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Theme issue contribution

Making Good Economies with Bad Economic Instruments: A brief history of wind power's changing economies

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Abstract
This article examines how notions of the good are entangled with instruments of valuation in the case of wind power in Denmark. Analytically, we develop what we tentatively call a comparative actantial approach to the study of policy instruments. Empirically, we inspect three support schemes introduced between 1979 and 1999 by the Danish state to foster the development of wind power. The comparative inspection shows wind power's notable shifts in what we call its actantial status: the same character appears as a very different kind of agent in the very different good economies for wind power portrayed by the instruments. The article contributes to two different but related literatures: it contributes to recent intersection between science and technology studies and economic geography inspecting the variable ontologies of energy resources, and it contributes to the discussion in this theme issue about instruments of valuation and the good economy.

Keywords: policy instruments; wind power; semiotics; resource; good economy; ANT

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Introduction

> Taxes and subsidies in the energy field are used for both *good* and *bad* reasons. In this analysis, whether a reason is good or bad must be based on whether the individual arguments are well-founded and may be used to bring about improvements in welfare from a socio-economic point of view. (Secretariat for Tax and Subsidy Analysis 2018: 9, emphasis in original).

The article's title paraphrases one of ethnomethodology's classics, Garfinkel and Bittner's 1967 '"Good" organizational reasons for "bad" clinical records'. There, Garfinkel and team reflect on the puzzle posed by the clinical records of an outpatient psychiatric ward that they were studying. If they were to approach the clinical records in terms of their statistical quality, the team realized, the ward's files were not good enough. Nevertheless, the records were important to – and a well-functioning part of – the everyday work of the organization. In practice the records were not read as statistics; they were seen as traces that could be used to reconstruct medical cases *ex post*. The ethnomethodologist's lesson is that, rather than confronting the situation as an expert whose task it is to assess the quality of the technical instrument they encounter, in this case patient records, they can study how such instruments become good or bad in an empirical situation.

Like ethnomethodologists, in this article, we approach technical instruments as a means of tracing the empirical notions of "what is good" in the studied situation. As in other contributions in this *Valuation Studies* theme issue, we are interested in how notions of the good or good economies entangle with instruments of valuation. What we do here, though, is not ethnomethodology in a strict sense. Rather than studying those who use technical instruments and the implicit ways in which instruments are used or assessed in practice, we focus on the notions of the good that instruments mobilize. To do so, we apply what we tentatively call "a comparative actantial" approach to the study of instruments. We find inspiration from some of the foundational studies in the actor–network tradition and we go back to Greimas's actantial categories.

Empirically, this article is about policy instruments in the energy field. Our focus, more specifically, is on the support schemes – the literal translation of *støtteordninger*, the term used in Danish – that have played, and still play, a critical role in fostering the development

of renewable energy in Denmark.[1] More precisely, we inspect three instruments: a support scheme from 1979 (Act on State Support for Renewable Energy); a support scheme from 1984 (Act Amending the Act on Taxation of Electricity); and a support scheme introduced in 1999 (Act on Electricity Supply).

What our comparative inspection of the policy instruments shows is wind's notable shift in what could be called its *actantial* status. The same character, so to say, wind, appears as a very different kind of agent in very different economies inscribed in the instruments. With the first instrument, the government introduced a subsidy to incentivize farmers and other rural residents to instal their own wind turbines and use less imported oil, thereby improving Denmark's balance of payments. Here, wind, or more precisely wind turbines and wind energy, is a resource tied to an oikos. The second instrument, a tax subsidy, was introduced to incentivize farmers and rural residents to instal even more turbines. Here wind turbines become a commodity whose commercialization will support a local industry. The third, and most recent, instrument is not a subsidy but a tendering mechanism. The instrument aimed at creating competition and incentivizing large energy firms to invest in large offshore wind farms, with the expectation that they will contribute to Denmark's future energy security and decarbonization. Here, wind becomes both a national energy resource and an asset. These different instruments, in turn, provide different ways of entangling wind power and "good economies". In the case of the first instrument, wind power is a *helper*, a character with a minor part in the task of reducing the use of imported oil. In the second, wind power plays a part in relation to the country's national growth, while in the third, it becomes the main hero in the country's quest for an economy that is both sustainable and guarantees energy security.

We expect that this article will be relevant to two different academic conversations. First, what we do extends the growing body of work on the economization of energy resources. Like part of this literature, we study the variable status of energy resources. To this discussion we add a comparative historical approach and a clearer emphasis on the instruments of re-sourcing. Second, we aim to contribute to the specific conversation developed in this theme issue on the good economy. We do that, particularly, by paying attention to the way in which the good

[1] The Danish wind industry has been studied extensively – often as a success story (e.g. Karnøe 1991). For instance, its success has been ascribed to effective communication and networking by engineers (Nielsen & Heymann 2014), the bricolage approach adopted by the industry (Garud and Karnøe 2003), sociopolitical devices allowing the positive valuation of wind power (Karnøe et al. 2022), etc. Our work is certainly informed by this literature, but rather than attempting to explain the success of the Danish wind industry per se, our attention is on the various policy instruments used to incentivize wind power development in Denmark.

economy is inscribed in policy instruments, and, importantly, by showing how this can be inspected in a historical fashion.

The argument unfolds in five sections: the first section introduces the analytical approach, the second explains our method, the third section presents the results of the analysis, fourth is the discussion, and the fifth is a short conclusion.

Analytical approach

Our approach could be labelled a *comparative actantial analysis of policy instruments*. In the following paragraphs, we explain what we mean by this, particularly, how our analytical position combines the concept of the actant, as originally used in semiotic analysis, with insights from actor–network theory (ANT) studies of technical instruments. Said briefly, what we do can be framed as *actantial*, but not in the usual sense of emphasizing how non-human actors have agency, but in the sense that we comparatively study the figures that populate the narratives inscribed in the analyzed instruments.

The actant

In his *Structural Semantics*, Algirdas Julien Greimas explains how investigations such as Propp's study of Russian popular stories permit us to separate two layers: on one level, each story with its delimited set of characters; on the other, when stories are read together, a delimited list of figures – "the villain", "the donor", "the helper", "the sought-for person", "the dispatcher", "the hero", "the false hero"– that appear in all narratives of a given genre. Greimas borrowed Tesnière's notion of the "actant" to name this second level. The following extracts, taken from Greimas and Courtés's dictionary of semiotics, further specifies the concept:

> An **actant** can be thought of as that which accomplishes or undergoes an act, independently of all other determinations [...] The term "actant" is linked with a particular conception of the syntax [...] In this aspect, actantial grammar, which is semiotic in nature, is seen as a more abstract formulation. At a deeper level, actantial grammar, not subject to phrase linguistic form, is able to account for the organization of narrative syntax [...] The concept of actant has the advantage of replacing, especially in literary semiotics, the term of character as well as that of "dramatis personae" (V. Propp), since it applies not only to human beings but also to animals, objects, or concepts [...] As the narrative discourse progresses, the actant may assume a certain number of actantial roles [...] This hero will be the hero only in certain parts of the narrative – s/he was not the hero before and s/he may well not be the hero afterwards. (Greimas and Courtés 1982: 5–6).

While "an articulation of actors constitutes a particular *story*; a structure of actants constitutes a *genre*" (Greimas 1976, our translation). Actants are classes of characters, the figures that populate genres, and actantial analysis is the inspection of narratives in terms of these categories.

As anyone who has opened a book on semiotics knows, semiotics can become very complicated. For instance, Greimas develops a sophisticated system to inspect relationships and transformations between actants in his famous semiotic square. At a more basic level – the level relevant here – however, actantial analysis can be relatively simple. Roland Barthes, in a recently translated interview (Fabbri et al. 2022, originally conducted in 1965), provides a simple explanation. In Barthes's words:

> Broadly speaking, these six classes are six archetypal characters, so to speak, divided in three pairs. The pair of desire and quest: that is, a certain character sets out in search of a certain object because they desire it. This character is the subject of the narrative, and what he's looking for is the object [...] A second pair is constituted by the character, who gives the sender-addresser of the good, which the subject is seeking. This is the arbiter, a sort of divinity of the situation, before whom the character who receives this good represents the receiver of the good. This is the pair, and the axis is that of communication. The third part is composed of the character (or characters of course) who helps the subject in his quest: they are the helpers, while the characters who oppose him are the opponents. (Barthes in Fabbri et al. 2022: 169–170).

Actantial analysis can be organized into a set of three pairs of categories. The pairs can be taken as the starting point for the inspection of all sorts of narratives, from Russian folk stories (Greimas 1976: 266), to fiction (Fabbri et al. 2022),[2] management literature (Greimas 1976: 279–281), or, as we propose here, the narratives inscribed in policy instruments.

ANT and the semiotic study of technical objects

Greimas's concept of the actant is, of course, well known, more widely because of its role in ANT. As Latour explains in his *Reassembling the Social*:

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[2] These are two of the examples given by Barthes (in Fabbri et al. 2022) "in the *Odyssey* we have a subject, Ulysses, who is the subject of desire, of the quest, and we have an object: Ithaca, the hearth, Penelope [...] Then you have a sender, the gods, who give Ulysses; and of course you have a helper, Athena, and an opponent, Poseidon" (p. 170). "Then for example the case of Marxism, where we can identify the actants, *lato sensus*: the subject is mankind, the good sought is a classless society, the opponent is the bourgeoisie, and the helper is the proletariat" (p. 172).

> To break away from the influence of what could be called "figurative sociology", ANT uses the technical word actant that comes from the study of literature [...] Because they deal with fiction, literary theorists have been much freer in their enquiries about figuration than any social scientists, especially when they have used semiotics of the various narrative sciences. This is because, for instance in a fable, the same actant can be made to act through the agency of a magic wand, a dwarf, a thought in the fairy's mind, or a knight killing two dozen dragons. (Latour 2007: 54–55).

Most commonly, when the term is invoked, it is in the formulation of that "that accomplishes and act" and it is used in ANT inspired studies to emphasize that answers to the question *who does the acting* should not be taken as known in advance: researchers should rather pay attention to those often surprising sources of agencies in each study. The importance of this insight notwithstanding, more relevant for our purpose is a second way in which ANT can be seen as an extension of the actantial narratology programme (Mattozzi 2019). The clearest and, perhaps the most relevant source, is Akrich's (1992) piece on how to study technical objects. In her words:

> Like a film script, technical objects define a framework of action together with the actors and the space in which they are supposed to act [...] Designers thus define actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways. A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object. I will call the end product of this work a "script" or a "scenario". (Akrich 1992: 208).

Technical objects inscribe *scripts* – "actors with specific tastes, competences, motives, aspirations, political prejudices, and the rest, and they assume that morality, technology, science, and economy will evolve in particular ways" – and one key task for analysis is to reconstruct these narratives.

Another important antecedent is Latour's inspection of what he calls "programs of actions" (in itself a reformulation of another of Greimas's terms, "narrative programs" (Mattozzi 2019)). Technical objects – including, famously relatively simple ones, such as doors, or keyholders – are loaded with programmes ("a set of written instructions that can be substituted by the analyst to any artifact" [Latour 1992: 255]). The evolution of instruments, from this perspective, can be studied as a series where programmes of actions become more complex as designers attempt to reintroduce the anti-programmes (scenarios pre-empting ways in which original programmes of actions could in practice be counteracted) in the object's design. An even earlier example is the emphasis Callon (1980)

gave to the notion of problematization. It is not that technical objects are responses to given problems; from this perspective, technical objects *problematize*: they inscribe a particular reconstruction of the situation they are supposed to respond to, with a simplified set of characters and their expected agencies, and a particular narrative of how they might combine in order to produce a desired future.

The ANT approach to technical objects has more recently applied in many areas, including – importantly in the context of this theme issue – various studies of instruments of valuation, including financial formulae (MacKenzie and Millo 2003), tables (Pollock and D'Adderio 2012), and business models (Doganova and Eyquem-Renault 2009), in what is often known as "market devices" (Callon et al. 2007). Some of the work in this area, in particular the various studies conducted by Muniesa and colleagues, have not only paid attention to how devices act (i.e. how they performatively change the situations in which they are implemented), but also how instruments themselves constitute semiotic entities. For instance, Ehrenstein and Muniesa (2013) inspected the characters and constrained realities present in documents of carbon offsetting projects, while Lezaun and Muniesa (2017) analyzed the specific actant, a decisionalist hero, contained in business school case-based training. More generally, Muniesa et al. (2017) proposed an approach to compare what could be seen as two key economic semiotic genres: the *market* (as understood by Callon 1998) characterized by homo economicus and pacified commodities, and *capitalization*, a situation where instruments portray economic agents as investors, investees, and assets. Finally, articles in a recent *Valuation Studies* theme issue (see Muniesa and Ossandón (2023) for an introduction) push this agenda further, by, for instance, exploring the semiotic – and dramaturgical – properties present in documents by global consultancy firms (Aguiar 2023).

A comparative actantial study of policy instruments

To sum up, not only does ANT borrow the notion of the actant from narrative semiotic analysis, we can see ANT inspired studies of technical objects as a continuation of the *actantial* programme of semiotics. Technical objects *inscribe* narratives and the analyst's role is to develop conceptual categories to describe and compare these narratives. What we attempt in this article can be placed within this tradition.

As early ANT did with engineering instruments and studies of valuation have done with market devices, we inspect policy instruments semiotically, that is, we comparatively inspect policy instruments as narrative constructions and use analytical categories to compare the figures that populate these narratives. We have however decided not to limit the categories of analysis to the concepts

developed in the ANT tradition, but to go back to the original categories used in semiotics. The main reason is that ANT studies of technical instruments tend to focus on one main actant, the technical object's expected users and the scripts and programmes of actions assigned to them, i.e. the instructions of how to make those actors act in particular ways. Greimas's categories – and semiotic analysis more generally – permit us to expand the scope of actants to consider which, as will become clear in the analysis, is relevant to comparatively inspecting the instruments in our study.

Of course, we are aware, this is not all ANT offers. Akrich, for instance, identifies a second task, besides that of identifying the scripts inscribed in technical objects, that consists of analysis of the empirical adjustments between the scripted scenarios inscribed in the object and the specific milieu in which the object is introduced. It is, certainly, this double movement, between script and de-scripting, that characterizes the ANT approach to technical objects more widely. Or, as Latour put it, ANT = Greimas + Garfinkel. As mentioned in the Introduction, what we do here focuses only on the first half of this "equation": we comparatively study the narratives instruments inscribe, but we do not study – in this article – how these narratives are enacted or creatively modified in the instruments' implementation. This is not for lack of interest. It is work for other articles.[3]

Methods

What follows details how we proceed in the investigation whose results are presented here, and how, in the iterative process of research, our initial problem and analytical approach become more delimited.

Our original intention was to inspect the various economic realities that have been attached to wind as an economic resource. To do that we decided to focus on the instruments used to support wind power: the economies these instruments inscribe to use the conceptual language presented in the previous section. Of course, this in no way assumes that the economies we find in the instrument are the economies finally implemented. As mentioned, that would require a very different type of study. Our aim is more simply to comparatively inspect the various economies that have been attached to wind as an energy resource. The research process we followed can be organized in three steps.

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[3] This article is part of a broader research where we inspect what we call the dynamics of problematizations that shape the various policy instruments used to support energy resources. We work with different methods. We inspect current forms of expertise and practices used in creating instruments to support future energy resources ethnographically. We also work historically, we inspect past instruments that have come to shape the successful development of wind power in Denmark. This article is part of the latter.

Step 1: Identifying the relevant instruments. Using the Danish media database, Infomedia, we began with a review of newspaper articles over a span of four decades, 1975–2021. We followed the news coverage in four (daily) media outlets – two major newspapers, a smaller more critical newspaper, and the leading business newspaper (Politiken, Jyllands Posten, Information and Børsen, respectively). We selected all articles covering or debating the remuneration of wind power as well as debates concerning the societal costs of wind power in Denmark (N=750). Through our initial reading of these articles, we established a timeline for initiatives and events referred to in the articles as important for the development of wind power. More importantly for our analysis here, we identified three key policy instruments subject to much debate. These became the focus of our analysis. The instruments, often referred to as either support schemes and/or subsidies, share that they were introduced over the past 40 years to promote wind power. There are many other policies, which also have significant implications for the economy of wind power (e.g. technical details of grid connections, environmental impact assessment requirements, etc.). We have, however, limited our study to the instruments stipulating terms of exchange and forms of remuneration, i.e. directly affecting economization processes.

Step 2: Constructing an archive. Once the focus of study was restricted to the three policy instruments mentioned, we gathered information to reconstruct the narratives inscribed in each instrument. The news coverage, as mentioned, helped us to identify them, but, naturally, newspapers do not necessarily cover policy instruments in detail. Unlike more recent policy instruments (for instance those developed in the context of the EU electricity market), the support schemes we studied were not necessarily connected to technical reports elaborating on specific reasons and expected outcomes. To reconstruct the semiotic narratives in each instrument, we had to construct our own archive. In other words, the policy instruments inspected here cannot be reduced to one document, but to a network of documents. In some instances, this network of documents also includes later modifications of an instrument. In these situations, we refer to them as the same instrument, if the main script and terms of exchange remain stable. The three instruments studied are adopted by law and thus can be traced to specific bills and acts in Folketingstidende.dk, a database collecting all authoritative parliamentary documents since 1953, including bills, acts, inquiries, debates, statements, etc. The three instruments, as presented by law, outline the terms of exchange between the defined parties. To better understand each instrument, we also collected minutes from parliamentary hearings and meetings as well as technical reports and evaluations of the energy sector, Energy

Plans, consultancy reports, and reports from for instance energy agencies as well as tax authorities.

Step 3: Comparative actantial analysis. Once all relevant documents had been collected, we proceeded to analyze them by identifying key actants in each instrument and the script and programmes associated with them. To do this, we worked in two steps (as summarized below in Table 1). We used the traditional ANT categories (we identified *users*, *programmes of action*, and *scripts* in each policy instrument), to then use the six categories or three pairs (subject – object of desire, sender – receiver, helper – opponent) to pinpoint the relevant actants in the three instruments.

Findings: Tracing the economies of wind power

Exposition of the results follows three levels. First, we provide a descriptive overview of the three instruments, with an emphasis on their internal narrative logic. Second, we systematize each of these instruments in terms of the relevant actantial categories. Third, we focus on the insights the comparative exercise provides.

Three policy instruments

Investment scheme (1979)

The very first policy instrument offering support to producers of wind power was enacted in 1979 (Act on State Support for Renewable Energy).[4] The law was part of a series of measures introduced in Denmark with the aim of countering the effects of the oil crises of the 1970s.

At the time, Denmark imported up to 98% of its energy, predominantly oil (Rüdiger 2011), and with oil prices dramatically increasing, energy supply became, for the first time since World War II, a major economic and political concern. The oil price increases triggered an economic crisis, including a negative balance of payment and rising unemployment. Denmark's first national Energy Plan (Ministry of Trade 1976) identified three main priority areas of action to alleviate the effects of the crises and to better prepare the energy system for the future: first, to reduce dependency on imported oil (mainly by shifting to coal and multiple suppliers); second, to reduce import of oil by increasing energy efficiency through insulation of buildings and co-production of heat and power; and third, to develop a multi-stringed energy supply, while increasing the use of domestic energy sources (Ministry of Trade 1976).

[4] From hereon Act 1979.

The law introducing the investment scheme was formulated by the Ministry of Housing and approved by *Folketinget*, the Danish parliament. The law grew out of an employment plan from 1977, the purpose of which was "to promote the use of renewable energy sources, and thereby limit the import of energy" (Act 1979). More specifically, the support scheme stipulated that 30% of an investment in the "installation of facilities/equipment that use solar energy, wind power, geothermal energy, biogas, straw, and other similar energy sources" would be reimbursed when "installed in connection with buildings" (Act 1979). The expected beneficiaries were rural homeowners. The instrument provided an incentive for rural residents to instal a wind turbine (or other renewable energy technologies mentioned in the bill) to replace their consumption of imported oil.[5] The owner of a new wind turbine could ask the municipality for reimbursement of nearly a third of the investment costs when installing a new turbine; the maximum amount allotted per application was €15,000 (€130,000 in 1981). The equipment had to be formally approved through a technical review in order to be eligible for support.

Even though turbines could, technically, be grid-connected, the prime intention with the support scheme was not to incentivize electricity generation per se, but rather to promote the use of other sources of energy (than oil) for immediate – or almost immediate – consumption. Given that a very high share of imported oil was used for heating, the policy instrument appears to be aimed more towards promoting the installation of heating technologies, such as solar heating, biogas, straw and wood. These were considered better means for import reduction, compared to what small wind turbines would be able to deliver.

By stimulating homeowners to invest in renewable energy equipment, the scheme was supposed to have a series of effects. First, as mentioned, it was part of a policy made to improve employment, particularly in the construction industry. Second, the law focused not only on the homeowner, but also on (private) companies producing or installing the renewable energy equipment. Homeowners were supposed to use the investment subsidy to buy, not build or assemble

[5] Domestic residents and farmers were assumed not to have the necessary competences to make investments in the new wind power technology. In 1978, the Danish Windmill Owners Association (DWO) was founded in order to secure the members' investments in the new and unknown technology (Karnøe and Garud 2012). The organization built new capacities with consultants who assisted in the assessment of local wind resources, exchanges with the electrical utilities association to establish conditions for grid-connection, insurance companies to cover component failures, etc.

equipment themselves.[6] Thus, indirectly, the support scheme was also aimed at producers of such standardized equipment.

The scheme was terminated in 1989, at which point in time support had been reduced to 10% of the investment costs.

Production scheme (1984)

The second instrument was enacted in 1984, when an act (Act Amending the Act on Taxation of Electricity)[7] authorized Denmark's Minister of Taxes and Duties to grant economic support to producers of wind power injected into the grid.

To understand the specific shape this instrument took, it is important to refer to a tax on the consumption of electricity, introduced in 1977. In the context of the series of reforms seeking to reduce the use of imported oil, the consumption of electricity was taxed. By the time the tax was introduced, producers of electricity, such as wind power, were exempted from the electricity tax. For instance, a wind turbine owner who consumed their own wind power would not be taxed on electricity consumed. What the production scheme of 1984 did was somewhat more complicated. It created an equivalence between the amount of electricity injected into the grid by private owners of wind turbines and their electricity consumption, and offered to "reimburse" them for the tax paid for electricity consumption as a form of remuneration for wind power delivered to the grid. As expressed in the Act:

> The Minister for Taxes and Duties is authorized to provide support corresponding to the tax per kWh to electricity producers for the amount of electricity produced by wind power, hydropower, biogas or other renewable energy and which is delivered to the electricity grid. (Act 1984).

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[6] This was critiqued by the Organization for Renewable Energy, who stated that this would lead to "the exclusion of people who will buy and assemble the equipment themselves (in particular wind turbines and biogas plants that mainly will be installed by the user)" (written critique Appendix 3, Law 212 1978). Arguing that self-building was a normal practice among farmers and rural residents, the Organization of Renewable Energy made it clear that the law would fall short of its aim, if the exclusion of self-builders was maintained, as self-builders would also replace imported oil. This critique indirectly indicates that the aim of the support scheme was to improve employment and build new industrial capacity, while leaving self-builders on their own. The support scheme aimed to incentivize rural residents and farmers, who were not self-builders, to buy approved renewable energy equipment from (Danish) producers that could produce electricity or heat for their own consumption from sources other than oil.

[7] From hereon Act 1984.

As the following quotation shows, wind power should be exempted because its use replaces the use of oil, which was the problematic energy source, targeted with the original tax:

> … no energy resources are consumed and no expensive fuels are imported, it seems only reasonable to exempt this electricity [wind power] from the electricity tax. (Parliamentary hearing of Act 1983).

As with the previous instrument, the direct expected beneficiaries were farmers and rural residents. As the following quotation from a parliamentary hearing of the bill shows, this second instrument targeted another more indirect beneficiary:

> Additionally, tax exemption will further the development and production of wind turbines, which is of significant importance to the new industry that has evolved. A considerable domestic market is essential for the export opportunities that are currently exploited, to be sustained and further developed. (Parliamentary hearing 1983).

During the early 1980s, the Danish wind turbine industry had been growing significantly, mainly as an effect of export to California (Karnøe 1991). At the same time, the economy was experiencing a recession and economic policy turned to new sources for growth. Against this backdrop, the growing wind turbine industry presented itself as a prominent source for export and possible growth, all the while providing energy from domestic energy sources. To strengthen exports, it was argued, a domestic market had to be made possible by providing private turbine owners with "economic benefits" (Parliamentary hearing of Act 1983). In other words, the expectation was that by supporting wind power producers, the demand for turbines would increase and thus benefit the wind turbine industry, and the economy of Denmark more generally.

The other key aspect regarding this second instrument is that the grid was considered a means of wind power producers to "store" their electricity rather than selling it as such. In other words, remunerating wind power producers a payment corresponding to the tax per kWh for wind power delivered to the grid meant that they could later

consume the same amount of kWh as if it were their own tax-exempted wind power.[8]

Eight years after its introduction, in 1992, the production scheme underwent an important transformation. As documented in the national energy plan of 1990 (Ministry of Energy 1990), and following the Brundtland report from 1987, CO_2 had become a new concern in Denmark's energy policy. The energy plan laid out the environmental effects of energy production. This time, wind power was to be tax reimbursed, not because it was local or because it benefited a local industry, but because: "Increased use of renewable energy sources reduces the use of fossil fuels and thus reduces the environmental effects of the energy industry". (Ministry of Energy 1990: 60)

The economic support provided to wind power delivered to the grid, on top of the electricity tax, now added a CO_2 tax. From 1992, wind power delivered to the grid became remunerated an amount corresponding to both the electricity tax *and* a CO_2 tax.

Tendering (1999)

The third instrument was introduced by the Act on electricity supply[9] (1999) as part of the electricity reform in 1999 (Ministry of Environment and Energy 1999). The reform was Denmark's local adaptation of the EU electricity liberalization directive, which entailed the unbundling of distribution and transmission from generation and a gradual market opening (the following year, in 2000, when Denmark entered the Nordic spot market, Nord Pool).

Since 1984, and the introduction of the production scheme, turbine technology had been developing rapidly: not only had turbines grown significantly in size, but it had also become possible to build offshore wind farms. In 1991, Vindeby, the world's first offshore wind park was established in southern Denmark. The park had eleven 450 kW turbines. Eleven years later, an even larger offshore park, Horns Rev 1, was opened. With 80 turbines, it could produce electricity at a different scale of magnitude, 160 MW. With the development of offshore wind farms, wind power became concentrated in large production units, quite unlike the historic small-scale and scattered

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[8] This strong framing as a local production unit was reinforced by regulation, the so-called "residence criterion" from December 1985. The production scheme had stimulated investment in wind farms in rural parts of the country, but many investors lived far from the turbines. This was against the intention of the law, stipulating that owners construct turbines on their own land. The residence criterion required beneficiaries to own the land on which the turbine was installed – or in the case of collective ownership, to live in the proximity of the turbine – no more than 10 km away (Administrative order on state subsidies for the utilization of renewable energy sources 1986).

[9] From hereon Act 1999.

development. Thus, wind power started to take on a new role in Denmark's energy supply.

The reform's emphasis on wind parks shifted the past association between wind power and rural homeowners producing energy for their own use. Instead, the expected beneficiaries of this third instrument were large energy companies with considerable capital to invest in costly offshore wind farms. As a debate following the tendering of Horns Rev II illustrates: "[t]he tender material is written so that it can only be carried out by a large electricity company, with a significant equity capital, or a state-owned company that may provide the necessary security." (Horns Rev II Konsortium 2004: 2).

Not only was the beneficiary different, the type of instrument importantly changed. As stated in the reform text,

> [A]n increasing share of our electricity consumption will be covered by renewable energy sources. Therefore, it is essential that a future electricity market can make use of more competition-based schemes, which may guarantee a cost-effective development of RE generation. (Ministry of Environment and Energy 1999).

Furthermore, the instrument was based on project-based tendering mechanisms designed to incentivize the development of wind farms. As stated in the electricity reform, "Offshore wind farms will be developed based on a centralized bidding procedure. Permits will be granted to the producer who offers the state the most favourable conditions." (Ministry of Environment and Energy 1999).

The expectation was that a tendering scheme would create competition between wind power developers, while at the same time guaranteeing the developer a stable strike price: the winning bid price and a variable premium, often with a predefined cap.[10] Considered a means of "balancing" the economic risks between state and developer, competitive tendering was expected to drive down prices all the while allowing the state to continue to control the installed capacity of electrical power and its location. What has often been argued to be the advantage of tendering over production support is the control that the state maintains over location as well as size of wind park, and thus the development of installed capacity (Hvelplund 2001).

Although introduced as early as 1999, it was not until 2004 that the tendering scheme was employed for the first time: Horns Rev 2, a 209 MW wind farm of more than 90 2 MW turbines covering an area of 35 km2, became the first to be commissioned from a tendering process. Almost 20 years later, the 2018 energy agreement challenged the specific design of the tendering scheme, encouraging the development

[10] To illustrate, the price would be composed of the bid price and in moments where the bid price was below the spot market price, the producer would get a supplement defined as the difference between bid price and spot market price.

of new models where "revenues may be created for the state as a result of the wind resource being exploited" (Ministry for Climate, Energy and Supply 2018). This led to the adoption of a so-called two-sided CfD,[11] in which the investor pays back the state when the market price is higher than the strike price. This was considered a more acceptable distribution of risk between the state and the developer (Energy Agency 2020), even allowing for the state to profit directly from continued growth in offshore wind power.

The three instruments' narrative semiotics

The three support schemes, we have proposed, can be read as semiotic narratives. We do this reading in two steps.

The first step uses the categories used in ANT analysis of instruments, the user's script and programme of action. The second step uses the basic categories of actantial narrative analysis. The table below provides a summary. As in previous ANT analyses of instruments, we identify expected users and their expected scenarios. This basic script is supplemented by the actantial categories that show a more complex storyline. Nevertheless, the three instruments show a similar basic form. The sender is the government that initiates the support instrument, the instrument is the subject, who is given the task to make others, the helpers, act differently and with that defeat certain opponents, which, in turn, will make the final addressee benefit more generally from the object of value. What varies in the different instruments are the specific characters.

[11] Contracts-for-Difference, or CfDs, are well-established financial instruments, a derivative, used in a variety of financial markets. First developed to leverage gold, CfDs have become a widespread tool in energy markets, most commonly used to support renewable energy projects, but also used at for instance the Hinkley Point C nuclear plant in the UK. Where CfDs are heralded for their distribution of risk between developers and state, they were preferred over other tools such as concessions, which would likely have ensured a more significant income for the state (through e.g. rent of the seabed). While a concession model was considered (quite like the historical arrangements for exploring natural gas and oil in the North Sea), it was argued to have negative effects on the further development of wind power (Copenhagen Economics 2020).

Investment support scheme (1979)	**Production scheme (1984)**	**Tendering scheme (1999)**
ANT categories		
Expected users are farmers and residents in rural areas. The *programme of action* takes the shape of an economic incentive. Farmers and residents in rural areas that instal wind turbines or other forms of renewable energy equipment for domestic use can claim compensation for 30% of the installation costs. The *script* is that the incentive is expected to increase the chance expected users will instal renewable energy equipment for domestic use, therefore reducing use of imported oil, enabling a future where Denmark is less dependent on foreign oil and has improved employment and balance of payments.	*Expected users* are farmers and residents in rural areas. The *programme of action* takes the shape of a tax return (reimbursement). Domestic producers of wind powered electricity will be reimbursed the electricity tax, equivalent to the amount of Kwh they have injected into the electricity grid. The *script* is that the tax return scheme will incentivize rural users of energy to become energy producers, while also leading to a growing industry.	*Expected users* are large energy companies. The *programme of action* takes the shape of a tendering scheme. Large energy companies that receive the right to exploit wind farms in a delimited area will be benefited by secured long-term investment. The *script* is a competition, where the winner is guaranteed secured investment, while participants are supposed to compete for the most cost-efficient bid.
Actantial categories		
Government (*sender*) introduces investment support scheme (*subject*) with the goal of making the country, Denmark (*receiver*), less dependent on foreign sources of energy (*opponent*). The instrument's (*subject*) goal is to incentivize rural inhabitants and farmers (*helpers*) to instal wind turbines (*helpers*) which will be used as sources of domestic electricity and heat, and with that to rely less on oil (*opponent*).	Government (*sender*) introduces a production scheme (*subject*) with the goal of increasing Denmark's (*receiver*) economy. The instrument's (*subject*) goal is to incentivize rural inhabitants and farmers (*helpers*) to instal wind turbines (*helpers*), which will help the local wind turbine industry further develop. Excess demand (beneficiaries, *helpers*) will lead to an increase in investment in facilities to make wind power technology available.	Government (*sender*) introduces competitive tenders (*subject*) with the goal of ensuring Denmark's (*receiver*) cost effective wind power production. The instrument's (*subject*) goal is to incentivize large wind power developers (*helpers*) to build and instal offshore wind farms (*helpers*), which will provide the country (*receiver*) with cheap wind power generated electricity.

The incentive (*subject*) will also expand demand and this will lead to an increase in investment in facilities to make renewable energy technologies available at lower prices. The instrument's beneficiaries – farmers and residents in rural areas – as well as wind turbines are only minor helpers in the larger quest (*object of value*) for Denmark's energy independence.	The instrument, farmers and residents in rural areas, are minor helpers in the larger quest (*object of value*) for Denmark's economic growth. With the modification of 1992, farmers and residents in rural areas, wind turbines and wind turbine industry, became helpers in the larger quest (*object of value*) for Denmark's economic sustainability.	The tendering mechanism, large wind power developers, wind farms, are helpers in the larger quest (*object of value*) for Denmark's energy security and sustainable economic development.

Table 1: Summary of the analysis.
Source: Authors' own work.

Comparing the three instruments

Although we do not engage in specialist semiotic or narrative analysis per se, borrowing basic aspects of this language helps to compare the different economies of wind power inscribed in the support schemes. Three aspects are, in our view, particularly salient in this context.

A first way of comparing the instruments is by paying attention to what in the semiotic language would be the "sender" and the "addressee", or in simpler terms, the final beneficiary. The first two support schemes assume a mechanical logic. The government sends – or implements – a support scheme that will make it more likely that a specific type of actor will act in a desired way, and this, in turn, will make the final beneficiary get closer to the final object of value. In the first instrument this is simpler: a domestic energy infrastructure investment subsidy is expected to increase farmers and rural homeowners' use of wind turbines, which, in turn, should reduce Denmark's reliance on imported oil. In the second instrument the logic is similar but with a slightly more complicated chain of connections. Tax reimbursement will increase farmers' and rural homeowners' wind power use, which will benefit a *helper*, the developing wind power industry, which, in turn, will help the Danish economy to grow. The instrument is not only oriented to reduce use of a particular type of energy source, but also, more explicitly than with the first instrument, which was also an employment support, is an industrial policy, a scheme to support the development of a local industry. The third instrument, finally, has a quite different internal logic. The government creates a tendering mechanism where companies that fulfil the entry

requirements are expected to bid on the right to develop a particular wind farm site, and it will be the task of the tendering or auction mechanism to identify the most efficient proposal. Here, unlike the previous instruments, the government does not create an incentive that will make a type of actor more likely to act in a particular way; the government introduces a competition that will make bidders compete to offer the lowest bid. If the sender of the second instrument becomes a developer of industrial policy, in the third it is a designer of competition, a market designer of sorts. The market designed in turn is expected to be able to sort between alternative scenarios, producing the most cost-efficient intervention.

A second relevant comparative issue appears when the instruments are considered in terms of what in the semiotic language is the "object of value" – the goal of the quest – its relationship with the "addressee" and key "helpers", the wind turbines themselves. In the first instrument, the main goal is to reduce Denmark's dependency on imported oil, which, in turn, is part of a broader quest to improve the Danish economy's balance of payments. In the second instrument there is an important transition. In its first version, the main goal was the country's economic growth, and, more indirectly, employment. However, since its 1992 modification, it has also been an instrument expected to reduce CO_2 emissions. It is here where CO_2 enters the economies envisioned in the studied support instruments. Wind power is now both a minor helper in reducing dependency on oil and economic growth, and a helper in the new national quest for making the economy less CO_2 dependent. Finally, in the third instrument, there is a combination of energy security and a growing sustainable economy. A key difference here is what is expected of the wind turbines themselves. In the first two instruments, wind turbines are deemed part of the infrastructure of farms and rural homes: wind turbines are domestic sources of heat or electricity. In the third instrument, on the other hand, turbines and wind farms are seen as national sources of energy: key components of the national power infrastructure.[12]

A third aspect refers to the ways in which each instrument portrays its key user and how it expects to change their way of acting; in ANT language, the instrument's scripts and programmes of action. In the first and second schemes, beneficiaries are private homeowners. The schemes should make them act differently: farmers and rural owners are incentivized to invest in non-oil energy infrastructure. This is a type

[12] Even though in the second instrument, wind turbines are thought to be connected to the electricity grid, wind power was, however, still considered as providing a marginal contribution in terms of overall energy supply (the expected potential was less than 10 times the installed onshore capacity in 1990 (Ministry of Energy 1990: 41). In fact, it seems as if the wind turbine industry was of more interest than wind power as such.

of economic intervention targeting a unit that could be thought of in terms of an *oikos*.[13] This, of course, does not mean these are instruments that work with pre-modern economic logic. These are instruments scripted with the specific narrative constraints of neoclassical economics governance. In the first instrument, the expectation is that by reducing the final cost of investing in non-oil-based energy infrastructure, beneficiaries will be more likely to replace oil dependent infrastructure. It is a similar logic that is present in the second instrument, but here instead of subsidizing domestic investment, economic action is incentivized via tax exemption.[14] The expected beneficiaries of the third instrument is, however, very different. These are definitely not located at the *oikos*, they are large energy companies. The type of incentive is also very different. While the first two instruments incentivize beneficiaries with different forms of savings, in the third, the final beneficiary, the winner of the tendering so to speak, is benefited with compensation that will provide security for the investment. While the user of the first and second instrument was assumed as domestic – and incentivized accordingly in terms of their budgeting (tax exemptions and return on machine investment), the user of the third instrument is assumed to be a large energy company that is incentivized in terms of future cash flow.

Discussion

The analysis presented in this article connects, we propose, with two different, but related streams of academic literature: work on energy resources and work on valuation and good economies.

Economic objects and energy resources

In their influential proposal for a research programme on economization, Çalişkan and Callon (2010) identified five foci of study; one was the study of economic objects. Research on economic objects, in turn, connects literature coming from economic

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[13] Ossandón and colleagues (Ossandón et al. 2022) propose a programme of research that examines the practices and instruments through which household finances are managed and governed. They call this approach financial oikonomization. In these terms, it could be argued that the two first schemes are instruments of energy oikonomization: interventions that aim to shift how the energy economy of the rural house is managed.

[14] Even though in the second instrument, wind turbines are thought to be connected to the electricity grid, wind power was, however, still considered as providing a marginal contribution in terms of overall energy supply (the expected potential was less than 10 times the installed onshore capacity in 1990 (Ministry of Energy 1990: 41). In fact, it seems as if the wind turbine industry was of more interest than wind power as such.

anthropology (notably the tradition associated with Appadurai's edited volume (1986) that emphasizes the temporal character of the commodity status of things; and work at the intersection of economics and sociology originating in France on how economic goods acquire certain qualities (see Musselin and Paradeise 2005 for a review). The key issue here is to follow the trajectories of economic objects, the life of the product in Callon and colleagues' terms (Callon et al. 2002), and how the qualities of economic objects shift with the different relational configurations in which they become situated.

The emphasis on the life of economic objects and their variable ontologies has become relevant in recent social studies of energy. Most work here comes from science and technology studies (STS) inspired economic geography, where long-lasting disciplinary interest in "resources" has given space for work on *resource-making*. From this perspective (see Bridge 2009, 2014), *being a resource* is not a given, but rather an effect, and what studies here do is to pay attention to the process in which things are turned into energy resources (Kuchler and Bridge 2018), with a more recent emphasis on assetization in current efforts of decarbonization (Langley et al. 2021). A different but related stream comes more directly from STS where attention has focused on the devices involved in energy resource making (see the chapters in Labussière and Nadaï 2018). Here too, it has been stressed that more attention should be paid to how energy resources are qualified as renewable and the specific assemblages participating in such processes (Labussière and Nadaï 2018).

In the light of this tradition, what we do in this article could also be seen as a study of wind power as a resource. As in the work just mentioned, we follow wind power not as a fixed entity, but as it is constituted in specific relational configurations. Analysis of the three policy instruments illustrates that the question in this case is not so much when – or when not – wind power becomes an energy resource, but rather the significant differences in the ways in which it becomes a resource. Comparatively inspecting the instruments supporting wind power development helps us to learn more about the relational properties of energy resources, and the way in which resources become commodities and assets.

In the first instrument, wind power is conceived as a domestic source of energy. At this stage, wind power is not framed as an exchangeable commodity, but as a resource consumed immediately in the adjacent home. With the second instrument, wind power is thought of as circulating in the grid and can, accordingly, be metered. It becomes a recognized source of energy, but it is not conceived of as a commodity that is sold. On the other hand, in instrument one partially but more clearly in instrument two, wind turbines are recognized as commodities on their own that are at the centre of a growing industry that requires support. All this changes with the third instrument. Here,

wind power is an essential part of the marketized electricity system. Wind power becomes a commodity – to be priced in the Nordic integrated market – and this commodity is taken as an essential component for the financial economy of energy investment. Future sales of wind power become a future cash flow that can be treated as an asset.

Good economy

A second literature is more directly connected to this *Valuation Studies* theme issue. A key problematic, in this context, is the study of what Asdal and colleagues have called "good economies" (Asdal et al. 2023). The following extract from a recent commentary by Asdal on Weber is helpful:

> A hypothesis with regard to our contemporary society is that the economy is now instead emerging as a new and differently ordered normative sphere. If this is so, this can be linked to a new financialized and moralized version of economy where the issue is no longer the correct allocation of scarce resources based on precise calculations of alternative costs and ends, but rather the idea of manufacturing markets for collective concerns (Frankel et al. 2019) and that of doing good with money [...] Rather than ensuring no penny is spent in vain, the aim becomes the provision and directing of capital; an economy where the division between fact and value is displaced from being the overriding good, to capital as both the instrument for moving capital towards good ends and capital as a good in and of itself. In other words, a version of economization as a "good economy" (Asdal et al. 2023) where that of distinguishing between fact and value is no longer the issue, but rather an idea of value creation that encapsulates the good, and the sustainable too. (Asdal 2022: 851).

The quotation has two implications that are relevant here. On the one hand, it is a diagnosis: contemporary government is not about separating the economy and the good. On the contrary, it can be characterized in terms of the various ways in which the good is pursued through economic instruments: markets that are supposed to work as policy devices (Frankel et al. 2019), green finance and accounting (Chiapello and Engels 2021), etc. On the other hand, what Asdal makes is also a methodological call to pay more attention to the various "good economies" that these economic instruments produce. In Asdal and colleagues' work (Asdal and Reinertsen 2021, Asdal and Huse 2023, Asdal et al. 2023) this is done by paying attention to the documents of policymaking.

What we do in our analysis can clearly be read with these lenses. On the basis of document archival methods, we compare policy instruments, and the comparative study shows the various good

economies of wind power. What we do is see that our comparative inspection is not of the different documents associated with one policy, but that rather we compare different instruments, and, accordingly, the different *good economies* of wind power. As mentioned earlier, we cannot claim to know how the instruments we study implement the narrative inscribed in them.

What we can see are the economies that wind power support schemes seek to underpin. The three instruments share that they are framed as responses to one key concern, namely, the energy dependency of Denmark. Wind appears as a local alternative to imported oil. Aside from that, the instruments differ significantly. In the first and second instruments, the economy of wind power is conceived as an intersection of an *oikos* and the overall national economy (if rural households and farms instal wind turbines, they will be less dependent on oil, which will, indirectly, increase employment in the construction sector, and improve Denmark's balance of payments; if rural households and farms are incentivized to inject wind power into the grid, they will demand more wind turbines, which will help to develop the wind turbine industry, and positively impact economic growth). There was, however, an important shift with the second instrument's modification in 1992, when wind power was supported in terms of its impact on CO_2 emissions. It could be argued that it is precisely with this modification that the support instruments we study become less driven by more or less traditional (macro-)economic goals (balance of payments, growth, employment) and become instruments that are expected to support a *good sustainable* future. This, in turn, is consolidated with the third instrument, which is closer to what Asdal and colleagues seem to have in mind when they think of a good economy. It is an instrument with "an idea of value creation that encapsulates the good, and the sustainable".[15]

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[15] As one of our reviewers pointed out, a third line of discussion – that we cannot expand on here for reasons of space – concerns the literature on policy instruments as developed for instance by Lascoumes and Le Galès (2007). One way of doing this could be by exploring further how what we do here, and what others have done before (e.g. Asdal and Huse (2023), Ossandón and Ureta (2019), Pallesen (2016)), that is, using ANT tools originally developed for the analysis of technical devices to study policy instruments, modify our understanding of instruments of policy more generally. Another and perhaps more difficult possibility could be to explore what here remains only an analytical hypothesis: namely, that policy instruments more generally can be inspected semiotically. A way of doing this could be to further test whether the method we rehearse here – when we look at an instrument in terms of a narrative with the instrument as the subject, with senders, receivers, helpers, beneficiaries, objects of value, opponents – works for other cases. We thank our colleague Troels Krarup for pointing us in this direction.

Conclusion

The quotation that opens this article comes from a six-volumes analysis of the tax and subsidy system in the energy sector published by the Danish tax authorities in 2018. The quote illustrates what has come to be the dominant expert position within energy policy. It is from this position that *good* and *bad* reasons for using policy instruments such as "taxes and subsidies in the energy field" can be expertly distinguished as a matter of "improvements in welfare from a socio-economic point of view". This article has also been about policy instruments in the energy field. We have inspected a series of economic support mechanisms in relation to wind power introduced in Denmark in previous decades. The analytical position, however, is not that of the expert implied in the quotation. We do not define what is good but study what becomes good: we compare the different good economies that are implicit in the different instruments we study. There is, however, a different way in which we could connect what we do in this article and the quotation. From the perspective of contemporary policymaking implied in the quotation the first two support schemes studied here are bad instruments. While they appear to have been perfectly reasonable in the context in which they were introduced, these are support schemes that do not pass the test of socioeconomic cost–benefit assessment used today, and more generally, what is today accepted as good instruments. They are relics of past forms of supporting the economies of wind power. From this perspective, the method rehearsed here could be read as a call for future work where what is traced is not only a transformation in the good economies of wind power, but in the nature of economic support instruments and the policymakers implied with them. We see, perhaps, a movement from a type of instrument where the policymaker's position is conceived of as someone tinkering with supply and demand (an expert that creates employment support and industrial policies that are supposed to impact the macroeconomic balance), to one in which the position of the policymaker is that of a market-designer, and from where it is possible to compare alternative policy instruments as if they were possible avenues of investment.

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