



The landrush of wind energy, its socio-material workings, and its political consequences: On the entanglement of land and wind assemblages in Denmark

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Environment and Planning C: Politics and Space

The landrush of wind energy, its socio-material workings, and its political consequences: On the entanglement of land and wind assemblages in Denmark

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Keywords:	assetisation, land-and-wind assemblage, energy justice, development practices, expert-lay
Abstract:	<p>Challenges of deploying wind farms on land are often associated with the notion of local acceptance. For developers, however, the socio-material practicalities of identifying appropriate sites and gaining access to land for building large wind farms has become an increasingly challenging endeavour. This paper illustrates how the commodification of wind energy cannot happen without the assetisation of land. Dis-assembling the valuation processes around the entangled wind-and-land assemblage, the paper casts a critical light on how calculative devices have helped to make land and wind into discrete, marketable, assets, accelerating a 'landrush' for access to scarce land. The landrush, in turn, has co-produced opaque and clandestine developer practices of acquiring access to privately-owned land to secure a viable investment. The paper argues that these developer practices result in an erosion of the participatory merits of planning and marginalise the role of local host communities, while elevating the significance of private landowners. Based on an assemblage lens founded in Science & Technology Studies (STS) and interviews conducted with a variety of stakeholders in Denmark, the paper concludes by discussing the implications of narrowed public participation in the entangled wind-land assemblage for energy justice. We argue for further inquiries into the assetisation of land for renewables and the associated 'sterilisation' of resources in this process, while pointing to the potential for cross-fertilising critical perspectives from human geography with analytical tools from STS for future research.</p>

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Abstract

~~While challenges~~ Challenges of deploying wind farms ~~have been mainly on land are often~~ associated with ~~the~~ notion of local acceptance, ~~the~~. For developers, however, the socio-material practicalities of identifying appropriate sites and gaining access to land for building large wind farms has become an increasingly challenging endeavour ~~for developers. By disentangling~~. This paper illustrates how the ~~mutually dependent commodification of wind energy cannot happen without the~~ assetisation of land ~~. Dis-assembling the valuation processes around the entangled wind and wind resources in Denmark, this land assemblage, the~~ paper casts a critical light on ~~the~~how calculative devices have helped to ~~make land and wind into discrete, marketable, assets, accelerating a 'landrush' for access to scarce land. The landrush, in turn, has co-produced opaque and clandestine developer~~ practices of acquiring access to privately ~~owned land as an inevitable prerequisite for deploying wind turbines. We illustrate~~ how expert-deployed calculative devices, intended to simplify matters, encourage land-grabbing to ~~secure a viable investment. The paper argues that these developer~~ practices amongst developers, ~~producing unforeseen consequences that erode~~result in an erosion of the participatory merits of planning and marginalise the role of local host communities, while elevating the significance of private landowners. ~~We trace how~~Based on an assemblage lens founded in Science & Technology Studies (STS) and interviews conducted with a variety of stakeholders in Denmark, the ~~use of various calculative tools for the assetisation of land for harnessing wind energy produces contestations, from the initial land-rush, to practices among competing developers and rent-seeking landowners, and to repercussions for public engagement. We conclude~~paper concludes by discussing the implications for ~~energy democracy and of narrowed public participation in the entangled wind-land assemblage for energy justice and. We~~ argue for further inquiries into the assetisation of land for renewables, ~~and point towards~~ and the associated 'sterilisation' of resources in this process, while pointing to the potential for cross-fertilising critical perspectives from human geography with analytical tools from STS for future research.

Key words: assetisation, calculative devices, Danish land and wind power planning and assemblage, development, socio-technical assemblages practices, expert and lay, energy democracy justice

"[Wind energy] has become a Klondike where everybody looks for how to maximize [profits]" (Community Owned Energy/NGO)

Introduction

The emergence of Denmark's wind power sector in the 1980s was largely driven by a social movement of ideologists, self-builders as well as scientists and politicians ~~in favour of this who wanted to promote~~ renewable energy ~~over rather than~~ nuclear power (Karnøe, Kirkegaard and ~~Buchhorn, 2010~~Caliskan, 2022). Back then, local wind turbine cooperatives and grassroots organisations ~~inspired were the~~ inspiration for development, but over the past four decades, techno-economic advancements have placed commercial wind farm developers in the driving seat, investing in ever-increasing ~~larger~~ wind ~~farm capacities~~farms (Kirkegaard et al., 2020).

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~~Given their~~With wind farms now on an industrial scale, the development practices and their reliance on expert technical and scientific knowledge, wind farms wind farms have increasingly come to resemble the ~~power plants fired by features of energy infrastructures based on fossil fuel~~fuels and nuclear power ~~that the wind sector was born in opposition to and should replace.~~, with a heavier reliance on expert technical and scientific knowledge. A particular challenge of ~~this~~the large-scale utilisation of wind energy is ~~that of~~the siting of wind farms ~~compatibly~~so they are compatible with other land uses, ~~which leads to~~. However, compatibility has turned into competition, and the valuation of wind and land resources ~~being~~has become inseparable. ~~Thus,~~An often overlooked consequence of the socio-material transformation of wind power has been a competitive rush for land between wind farm developers to secure access to land to erect wind turbines. This has also been described to produce a “Klondike” effect by local community members (NGO). Land and wind have thus become two mutually dependent assets. OneA market assemblage around any of these two assets can however not be established without the other: that is, one cannot be capitalised to produce value from the marketable electricity generated by a wind farm without the other (Sellwood and Valdivia, 2018; Nadaï and Cointe, 2020Cointe, 2018). ~~The development of wind power has therefore become dependent on a number of valuation tools such as maps, zoning plans, land leases and public engagement guidelines that are supposed to simplify, streamline, negotiate and legitimise wind energy development. Paradoxically, though, they have come to do the opposite — complicating matters as they collide and overflow.~~

In this paper, we inquire into the calculative devices that operate in the black-boxed nexus of land, wind power, and planning processes. We reveal how the two entangled markets of wind and land have narrowed the space for public engagement in planning for wind farms through the co-production of opaque processes. The calculative devices employed are meant to secure the ‘best’ and windiest sites, ensure legitimate planning of land use, and enhance public accountability. Yet their intertwining further complicates the siting and public participation processes, as well as deepening the divide between experts and lay people — for example, profit-driven developers and local communities. We show that at the root of this is that ‘accessing’ the wind resource does not only involve technological devices (wind farms) and an economic valuation of the resources (remuneration for electricity produced) creating revenue streams (Nadaï and Cointe, 2020), but also requires territorial and legal access to the resource. An ~~often overlooked consequence of the socio-material transformation of wind power has been the production of a “Klondike” effect (Community Owned Energy/NGO): a competitive rush for land between wind farm developers to secure access to land to erect wind turbines.~~

While focussing on the role of land as an asset, we follow up on a recent surge in studies on land use as part of on-going large-scale development of renewable energies in the green transition (e.g. Labussière and Nadaï, 2018a). Inspired by work that has examined how land and wind are assembled as investable resources (Li, 2014; Christophers, 2016; Billon and Sommerville, 2017; Nadaï and Labussiere, 2018; Kirkegaard and Nyborg, 2021), we reveal the socio-material work underlying the valorisation and assetisation of land, as wind energy transforms land into an investable “asset”: a revenue-generating resource with recurring earnings (Birch, 2017), Birch, 2020; Nadaï and Cointe, 2020). We do so by adopting the relational assemblage lenses of Actor-Network Theory (ANT) and the Social Studies of Markets (SSoM) (e.g., Çalışkan and Callon, 2010). These help us to zoom in on calculative devices, and their role in both carving out the valorisation of land and wind, and in undermining the intentions of the planning system to ensure public participation and energy justice. We thus trace how the calculative devices, designed to make clear and simplify — or ‘black box’ — the value of the asset in each of the land and wind assemblages, actually entangle the assets, colliding and complicating the process of producing and marketising the commodity of electricity. Our work

contributes conceptually to discussions in human geography (e.g., Anderson and McFarlane, 2011) to better understand the processes of commodifying and marketising nature and natural resources (e.g. Bakker and Bridge, 2006; Castree, 2003a; Nadaï and Cointe, 2020).

We start In this paper, we adopt a socio-material lens of socio-technical assemblages (Li, 2014; Callon, 1986; Nadaï and Cointe 2018) to cast a critical light on the current processes of assetising land for wind power and its political consequences. The paper reveals how the assetisation of wind and land have accelerated the landrush in Denmark, not only leading to intense negotiations for gaining access to scarce land, but also resulting in a constrained space for public engagement through the co-production of opaque planning-and-development practices. While focussing on the role of land as an asset, we contribute to a recent surge in studies on land appropriation as an element of large-scale development of renewable energies in the green transition (e.g. Labussière and Nadaï, 2018a, Siamanta & Dunlap, 2019; Alonso Serna, 2022; Wade and Ellis, 2022). Inspired by work that has examined how land (Li, 2014; Christophers, 2016; Le Billon and Sommerville, 2017) and wind (Nadaï and Labussiere, 2018a, 2018b; Kirkegaard and Nyborg, 2021) are assembled as investable resources, we reveal the socio-material work underlying the transformation of land into an asset, that is, a revenue-generating resource with recurring earnings (Birch, 2017, 2020; Nadaï and Cointe, 2020). We show how these processes have meant that the negotiations over land are kept confidential, often accompanied by the exclusion of local communities, non-experts and non-land owning neighbours. Our findings thus relate strongly to discussions of energy justice and public participation.

We begin the paper with an overview of the emerging role of land infor harnessing renewables, particularly wind energy, before briefly outlining the conceptual and methodological framework, followed by the empirical background in Denmark. In the analysis, we then trace the contested assetisationrole of land for harvesting wind energy through the employment of various calculative tools from the initial land rush, to and explore practices among competing developers, and to to access land resources as well as their consequences for public engagement-participation. Finally, in the discussion and conclusion deliberateswe elaborate on how wind energy has seemingly become radically transformed from a technology of the public to one that has largely been pushed outside the public realm, and reflect upon wider theoretical and practical implications of this issue.

Land as an asset for deploying wind farms

Without having access to land, no onshore wind farm can be built in the first place. Two key factorsconditions contribute to the significance of land for wind energy and have contributed to an increasedenhanced the competition for land for building wind farms. First, the general shift from extractive subterranean modes of energy production (fossil fuels) to a more horizontal and decentralised production of renewable energy, dictates that a larger surface area is required (Huber and McCarthy, 2017). Second, the upscaling and technological advancements in wind power generation has led to large utility-scale projects and thisrequiring more extensive land areas, which has gone hand in hand with a severedecoupling of the wind estate from the land estate (Horst and Vermeylen, 2010). These two factors have enhanced the significance of land because, without having access to land, no wind farm can be built in the first place. Wind energy can thus not be harnessed, which ultimately stops the assemblage of a market for wind power development. While the materiality of wind becomes quantifiable through calculative tools that make wind speeds measurable, enabling the transformation of wind into a valuable energy resource by experts. Wind energy cannot be harnessed as a 'resource' before a 'wind farm site' has been constructed (Nadaï and LabussiereLabussière, 2018; Nadaï and CointeCointe, 2020), only its relationship with other material

assets such as land and wind turbines enables the production of a marketable commodity from wind (Sellwood and Valdivia, 2018; Nadaï and Coïnte, 2020); Kirkegaard and Nyborg, 2021; Wade and Ellis, 2022). That is, to turn the wind into an investable 'resource', a 'site' must first be assembled. This requires that the land on which the wind turbines are to be placed is valued through various calculative devices (Callon, 1998), such as wind speed assessment tools (e.g. GIS maps and wind atlases) and usually made public via municipal plans with designated wind energy zones. In line with geographical and political-ecological perspectives, land for utilising wind energy can thus be understood as a resource and an object for human appropriation. The transformation of the wind and land into resources and assets can be seen as a network-effect, or 'assets-as-assemblages'/'agencements' (paraphrasing Nadaï and Coïnte, 2020: 151). In this assemblage, wind power is a commodity for sale (i.e. electricity generated from the wind farm) while the land ('site') is an asset, based on asset-based income which is generated through licensing (Birch, 2017: 465) or rents (Birch, 2020; Nadaï and Coïnte, 2020).

The underlying processes of the negotiation of ~~varied~~various uses and access rights by commercial actors have by some been associated with the concept of "land grabbing" or "green grabbing" (e.g. Borras Jr et al., 2011). These notions refer to an ~~underlying~~inherent "appropriation, transfer of ownership or user rights and control over land and resources" (Fairhead et al., 2012: 238) to powerful private actors based on green, environmental or conservatory rationales "arising from new economic valuations of natural resources" (Dunlap, 2017: 18). A ~~land-rush~~landrush driven by interests of green grabbing is characterised by "a sudden, and hyped interest in a resource because of its newly enhanced value and the spectacular riches it promises to investors [developers] who enter into business early" (Li, 2014: 595). Notably, these notions have recently appeared ~~with regard to~~alongside the challenges related to the planning and development of wind farms, both in the Global South (Cormack and Kurewa, 2018) and ~~in~~ the Global North (Horst and Vermeulen, 2010; Labussière and Nadaï, 2018b; Siamanta, 2019); Elmallah and Rand, 2022). Of particular relevance is the encroachment of planning into the private sphere due to the inevitable contractual negotiations with landowners. Jacquet (2015) has emphasised that the ability of landowners to influence new utility-scale projects, i.e. large-scale infrastructure developments, such as wind farms, on their land is not a novel phenomenon, but suggests that the vast and contiguous scales of land "undergoing privately controlled energy development are unprecedented" (Jacquet, 2015: 234). It follows that the process of getting access to land in the first place is a potential area of contestation, as "the most fundamental conflicts relate to the right to capture the resource itself" (Horst and Vermeulen, 2010: 67). ~~Hereby, the question of land, its ownership and valuation for wind energy purposes is inevitably linked to issues of power (e.g. Horst and Vermeulen, 2010; Christophers, 2016; Cormack and Kurewa, 2018; Labussière and Nadaï, 2018a; Siamanta, 2019).~~

When land becomes scarcer for ~~particular~~certain uses, the ~~land-rush~~landrush becomes more critical and individual property rights more crucial and ~~forceful~~powerful. According to Christophers (2016: 135) who refers to Elden (2010), land is indeed a "territory understood specifically as a form of property, something owned and potentially capable of being bought and sold". ~~This diverges from the notion of land as~~Rather than a fictitious commodity, ~~arguing land is not produced as a real commodity with the purpose to be sold on the market. Instead, it is through ownership that~~land becomes commoditised to resemble a real commodity through ownership (Christophers, 2016). A right to land, be it based on property or use, is an exclusive right, where the mode of exclusion can be physical, forceful, regulatory or "can operate by means of market mechanism that excludes people who cannot afford the price" (Li, 2014: 591). Hence, wind energy not only requires material enclosures to capture its value (Sellwood and Valdivia, 2018), but property rights become ultimatelyalso entangled with

processes of land use planning (Blomley, 2017). ~~The scarcity and limitation of suitable land reinforces its valorisation in order for prospective investors to foresee a return on investment (ROI), and for commodification and marketisation of wind to take place (Billon and Sommerville, 2017; Labussière and Nadaï, 2018a; Nadaï and Cointe, 2020). Despite its critical role for renewable energy development, ownership of “key biophysical resources” has received surprisingly little attention (see Wade and Ellis, 2022). Following on from Wade and Ellis (2022: 1), we inquire into the construction of ‘wind rights’ as landowners and developers are “enclosing the ‘windy commons’ [paraphrasing Ostrom, 2004] to extract ‘wind rents’ from monopoly property rights”, creating procedural and distributional injustices (Holifield, 2009; Jenkins et al., 2016; Elmallah and Rand 2022).~~

Towards an assemblage of land for harnessing wind

Most studies dealing with the nexus of land, wind, and planning have emerged from geography and political ecology, taking a critical approach to the valuation, appropriation and commodification of land (or nature and space, e.g. Castree, ~~2003a~~2003, Smith, 2007) ~~and wind resources as an expression of neoliberal capitalist relations;~~ Wade and Ellis, 2022) ~~and wind resources as an expression of neoliberal capitalist relations.~~ In this paper, however, we follow a complementary path by Li (2014), Christophers (2016), ~~and~~ Le Billon and Sommerville (2017) and Nadaï and Cointe (2020) to scrutinise ~~and disassemble~~ the processes that produce land as a commodifiable asset in ~~order to shed more light on the socio-material work involved in marketising land for wind power~~ the first place and that co-produce a ‘landrush’. Human geography has recently begun to stress the need to look further into land as a ‘real’ commodity and its connection to markets (Christophers, 2016; Li, 2014). More specifically, Li (2014) and Nadaï and Cointe (2020) stress that land resources do not have an intrinsic quality value and instead are assembled as an investible but “provisional assemblage of heterogeneous elements including material substances, technologies, discourses and practices” (Li, 2014: 589).

~~This approach speaks to the SSoM and its relational and symmetrical~~ Drawing on this lens of socio-technical (market) material assemblages/ agencements (STA) — that is, an “arrangement or assemblage (and power field) of heterogeneous [i.e., human and non-human] elements” (Çalışkan and Callon, 2010: 23). ~~While, founded in Science & Technology Studies (STS), we extend the~~ assemblage thinking ~~has been~~ introduced more recently in human geography (e.g. Anderson and McFarlane, 2011; Krauss, 2010; Labussière and Nadaï, 2018a; Le Billon and Sommerville, 2017; Kropp, 2018; Chezél and Nadaï, 2019; ~~Nadaï and Cointe, 2020~~), ~~we introduce the notion of market STA for the first time in an exploration of entangled markets for wind and land. By including non-human actants in the analysis, the SSoM helps us to shed light on how and through which).~~ Exploring the entanglement of wind (as a commodity) and land (as an asset), the lens of socio-technical assemblages helps us to discern how the valuation of wind has reconfigured the valuation of land, and vice versa. In other words, the commodification of wind as an energy resource re(valorises) and mobilises land for the production of wind energy, while competing land uses limit the production of wind energy. On the one hand, developers make their judgement as to whether a wind farm project is economically viable or not by calculating the potential return on investment (ROI) based on the expected energy production from the wind, using specific types of wind turbines, that would be placed on a specific piece of land. Ultimately, if they succeed in mobilizing all these material entities, then the land is turned into a ‘site’ for wind energy production (Kirkegaard and Nyborg, 2021; Sellwood and Valdivia, 2018; Nadaï and Cointe, 2020) whereby a market assemblage can be mobilized (Karnøe et al., 2022; Kirkegaard et al., 2020). On the other hand, competing land uses, place-related conflicts and planning regulations serve

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3 to constrain the utilisation of wind energy regardless of the measurable wind resource (e.g. Cowell,
4 2010).

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6 The socio-technical assemblage lens is relational and socio-material, meaning that once one entity
7 shifts, the entire assemblage's configuration will shift as well. The assemblage lens hereby also helps
8 unpack shifting agencies and power relations. To show this, we first trace how calculative devices such
9 as geographical maps, wind measurements, maps of landownership, municipal zoning, and land-
10 leasing contracts make visible the scarcity of available land, triggering a landrush for the limited
11 locations to develop wind farms. Here, the wind is the point of departure in the valuation process,
12 while land acts as a constraining mediator that determines whether and where the wind can be
13 utilised in an economically viable way or not. Second, we illustrate how the land rush produces opaque
14 and iterative negotiations between developers, landowners, and municipal planners. Finally, we show
15 how the construction of land as a scarce resource has shrunk some agencies and enlarged others,
16 notably inhibiting the engagement and participation of the public and producing concerns over energy
17 (in)justice (Holifield, 2009; Jenkins et al., 2016; Elmallah and Rand, 2022). Our analysis in turn reflects
18 on how the assetisation of land through the wind deepens the divide between those who have
19 property and access rights and those who do not. Entangled in the Danish planning system for wind
20 power development, these issues have become enmeshed with "procedural injustices" (Elmallah and
21 Rand, 2022) of planning and development practices with a constrained space for 'non-expert'
22 deliberation. Developer practices and the planning system are working to exclude certain publics and
23 forms of expertise and include others into the planning and development of wind farms (Van Veelen
24 and Eadson, 2019), with surprising resemblances to the closed and technocratic processes of large-
25 scale nuclear developments (Wynne, 1983). framing devices values and qualities are ascribed to
26 different 'things', and thus how markets are formed as hybrid assemblages (Nadaï and Coïnte, 2020)
27 around commodified assets. When succeeding in framing — or 'black-boxing' — a 'thing' with (non)-
28 monetary value, a market STA can be temporarily stabilised around the emergent 'good' ('commodity'
29 or 'asset') (Çalışkan and Callon, 2010). We thus argue for the need to inquire into the work of
30 calculative tools that act as 'market devices' as they equip market agents with the agency to calculate
31 the prospective value accrued from their investment. Without such calculative agency, no market can
32 be formed (Çalışkan and Callon, 2010; Callon, 1998).

33
34 The case of wind power and land in the Danish planning system shows how the wind resource adds
35 value to the land, which in turn enables the wind to be marketised. It is therefore necessary to look
36 into two entangled market STAs: the wind is the starting point in the valuation process, while the land
37 acts as a mediator, determining whether the wind can be utilised in an economically viable way or
38 not. First, the wind power STA is based on a commodity for sale (electricity from the wind farm) while,
39 second, the land STA is based on asset-based income which is generated through licensing (Birch, 2017:
40 465) or rents (Birch, 2020; Nadaï and Coïnte, 2020).

41
42 To show how land is being socio-materially assembled as an 'asset' (a "site") (Nadaï and Coïnte, 2020)
43 — constituting "assets-as-agencements" (Nadaï and Coïnte, 2020: 151) and the wind constructed as a
44 'resource' (Kirkegaard and Nyborg, 2021) that yields an income stream (Birch, 2017: 463; Nadaï and
45 Coïnte, 2020), we follow calculative devices such as maps (wind resources, landownership, municipal
46 zoning), and land-leasing contracts. Hereby, we demonstrate how land is constituted as an obligatory
47 passage point for the marketization of wind power development. Through this, we shed light on how
48 these devices make calculations of value possible, and at the same time inhibiting the engagement of
49 the public. This reveals how framings, as well as the very calculative devices employed, are supposed
50 to simplify and blackbox valuations, but also that these black-boxing framing are fragile, causing
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ubiquitous 'overflowing' (or 'externalities') (Callon, 1998). The fragility of framings is engendered by the inclusion/exclusion of actors, which tends to skew markets towards particular interests at the expense of others, often causing opposition (Callon, 1998; Caliskan and Callon, 2010).

Empirical background

The regulatory and legal framing of wind farm planning in Denmark has mostly followed procedural rationales and instrumental justifications. ~~In particular, participation is often,~~ conceived of as a procedural requirement to ensure democratic legitimacy of decision-making processes and broadly recognised outcomes. ~~Ideally~~ In Denmark, public participation in wind farm developments ideally takes place at in two stages: 1) municipal planning of land use (zoning), and 2) development and adoption of local plans for specific projects (including environmental impact assessment (EIA)). Each stage involves a 4-to-8-week-weeks consultation period in which community members are invited to submit responses ~~and representations~~ concerning the proposed plans. In 2009, an information brochure called "The Good Process" was issued to give inspiration for improving public engagement and ~~thereby with the desire to~~ increase public support for wind farms (see figure 1).

Insert Figure 1 around here

Figure 1 shows a seemingly linear two-stage ~~linear~~ process with several phases open to public engagement and a ~~clear~~ recommendation that engagement should be considered very early on in the process. Although this two-tier process seems straightforward on paper, the 'Good Process' ~~does~~ has not been seen to work as intended in practice. This can be attributed to two land-related issues. Firstly, not all municipalities designate wind farm areas or zones in their municipal land use plan. Secondly, it is possible to adopt a supplement to the municipal plan that designates an actual site in the superordinate plan at the same time as the local plan is adopted (Armeni and Anker, 2020). This effectively circumvents the strategic land use planning that had been agreed collectively. in the first stage. Not only do both issues allow developers to select wind farm sites independently of the municipality but it also suspends the two-tier process while muddying the participation process. ~~Thus,~~ the emergent market for land has, with significant implications for public participation in the planning of new wind farm developments.

The empirical analysis is based on secondary data such as maps of land plots, municipal wind power plans, public hearing responses, and policies, supplemented with extensive primary data consisting of 35 semi-structured interviews in total (2016-2018, 2020) with wind farm developers(11), landowners and estate owners(2), municipal planners(12), regulators(2), farmers' associations(1), EIA consultants(3), NGOs(1), and local community members(3) in addition to observations at public hearings in the period 2016-2018.

Analysis: Assetisation The production of land and a landrush in

Danish wind power and its effects on public participation

practices

In the following, a three-tier analysis is unfolded: First, the paper displays how different calculative tools have co-produced a landrush in the Danish wind power market assemblage. Second, the analysis shows how developers in this entangled land-wind market assemblage employ specific practices for gaining access to land. Third, we display how these practices eventually undermine public participation within the existing planning and development system.

The construction of a Klondike-like landrush

To attract investors secure investment into a STA around wind power development, commercial developers must be able to calculate and demonstrate economic viability, e.g. by calculating an attractive potential Return on Investment (ROI). To construct the wind-) from producing wind energy in a specific site. That is, the wind must first be construed as a potential potentially valuable 'asset' or commodifiable 'energy resource', there. To do so, various calculative devices are many calculative tools being used, one of which –with maps –plays playing a particularly crucial role. In particular, we refer to Of special importance are the maps of: wind resource resources, municipal zoning, and land ownership. These tools devices are in constant use being used constantly as developers try to put together a feasible wind farm project.

Firstly, wind resource maps, such as the European Wind Atlas¹, help to direct wind farm developers to areas of good wind potential (Kirkegaard and Nyborg, 2021) and), as different sites can be thought of as having energy reserves; “and their energy potential most often quantified” (Nadaï and Labussière, 2018: 57). This quantification of the energy potential is essential for wind farm developers, so they can to be able to collect a portfolio of promising sites based on wind atlas data. Today, with the vast computing power available, wind atlases have been improved and digitalised, expanded and refined. The Global Wind Atlas, for example, takes global weather data from the last 20 years and together with topographical data from Space Shuttle missions, it can show wind speed distributions for every 250m over the whole land mass of the earth. Knowing this, the The energy potential of the wind has thus been mapped around the globe, making turning wind farm developers into calculative agents that can determine the revenue from specific sites and plots of land anywhere on earth. This For developers, this is the most important element for calculating the envisioned potential ROI and for mobilizing investment in specific projects.

Secondly, plans for land use made by municipalities are usually visualised in on 'zoning maps' – maps of desired or required uses for land areas within the municipal boundaries, produced by – often employing Geographical Information System-tools (GIS). These zones are designated through a process shaped by legislation and influenced by politicians, municipal planners and local people citizens. Using the same GIS tools as the planners, the developers can often predict where wind energy zones will be, also before the municipal plan is published. Along with zoning for other land uses, these maps play an important role for the assetisation of wind as they carve out potential sites of wind farm development, and thus investment, for wind farm developers. Zoning maps in the municipal plans are important calculative devices as they, with their the designation of priority areas for wind energy, enable both restricts the available areas for wind farm development but also enables developers to “assess the potential and capacity of specific sites and thus calculate another element of the potential ROI.

“First, we look at the maps” [...] and then we can calculate “how many turbines we can we install, and estimate how big an impact on the municipality it will have” (Developer1), and thus calculate another element in the potential ROI.

Wind energy sites are thus 'created' through maps, calculations, 'zoning' and designations that support (and perform) the making of these sites and landscapes/sites as suitable for wind power (Labussière and Nadaï, 2018a; Kirkegaard and Nyborg, 2021; Nadaï and Coïnte, 2020). At the same time, they co-produce competition for access to specific (and often, the same) favourable sites.

¹ First published by Risø National Laboratory in Denmark (1989) (today the Wind and Energy Systems Department at the Technical University of Denmark).

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3
4 *Thirdly*, none of these valuations of potential RoI can be realized without assigning each turbine to a
5 specific piece of land for it to stand on (Nadaï and Coïnte, 2020). For this, developers need maps of
6 land ownership. Having selected potential sites for development, developers combine their own local
7 knowledge, ~~publically~~publicly available data and specialist knowledge from land surveyors, ~~in order~~
8 to assess which plots of land they need ~~to gain access to~~ in order to locate the foundations of the planned
9 wind turbines ~~(areal information)~~(areal information/miljoportal.dk; bondeejern.dk). In Denmark,
10 these maps often reveal multiple small strips, or packets, of land, ~~making~~turning the ~~job~~process of
11 gaining access to the good spots ~~somewhat of into~~ a puzzle, as exemplified in the map below from a
12 site in Northern Jutland.

13
14 *Insert figure 2 around here*

15
16
17 The landrush for specific sites is thus an effect of socio-material processes of measuring and calculating
18 the potential RoI, co-produced by wind resource mapping, zoning, and land access co-produced by
19 landownership and land-leasing contracts. Crucially, wind farm developers will not be able to realise
20 their investment without access to land (see figure 3).

21
22 *Insert figure 3 around here*

23
24 Land-leasing contract are agreements which set the rent a landowner is to be paid so that the land
25 can be used for producing renewable energy instead of crops. They are thus critical in co-shaping the
26 practices of different key actors (landowners, developers, and municipal planners). Having mapped
27 the wind resources in Denmark, all developers wait for the publication of the municipal plans.

28
29 *“All the developers sit there waiting on the publication of this [municipal zoning plan]...:*
30 *‘okay, there it was, now we start the car’, and then we have like 30 people driving to some*
31 *landowner” (Developer2).*

32
33
34 Some developers even use a ‘land-scout’ to investigate the municipal designation of wind
35 development zones to be able to rush out to the local farmer and say

36
37 *“your area has been appointed here, would you be willing to sell, are you interested*
38 *in owning turbines, what is your interest, can we make an agreement?”*
39 *Here(developer2).*

40
41 In this way, municipal plans are used to enrol landowners into signing a land-leasing contract, creating
42 a “Klondike”-like landrush (NGO Wind People). The rush for land is sometimes so acute that
43 developers attempt to sign land-leasing agreements even before any municipal plans have been issued,
44 based entirely on their own mapping of local conditions.

45 46 47 Developer practices of gaining access to the land

48 Rather than being dependent on local community acceptance or municipal support, wind farm
49 developers depend on good relations with large landowners to be able to access the land (Developer
50 3). Given the accelerated landrush, landowners and developers have engaged in complex negotiation
51 practices as developers try to gain access to land (Rudolph and Kirkegaard, 2019). Competing for
52 access to land at the same time as their competitors attempt to sign land-leasing contracts for the
53 same sites (EIA consultant), landowners are considered the critical ‘gate-keeper’:

54
55
56 *“our main stakeholders in a project, yeah, more than the municipality, because if*
57 *we don’t have any landowners and if they are not for the project, we don’t have*
58 *any project [...]. Having the landowners on board, and having the municipalities on*
59 *board. But not so much the neighbours, because they are not so important in the*
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first part. Sorry to say that, but that's our experience. Because the crucial stuff is with the landowners and is with the municipality" (Developer3).

"without consent~~insert figure 2 around here~~

The harvesting of resources: land-leasing contracts as obligatory passage points

The entangled land and wind STAs turn land access into an 'obligatory passage point'. Wind farm developers will not be able to realise their investment without access to land. The process of identifying sites for each wind turbine is iterative: wind resource, zoning, land access. Only when the leasing of land in positions that have sufficient wind resource and appropriate zoning is secured, can a project move forward and an investment be made (see figure 3).

insert figure 3 around here

Land-leasing contracts, with their promised rent to be paid to the landowner, are thus construed as critical calculative devices co-shaping the market and practices of different key actors (landowners, developers, and municipal planners), as explored further below.

Competition for land and the critical role of landowners

Evidence of land-leasing agreements being an obligatory passage point is seen around the time of the publication of the municipal zoning plan when, "all the developers sit there waiting on the publication of this...: 'okay, there it was, now we start the car', and then we have like 30 people driving to some landowner" (Developer2). For the developer, it is therefore essential to sign land-leasing contracts, and to do it before the "competitors that try to make agreements as well" (EIA consultant). Landowners are therefore considered more important than local neighbours "because of how the legislation is put together, because without consents from the landowner there will be no project and if you approach the neighbours first, then you risk another developer has approached the landowner first and then it doesn't matter if you've approached the neighbours first because then someone else will have an agreement with the landowner and then they have first right to be the ones who develop" (EIA consultant). Hereby, developers first and foremost need to be "having the landowners on board, and having the municipalities on board. But not so much the neighbours, because they are not so important in the first part. Sorry to say that, but that's our experience. Because the crucial stuff is with the landowners and is with the municipality" (Developer3).

Developers are thus "totally dependent on a good relationship" with the large landowners as they are "probably our main stakeholders in a project, yeah, more than the municipality, because if we don't have any landowners and if they are not for the project, we don't have any project" (Developer3). Moreover, As landowners often "have really high stakes in the local society. So, if you kind of go together with them, everything goes much easier" (developer3). In order (developers 1, 2, 3), it is important to gain the trust of a landowner ~~on~~when making a land-leasing agreement, developers ~~must~~stand this requires an investment in time and relationship-building. Developers frequently have a lot of "coffee and cake, a lot of that, just to visit them and talk and gain their confidence cake' with landowners, paying informal visits before we start the real negotiations" (developer3). Apart from small talk over coffee and cake, developers will often also offer start, and sometimes offering help to the landowner, sometimes just "small things" (Landowner1; developer3).

Through the Intense price negotiations

The value of a site, co-produced by the zoning of land use, the in municipal plan attributes potential value to land, and this can be used by the landowners when negotiating with wind farm developers who are competing for access to land. Sometimes, when “different landowners within the same site are approached plans, is well known by different parties”, “then they try to make an agreement”, and “sometimes they solve it and sometimes they are just deadlocked for years, seriously, years” (EIA consultant). Landowners are thus able the landowners and they will often negotiate with several developers simultaneously. This enables them to push up the prices on the rent of the land, asking all the developers about the best price they can offer (developer2), and comparing the potential revenue per hectare from using the land for harvesting the wind or with that from harvesting crops or livestock. Increased competition for land in recent years has also revealed (developers 1, 2). This rent-seeking behaviour has been intensified by the landrush, as “We have also the cases where they [landowners] have come to

“know the game and they say ‘just’ just deliver an envelope with a number on it and we’ll we’ll come back to you” (developer1). As argued by a developer, “farmers, Farmers like to make money out of the land, basically, they don’t care. They see it as a business, as anything else they grow”, so “[...] of course it’s a lot of economical stuff and money [for the landowners], so you know, we can talk about this and getting agreed, but it’s different for the local residents who have to live there, looking at it every day”.” (developer1)

In more recent years, however, with the fierce competition for land, Some landowners have become concerned with how they, however, also have to live in and with the community, and have grown tired of the ‘aggressive’ tactics of developers, who try to push them to sign unfavourable land-leasing contracts (landowners1 and 2). This has in turn led to a new actor: and have engaged with farmers’ associations (“Landboforeninger”) who provide support to the landowners with support for negotiating, e.g. by ensuring there are ways to get out of an agreement with a developer and keeping the door open for other more profitable land-leasing agreements with other developers (farmers’ association). This in negotiations. Bargaining about land rents adds uncertainty to the development of a wind farm as an entire project might may fall apart-, or may be deadlocked for years, if a landowner pulls out of a project negotiations (developers; EIA consultant).

Negotiating municipal plans – contesting zoning maps and developing new sites

With stiff competition for land, and increasing agency of landowners, developers are progressively moving beyond the designated areas in the municipal plan because the, as sites tend to be increasingly taken before they have officially been designated.

“designated areas normally are taken, I mean, when they are decided. So, you have to find a way into the areas, before they are decided, and then you have to lobby to get them approved” (developer1).

In Denmark, some municipalities designate areas for wind power development in their municipal plans, while others do not. At the same time, there are varying degrees of enforcement, which makes the municipal plans and zones negotiable when commercial wind farm developers compete for suitable sites and sometimes move beyond the designated areas to avoid competition. Developers “, through informal discussions with municipal planners, try to find out” with the planners “what do you see, what would you like, what do your politicians like? We try to find out” the municipality prefers (developer1). Developers have devised practices of These discussions can also mean that developers become involved in the reshaping the of municipal priority areas of the municipal plans, e.g.

convincing planners to include additional sites into the municipal plan wherefor which the developer has already made agreements with local landowners ~~on land lease rents~~:

“And that’s probably the way in which the municipality’s wind farm plans have come up, right...the municipality may have done some pre-screening, but long before that, the developer has been out there screening and making pre-deals, and then putting those sites into the municipality’s plans” (developer4).

~~Some developers use “a ‘land scout’ to investigate in municipalities, what area are they designating for development of wind as primary areas and then you go out to the local farmer and say “your area has been appointed here, would you be willing to sell, are you interested in owning turbines, what is your interest, can we make an agreement?” (developer2). In this way, the municipal plan is used as a mobilisation device to enrol landowners into signing a land-leasing contract. Developers are also able to find new sites or expand existing sitesones by buying up residential properties for subsequent demolition, for instance by approaching local residents and making purchase agreements with them. A municipal planner explained how a (Rudolph and Kirkegaard, 2017; developer found a way to1). Having realised that they can exploit the Access to Public Administration Files Act (Offentlighedsloven 2014) to), developers can get insights into the citizens’ concerns. In one case, this provided the developer with information about which, enabling them to approach concerned citizens to approach to expand a possible site:~~

“[They [developers] have asked for access to the consultation responses... and read that there are some citizens who live down here who say if there will be erected turbines here and here... then we are surrounded... then we will not live here anymore... and then they got the idea if they should just buy them all out...” (planner2)

Planners ~~also explained~~explain how ~~the~~ developers use the public consultation process to influence which areas are to be considered for inclusion in the municipal plan, either by sending in statements themselves or mobilising local people to do so. ~~Developers also invite, or inviting themselves to the planners’ office for impromptu meetings to show them planners their potential project, sweet-talk persuade~~ them into supporting it, arguing. Here, they argue for how their project aligns with the municipality’s plans, ~~emphasising that they~~ have ensured support amongst local residents in the area, and that it should be included in the plan.

“Typically, it’s about them trying to convince us that this is a good spot in relation to...to harvest wind resources, and they don’t find any substantial impact on the landscape...funnily enough they never think so, no matter if it’s the most pristine [landscape], and even if it’s almost put in the middle -of a river valley, well, then they don’t foresee any impact, and then they typically tell us that they have local support, they often mention that...and then they will often try to find something in the municipal plan that they can link it to, for instance that we have put up some guidelines for something, or if we in our debate phase material have said that we will prioritize the consideration for neighborsneighbours, landscapes or cultural environments [...] so they will use some of our buzzwords” (planner1).

Under Planning and development under the radar ~~—undermining the and~~
constrained public? On the ‘Klondike participation

Fierce competition for land rush’ or ‘system failure’

has meant that landowners have become more concerned with how they must be able to live in and with the community (landowners1 and 2). The developer practices of contacting landowners and

municipal planners in advance of the official planning process ~~starting~~, leads to ~~it being~~ “controversies with the non-land owning local community

“[it’s] really difficult in terms of the local community, they can’t understand why they haven’t been involved in the process at a much earlier stage... because when they first hear about it, then all the deals with the farmers have been made...it’s been included into the municipal plans, right?” (developer5). In turn,

“[the landowner] just sits there smelling gold, and the neighbours have no clue what is going on around them. So we would prefer to get rid of the municipal wind power plan and then drive out and develop our own sites so to speak” (developer2).

The developer practices – co-~~produced~~determined by the planning system and landrush – often make local communities feel “uncomfortable” as they are “taken by surprise by new ideas...you’d like to know about it when others are informed” (developer5). This observation is shared by the planners, who get many calls from local citizens that are confused after having been approached by a developer, because they think the municipality has already approved a certain project without involving the broader public in the process. The locals explain how the developers come to their door and attempt to acquire goodwill, sometimes by offering money (what they consider a bribe or a ‘sweetener’) or ask to make purchase agreements, and often they leave them with the impression that ~~the deal has already been~~ made’made. As one of the planners said:

“Yeah, so they call in and ask, ‘can it really be true...will our property really be bought, can you just do that’ and things like that... and we don’t have anything to do with that, it’s the developers who try and put a bit of pressure on them” (planner2).

Indeed, not only do the current practices ~~do not correspond well with thenot live up to ideals prescribed in~~ many “thick books about public engagement and network-based planning” ~~— or with the ‘Good Process’—~~ [...which argue that “] the local communities must be part of this process from day one” (developer5). Nevertheless, they also ultimately undermine the intentions of the ‘good process’ as envisioned by authorities: Essential activities take place under the radar, bypassing the local public or disregarding early strategic decisions:

“it’s just not working because the first four years are passing by under the radar in order to ensure that the other developers don’t realise what’s going on out there, because then they will come and put up a flag in the centercentre of it all and want a share of this, right? [...] And if they can just make one farmer sign a deal with them, then [...] it stops...they say, well, it’s all fine and well if we can become part of this, but you won’t get anywhere without us, so it’s 50-50, or what are we talking about? So the entire pre-work is taking place under the radar, and that’s very hard for the local communities to understand” (developer5).

The ~~‘Klondike-like’ (NGO)~~socio-material land ~~rush is~~ wind assemblage in Denmark has thus positioned landowners as critical agents. This, in turn, beinghas been linked to an alleged “system failure”failure’ of the Danish planning system ~~—, which precludes public participation, limits the space for publicly legitimised decisions and raises concerns over procedural justice:~~

“The

“system failure is that developers start with the landowners and make agreements to use their land, and often, of course, also money, a lot of money is involved. It’s

not so much the money, that's an issue by itself, but it's that you start with the landowners but you do not consider the rest of the community...I think if the communities were given the upper hand it would change the game completely" (EIA consultant).

However, the 'system failure' – creating deficits of procedural justice - is rather a socio-material effect engendered by a portentous interplay of the contested Danish planning system, inconsistent legislation for wind energy and scarcity of land. Together they co-produce a landrush that in turn provokes wind farm developer practices which privilege landowners and planners and deprive local communities of their entitlements in planning procedures.

Discussion: ~~Calculative tools, enclosure of land and opaque~~ ~~planning processes~~ New power constellations in the land-wind assemblage

The first part of our analysis has illustrated the ~~practices and processes that produce wind territories~~ role of material devices in co-producing a landrush, while the second part exposed developer practices of gaining access to land, and the third part demonstrated how public participation and public concerns have been precluded from the land-wind assemblage. In the following, we shed a critical light on the production of the wind energy-induced landrush and discuss its wider implications and justice-related consequences.

Role of calculative devices in constituting a landrush: enclosure as sterilization of land

In the first part of our analysis, we described the role of calculative devices in co-constituting a landrush by producing sites for wind energy as new "zones of material appropriation" (Sellwood and Valdivia, 2018: 205) and the emergence of a market around land – within the market assemblage around wind farm development – with). In other words, whilst wind farm developers, landowners, and municipalities as central players. Wind farm developers, in particular, draw on use the various calculative devices to determine whether to invest in a potential wind farm site (see table 1) or not, the enhanced and entangled valuations of wind and land have produced unintended effects in terms of a rush for land both by creating scarcity and by unenforced legislation.

Insert table 1 around here

While different calculative tools help to frame and assemble a STA around wind power development, they also overflow and initiate a rush for land. For instance, zoning maps tend to overflow because they are not followed, and the land-leasing contracts overflow when flexibility is integrated that allow landowners to leave the deal. Thus, the framing device of the contract becomes "a potential conduit for overflows" (Callon, 1998: 253-4), illustrating how it is "illusory to suppose that one can internalize every externality by drawing up an all-embracing contract that provides for every eventuality" or even that property rights can "prevent this overflowing" of know-how and technology (Callon, 1998: 18,255). While local community members do not possess any powerful market devices in the emerging market around land, they have the legal right to submit objections once planning applications are filed. Thus, the opaque planning processes – including both concealing and concealed entanglements – tend to generate contestations amongst local communities:

— First, concealing entanglements relate to how the Danish planning law includes zoning practices where the municipality designates priority areas for wind energy. However, only some municipalities designate areas for wind power development in their municipal plans. At the same time, there is a varying degree of enforcement of plans, making the municipal plans and zones negotiable. These entanglements between plans, zones, developers, and landowners are concealing the planning and public hearing processes, often to the frustration of local communities.

— Second, the entangled markets for wind farm development and land use mean that early negotiations, before the official planning process starts, are concealed. Clandestine negotiations between wind farm developers and private landowners about land leases serve to secure viable projects while the local public is kept in the dark. This results in rumours and resistance that sometimes threaten to destabilise wind farm developments. In this way, “The Good Process” is circumvented, with no actual involvement of the local community before most deals have already been set, invalidating the entire public engagement process.

Our study has illustrated how land ownership has become increasingly important for wind farming and thus energy transition trajectories, causing a controversy over who is capable of harnessing the wind. Within the existing governance structures of the wind power STA, the one who is entitled to and capable of harnessing the wind is also the one with access to the land. This construes the one who owns the land as a critical actor for the path of renewable energy trajectories.

We have shown how the first (and subsequent) steps of harnessing wind are infeasible without the socio-material work of creating spaces for wind farming, that is, the making of valuable sites as assets (also see Nadaï and Coïnte, 2020) through various calculative tools and devices.

As the land is inscribed into different maps and licensing agreements, it is constituted as an asset around which a market for land is assembled. In turn, this enables developers to calculate the potential ROI for their wind farm. Our findings illustrate how the growth and importance of wind energy has unleashed driven a revalorisation and renewed assetisation of land (Kirkegaard and Nyborg, 2021; Labussière and Nadaï, 2018a; Nadaï and Coïnte, 2020), with rising impetus on, our findings highlight the increased significance of private landowners and contractual agreements on land (Jacquet 2015, Nadaï and Coïnte, 2020; Kirkegaard and Nyborg, 2020). From the landowner’s perspective, the disparity between current productive income from land (agriculture) and the potentially achievable rental income from wind turbines drives investment and development, bearing. This bears some resemblance to the rent-gap-theory originating from urban contexts (Slater, 2017). Since developers lease the land where the development takes place, private landowners play a major rolesrole in the planning and siting of these facilities. That is, meaning that “Landowners can, in principle, negotiate for any preferred land use and development practice, although unknowledgeable landowners may simply sign the standard lease given to them by the energy company” (Jacquet, 2015: 234). In these negotiations for gaining access to the land, calculativematerial devices (particularly licensing agreements and, in particular land-lease contracts), help to enclose or ‘sterilise’ the land and protect it against other developers. Moreover, the very act of erecting a turbines on a piece of land “sterilises” this land and a large area around it, due to the wake effect, preventing other developers placing viable projects in the vicinity, further exacerbating competition for land. The enclosure of land by wind energy presents a particular manifestationexpression of enclosure, which can be dubbed as dub a process of ‘sterilisation of land’, that further nuancingnuances the literature on ‘enclosure’ of land in terms of private appropriation of land and exclusion of other uses (e.g. Jeffrey et al., 2012). The very act of erecting a wind turbine on a piece of land “sterilises” this land and a large area around it, as the wake effect means other turbines placed nearby will generate less energy. This prevents other developers placing viable projects in the vicinity and further exacerbating the scarcity of land for wind energy.

The revealing of Opaque developer practices

In the socio-material processes second part of our analysis, we illustrated how wind farm developers employ practices of assetisation of the land, asks the fundamental question of who should own the wind? Or more accurately, who should be granted the right to appropriate — harvest and profit from — wind power generation? Furthermore, who is then able to participate in the planning of wind energy, and how? Since the legitimisation of the appropriation of the wind resource is determined by the entitlement of utilising the land, the assetisation of land grabbing through wind energy deepens the divide between those who have property and user rights and those who do not, bringing issues of distributional energy justice (Jenkins et al., 2016) to the fore. The analysis here shows how these rights are co-constructed by calculative tools that assist in entangled processes of assetising (and enclosing) land and commodifying wind energy. Indeed, materiality matters, not just in terms of the wind and the soil, but also in terms of the devices used to calculate values and setting up boundaries between those who can use and define the tools and those who cannot.

Calculative tools are thus also working to exclude and include certain publics into the planning and development of wind farms, producing a narrowed space for participatory and just energy transitions clandestine and (Van Veelen and Eadson, 2019), with surprising resemblances to the closed and technocratic processes of large scale nuclear developments (Wynne, 1983). This makes wind power resemble an increasingly “fossilised” STA (Labussière and Nadaï, 2018a) far away from the origins of the cooperative social movement. We argue that social opposition to renewable energy developments results, partly, from these often overlooked exclusionary and privileging mechanisms, and the opaque negotiations between developers, with municipal planners, and landowners that happen outside the public sphere and that point to democratic deficiencies and the closure of public, participatory spaces. Thus, social acceptance cannot be fully comprehended without understanding the ways in which the capitalisation of land co-shapes wind developments and the associated agency of various (potential) publics. Evidently, developers do not hide their stance that “neighbours are not that important” in the current STA, nor is the strategic municipal theme plan, which they would rather “get rid of”. This is, nonetheless, the first part of the ‘two-tier good process’, that otherwise ensures some sort of legitimacy and accountability in terms of where wind power development should happen in the municipalities, having undergone a public consultation process. Indeed, the issue of land subverts the ideals of the “The Good Process” and attempts to devise new participatory techniques to supplement the invited spaces of public consultation (Solman et al., 2021). Meanwhile, despite its good intentions, “The Good Process” in itself has been critiqued for its deficient and confined role and agency of the public (Clausen et al., 2019), an issue that is further eroded in the current configuration of the wind and land STAs. According to Jacquet (2015: 232), “The energy development leasing process represents a mode of ‘participation’ in the planning process, albeit one that contrasts in important ways with the ideals of ‘public participation’—Even in the case of collective negotiation, such”. Since contracts with landowners are executed privately and the details, usually taking place in intimate settings of private homes that are not publicly accessible (Jacquet, 2015: 232), taking place in the landowner’s home where developers attempt to, they provide an intimate and a means for private forum for ‘participation’ and concealed participation in the planning and siting process of the energy developments” (Jacquet, 2015: 234). Moreover, when a privileged few. When developers tell planners that they have ensured ‘local goodwill’ for a specific site, they are not providing an interest-free space for the local community to jointly deliberate what they want for their common future, but rather. Rather, they approach individuals with whom they try to make secretive deals based on individual interests. In addition, they even utilize their legal right to access the public hearing responses to municipal zone planning, to identify vulnerable citizens who are prepared to sell their

property in order to make space for wind farms, thereby interfering with and ~~foiling~~undermining democratic principles of transparency and participation.

~~Our findings also support Jacquet's (2015) observations and underline what happens when developers and landowners take on the task of facilitating the dialogue between relevant stakeholders of a wind energy project, and thus, in reality, are given the responsibility to foster public participation (Clausen et al., forthcoming) in the green transition. Constrained spaces for public participation in the shadow planning systems~~

~~Third, our final part of the analysis hints at how the current planning system – enmeshed in the land-wind market assemblage – has diminished the spaces for meaningful public participation. Informal practices as the ones described seem to have become “systematic and almost institutionalised in shadow planning systems” in Denmark, resulting in de-facto two planning systems: one formal and one informal (Fox-Rogers and Murphy, 2014: 251-.) in Denmark, resulting in de-facto two planning systems: one formal and one informal. Wind farm planning is therefore not only embedded in legal, economic and ownership structures that are imbued by existing power relations, but may also perpetuate power imbalances and coercive dynamics intimidating the public sphere (see also Clausen et al., forthcoming, 2021). ‘More’ or ‘better’ participation is unlikely to change anything, unless the assetisation of land and immanent land-grabbing practices are unpacked and reconceived. Our findings hereby support Jacquet's (2015) observations and underline what happens when developers and landowners take on the task of facilitating dialogue between relevant stakeholders of a wind energy project, and thus, in reality, are given the responsibility to foster public participation (Clausen et al., 2021) in the green transition.~~

~~We argue that social acceptance of wind energy cannot be fully comprehended without understanding the ways in which the capitalisation of land, the planning system and developer practices co-shape wind developments and the associated agency of various publics. Evidently, developers do not hide their perspective that neighbours are not that important for their goals, nor that they would rather “get rid of” the strategic municipal theme plan. These elements are however central parts of the first instalment of the ‘two-tier good process’, to ensure some sort of legitimacy and accountability in terms of where wind power development should happen in the municipalities. Indeed, the issue of land subverts the ideals of the “The Good Process” and attempts at devising new participatory techniques to supplement such ‘invited spaces’ of public consultation (Solman et al., 2021; Clausen et al., 2019).~~

~~Concealing and concealed entanglements widening the divide between ‘expert’ and ‘lay’~~

~~What our lens of marketization as a matter of focus on the entangled commodification and assetisation processes has revealed can help to reveal is how “participating publics have never been more removed from the centres of power and calculation” (Chilvers and Kearnes, 2016: 7). Indeed, the calculative – as the entangled land-wind assemblage constitutes concealing and concealed entanglements:~~

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First, *'concealing entanglements'* are generated as plans, zones, developers, and landowners are producing not only a landrush, but also (in)advertently conceal the planning processes, often to the frustration of local communities. While the Danish planning law includes zoning practices to designate municipal priority areas for wind energy, not all municipalities allocate areas for wind power development in their municipal plans. At the same time, there is a varying degree of enforcing the plans. This makes the municipal plans and zones negotiable and contestable and conceals the actual processes that spawn the sites for wind farm projects.

Second, *'concealed entanglements'* mean that early negotiations, before the official planning process starts, are concealed. Clandestine and opaque negotiations between wind farm developers and private landowners about land leases serve to secure viable projects while the local public is kept in the dark. Paraphrasing Elmallah and Rand (2022), this entails that public hearings are often taking place 'after the leases have been signed' when 'it's a done deal'. This often results in rumours and resistance that sometimes threaten to destabilise wind farm developments as the subsequent development process is considered pure make-belief carrying the suspicion of tokenist rationales. In this way, "The Good Process" as promoted by the Danish authorities is circumvented, invalidating the entire public engagement process.

Within the existing governance structures of the wind-land market assemblage, the one who is entitled to and capable of harnessing the wind is also the one with access to the land. Land ownership has become increasingly important for wind farming and thus energy transition trajectories, not only causing controversy over who is entitled to and capable of harnessing the wind (also see Elmallah and Rand, 2022; Wade and Ellis, 2022), but also co-producing new power constellations, and causing contestations over who should earn on the 'commons' of the wind (Ostrom, 2004). Calculative tools are employed to commodify the wind, planning procedures and development practices play a formative role as technocratic techniques that frame. These techniques co-produce the stakes, stakeholders, earnings, and spaces for public engagement in the governance of the green transition (Kirkegaard & Nyborg, 2021), corroborating a boundary widening the distance between the 'experts' and the 'lay people' (Wynne, 1983), and often complicating matters more than they simplify as they were intended to do. As pointed out by Chilvers and Kearnes (2016), "some have begun to suggest that the peculiar cultural and political sensitivities that characterize a-; Aitken, 2009). Such "distinctly late modern attitude towards science, technology and the environment represent" (Chilvers and Kearnes, 2016: 2) - representing an 'age of participation' (2), which (ibid.) is characterized by a "proliferation of techniques and practices designed to foster public engagement" (ibid.:8), which however is-. Despite all the attention, 'actual' participation remains a mirage or a spectacle. Not only are these practices often confined to invited spaces of stakeholder participation (Cuppen, 2018), they are moreover, as this paper shows, circumvented by the landrush.

A critical perspective on land-wind assemblages

To inquire critically into the matter of confined 'invited spaces of stakeholder participation' (Solman et al., 2021). To inquire critically in to this, however, we argue that assemblage the entangled assetization of land and calculative tools have helped wind can help us to illustrate the socio-material work entailed in the assetisation and marketization processes contained in it, making it possible to look into envision how things could be otherwise. Indeed, our insights raise, albeit indirectly, the fundamental question of who should own the wind, or more accurately, who should be granted the right to appropriate – harvest and profit from – wind power generation, and who should be invited into these negotiation processes. Our findings also hint at more ethical considerations about the interplay between procedural and distributional justice and how energy justice is socio-materially

grounded and construed. The wind power assemblage in Denmark has become increasingly “fossilised” (Labussière and Nadaï, 2018a), moving further away from the origins of the cooperative social movement. Our study contributes to the social acceptance literature by showing how opposition to renewable energy developments is, partly, embedded in often overlooked privileging mechanisms, in this case exclusionary negotiations between developers, planners, and landowners that happen outside the public sphere, and mediated by material devices. This points to democratic deficiencies and the closure of public participatory spaces, raising fundamental questions about how spaces for public participation are socio-materially constructed. Since the appropriation of the wind resource is legitimised and determined by the entitlement to utilise the land (Wade and Ellis, 2022), the assetisation of land through wind energy deepens the divide between those who have property or user rights and those who do not, bringing issues of distributional energy justice (Jenkins et al., 2016) to the fore. The issue of gaining access to land indicates how these rights are co-constructed by different calculative devices that provide technocratic assistance for commodifying wind energy and assetising (and enclosing) land in the first place, and produce scarcity and an accelerated landrush. However, it is the consequential and concealed development practices to gain access to land by negotiating property and user rights that undermine the planning system for utility-scale wind power developments and create procedural injustices.

Future research should therefore look further into the relationship between material practices and public participation, i.e. to what extent the constrained spaces for public participation are co-shaped by calculative devices and tools and how they co-produce the boundaries of entitlement and participation. Having illustrated how opaque and informal planning processes for wind farms in Denmark originate from a rush for land and are co-performed that is intensified by expert tools and devices and practices, our study responds to Holifield's (2009) call for using ANT-employing a social-material assemblage approach as a critical approach perspective to environmental justice research: to trace the construction of environmental inequalities. We argue that the ANT-lens a critical consideration of the processes of socio-material assetization supplements current approaches within energy justice and energy democracy literature (van Veelen and van der Horst, 2018; Jenkins et al., 2016) that aim to understand where injustices happen, which and what sections of society are ignored or misrepresented, and how decision-makers seek to engage with communities with a much stronger focus on how the injustices are constructed and naturalized through the mobilisation of both human and non-human actor entities. Future studies would also benefit from exploring how and whether to what extent these trends and processes are specific to the Danish context or more mature wind energy markets, like in Denmark, or whether there are different entanglements of the nexus of land, wind, and the planning system assembled by specific types of knowledge, tools and practices and effecting other consequences, in less mature energy markets effectuating other consequences. The study also raises the question of how and whether the size and scale of available land matters for the acceleration of a landrush and associated consequences for public participation.

Overall, our insights spur new questions concerning what the sort of legitimacy that the planning process is supposed to secure, what is the public hearing process about and what does it mean its wider implications for energy democracy when being undermined by the land-rush? landrush and entitlement. Following Birch (2020: 3) and his notion of rentiership-lens (2020), our study may indeed hint at the workings of “Contemporary contemporary, technoscientific capitalism” (3), characterized by the (re)configuration of a range of ‘things’ “as assets or capitalized property”, increasingly “underpinned by rentiership or the appropriation of value through ownership and control rights” (3). In our case, we also see “rentiership” – in the form of rents as revenues from the ownership of land as an asset – “as a technoeconomic practice and process” (Birch, 2020: 3) where “assets-as-agencements” (Nadaï and Coïnte, 2020: 165) (re-)configure and transform the

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3 STAssemblage around wind power deployment. ByIn doing so, tracing negotiations over access to
4 land, less articulated social contestations over wind power ~~could bein advanced energy transitions~~
5 have been revealed, ~~that are to be~~ enmeshed in broader issues of planning, marketisation,
6 transparency, and democracy.
7

8 9 Conclusion

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11 This paper focused on the entanglement of land and wind in Danish wind power
12 ~~development,developments~~ and illustrated the reciprocity of wind and land resources for the
13 utilization of wind energy. By tracing the underlying practices of assetisation of land, we exposed how
14 the ~~capitalisatoncapitalisation~~ of wind valorises land to harness the wind and how access to land
15 ~~constitutes an obligatory passage point~~ has become a predicament for the ~~marketizationutilization~~ of
16 wind power. ~~Construed~~ Constructed as a scarce resource, land has become socio-materially
17 constituted as a highly valued ~~and contested~~ asset – through various calculative ~~framing devices~~
18 fdevices - that has evoked enhanced competition around its access. The competition for access to
19 land. ~~While each device on its own serves, in turn, culminates in concealed planning and developer~~
20 practices that give preference to necessary negotiations with landowners and exclude the public from
21 early decision-making, thus counteracting formal planning procedures. While calculative devices are
22 employed to value the wind resource and serve the purpose of simplifying and streamlining the
23 planning process, ~~in relation to each other theythey also valorise the land resource and~~ complicate
24 the process by prompting a rush for land, ~~as manifested that manifests~~ in intertwined practices of land
25 assetisation, grabbing and enclosure, ~~that bypasses or what we term sterilisation. These land-related~~
26 practices bypass principles of public engagement, ~~thus evoking a critical and evoke~~ democratic
27 ~~deficitdeficits~~ in Danish wind farm planning. The presented insights contribute to a critical ~~ruralenergy~~
28 geography literature by ~~followingnuancing~~ how land becomes enclosed and sterilised by wind energy.
29 In turn, they also contribute to the STS-literature by revealing the socio-material
30 ~~constructionunderpinnings~~ of democratic deficits by deconstructing the process of assetisation and
31 following the efficacy of entangled land and wind assemblages. In conclusion, efforts towards
32 enhanced public participation in Denmark to re-establish confidence in and acceptance of the
33 deployment of large-scale wind energy projects are likely to remain fruitless and continue to
34 ~~evokeprovoke~~ contestations, unless the relationship between wind energy and ~~land withinspatial~~
35 planning practices is fundamentally rethought.
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Abstract

Challenges of deploying wind farms on land are often associated with the notion of local acceptance. For developers, however, the socio-material practicalities of identifying appropriate sites and gaining access to land for building large wind farms has become an increasingly challenging endeavour. This paper illustrates how the commodification of wind energy cannot happen without the assetisation of land. Dis-assembling the valuation processes around the entangled wind-and-land assemblage, the paper casts a critical light on how calculative devices have helped to make land and wind into discrete, marketable, assets, accelerating a 'landrush' for access to scarce land. The landrush, in turn, has co-produced opaque and clandestine developer practices of acquiring access to privately-owned land to secure a viable investment. The paper argues that these developer practices result in an erosion of the participatory merits of planning and marginalise the role of local host communities, while elevating the significance of private landowners. Based on an assemblage lens founded in Science & Technology Studies (STS) and interviews conducted with a variety of stakeholders in Denmark, the paper concludes by discussing the implications of narrowed public participation in the entangled wind-land assemblage for energy justice. We argue for further inquiries into the assetisation of land for renewables and the associated 'sterilisation' of resources in this process, while pointing to the potential for cross-fertilising critical perspectives from human geography with analytical tools from STS for future research.

Key words: assetisation, land-and-wind assemblage, development practices, expert-and-lay, energy justice

"[Wind energy] has become a Klondike where everybody looks for how to maximize [profits]" (Community Owned Energy/NGO)

Introduction

The emergence of Denmark's wind power sector in the 1980s was largely driven by a social movement of ideologists, self-builders as well as scientists and politicians who wanted to promote renewable energy rather than nuclear power (Karnøe, Kirkegaard and Caliskan, 2022). Back then, local wind turbine cooperatives and grassroots organisations were the inspiration for development, but over the past four decades techno-economic advancements have placed commercial wind farm developers in the driving seat, investing in ever-larger wind farms (Kirkegaard et al., 2020).

With wind farms now on an industrial scale, wind farms have increasingly come to resemble the features of energy infrastructures based on fossil fuels and nuclear power, with a heavier reliance on expert technical and scientific knowledge. A particular challenge of the large-scale utilisation of wind energy is the siting of wind farms so they are compatible with other land uses. However, compatibility has turned into competition, and the valuation of wind and land resources has become inseparable. An often overlooked consequence of the socio-material transformation of wind power has been a competitive rush for land between wind farm developers to secure access to land to erect wind turbines. This has also been described to produce a "Klondike" effect by local community members

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3 (NGO). Land and wind have thus become two mutually dependent assets. A market assemblage
4 around any of these two assets can however not be established without the other: that is, one cannot
5 be capitalised to produce value from the marketable electricity generated by a wind farm without the
6 other (Sellwood and Valdivia, 2018; Nadaï and Coïnte, 2018).
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9 In this paper, we adopt a socio-material lens of socio-technical assemblages (Li, 2014; Callon, 1986;
10 Nadaï and Coïnte 2018) to cast a critical light on the current processes of assetising land for wind
11 power and its political consequences. The paper reveals how the assetisation of wind and land have
12 accelerated the landrush in Denmark, not only leading to intense negotiations for gaining access to
13 scarce land, but also resulting in a constrained space for public engagement through the co-production
14 of opaque planning-and-development practices. While focussing on the role of land as an asset, we
15 contribute to a recent surge in studies on land appropriation as an element of large-scale development
16 of renewable energies in the green transition (e.g. Labussière and Nadaï, 2018a, Siamanta & Dunlap,
17 2019; Alonso Serna, 2022; Wade and Ellis, 2022). Inspired by work that has examined how land (Li,
18 2014; Christophers, 2016; Le Billon and Sommerville, 2017) and wind (Nadaï and Labussiere, 2018a,
19 2018b; Kirkegaard and Nyborg, 2021) are assembled as investable resources, we reveal the socio-
20 material work underlying the transformation of land into an asset, that is, a revenue-generating
21 resource with recurring earnings (Birch, 2017, 2020; Nadaï and Coïnte, 2020). We show how these
22 processes have meant that the negotiations over land are kept confidential, often accompanied by
23 the exclusion of local communities, non-experts and non-land owning neighbours. Our findings thus
24 relate strongly to discussions of energy justice and public participation.
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29 We begin the paper with an overview of the emerging role of land for harnessing renewables,
30 particularly wind energy, before briefly outlining the conceptual and methodological framework,
31 followed by the empirical background in Denmark. In the analysis, we then trace the contested role of
32 land for harvesting wind energy and explore practices among competing developers to access land
33 resources as well as their consequences for public participation. Finally, in the discussion and
34 conclusion we elaborate on how wind energy has seemingly become radically transformed from a
35 technology of the public to one that has largely been pushed outside the public realm and reflect upon
36 wider theoretical and practical implications of this issue.
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40 Land as an asset for deploying wind farms

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43 Without having access to land, no onshore wind farm can be built in the first place. Two key conditions
44 contribute to the significance of land for wind energy and have enhanced the competition for land for
45 building wind farms. First, the general shift from extractive subterranean modes of energy production
46 (fossil fuels) to a more horizontal and decentralised production of renewable energy, dictates that a
47 larger surface area is required (Huber and McCarthy, 2017). Second, the upscaling and technological
48 advancements in wind power generation has led to large utility-scale projects requiring more
49 extensive land areas, which has gone hand in hand with a decoupling of the wind estate from the land
50 estate (Horst and Vermeylen, 2010) by experts. Wind energy cannot be harnessed as a 'resource'
51 before a 'wind farm site' has been constructed (Nadaï and Labussière, 2018; Nadaï and Coïnte, 2020;
52 Kirkegaard and Nyborg, 2021; Wade and Ellis, 2022). That is, to turn the wind into an investable
53 'resource', a 'site' must first be assembled. This requires that the land on which the wind turbines are
54 to be placed is valued through various calculative devices (Callon, 1998), such as wind speed
55 assessment tools (e.g. GIS maps and wind atlases) and usually made public via municipal plans with
56 designated wind energy zones. In line with geographical and political-ecological perspectives, land for
57 utilising wind energy can thus be understood as a resource and an object for human appropriation.
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3 The transformation of the wind and land into resources and assets can be seen as a network-effect,
4 or '*assets-as-assemblages/''agencements''*' (paraphrasing Nadaï and Coïnte, 2020: 151). In this
5 assemblage, wind power is a commodity for sale (i.e. electricity generated from the wind farm) while
6 the land ('site') is an asset, based on asset-based income which is generated through licensing (Birch,
7 2017: 465) or rents (Birch, 2020; Nadaï and Coïnte, 2020).
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10 The underlying processes of the negotiation of various uses and access rights by commercial actors
11 have by some been associated with the concept of "land grabbing" or "green grabbing" (e.g. Borras Jr
12 et al., 2011). These notions refer to an inherent "appropriation, transfer of ownership or user rights
13 and control over land and resources" (Fairhead et al., 2012: 238) to powerful private actors based on
14 green, environmental or conservatory rationales "arising from new economic valuations of natural
15 resources" (Dunlap, 2017: 18). A landrush driven by interests of green grabbing is characterised by "a
16 sudden, and hyped interest in a resource because of its newly enhanced value and the spectacular
17 riches it promises to investors [developers] who enter into business early" (Li, 2014: 595). Notably,
18 these notions have recently appeared alongside the challenges related to the planning and
19 development of wind farms, both in the Global South (Cormack and Kurewa, 2018) and the Global
20 North (Horst and Vermeylen, 2010; Labussière and Nadaï, 2018b; Siamanta, 2019; Elmallah and Rand,
21 2022). Of particular relevance is the encroachment of planning into the private sphere due to the
22 inevitable contractual negotiations with landowners. Jacquet (2015) has emphasised that the ability
23 of landowners to influence new utility-scale projects, i.e. large-scale infrastructure developments,
24 such as wind farms, on their land is not a novel phenomenon, but suggests that the vast and
25 contiguous scales of land "undergoing privately controlled energy development are unprecedented"
26 (Jacquet, 2015: 234). It follows that the process of getting access to land in the first place is a potential
27 area of contestation, as "the most fundamental conflicts relate to the right to capture the resource
28 itself" (Horst and Vermeylen, 2010: 67).
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34 When land becomes scarcer for certain uses, the landrush becomes more critical and individual
35 property rights more crucial and powerful. According to Christophers (2016: 135) who refers to Elden
36 (2010), land is indeed a "territory understood specifically as a form of property, something owned and
37 potentially capable of being bought and sold". Rather than a fictitious commodity, land becomes
38 commoditised to resemble a real commodity through ownership (Christophers, 2016). A right to land,
39 be it based on property or use, is an exclusive right, where the mode of exclusion can be physical,
40 forceful, regulatory or "can operate by means of market mechanism that excludes people who cannot
41 afford the price" (Li, 2014: 591). Hence, wind energy not only requires material enclosures to capture
42 its value (Sellwood and Valdivia, 2018), but property rights become also entangled with processes of
43 land use planning (Blomley, 2017). Despite its critical role for renewable energy development,
44 ownership of "key biophysical resources" has received surprisingly little attention (see Wade and Ellis,
45 2022). Following on from Wade and Ellis (2022: 1), we inquire into the construction of 'wind rights' as
46 landowners and developers are "enclosing the 'windy commons' [paraphrasing Ostrom, 2004] to
47 extract 'wind rents' from monopoly property rights", creating procedural and distributional injustices
48 (Holifield, 2009; Jenkins et al., 2016; Elmallah and Rand 2022).
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54 Towards an assemblage of land for harnessing wind

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57 Most studies dealing with the nexus of land, wind, and planning have emerged from geography and
58 political ecology, taking a critical approach to the valuation, appropriation and commodification of
59 land (or nature and space, e.g. Castree, 2003; Wade and Ellis, 2022) and wind resources as an
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3 expression of neoliberal capitalist relations. In this paper, however, we follow a complementary path
4 by Li (2014), Christophers (2016), Le Billon and Sommerville (2017) and Nadaï and Cointe (2020) to
5 scrutinise the processes that produce land as a commodifiable asset in the first place and that co-
6 produce a 'landrush'. Human geography has recently begun to stress the need to look further into
7 land as a 'real' commodity and its connection to markets (Christophers, 2016; Li, 2014). More
8 specifically, Li (2014) and Nadaï and Cointe (2020) stress that land resources do not have an intrinsic
9 value and instead are assembled as an investible but "provisional assemblage of heterogeneous
10 elements including material substances, technologies, discourses and practices" (Li, 2014: 589).

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12
13 Drawing on this lens of socio-material assemblages, founded in Science & Technology Studies (STS),
14 we extend the assemblage thinking introduced more recently in human geography (e.g. Anderson and
15 McFarlane, 2011; Krauss, 2010; Labussière and Nadaï, 2018a; Le Billon and Sommerville, 2017; Kropp,
16 2018; Chezeli and Nadaï, 2019). Exploring the entanglement of wind (as a commodity) and land (as an
17 asset), the lens of socio-technical assemblages helps us to discern how the valuation of wind has
18 reconfigured the valuation of land, and vice versa. In other words, the commodification of wind as an
19 energy resource re(valorises) and mobilises land for the production of wind energy, while competing
20 land uses limit the production of wind energy. On the one hand, developers make their judgement as
21 to whether a wind farm project is economically viable or not by calculating the potential return on
22 investment (ROI) based on the expected energy production from the wind, using specific types of wind
23 turbines, that would be placed on a specific piece of land. Ultimately, if they succeed in mobilizing all
24 these material entities, then the land is turned into a 'site' for wind energy production (Kirkegaard and
25 Nyborg, 2021; Sellwood and Valdivia, 2018; Nadaï and Cointe, 2020) whereby a market assemblage
26 can be mobilized (Karnøe et al., 2022; Kirkegaard et al., 2020). On the other hand, competing land
27 uses, place-related conflicts and planning regulations serve to constrain the utilisation of wind energy
28 regardless of the measurable wind resource (e.g. Cowell, 2010).

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31 The socio-technical assemblage lens is relational and socio-material, meaning that once one entity
32 shifts, the entire assemblage's configuration will shift as well. The assemblage lens hereby also helps
33 unpack shifting agencies and power relations. To show this, we first trace how calculative devices such
34 as geographical maps, wind measurements, maps of landownership, municipal zoning, and land-
35 leasing contracts make visible the scarcity of available land, triggering a landrush for the limited
36 locations to develop wind farms. Here, the wind is the point of departure in the valuation process,
37 while land acts as a constraining mediator that determines whether and where the wind can be
38 utilised in an economically viable way or not. Second, we illustrate how the land rush produces opaque
39 and iterative negotiations between developers, landowners, and municipal planners. Finally, we show
40 how the construction of land as a scarce resource has shrunk some agencies and enlarged others,
41 notably inhibiting the engagement and participation of the public and producing concerns over energy
42 (in)justice (Holifield, 2009; Jenkins et al., 2016; Elmallah and Rand, 2022). Our analysis in turn reflects
43 on how the assetisation of land *through* the wind deepens the divide between those who have
44 property and access rights and those who do not. Entangled in the Danish planning system for wind
45 power development, these issues have become enmeshed with "procedural injustices" (Elmallah and
46 Rand, 2022) of planning and development practices with a constrained space for 'non-expert'
47 deliberation. Developer practices and the planning system are working to exclude certain publics and
48 forms of expertise and include others into the planning and development of wind farms (Van Veelen
49 and Eadson, 2019), with surprising resemblances to the closed and technocratic processes of large-
50 scale nuclear developments (Wynne, 1983).

Empirical background

The regulatory and legal framing of wind farm planning in Denmark has mostly followed procedural rationales and instrumental justifications, conceived of as a procedural requirement to ensure democratic legitimacy of decision-making processes and broadly recognised outcomes. In Denmark, public participation in wind farm developments ideally takes place in two stages: 1) municipal planning of land use (zoning), and 2) development and adoption of local plans for specific projects (including environmental impact assessment (EIA)). Each stage involves a 4-to-8-weeks consultation period in which community members are invited to submit responses concerning the proposed plans. In 2009, an information brochure called “The Good Process” was issued to give inspiration for improving public engagement and with the desire to increase public support for wind farms (see figure 1).

Insert Figure 1 around here

Figure 1 shows a seemingly linear two-stage process with several phases open to public engagement and a recommendation that engagement should be considered very early on in the process. Although this two-tier process seems straightforward on paper, the ‘Good Process’ has not been seen to work as intended in practice. This can be attributed to two land-related issues. Firstly, not all municipalities designate wind farm areas or zones in their municipal land use plan. Secondly, it is possible to adopt a supplement to the municipal plan that designates an actual site in the superordinate plan at the same time as the local plan is adopted (Armeni and Anker, 2020). This effectively circumvents the strategic land use planning that had been agreed collectively in the first stage. Not only do both issues allow developers to select wind farm sites independently of the municipality but it also suspends the two-tier process while muddying the participation process, with significant implications for public participation in the planning of new wind farm developments.

The empirical analysis is based on secondary data such as maps of land plots, municipal wind power plans, public hearing responses, and policies, supplemented with extensive primary data consisting of 35 semi-structured interviews in total (2016-2018, 2020) with wind farm developers(11), landowners and estate owners(2), municipal planners(12), regulators(2), farmers’ associations(1), EIA consultants(3), NGOs(1), and local community members(3) in addition to observations at public hearings in the period 2016-2018.

Analysis: The production of a landrush in Danish wind power and its effects on public participation practices

In the following, a three-tier analysis is unfolded: First, the paper displays how different calculative tools have co-produced a landrush in the Danish wind power market assemblage. Second, the analysis shows how developers in this entangled land-wind market assemblage employ specific practices for gaining access to land. Third, we display how these practices eventually undermine public participation within the existing planning system.

The construction of a Klondike-like landrush

To secure investment into wind power development, commercial developers must be able to calculate and demonstrate economic viability, e.g. by calculating an attractive potential Return on Investment (RoI) from producing wind energy in a specific site. That is, the wind must first be construed as a potentially valuable ‘asset’ or commodifiable ‘energy resource’. To do so, various calculative devices are used, with maps playing a particularly crucial role. Of special importance are the maps of wind

resources, municipal zoning, and land ownership. These devices are being used constantly as developers try to put together a feasible wind farm project. *Firstly*, wind resource maps, such as the European Wind Atlas¹, help to direct wind farm developers to areas of good wind potential (Kirkegaard and Nyborg, 2021), as different sites can be thought of as having energy reserves “and their energy potential most often quantified” (Nadaï and Labussièrre, 2018: 57). This quantification of the energy potential is essential for wind farm developers to be able to collect a portfolio of promising sites. Today, with the vast computing power available, wind atlases have been improved and digitalised, expanded and refined. The Global Wind Atlas, for example, takes global weather data from the last 20 years and together with topographical data from Space Shuttle missions it can show wind speed distributions for every 250m over the whole land mass of the earth. The energy potential of the wind has thus been mapped around the globe, turning wind farm developers into calculative agents that can determine the revenue from specific sites anywhere on earth. For developers, this is the most important element for calculating the potential ROI and for mobilizing investment in specific projects.

Secondly, plans for land use made by municipalities are usually visualised on ‘zoning maps’ – maps of desired or required uses for land areas within the municipal boundaries – often employing Geographical Information System-tools (GIS). These zones are designated through a process shaped by legislation and influenced by politicians, municipal planners and local citizens. Using the same GIS tools as the planners, the developers can often predict where wind energy zones will be, also before the municipal plan is published. Along with zoning for other land uses, these maps play an important role for the assetisation of wind as they carve out potential sites of wind farm development, and thus investment, for wind farm developers. Zoning maps in the municipal plans are important devices as the designation of priority areas for wind energy, both restricts the available areas for wind farm development but also enables developers to assess the potential and capacity of specific sites and thus calculate another element of the potential ROI.

“First, we look at the maps [...] and then we can calculate how many turbines we can install, and estimate how big an impact on the municipality it will have”
(Developer1).

Wind energy sites are thus ‘created’ through maps, calculations, ‘zoning’ and designations that support (and perform) the making of these sites and landscapes as suitable for wind power (Labussièrre and Nadaï, 2018a; Kirkegaard and Nyborg, 2021; Nadaï and Coïnte, 2020). At the same time, they co-produce competition for access to specific (and often, the same) favourable sites.

Thirdly, none of these valuations of potential ROI can be realized without assigning each turbine to a specific piece of land for it to stand on (Nadaï and Coïnte, 2020). For this, developers need maps of land ownership. Having selected potential sites for development, developers combine their own local knowledge, publicly available data and specialist knowledge from land surveyors, to assess which plots of land they need gain access to (areal information/miljoportal.dk; bondeejern.dk). In Denmark, these maps often reveal multiple small strips, or packets, of land, turning the process of gaining access to the good spots into a puzzle, as exemplified in the map below from a site in Northern Jutland.

Insert figure 2 around here

The landrush for specific sites is thus an effect of socio-material processes of measuring and calculating the potential ROI, co-produced by wind resource mapping, zoning, and land access co-produced by

¹ First published by Risø National Laboratory in Denmark (1989) (today the Wind and Energy Systems Department at the Technical University of Denmark).

landownership and land-leasing contracts. Crucially, wind farm developers will not be able to realise their investment without access to land (see figure 3).

Insert figure 3 around here

Land-leasing contract are agreements which set the rent a landowner is to be paid so that the land can be used for producing renewable energy instead of crops. They are thus critical in co-shaping the practices of different key actors (landowners, developers, and municipal planners). Having mapped the wind resources in Denmark, all developers wait for the publication of the municipal plans.

“All the developers sit there waiting on the publication of this [municipal zoning plan]...: ‘okay, there it was, now we start the car’, and then we have like 30 people driving to some landowner” (Developer2).

Some developers even use a ‘land-scout’ to investigate the municipal designation of wind development zones to be able to rush out to the local farmer and say

“your area has been appointed here, would you be willing to sell, are you interested in owning turbines, what is your interest, can we make an agreement?” (developer2).

In this way, municipal plans are used to enrol landowners into signing a land-leasing contract, creating a “Klondike”-like landrush (*NGO Wind People*). The rush for land is sometimes so acute that developers attempt to sign land-leasing agreements even before any municipal plans have been issued, based entirely on their own mapping of local conditions.

Developer practices of gaining access to the land

Rather than being dependent on local community acceptance or municipal support, wind farm developers depend on good relations with large landowners to be able to access the land (Developer 3). Given the accelerated landrush, landowners and developers have engaged in complex negotiation practices (Rudolph and Kirkegaard, 2019). Competing for access to land at the same time as their competitors attempt to sign land-leasing contracts for the same sites (EIA consultant), landowners are considered the critical ‘gate-keeper’:

“our main stakeholders in a project, yeah, more than the municipality, because if we don’t have any landowners and if they are not for the project, we don’t have any project [...]. Having the landowners on board, and having the municipalities on board. But not so much the neighbours, because they are not so important in the first part. Sorry to say that, but that’s our experience. Because the crucial stuff is with the landowners and is with the municipality” (Developer3).

“without consent from the landowner there will be no project and if you approach the neighbours first, then you risk another developer has approached the landowner first and then it doesn't matter if you've approached the neighbours first because then someone else will have an agreement with the landowner and then they have first right to be the ones who develop” (EIA consultant).

As landowners often have high stakes in the local society (*developers 1, 2, 3*), it is important to gain the trust of a landowner when making a land-leasing agreement, and this requires an investment in time and relationship-building. Developers frequently have a lot of ‘coffee and cake’ with landowners, paying informal visits before the real negotiations start, and sometimes offering help to the landowner (*Landowner1; developer3*).

Intense price negotiations

The value of a site, co-produced by the zoning of land use in municipal plans, is well known by the landowners and they will often negotiate with several developers simultaneously. This enables them to push up the prices on the rent of the land, asking all the developers about the best price they can offer, and comparing the potential revenue per hectare from using the land for harvesting the wind with that from harvesting crops or livestock (*developers 1, 2*). This rent-seeking behaviour has been intensified by the landrush, as landowners have come to

“know the game and they say ‘just deliver an envelope with a number on it and we’ll come back to you. Farmers like to make money out of the land, basically, they don’t care. They see it as a business, as anything else they grow [...] of course it’s a lot of economical stuff and money [for the landowners], so you know, we can talk about this and getting agreed” (developer1)

Some landowners have, however, also grown tired of ‘aggressive’ developers, and have engaged with farmers’ associations (“*Landboforeninger*”) who provide support to the landowners in negotiations. Bargaining about land rents adds uncertainty to the development of a wind farm as an entire project may fall apart, or may be deadlocked for years, if a landowner pulls out of negotiations (*developers; EIA consultant*).

Negotiating municipal plans – contesting zoning maps and developing new sites

With stiff competition for land, and increasing agency of landowners, developers are progressively moving beyond the designated areas in the municipal plan, as sites tend to be increasingly taken before they have officially been designated.

“designated areas normally are taken, I mean, when they are decided. So, you have to find a way into the areas, before they are decided, and then you have to lobby to get them approved” (developer1).

In Denmark, some municipalities designate areas for wind power development in their municipal plans, while others do not. At the same time, there are varying degrees of enforcement, which makes the municipal plans and zones negotiable when commercial wind farm developers compete for suitable sites and sometimes move beyond the designated areas to avoid competition. Developers, through informal discussions with municipal planners, try to find out what the municipality prefers (*developer1*). These discussions can also mean that developers become involved in the reshaping of municipal priority areas, e.g. convincing planners to include additional sites into the municipal plan for which the developer has already made agreements with local landowners:

“And that’s probably the way in which the municipality’s wind farm plans have come up, right...the municipality may have done some pre-screening, but long before that, the developer has been out there screening and making pre-deals, and then putting those sites into the municipality’s plans” (developer4).

Developers are also able to find new sites or expand existing ones by buying up residential properties for subsequent demolition, for instance by approaching local residents and making purchase agreements with them (Rudolph and Kirkegaard, 2017; *developer 1*). Having realised that they can exploit the *Access to Public Administration Files Act (Offentlighedsloven 2014)*, developers can get insights into citizens’ concerns, enabling them to approach concerned citizens to expand a possible site:

“[They [developers] have asked for access to the consultation responses... and read that there are some citizens who live down here who say if there will be erected

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3 *turbines here and here... then we are surrounded... then we will not live here*
4 *anymore... and then they got the idea if they should just buy them all out..."*
5 *(planner2)*
6

7 Planners explain how developers use the public consultation process to influence which areas are to
8 be considered for inclusion in the municipal plan, either by sending in statements themselves or
9 mobilising local people to do so, or inviting themselves for impromptu meetings to show planners
10 their potential project, persuade them into supporting it. Here, they argue for how their project aligns
11 with the municipality's plans, have ensured support amongst local residents in the area, and that it
12 should be included in the plan.
13

14
15 *"Typically, it's about them trying to convince us that this is a good spot in relation*
16 *to...to harvest wind resources, and they don't find any substantial impact on the*
17 *landscape...funnily enough they never think so, no matter if it's the most pristine*
18 *[landscape], and even if it's almost put in the middle of a river valley, well, then*
19 *they don't foresee any impact, and then they typically tell us that they have local*
20 *support, they often mention that...and then they will often try to find something in*
21 *the municipal plan that they can link it to, for instance that we have put up some*
22 *guidelines for something, or if we in our debate phase material have said that we*
23 *will prioritize the consideration for neighbours, landscapes or cultural*
24 *environments [...] so they will use some of our buzzwords" (planner1).*
25
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27 Planning and development under the radar and constrained public 28 participation 29

30 Fierce competition for land has meant that landowners have become more concerned with how they
31 must be able to live *in* and *with* the community (*landowners1 and 2*). The developer practices of
32 contacting landowners and municipal planners in advance of the official planning process, leads to
33 controversies with the non-land owning local community
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36 *"[it's] really difficult in terms of the local community, they can't understand why they haven't*
37 *been involved in the process at a much earlier stage... because when they first hear about it,*
38 *then all the deals with the farmers have been made...it's been included into the municipal plans,*
39 *right?" (developer5).*
40

41 *"[the landowner] just sits there smelling gold, and the neighbours have no clue what is going*
42 *on around them. So we would prefer to get rid of the municipal wind power plan and then drive*
43 *out and develop our own sites so to speak" (developer2).*
44
45

46 The developer practices – co-determined by the planning system and landrush – often make local
47 communities feel "uncomfortable" as they are "taken by surprise by new ideas...you'd like to know
48 about it when others are informed" (*developer5*). This observation is shared by the planners, who get
49 many calls from local citizens that are confused after having been approached by a developer, because
50 they think the municipality has already approved a certain project without involving the broader public
51 in the process. The locals explain how the developers come to their door and attempt to acquire
52 goodwill, sometimes by offering money (what they consider a bribe or a 'sweetener') or ask to make
53 purchase agreements, and often they leave them with the impression that the deal has already been
54 made. As one of the planners said:
55
56

57 *"Yeah, so they call in and ask, 'can it really be true...will our property really be bought, can you*
58 *just do that' and things like that... and we don't have anything to do with that, it's the*
59 *developers who try and put a bit of pressure on them" (planner2).*
60

Indeed, not only do the current practices not live up to ideals prescribed in many “*thick books about public engagement and network-based planning [...which argue that] the local communities must be part of this process from day one*” (developer5), they also ultimately undermine the intentions of the ‘good process’ as envisioned by authorities: Essential activities take place under the radar, bypassing the local public or disregarding early strategic decisions:

“it’s just not working because the first four years are passing by under the radar in order to ensure that the other developers don’t realise what’s going on out there, because then they will come and put up a flag in the centre of it all and want a share of this, right? [...] And if they can just make one farmer sign a deal with them, then [...] it stops...they say, well, it’s all fine and well if we can become part of this, but you won’t get anywhere without us, so it’s 50-50, or what are we talking about? So the entire pre-work is taking place under the radar, and that’s very hard for the local communities to understand” (developer5).

The socio-material land-wind assemblage in Denmark has thus positioned landowners as critical agents. This, in turn, has been linked to an alleged ‘system failure’ of the Danish planning system, which precludes public participation, limits the space for publicly legitimised decisions and raises concerns over procedural justice:

“The system failure is that developers start with the landowners and make agreements to use their land, and often, of course, also money, a lot of money is involved. It’s not so much the money that’s an issue by itself, but it’s that you start with the landowners but you do not consider the rest of the community...I think if the communities were given the upper hand it would change the game completely” (EIA consultant).

However, the ‘system failure’ – creating deficits of procedural justice - is rather a socio-material effect engendered by a portentous interplay of the contested Danish planning system, inconsistent legislation for wind energy and scarcity of land. Together they co-produce a landrush that in turn provokes wind farm developer practices which privilege landowners and planners and deprive local communities of their entitlements in planning procedures.

Discussion: New power constellations in the land-wind

assemblage

The first part of our analysis illustrated the role of material devices in co-producing a landrush, while the second part exposed developer practices of gaining access to land, and the third part demonstrated how public participation and public concerns have been precluded from the land-wind assemblage. In the following, we shed a critical light on the production of the wind energy-induced landrush and discuss its wider implications and justice-related consequences.

Role of calculative devices in constituting a landrush: enclosure as sterilization of land

In the first part of our analysis, we described the role of calculative devices in co-constituting a landrush by producing sites for wind energy as new “zones of material appropriation” (Sellwood and Valdivia, 2018: 205). In other words, whilst wind farm developers use the various calculative devices

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3 to determine whether to invest in a potential wind farm site or not, the enhanced and entangled
4 valuations of wind and land have produced unintended effects in terms of a rush for land both by
5 creating scarcity and by unenforced legislation.
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7 While the growth and importance of wind energy has driven a revalorisation and renewed assetisation
8 of land, our findings highlight the increased significance of private landowners and contractual
9 agreements (Jacquet 2015, Nădăi and Coînte, 2020; Kirkegaard and Nyborg, 2020). From the
10 landowner's perspective, the disparity between current productive income from land (agriculture) and
11 the potentially achievable rental income from wind turbines drives investment and development. This
12 bears some resemblance to the rent-gap-theory originating from urban contexts (Slater, 2017). Since
13 developers lease the land where the development takes place, private landowners play a major role
14 in the planning and siting of these facilities, meaning that "Landowners can, in principle, negotiate for
15 any preferred land use and development practice, although unknowledgeable landowners may simply
16 sign the standard lease given to them by the energy company" (Jacquet, 2015: 234). In these
17 negotiations for gaining access to the land, material devices, in particular land-lease contracts, help to
18 enclose the land and protect it against other developers. The enclosure of land by wind energy
19 presents a particular expression of enclosure, which we dub a process of 'sterilisation of land' that
20 further nuances the literature on 'enclosure' of land in terms of private appropriation of land and
21 exclusion of other uses (e.g. Jeffrey et al., 2012). The very act of erecting a wind turbine on a piece of
22 land "sterilises" this land and a large area around it, as the wake effect means other turbines placed
23 nearby will generate less energy. This prevents other developers placing viable projects in the vicinity
24 and further exacerbating the scarcity of land for wind energy.
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30 Opaque developer practices

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32 In the second part of our analysis, we illustrated how wind farm developers employ practices of land
33 grabbing through clandestine and opaque negotiations with municipal planners and landowners.
34 According to Jacquet (2015: 232), "The energy development leasing process represents a mode of
35 'participation' in the planning process, albeit one that contrasts in important ways with the ideals of
36 'public participation'". Since contracts with landowners are executed privately, usually taking place in
37 intimate settings of private homes that are not publicly accessible (Jacquet, 2015), they provide a
38 means for private and concealed participation in the planning process of a privileged few. When
39 developers tell planners that they have ensured 'local goodwill' for a specific site, they are not
40 providing an interest-free space for the local community to jointly deliberate what they want for their
41 common future. Rather, they approach individuals with whom they try to make secretive deals based
42 on individual interests. In addition, they even utilize their legal right to access the public hearing
43 responses to municipal zone planning, to identify vulnerable citizens who are prepared to sell their
44 property in order to make space for wind farms, thereby interfering with and undermining democratic
45 principles of transparency and participation.
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50 Constrained spaces for public participation in the shadow planning systems

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52 Third, our final part of the analysis hints at how the current planning system – enmeshed in the land-
53 wind market assemblage – has diminished the spaces for meaningful public participation. Informal
54 practices as the ones described seem to have become "systematic and almost institutionalised in
55 shadow planning systems" (Fox-Rogers and Murphy, 2014: 251) in Denmark, resulting in de-facto two
56 planning systems: one formal and one informal. Wind farm planning is therefore not only embedded
57 in legal, economic and ownership structures that are imbued by existing power relations but may also
58 perpetuate power imbalances and coercive dynamics intimidating the public sphere (see also Clausen
59
60

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3 et al. 2021). ‘More’ or ‘better’ participation is unlikely to change anything, unless the assetisation of
4 land and immanent land-grabbing practices are unpacked and reconceived. Our findings hereby
5 support Jacquet’s (2015) observations and underline what happens when developers and landowners
6 take on the task of facilitating dialogue between relevant stakeholders of a wind energy project, and
7 thus, in reality, are given the responsibility to foster public participation (Clausen et al., 2021) in the
8 green transition.
9

10
11 We argue that social acceptance of wind energy cannot be fully comprehended without understanding
12 the ways in which the capitalisation of land, the planning system and developer practices co-shape
13 wind developments and the associated agency of various publics. Evidently, developers do not hide
14 their perspective that neighbours are not that important for their goals, nor that they would rather
15 “get rid of” the strategic municipal theme plan. These elements are however central parts of the first
16 instalment of the ‘two-tier good process’, to ensure some sort of legitimacy and accountability in
17 terms of *where* wind power development should happen in the municipalities. Indeed, the issue of
18 land subverts the ideals of the “The Good Process” and attempts at devising new participatory
19 techniques to supplement such ‘invited spaces’ of public consultation (Solman et al., 2021; Clausen et
20 al., 2019).
21
22

23 24 Concealing and concealed entanglements widening the divide between 25 26 ‘expert’ and ‘lay’ 27

28
29 What our focus on the entangled commodification and assetisation processes can help to reveal is
30 how “participating publics have never been more removed from the centres of power and calculation”
31 (Chilvers and Kearnes, 2016: 7) as the entangled land-wind assemblage constitutes concealing and
32 concealed entanglements:
33

34 First, ‘concealing entanglements’ are generated as plans, zones, developers, and landowners are
35 producing not only a landrush, but also (in)advertently conceal the planning processes, often to the
36 frustration of local communities. While the Danish planning law includes zoning practices to designate
37 municipal priority areas for wind energy, not all municipalities allocate areas for wind power
38 development in their municipal plans. At the same time, there is a varying degree of enforcing the
39 plans. This makes the municipal plans and zones negotiable and contestable and conceals the actual
40 processes that spawn the sites for wind farm projects.
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43 Second, ‘concealed entanglements’ mean that early negotiations, before the official planning process
44 starts, are concealed. Clandestine and opaque negotiations between wind farm developers and
45 private landowners about land leases serve to secure viable projects while the local public is kept in
46 the dark. Paraphrasing Elmallah and Rand (2022), this entails that public hearings are often taking
47 place ‘after the leases have been signed’ when ‘it’s a done deal’. This often results in rumours and
48 resistance that sometimes threaten to destabilise wind farm developments as the subsequent
49 development process is considered pure make-belief carrying the suspicion of tokenist rationales. In
50 this way, “The Good Process” as promoted by the Danish authorities is circumvented, invalidating the
51 entire public engagement process.
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55 Within the existing governance structures of the wind-land market assemblage, the one who is
56 entitled to and capable of harnessing the wind is also the one with access to the land. Land ownership
57 has become increasingly important for wind farming and thus energy transition trajectories, not only
58 causing controversy over who is entitled to and capable of harnessing the wind (also see Elmallah and
59 Rand, 2022; Wade and Ellis, 2022), but also co-producing new power constellations, and causing
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3 contestations over who should earn on the ‘commons’ of the wind (Ostrom, 2004). Calculative tools
4 to commodify the wind, planning procedures and development practices play a formative role as
5 technocratic techniques. These techniques co-produce the stakes, stakeholders, earnings, and spaces
6 for public engagement in the governance of the green transition (Kirkegaard & Nyborg, 2021),
7 widening the distance between ‘experts’ and the ‘lay people’ (Wynne, 1983; Aitken, 2009). Such
8 “distinctly late modern attitude towards science, technology and the environment” (Chilvers and
9 Kearnes, 2016: 2) - representing an ‘age of participation’ (ibid.) is characterized by a “proliferation of
10 techniques and practices designed to foster public engagement”(ibid.:8). Despite all the attention,
11 ‘actual’ participation remains a mirage or a spectacle. Not only are these practices often confined to
12 invited spaces of stakeholder participation (Cuppen, 2018), they are moreover, as this paper shows,
13 circumvented by the landrush.
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17 A critical perspective on land-wind assemblages

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19 To inquire critically into the matter of confined ‘invited spaces of stakeholder participation’, we argue
20 that the entangled assetization of land and wind can help us to envision how things *could be otherwise*.
21 Indeed, our insights raise, albeit indirectly, the fundamental question of who should own the wind, or
22 more accurately, who should be granted the right to appropriate – harvest and profit from – wind
23 power generation, and who should be invited into these negotiation processes. Our findings also hint
24 at more ethical considerations about the interplay between procedural and distributional justice and
25 how energy justice is socio-materially grounded and construed. The wind power assemblage in
26 Denmark has become increasingly “fossilised” (Labussière and Nadaï, 2018a), moving further away
27 from the origins of the cooperative social movement. Our study contributes to the social acceptance
28 literature by showing how opposition to renewable energy developments is, partly, embedded in
29 often overlooked privileging mechanisms, in this case exclusionary negotiations between developers,
30 planners, and landowners that happen outside the public sphere, and mediated by material devices.
31 This points to democratic deficiencies and the closure of public participatory spaces, raising
32 fundamental questions about how spaces for public participation are socio-materially constructed.
33 Since the appropriation of the wind resource is legitimised and determined by the entitlement to
34 utilise the land (Wade and Ellis, 2022), the assetisation of land through wind energy deepens the divide
35 between those who have property or user rights and those who do not, bringing issues of
36 distributional energy justice (Jenkins et al., 2016) to the fore. The issue of gaining access to land
37 indicates how these rights are co-constructed by different calculative devices that provide
38 technocratic assistance for commodifying wind energy and assetising (and enclosing) land in the first
39 place, and produce scarcity and an accelerated landrush. However, it is the consequential and
40 concealed development practices to gain access to land by negotiating property and user rights that
41 undermine the planning system for utility-scale wind power developments and create procedural
42 injustices.
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49 Future research should therefore look further into the relationship between material practices and
50 public participation, i.e. to what extent the constrained spaces for public participation are co-shaped
51 by calculative devices and tools and how they co-produce the boundaries of entitlement and
52 participation. Having illustrated how opaque and informal planning processes for wind farms in
53 Denmark originate from a rush for land that is intensified by expert tools, devices and practices, our
54 study responds to Holifield's (2009) call for employing a social-material assemblage approach as a
55 critical perspective to environmental justice research to trace the construction of environmental
56 inequalities. We argue that a critical consideration of the processes of socio-material assetization
57 supplements current approaches within energy justice and energy democracy literature (van Veelen
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3 and van der Horst, 2018; Jenkins et al., 2016) that aim to understand where injustices happen and
4 what sections of society are ignored or misrepresented with a stronger focus on *how the injustices are*
5 *constructed and naturalized* through the mobilisation of both human and non-human entities. Future
6 studies would also benefit from exploring to what extent these trends and processes are specific to
7 more mature wind energy markets, like in Denmark, or whether there are different entanglements of
8 land, wind, and the planning system assembled by specific types of knowledge, tools and practices, in
9 less mature energy markets effectuating other consequences. The study also raises the question of
10 how and whether the size and scale of available land matters for the acceleration of a landrush and
11 associated consequences for public participation.
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15 Overall, our insights spur new questions concerning the sort of legitimacy that the planning process is
16 supposed to secure and its wider implications for energy democracy when being undermined by the
17 landrush and entitlement. Following Birch (2020: 3) and the notion of rentiership, our study may
18 indeed hint at the workings of “contemporary, technoscientific capitalism”, characterized by the
19 (re)configuration of a range of ‘things’ “as assets or capitalized property”, increasingly “underpinned
20 by rentiership or the appropriation of value through ownership and control rights”. In our case, we
21 also see “rentiership” – in the form of rents as revenues from the ownership of land as an asset – “as
22 a technoeconomic practice and process” (Birch, 2020: 3) where “*assets-as-agencements*” (Nadaï and
23 Coïnte, 2020: 165) (re-)configure and transform the assemblage around wind power deployment. In
24 doing so, tracing negotiations over access to land, less articulated social contestations over wind
25 power in advanced energy transitions have been revealed to be enmeshed in broader issues of
26 planning, marketisation, transparency, and democracy.
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30 Conclusion

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33 This paper focused on the entanglement of land and wind in Danish wind power developments and
34 illustrated the reciprocity of wind and land resources for the utilization of wind energy. By tracing the
35 underlying practices of assetisation of land, we exposed how the capitalisation of wind valorises land
36 to harness the wind and how access to land has become a predicament for the utilization of wind
37 power. Constructed as a scarce resource, land has become socio-materially constituted as a highly
38 valued asset – through various calculative devices - that has evoked enhanced competition around
39 its access. The competition for access to land, in turn, culminates in concealed planning and developer
40 practices that give preference to necessary negotiations with landowners and exclude the public from
41 early decision-making, thus counteracting formal planning procedures. While calculative devices are
42 employed to value the wind resource and serve the purpose of simplifying and streamlining the
43 planning process, they also valorise the land resource and complicate the process by prompting a rush
44 for land that manifests in intertwined practices of land assetisation, grabbing and enclosure, or what
45 we term sterilisation. These land-related practices bypass principles of public engagement and evoke
46 democratic deficits in Danish wind farm planning. The presented insights contribute to a critical energy
47 geography literature by nuancing how land becomes enclosed and sterilised by wind energy. In turn,
48 they also contribute to the STS-literature by revealing the socio-material underpinnings of democratic
49 deficits by deconstructing the process of assetisation and following the efficacy of entangled land and
50 wind assemblages. In conclusion, efforts towards enhanced public participation in Denmark to re-
51 establish confidence in and acceptance of the deployment of large-scale wind energy projects are
52 likely to remain fruitless and continue to provoke contestations, unless the relationship between wind
53 energy and spatial planning practices is fundamentally rethought.
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22 23 24 **Reports and regulations**

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27 enacted Jan. 1, 2014.

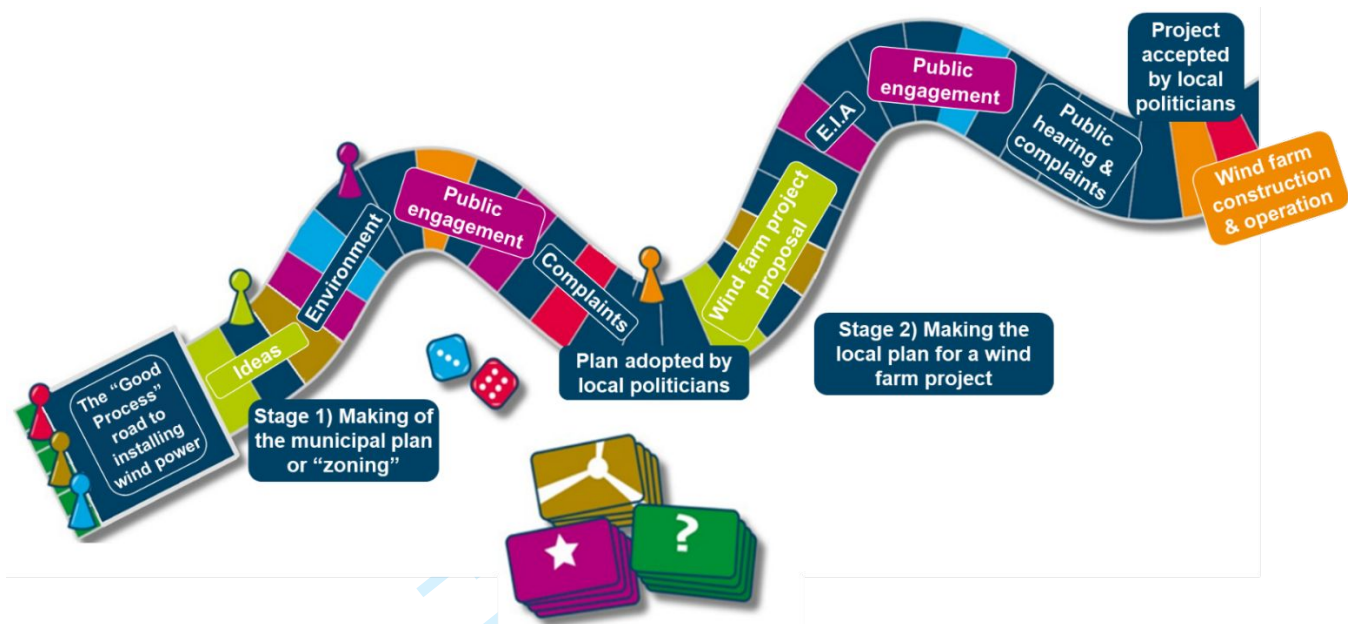
28
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30 Government Denmark, Danish Wind Turbine Owners’ Association, and Danish Wind Turbine Industry
31 Association. <https://naturstyrelsen.dk/media/nst/Attachments/VindDengodeproces110609.pdf>

32 33 **Web-sites**

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36 December 10, 2020.

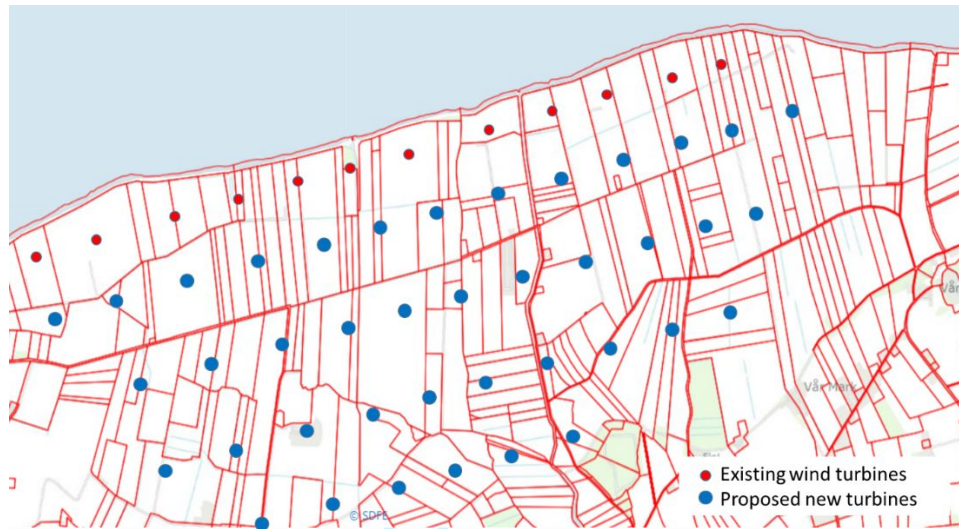
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38 <https://www.bondejern.dk/detektor-tips/how-to-find-a-lodsejer/>, accessed on December 10, 2020.

Figure 1: "The Good Process" for wind farm planning in Denmark



Source: Based on the original (in Danish) by The Danish Society for Nature Conservation et al. (2009). Translated and re-drawn by the authors.

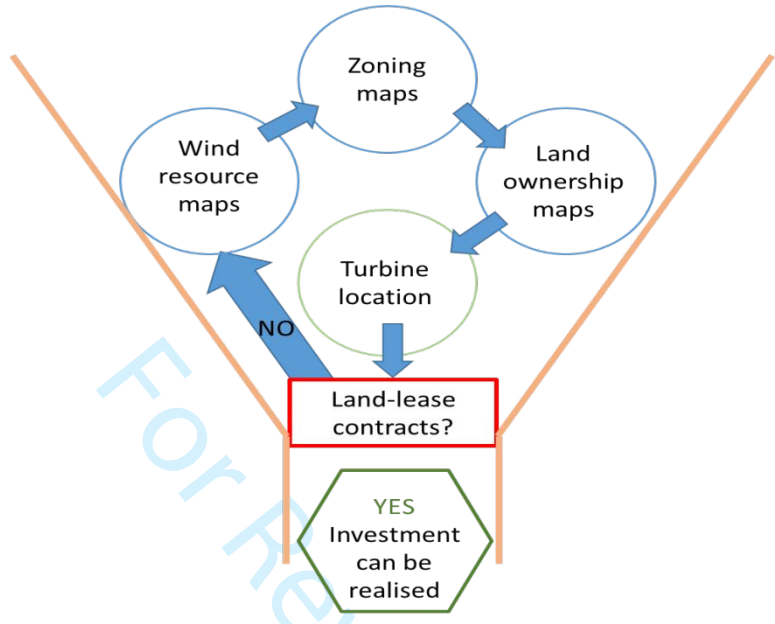
Figure 2: Demarcation of land ownership in the area of a potential wind farm extension in northern Jutland



Source: Map and ownership boundaries taken from "Danmarks Miljøportal", position of turbines from project developer's website.

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Figure 3: Iterative use of mapping tools and ~~importance~~ ~~obligatory passage point~~ of land-lease contracts in land-wind assemblage



Source: Authors' own design