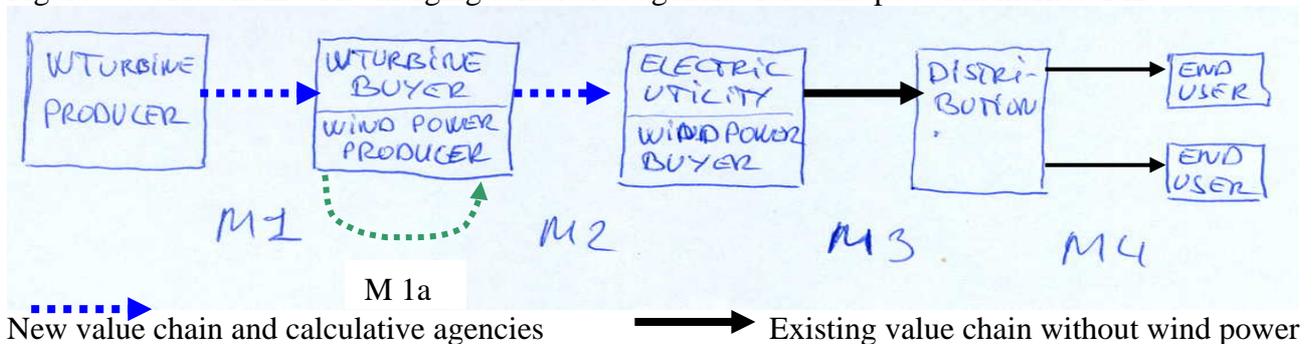


Figure 3: Value chain with emerging calculative agencies for wind power in market 'M2'



The emergent wind power market in figure 2 and 3 is an outcome of a highly specific and contingent processes of configuration of calculative agencies that did not pre-exist (figure 1), but were co-produced with various devices for calculative framing. Indeed it was not an ‘efficient linear process’, but a path contingency process where institutional and legal rights were disrupted, re-negotiated such that the path at any point could move in different directions.

As ‘the making process unfolds’ the outcomes of the interactive constellations of the framing and the framing devices such as tools, justifications and classifications are not mechanical or predictable. Thus, the disciplining role of tools and devices in formatting calculative agencies and markets is not deterministically given. In Callons words:

“It [the Foucaudian disciplining, pk] evolves and transforms itself since the tools, those solid points in the system, are themselves plastic, open, reconfigurable, and, moreover, constantly reconfigured. As framing and calculating tools they have the property, through transforming themselves, of varying the modalities of framing and calculation. They are exchangers which stabilize certain procedures but simultaneously help them to evolve. (Callon 1998a:26)

There is loose or emergent coupling as the interaction unfolds (Weick 1979), and tools makes agencies in an unfolding ordering characterized by dynamics of affordances and resistances (Pickering 1995, Hutchby?, 2003), and where the interests and identities of involved actants/agencies may change in the process of putting them in play, as ‘consequences/overflows’ are articulated and ‘states of world’ problematized (Callon 1998, March 1994).

The main analytical dimensions of the paper will be:

1. The emergence of calculative agencies. An important part of actor-making processes are also the emergence of economic actors as ‘calculative agencies’. Indeed from this perspective actors do not have intrinsic or pre-given capacities, but are emergent properties and variable geometry that are contingent upon the socio-technical networks in which they are embedded (Callon 1998/1999, Granovetter 19xx) or ontologies (Hodgson). The specific identities/roles, rights and responsibilities, capacities to act, competencies, preferences and interest of ‘producers’/‘suppliers’, ‘users’/‘buyers’, ‘scientists’, ‘media’ and ‘regulators’, may be dynamic and changing.
2. Calculative devices and how their formation framed the worth of wind power first in private and local negotiations, and later how the worth of wind power depend upon how

‘investment subsidies’ and ‘income subsidies’ for wind power became inscribed in legislative artefacts (and supported and justified by a political coalition). The value of an idea/thing/product is not laying ‘in a product’ by nature, and we study how wind power over time is given different values which depends upon recognizable properties (value-metrics, dimensions of merit/non-merit), and how these dimensions becomes legitimate and acceptable. Such issues as externality costs/benefits arising from wind power or conventional energy production become important here and key in the formation of parameters and their value in a calculative device.<sup>4</sup> Formatting calculative devices is about settling on ‘brackets’ – what is inside and what is outside. What counts – and how to count what counts as sociology of accounting formulates it (Miller 1998). Calculative devices performs the economy when they are organized, like accounting tools (Beuenza & Garud 2003). Calculative devices do not give deterministic effects, their effects emerge by being translated and enacted – indeed for every single buyer of a wind turbine an understanding or norm for acceptable **Return on Investment** shapes if they buy a wind turbine or not, if the exchange is accomplished or not. Some of the earliest buyers were highly ideologically motivated ‘for alternative energy and against centralism and nuclear power’, and consequently accepted a very low ROI – just enough to avoid losses or enough profit to buy some ‘red wine’ for the annual meeting in the wind turbine cooperative. Later this user type was marginalized to those demanding more and more ROI.

3. Wind power and the material standards of Direct Current and quality of electric current so as to serve fine electronics. This relates to the commodification process by which we mean the ways in which an idea, a thing, a product feature becomes recognized as suitable for market transactions. Clearly, electricity is not just atoms as pure nature, but socialized atoms packed in certain ways to have certain qualities in socio-technical networks.
4. Transactional spaces as Networked territories that are made possible as multiple actors share elements/embedding dimensions of the transactional spaces, but this is not the same as all actors in the coalition’ have shared interests, shared meaning nor share the same goal – but still they may participate in the coalition. This is important in the ongoing process on knitting

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<sup>4</sup> The economic discipline does recognize externalities, but does not conceptualise the process by which issues are articulated, nor how they become transformed/translated into a parameter with a certain value used in calculations. That is they do not conceptualise how the institutions as well as specific parameters that enter the ‘calculative device’ become mobilized and organized. Constructivist sociology offers a perspective on this that goes beyond ‘classic realism’, drops the ‘social’ of ‘social constructivism’ and make claim for hyper-realism as a form of constructivism (Latour 1999, 2003).

and weaving together elements comprising the transactional space. We will mobilize Thevenot et al (2003) notion of justifications as an important device to knitting and weaving ('gluing') together coalitions over time. It is argued here that multiple justifications at an point in time enhances coalition building as justifications helps to build 'shared spaces' (or networks of longer and more diverse materials, Latour 1987), but not necessary shared meanings or interests. Further, over time justifications may shift and be subject to substitutions in contend and ranking. It is argued here that this dynamics contributes to the robustness of a regime of worth for any technology, here wind power.

Table 1 is an attempt to illustrate the 'gradual filling out' as well as change in the institutional arrangement and the calculative device. Changing agencies, legislative artefacts, classifications, calculative devices, justifications – coalitions of actors (maybe worldviews)

Table 1: Framing dynamics in the Danish wind power market: Constructing calculative agents, calculative devices and justifications.

subject	Pre- 1975	1975	1976	1979	1983/84	1985/86
Wind turbine owner framing rights	Not existing entity no rights	1) Riisager negotiate with Local Utility	3 km restriction on distance between owners house and wind turbine site. Linked to local utility	3 km restriction and linked to local utility	No restrictions on distance between owners house and the wind turbine site	Residence criteria: Max 10 km Power prod. Only 35% more than own consumption
Individuals and Cooperatives with shared ownership		2) Møller negotiate with Local utility				
Elements in Calculative device:	Utilities not involved in wind power	Local contracts: 1) Kwh-exchange 2) Money 9-øre	National Guidelines (DEF) for contracts: Payment Equivalent to fuel savings		New National Guide-lines (DEF) 10 years 70% of normal el-price	
1) Utility payment for wind power						
2) Grid connection costs			Utility paid and responsible for everything	Utility paid and responsible for everything	Shift from shared payment to 3 shared (state, utility, owner)	
3) State invest. Subsidy to wind turbine owner				30 % of retail value of wind turbine	25% to individual  25% extra for wind farms	20% (dropping to 10% 1988-stopped in 1989 wind farm stopped)
4) State – income subsidy to wind turbine owner					Refund of electricity tax 20 øre/2-3 euro cents	
Accepted <b>Return on Investment</b> for wind turbine owners		Modest profit-Avoid losses 'enough profit to buy red wine' for annual meeting			Wind turbine owner types with different profiles for <b>Return On Investment</b>	
Electricity quality (standard)		Must be met	Must be met	Must be met	Must be met	
	Pre-1975	1975	1976	1979	1983/84	1985/86

Another important framing devices was the development of the 'Wind Atlas', that was used to 'represent and clarify' the wind properties of Nature and estimate the economic value of the wind regime in a certain geographical location based on the ruggedness of the landscape and wind speed characteristics.

Also the approval system, that only allowed state subsidies to approved wind turbines was important, as the important criteria of the approval scheme was to ensure that the 'operational reliability of the wind turbine' (safety brake systems) as well as levels of fatigue in used materials as the wind turbine was exposed to severe structural tensions and vibrations in its life time.