Briefing Report: Wind and Solar Projects in Brandenburg

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Summary and Recommendations

This briefing paper reports on research to investigate renewable energy production in Brandenburg. Brandenburg is with 7,100 MW installed capacity in wind production and 3,700 MWp solar[1] the state with the second most onshore wind installed and was ranked fourth in feeding solar electricity into the grid. Brandenburg is of special interest due to the high density of wind engines in "energy suitability areas" and its high number of (converted) lignite mining areas. The report is authored by a team of researchers based at Martin Luther University Halle-Wittenberg and the University of Technology Sydney, cooperating with researchers from the University of Sydney, Australia[2], and is based on information gathered during field research and visits to villages and cities in Southern Brandenburg between 2018 and 2020.

Brandenburg's electricity generation from renewable energy of 18,300 million kWh compares to 32,477 million kWh of coal fired electricity generation. [3] First installations of wind turbines started in the 1990s. In 1993, regional planning was introduced as a form of land use regulation, followed in 2003 by regional planning to allocate wind suitability areas.[4] This allocation has helped to establish and enforce environmental protection, yet it to some extend lag behind in adapting to technological development, and has been too little concerned with social aspects. Questions of energy democracy are mostly sidelined and dynamics of renewable energy installation and production left to Brandenburg's municipal governments, local residents and companies or investors, often from outside the state.

We suggest that

[1] https://www.foederal-erneuerbar.de/landesinfo/bundesland/BB/
[2] See www.decarbenergy.net
[3] https://www.foederal-erneuerbar.de/landesinfo/bundesland/BB/
[4] Conversation with planner November 2020 and Gesetz zur Regionalplanung und zur Braunkohlen- und Sanierungsplanung 2012, available at https://bravors.brandenburg.de/gesetze/regbkplg#9

1) decision making on renewable energy production in Brandenburg becomes more transparent on a local level, comprising information, discussion, and opinion polls of affected locals at a very early planning stage. If this does not take place, opponents may take to "playing for time" through prolonging or impeding planning and approval procedures. Local processes of negotiation and deliberation should draw in local experts, and draw on the expertise they have developed, allowing them to participate in shaping the *Energiewende* from the ground up, rather than having them work against it.
2) citizen energy, i.e. local ownership of power generation units, is made obligatory in renewable energy production
3) regional planning takes the vertical dimension of wind energy into account when realigning distance regulations.

1. Germany's 'Energy Transition'

The German *Energiewende*, or energy transition, is an ambitious suite of policy measures which aim to decarbonize the economy and achieve an almost complete transition to an energy system based on renewable energy by mid-century. It has been described as "one of the most ambitious national energy transition initiatives worldwide" (Moss et al. 2014, 1). A crucial turning point for the *Energiewende* was the Fukushima nuclear accident in 2011, which led Germany to declare a national phase-out of nuclear energy – at the same time as committing to renewable energy. Germany set itself a target of 35 % of national electricity generation to be provided by renewables by 2020, and 80 % by 2050 (Bundesregierung, 2011), while phasing out of all currently operating nuclear power plants by 2022. This is especially challenging, as Germany is and plans to remain a major industrial economy.

While 2011 is sometimes seen as the year of birth of the Energiewende, it is more accurate to see it as the continuation of a policy approach and process of self-definition which has been unfolding at least since the early 1990s. The term *Energiewende* was originally coined in 1980, but did not become the "official headline of the new German energy paradigm" until 2011 (Fabra et al, 2015, 51). Some of the important milestones on the long political road of the Energiewende are the passing of the Renewable Energy Law (Erneuerbare-Energien-Gesetz (EEG)) in 2000, and the 2010 Energy and Climate Policy Package, which set out Germany's ambitious emissions reduction targets. It was the decision for an exit from nuclear energy in 2011, however, which turned the energy transition into an "official headline". Unlike many such headlines, the energy transition has had bipartisan support from the major political parties in Germany, the CDU (Christian Democrats), and the Social Democrats (SPD), as well as the Greens (Bündnis 90/Die Grünen) and the Left Party (Die Linke), and has been greeted positively by major environmental organizations such as Greenpeace and the German Climate Alliance (Klima Allianz Deutschland). Public support for the Energiewende was strong from the beginning, and has largely remained so (Amelang 2015, IASS 2020), but there were also early doubts as to whether the Federal government had the political will and the means to implement this ambitious transformation (Dehmer 2013, 72).

Indeed, soon after setting the emission and renewable energy targets and the beginning of the nuclear phase-out, production of brown coal increased from 176

million tons in 2011 to 183 million tons in 2013.[5] Consequently, greenhouse gas emissions also rose from 919 million tons in 2011 to 941 million tons in 2013. They started to decline again only in 2014.[6] And while Germany seemed to be on track with emission reduction, the Federal government stated in the spring of 2020 that it will most likely miss its emission reduction targets for 2020 by 3 to 4 %. However, due to the economic impact of the Covid-19 pandemic it might still reach the target. For the 2030 goals of 55 % emission reduction, the coal exit law passed in 2020 is an important factor. It requires the phase out of all coal mining and combustion by 2038 – an necessary step to overcome the coal conundrum, and take the Energiewende to the next stage.

The development of renewable energy, particularly wind and solar, has advanced over the last decades. Germany reached its target of 35 % electricity production by renewables in 2018, two years ahead of time. In 2019, renewables had a share here of 39 %. However, several amendments to the renewable energy laws have slowed down anticipated developments in the renewables sector. The switch to reverse auctions in 2017 bought a decline in new installations of onshore wind from 1853 devices in 2017 to 754 in 2018[7] and 325 in 2019.[8] The subsidies for solar installations have been capped to a total installation of 52 GW, which also decelerates the speed of installing renewables. Last not least, the *Energiewende* is not simply a set of policy instruments, but also a social process. It is not a straightforward development from fossil-fuel to renewable energies, but has seen and is likely to continue to see several adaptations, alternations, setbacks and diversions. Supporters of the coal industry – framed as a transitional energy source or bridging technology – fought over jobs and against a planned climate levy, and eventually ended up with a coal exit law suspending all coal mines and power plants by 2038, while arguably overpaying the mining companies with compensations. The solar industry has seen enormous growth in the first decade of the millennium, but crashed in 2012. Renewable energy production, once hailed as a democratisation of the German energy system (Jungjohann and Morris 2016) and praised for the creation of a "booming environmental industry" (Hillebrand, 2013, 668), has also experienced the downsides of such booms. It now generated not only support as an essential part of the Energiewende, but also criticism and protest (Reusswig et al. 2015).

2. The Brandenburg Model

Local area

Brandenburg has for a long time been an energy exporting state. Currently, more than 50% of electricity produced in Brandenburg is exported out of the state. Brandenburg

[5] https://de.statista.com/statistik/daten/studie/156258/umfrage/braunkohlefoerderung-in-deutschland-seit-1990/
[6] https://www.umweltbundesamt.de/daten/klima/treibhausgas-emissionen-in-deutschland#emissionsentwicklung-1990-bis-2018
[7] http://www.windmonitor.de/windmonitor_de/bilder_javascript.html?db_communicate=%27Windenergieeinspeisung.daten%27&p_lang=ger&img_id=429
[8] https://www.wind-energie.de/fileadmin/redaktion/dokumente/pressemitteilungen/2020/Status_des_Windenergieausbaus_an_Land_-_Jahr_2019.pdf

produces significantly more energy than it requires and calls itself "Energieland" ("energy state"), quite rightly so.[9] Of the energy produced, 18,300 million kWh stem from renewable energy, mostly wind. In other words, there are currently about 3,700 wind power plants, 35,000 photovoltaic plants and more than 500 biogas plants set up, generating the highest amount of electricity from renewable energy per inhabitant.[10]

Brown coal mining has been taking place in the state's Eastern most parts, the Lausitz, for more than 150 years, securing the energy production of the former GDR (of which the current state was part) and providing 32,477 million kWh in 2018. Open pit mines cover currently about 1,485 km² or 0.4 % of Germany's surface area,[11] and with 296 km² the ones in the Lausitz make up 1.0 % of Brandenburg's land use.[12] Renewable energy production, in form of wind farms is scheduled to cover about 2 % of Brandenburg's surface area. The state is comparatively sparsely populated with 8.6 % settlement and traffic areas,[13] and 85 inhabitants per square kilometre.[14] It is administratively intertwined with the state of Berlin, which it encloses. The city of Potsdam with 180,000 inhabitants is Brandenburg's capital and largest city, followed by Cottbus with 100,000, and about 100 smaller cities and 1,700 villages.[15]

About 50 % (15.000 km²) of Brandenburg is agricultural land,[16] and roughly 18.000 people (2 %) work in the agrarian and forestry sector.[17] The soil quality of tilled land in Brandenburg is lower than the German average, which with 62 points (on a scale of 0 to 102) stands for an internationally high potential yield for grains. Brandenburg has – except for some parts in the South of the state – light, sandy soil in morainic landscapes, which yield small crops when climatic conditions in summer adverse (e.g. too little rain).[18] Local people speak of "Karnickelsand" or "märkische Streusandbüchse" (literally: rabbit sands or scatter sands) when stressing that soil

[9] https://www.politische-bildung-brandenburg.de/themen/land-und-leute/wirtschaft-und-tourismus/von-der-kohle-zu-wind-und-sonne
[10] https://mwae.brandenburg.de/de/erneuerbare-energien/bb1.c.478388.de
[11] Comprising also stone pits, https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Landwirtschaft-Forstwirtschaft-Fischerei/Flaechennutzung/Tabellen/bodenflaeche-insgesamt.html
[12] Statistisches Bundesamt, Fachserie 3, Reihe 5.1, 2018: 44ff. https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Landwirtschaft-Forstwirtschaft-Fischerei/Flaechennutzung/Publikationen/Downloads-Flaechennutzung/bodenflaechennutzung-2030510187004.pdf?__blob=publicationFile
[13] https://www.statistik-berlin-brandenburg.de/publikationen/aufsaetze/2006/DA-BB_200602-03.pdf, compared to 12.8% nationwide.
[14] Compared to 233 inhabitants/square kilometre throughout Germany.
[15] https://service.brandenburg.de/de/kommunale-verwaltungsstruktur/20108
[16] https://mik.brandenburg.de/sixcms/detail.php?id=57177. This is low compared to the other states in Eastern Germany (at around 60%), where soil quality or climatic conditions are better (https://www.statistik-berlin-brandenburg.de/publikationen/aufsaetze/2006/DA-BB_200602-03.pdf).
[17] https://statistik.arbeitsagentur.de/Statistikdaten/Detail/202004/iiia6/beschaeftigung-sozbe-monatsheft-wz/monatsheft-wz-d-0-202004-pdf.pdf
[18] https://www.bgr.bund.de/DE/Themen/Boden/Ressourcenbewertung/Ertragspotential/Ertragspotential_node.html; https://geoviewer.bgr.de/mapapps4/resources/apps/geoviewer/index.html?lang=de&tab=boden&cover=boden_potenziale&layers=boden_sqr1000_ags; https://mluk.brandenburg.de/mluk/de/ueber-uns/oeffentlichkeitsarbeit/veroeffentlichungen/detail/~01-07-2011-steckbriefe-brandenburger-boeden (https://www.boell.de/de/bodenatlas; https://www.umweltbundesamt.de/daten/flaeche-boden-land-oekosysteme/flaeche/struktur-der-flaechennutzung#die-wichtigsten-flachennutzungen)

quality is less than average (around 30 points). Compared to West Germany, land in East Germany is more often owned in large estates (over 100 ha, 93% in Brandenburg[19]), which is not least due to the collectivization of agricultural land in the former GDR in the 1960s, and its influence on transforming socialist agricultural cooperatives into capitalist cooperative farms, as well as the sell-off to large agro businesses in the aftermaths of Germany's reunification in 1990.

Brandenburg's (Renewable) Energy Strategy

Brandenburg's government started in the 1990s with the first programmes to financially support renewable energy production. In 2008 and 2012, the state adopted the programmatic "Energiestrategie 2020" and "Energiestrategie 2030", respectively. The energy strategy 2020 scheduled an expansion of installed wind capacity to 7,500 MW till 2020 and 10,500 MW till 2030. Considering that most of the growth from 2020 on will be implemented through repowering of older wind power plants, the state inserted also in the later strategy an aim of about 2 % of the land (585 km²) designated to wind energy production.[20] By end-2019, Brandenburg had reached a total of 7,297 MW installed wind capacity.[21]

Brandenburg's Energiestrategie 2030 (Energy Strategy 2030, written in 2012 and evaluated in 2017) also includes brown coal as a so-called bridging technology. Two major lignite power plants are in operation in the state (Jänschwalde and Schwarze Pumpe, with 3,000 MW and 1,600 MW, respectively), as is one lignite heating plant (in Cottbus), and two open cut mines (Jänschwalde and Welzow-Süd, with 7.4 million tons and 17.4 million tons excavated in 2019, respectively[22]). Lignite mining has a long tradition in Brandenburg of 150 years, and was the prime energy resource during GDR times (Förster 1968; Müller 2017). In 2017, it still accounted for about 57 % of the state's electricity production. Brandenburg produced with the 32,477 million kWh roughly 28 % of the national lignite-based electricity.[23] Brandenburg rightfully labels itself as an "energy state", and draws this label from two overlapping systems of energy production. [24] Lignite mining and combustion, however, will end in Brandenburg in the near future. The Jänschwalde power plant is scheduled for a shutdown by 2028, Schwarze Pumpe by 2038.

The Energiestrategie 2030 hence needs revision, but it is worth noting that Brandenburg set the following aims:

- Increasing the share of renewables in primary energy consumption to 32 %
- Reducing primary energy consumption by 20 % (to 523 PJ) as compared to 2007
- Securing 2 % of the state's surface for wind energy

[19] https://www.boell.de/de/bodenatlas
[20] Overwien & Groenewald 2015: 603.
[21] According to Deutsche Windguard, https://www.windguard.de/veroeffentlichungen.html?file=files/cto_layout/img/unternehmen/veroeffentlichungen/2020/Status%20des%20Windenergieausbaus%20an%20Land%20-%20Jahr%202019.pdf
[22] Numbers according to https://www.leag.de/de/geschaeftsfelder/bergbau/. The comparatively low number for Jänschwalde is also due to a legally binding mining stop from September 2019 to February 2020, that two environmental NGOs fought for.
[23] www.foederal-erneuerbar.de
[24] Becker, Gailing, Naumann 2013: 20.

- Integrating renewable energy into the system with a focus on storage technology, grid extension, and grid reconstruction
- Reducing absolute CO_2 emissions by 72% (to 25 million tons) as compared to 1990

Other than the former Energiestrategie 2020, the 2030 one also explicitly includes participation. The state describes is strategy as an "energy-political target square", comprising environmental and climate compatibility, profitability, security of supply, and acceptance & participation.[25] Brandenburg aims with its energy policy at being transparent, fostering regional participation, supporting regional, communal and sectoral energy concepts, fostering jobs in renewable energies and avoiding severe social and ecological breaks in the mining industry. [26] To reach these goals, Brandenburg set up a package of measures to make the use of energy more efficient, to reduce CO_2 emissions in conventional heat- and electricity generation, to improve transmission, distribution and storage, and to expand renewable development.[27]

Wind energy

Regarding wind energy, the Brandenburg ministry for economics, labour and energy states that "wind energy is a key branch of renewable energy. Wind energy has developed into an important cornerstone of German energy production and national economy." [28] As mentioned, Brandenburg's government set 10,500 MW as the goal for developing wind until 2030.[29] Analogous to the national trend, wind development slowed down in Brandenburg after 2017, with 535 MW added in 2017, but only 208 MW in 2019, and 96 MW added in the first half of 2020.[30] To reach 10,500 MW by 2030, it would require an additional 320 MW each year.[31]

While state politicians still mention Brandenburg as of the three leading states in Germany as regards wind energy, they also acknowledge that "intense dialogue, transparency and acceptance in general public are of major significance" for the future of wind energy. Including the public in planning procedures from the very beginning and allowing participation is deemed essential.[32]

In practice, the public can get involved through formal interventions during a pre-set mandatory time frame of publishing very advanced plans and through voicing their concerns at formal hearings to approve detailed planning (which are mandatory for parks with more than four wind turbines).

Regarding acceptance – and arguably also as a consequence of promised tax benefits not reaching affected communities as well as grid charges impinging on individual electricity consumption bills – Brandenburg's government passed a law in 2019 that

[25] See also https://energie.wfbb.de/de/Energiestrategie-2030
[26] https://energie.wfbb.de/de/Energiestrategie-2030
[27] https://energieagentur.wfbb.de/de/download/file/fid/11622
[28] https://mwae.brandenburg.de/de/windenergie/bb1.c.478387.de
[29] Koalitionsvertrag 2019-2024, p.66:
https://www.brandenburg.de/media/bb1.a.3780.de/191024_Koalitionsvertrag_Endfassung.pdf
[30] https://www.windbranche.de/windenergie-ausbau/bundeslaender/brandenburg
[31] https://www.wind-energie.de/presse/pressemitteilungen/detail/detail/News/ausbau-der-windenergie-in-brandenburg-weiterhin-schwach/
[32] https://mwae.brandenburg.de/de/windenergie/bb1.c.478387.de

obligates wind energy operators to pay 10,000 Euro per year per wind turbine directly to all adjunct communities within a 3 km radius.

Solar energy
Brandenburg aims at an installed capacity of 3,500 MWp solar power by 2030. In 2018 it already reached 3,703 MWp of installed capacity.[33] The size of solar plants varies considerably between individually focused roof-top solar of up to 10 kWp, and open-site installations of more than 100 MWp. Brandenburg has large unused former military areas as well as former lignite mining areas, of which some are used for solar power. Current developments, where falling prices of devices allow for an economic set-up and running of large-scale PV without subsidies, tend to focus more on investment in converting agricultural land, as it does not require costs for cleaning up contaminations.

3. Understanding rural Brandenburg

To better understand the implementation of Brandenburg's Energiestrategie and potential obstacles and resentments to renewable development on the ground, the authors of this report have been conducting field research, mainly in Teltow-Fläming, a predominantly agricultural region of the state south of Berlin, from 2018 onwards.[34] The following vignette describes but one occasion where renewable energy is locally discussed.

In summer 2020, the local council of Niederau[35] met in a gym rather than in the town hall, due to physical distancing rules during the Covid19 pandemic. The lightweight construction of the gym means it has terrible acoustics; the open doors allow fresh air, but also birds and their sound to enter. For today's meeting, wind energy is on the agenda, although this is not clearly communicated: the mayor wrote only "contribution by voters' association" on the public invitation. Peter Nieborg is the head of the association that won two seats about seven years ago on the grounds of its opposition to the continuously increasing wind farming in their close vicinity and in the forest. Nieborg grew up in a town about 30 km away and used to work for the automobile, agricultural engineering and energy industry until his early retirement about 13 years ago. He is an agile man who drives almost everywhere on his heavy motorbike.

Nieborg starts his speech by acknowledging that the lack of transparency he and his voters' association (as well as the preceding citizens' initiative) had previously complained about has changed for the better. Contracts and tentative agreements with wind developers are no longer signed by the municipal administration and the mayor only, but are discussed in the council. For him, this is a sign that you can affect local politics, and it is not only state or national levels of government which decide. However, the density of wind power in and around Niederau are high: the local government area currently houses 186 wind turbines, with 40 more being scheduled. 8 % of the area's land is demarcated as wind suitability areas, and in the most dense parts, there is one power plant for every 11 inhabitants.

[33] https://mwae.brandenburg.de/sixcms/detail.php/791427
[34] For methods please refer to www.decarbenergy.net and Müller and Morton 2018.
[35] All names of places and people, except for Teltow-Fläming and Illmersdorf-Rietdorf, have been changed.

Nieborg continues with listing the issues and problems with wind energy, and continues his criticism of the local council's work: a decision that no power plants were to be built in the forest was taken about two years ago, but this is exactly what the council allows to be done now. Also, the administration drafted a local land development plan under pressure from wind energy investors.
When he finishes his talk, the mayor wants to immediately proceed to the next item on the agenda. However, it is the deputy head of administration that rises to speak. Christiane Ditschel has been in the administration for years, and she – like Nieborg – is a resolute person who does not show her age, although she is about to retire soon. Ditschel takes the floor to react to Nieborg's accusation of the administration: There have never been any preparation of decisions from their side that comply with the interests of single investors. She could say more on the topic, but she refuses to do so now.
The mayor then very quickly and hardly audible asks if there are any further questions? – No? – Proceed. It is only in the next agenda issue – citizen question time – that a member of the citizen's initiative rises to speak. She'd like to add more to the wind issue, but the mayor quite rudely cuts her short by asking what her question is. She replies with a direct one: How come there is such an arrogance to override the topic? No-one of the present almost twenty council members answers her. It is only later that evening, when the issue is no longer wind, that the spokesperson of the village of Tulpenberg says – directed at the audience, which is sparse with about ten people – that he just wanted to mention that they are not sitting idle but engage with the wind topic. Not least through Nieborg's emails he receives unasked. Nieborg replies immediately: But please mention as well that you are entangled with wind energy and that you profit from it monetarily!

The council meeting in Niederau illustrates several points: **Firstly**, people are eager to engage with politics and administrative/bureaucratic procedures when it comes to local development of renewable energy. There is no unanimous rejection of or even concern with wind power in rural areas, but informed discussions are needed and a more inclusive decision-making process wanted. While wind energy impacts a number of residents directly and might lead to criticism, the overall acceptance of the *Energiewende* remains high throughout Germany and Brandenburg (IASS 2020). Likewise, solar panels are seen as a valuable contribution to the Energiewende, yet bear the potential of land grabbing and conflicting with agriculture. Discussions of potential local influence and informed consideration of pros and cons can take place within local political forums. Protest on the streets is not feasible, not least as it requires the mobilization of masses. When informed discussion and local participation does not happen at a very early planning stage, opponents might take to playing for time through prolonging or impeding planning and approval procedures.
Secondly, local government and administration do have formative power. Even though the accusation was rejected, other examples show that there is administrative power. Administration does (or does not) prepare proposals and drafts proposed resolutions. Administrative staff regularly are permitted to speak and intervene at council meetings and make use of this right in more or less appropriate ways. Furthermore, and due to Brandenburg's administrative re-division of local governments, the head of administration represents the elected mayors at higher levels, thus acquiring influence and decision making power without being directly elected. He/she hence acts as leader of both administration and politics.

Thirdly, the heated discussion and in parts rude manner at the local council meeting runs along factional lines as well as referring to other quarrels, sometimes even feuds. It is a rural area where people have often known each other for a long time. If this is not the case, an implicit hierarchy is erected between those living in the area "forever" and those "recently" migrated – as one mayor stressed during electing a honorary mayor, who was regarded a newbie, living in his village for ten years "only". Old rivalry or competition might lead to a disinclination, resulting in almost habitual quarrel or rejection of the other's arguments – be it related to renewable energy or not.

4. Issues with the Brandenburg Model

Development and ownership of renewable projects

"What money does not solve, more money will"
Torben, wind project developer

One of the main problems of wind and solar farms in Brandenburg is the question of ownership. Rooftop solar in rural Brandenburg is usually individually owned and energy as well as profits harvested individually. Wind parks, on the other hand, have different participation and profit sharing schemes. There exist a number of showcase projects, where shareholding plays a central role. However, large wind parks are in Brandenburg mostly owned by wind companies. Of the 350 wind parks (and 3890 wind turbines) in Brandenburg, only 9 parks are partially owned locally and hence can qualify as citizen energy production.[36] Those owned by companies have different types of business models – from limited liability companies to cooperatives – but profit is generated in large parts elsewhere. Locals perceive wind companies mostly as outsiders who perform "Flächensicherung" for new projects (securing plots through contracts), who go through the approval procedure, and erect wind turbines, which they later sell or operate. Most interaction between the companies and locals happens during Flächensicherung, which comprises information events as well as salesmen[37] going from door to door, trying to convince owners to sign preliminary contracts. Methods vary from establishing trustful relationships on eyelevel, to hard bargaining and monetary concessions, to taking advantage of inexperience. The past performance of some wind project developers – stories of bribery, false statements, and short-changing also circulate – has sustainably damaged the image of the sector. At the same time, regional planning with the regulation and concentration of wind power plants in particular areas, the legal changes as regards increased approval procedure and the change from feed-in-tariffs to reverse auction, as well as the rapid technical development of wind turbines has created a framework that allows almost exclusively for professional wind developers and investors to erect and operate wind power plants. The democratisation of energy, that Morris and Jungjohann (2016) see in the German energy transformation is not the way wind energy production is currently executed in Brandenburg. However, even in the current market-based

[36] Depending on the definition of citizen wind parks, i.e. how narrow or broad local (co-)ownership is defined, between one and nine wind parks in Brandenburg qualify as *Bürgerwindpark*.
[37] The majority of wind developers and especially sales representatives are male.

system, citizen energy production would be possible. A conceivable (yet hardly executed) option is to allocate a number of solar panels or wind turbines within a park exclusively for local ownership.
It has to be noted, though, that profits for leasing out land (about ½ to 1 ha) for one wind turbine still reach high revenues of about 50,000 Euro per annum – in a state with a per capita net income of approximately 20,000 Euro.[38] The poor soil quality and low agricultural yields referred to above mean it may be much more lucrative for a farmer to lease land to a wind farm than actually work the land for farming.

Social impacts

> "It destroys village communities – I don't want to see that happening again"
> Wilhelm, head of an agricultural co-operative

While co-operative ownership of renewable energy is common for solar panels installed on community owned houses, for agricultural co-operatives' renewable energy, or for wind power plants installed in the 1990s and 2000s, contemporary wind parks in Brandenburg are often investment based and open for national or international investments. Considering the German Gini coefficient of wealth distribution of 0.76 and the wealth in West Germany being on average twice as high as in East Germany,[39] open shareholding does not necessarily lead to high numbers of Brandenburg's citizens to become partial owners. The idea of "citizen energy", where locals own devices for producing renewable energy and harvest the profits, works in Brandenburg almost only for small scale solar. With wind farms and solar parks, revenues go to investors, project developers, operators and land owners.
Of these beneficiaries, only some of the land owners live in the communities that see wind parks in their vicinity, and not everyone in a village or small town owns farm or forest land in a wind suitability area.[40] In consequence, with the appearance of wind project salesmen and potential revenue numbers circulating, discussions within and beyond villages begin. As one village representative put it, "there are people running around with dollar-signs in their eyes, and those without". The idea of earing large extra income alters established distributions and – with the notion of earning money without doing anything for it – can create envy. In rural communities as tightly knit societies that hardly know the anonymity of the city, as well as in small towns where people know each other through multiple private and professional interlinkages, sudden profits unequally shared have the potential to foster pre-existing animosities and rupture what one of our informants called a "finely tuned and balanced social structure, where you still greet your neighbour even though you talk bad about him within your family."

[38] https://www.statistik-berlin-brandenburg.de/BasisZeitreiheGrafik/zeit-vgr.asp?Ptyp=400&Sageb=82000&creg=BBB&anzwer=7
[39] According to DIW, https://www.diw.de/documents/publikationen/73/diw_01.c.679970.de/19-40.pdf
[40] Some companies have developed revenue models that distribute profits a bit more equally to everyone owning land in wind suitability areas (according to the size of their property), rather than renting only the ½ hectares needed for the actual location of the wind power plants. (so called Flächenpachtmodell).

Benefits for communities

> "The promises of tax revenues were a joke. Through write-offs and headquarters elsewhere, we never got any."
> Paul, mayor

In 2009, the German government had decided to split commercial tax revenues for wind parks. It was from now on mandatory to pay a minimum of 70% of the taxes to the communities where wind parks are located and only the remaining 30% at the place of the company's headquarters. Previously, it was for the company to decide if they pay it where profits are generated or where the headquarters are – a decision also made on the grounds of the rate of assessments that differ between communities. In consequence, the promised fiscal benefits from energy production did not necessarily reach communities bearing the burden. In 2012, the splitting was also introduced for large scale solar, albeit with an transition period of 10 years.
In consequence, the 2012 guidelines for Brandenburg's communities for participating in wind energy development, list commercial tax revenues as one of the prime benefits (Beier and Judick 2012, 5f). The authors refer to the city of Nauen's 2011 commercial tax revenue from wind parks of more than 3 million Euro.
However, as several of our informants told us, even after the tax splitting, companies still manage to not pay taxes to communities: Listing (locally generated) income and (elsewhere generated) expenses of a single company allows to postpone tax payments to years way after announced and theoretically calculated time for amortization.
As a response to this and a declining local acceptance of wind energy, Brandenburg's government in 2019 passed a law that obligates wind operators to pay 10,000 Euros per year per (newly erected) wind power plant to adjunct communities.[41] However, first responses in 2019 from wind companies and citizens in Brandenburg were largely negative. While wind critics understand this as a political incentive to buy consent, project developers articulate that this is an unnecessary regimentation in a context where they are already obliged to environmental compensation and voluntarily set up funds for communities.
As a matter of fact, many of the wind parks developed in Brandenburg in the last decade saw agreements between communities and wind developers. While most of these are informal to prevent the notion of accepting advantages,[42] as of late even official agreements are signed that include for example financial compensation for administration, and money for improving local infrastructure.[43] The environmental replacements which can also be payed as monetary compensations into a fund, on the other hand, have in the past often proven to be hard to acquire, especially for communities with honorary mayors or limited capacities to apply for the funds and

[41] https://bravors.brandenburg.de/gesetze/bbgwindabgg
[42] Common is the installment of a foundation, were chances for successful applications from the affected communities is practically 100%.
[43] See http://ratsinfo-online.net/heideblick-bi/vo020.asp?VOLFDNR=1499#searchword, http://ratsinfo-online.net/heideblick-bi/___tmp/tmp/45-181-136176651124/176651124/00057272/72-Anlagen/08/2018-07-03StaedtebaulicherVertrag6EntwurfStan.pdf

go through the application process and its criteria for exclusion. Even the comparatively well-equipped administration in the city of Niederau does currently not find ways to apply. In consequence, money does not go to affected communities, but elsewhere in Brandenburg. Another consequence is that the Naturschutzfond Brandenburg, housing the funds, had in 2019 a surplus of more than 6 million Euro for compensation.[44]

Environmental impacts

"We have to use animals to protect humans."
Peter, local anti-wind activist

The installation of wind energy is subject to extensive regulations, comprising the governmental allocation of wind suitability areas, or calculation of and adherence to noise emissions or cast shadow maximums expressed in minimum distance to settlements. The approval of plans to set up one or multiple wind power plants (subject to federal immission protection law) lies with the state's bureau of environment (Landesamt für Umwelt). Past approval procedures have shown that permission was denied several times on environmental protection grounds. The planned wind turbines close to Illmersdorf-Rietdorf can serve as an example. In 2015 two companies applied with the bureau for environment for setting up ten[45] and nine wind turbines, respectively, in the Illmersdorfer-Rietdorf forest. The procedure comprised environmental assessment and expert surveys, stating that no avifauna would be severely damaged. However, lay people did monitor the avifauna in the forest, too, and noted that a pair of eagle owls is nesting there. Reporting this to the bureau led not only to their examination, but to someone cutting the tree. However, the eagle owls build a new aerie a few kilometers south and the first one did not get deleted from the bureau's map, resulting in half of the wind park area being banned. The first company received the negative decision in 2018. The second company withdrew its application. Currently, applications for four wind turbines are still being processed in the Illmersdorf-Rietdorf forest. As expected, the public hearing in late 2019 laid a special focus on the avifauna and the eagle owl, with the company and critics confirming that the pair has not been seen in the currently proposed area, yet monitoring will prevail until the planning procedure is completed.

With achieving the aim of preventing single or multiple wind turbines that are perceived – in this as in other cases – as too close, too many, too loud or too disturbing through environmental protection arguments, it becomes self-evident that critics utilize this criterion in formal approval procedures. As an informant said, "actually, it is bad to see the differences in protecting environment, avifauna, bats and human beings. Protecting humans is dealt with on half a page, always stating that acoustic noise emissions are within limits, [whereas animal protection fills several pages]." Geiselmann in her study comprising interviews with stakeholders of several wind projects confirms that a strategic use of environmental protection arguments and regulations is quite common (Geiselmann 2018).

44 https://www.naturschutzfonds.de/data/nsf/Dokumente/Jahresbericht/Jahresbericht_Stiftung_NaturSchutzFonds_2018.pdf

45 The number was changed to nine in 2016.

Landscape impacts

"If we are able these days to build ever larger wind turbines,
let us use them for maximum energy generation."
Klaus, regional planning bureau

With Brandenburg being a comparatively flat area, wind turbines are visible over long distances and characterize the landscape. With regional planning procedures aiming at controlling the "Wildwuchs", or uncontrolled growth, of single wind turbines and implementing a regulated concentration of wind turbines in wind parks, the result is in some places that villages feel literally surrounded by wind turbines.
What is more, regional planning procedures are concerned with the two dimensions of a surface area, width and length. When distances from residential buildings (of 600 m from residential buildings in Brandenburg in general, and of 1,000 m from residential buildings in some parts of it) were set, the average height of a wind turbine was between 50 and 150 meters. With ever larger wind turbines of up to 250 meters, distance minimums to residential buildings have not been increased, but negative effects such as cast shadow and sound emissions calculated and regulated on a time scale: when higher wind turbines create cast shadow over residential areas, days per year or hours per day are counted and the turbine turned off temporarily. However, this does not take the landscape impact into account. It is on the contrary argued that landscape impacted through wind turbines are no longer obtaining any kind of landscape-related protective status. In consequence, efficiency considerations – larger turbines generate more electricity on an almost equal patch of land – dominate, leaving potential impacts on landscapes through extremely high buildings (250 m is 60 m higher than the dome in Cologne and 60 m smaller than the Eifel tower) aside. Similarly, repowering older wind turbines – i.e. replacing less efficient, smaller wind turbines with latest technology and significantly higher ones – requires calculations of cast shadow and sound emissions, but is not subject to adjusted distance regulations that take the (visual or landscape) impact of height into account.

Conclusions and Recommendations

The distributed nature of wind energy generation has brought with it the evolution of a distributed system of energy governance. We argue that it is at the local level, and predominantly through local forums such as the regional planning bodies and local councils, that the social legitimacy of renewable energy is produced, experienced, and contested by citizens. The regional planning bodies are now the principal vehicle through which the German energy transition is governed and regulated. The future of the *Energiewende* is being played out in regions like Teltow-Fläming, in the offices of municipal planners, at community meetings in village halls, in the villages and fields themselves.

Understanding what is at stake in local conflicts over wind energy, what shapes peoples' attitudes as they develop over time, and what might make them more likely to accept a great density and height of new wind installations in the places where they live, will be crucial to achieving the expansion of wind energy necessary for both Brandenburg and Germany to achieve their climate goals.

In terms of relative costs, people in Brandenburg live with the *Energiewende* on their doorsteps, as opposed to city dwellers, who may support its goals, but do not have to be confronted with it in their daily lives.

In purely financial terms, Brandenburg also has the highest electricity prices in the whole of Germany, due to the network charge and the renewable energy law's apportionment of costs. In consequence, some people in Brandenburg over time acquired expertise in the regimentation, financial, environmental and technical aspects of wind energy. However, they do not use it to better their position in energy partnerships, but rather use it to target and stop wind projects. And it appears that the resistance to further expansion of wind energy is having some political effect, as the state parliament of Brandenburg in 2019 declared a 2-year moratorium on further wind development in regions which have no currently valid regional plan.[46] At the same time, the moratorium underlines the importance of time as a factor in protest against wind turbines as well as its development. Accordingly, the moratorium has been sharply criticized by the Wind Energy Association Brandenburg, which argues that the moratorium and other factors such as the relative age of many of the wind plants in Brandenburg will make it impossible to reach the target of 10,5 Gigawatt installed capacity by 2030 set by the state's own energy strategy.[47]

Recommendations

Based on our analysis, we recommend that

1) decision making on renewable energy production in Brandenburg becomes more transparent on a local level, comprising information, discussion, and opinion polls of affected locals at a very early planning stage.

If this does not take place, opponents may take to "playing for time" through prolonging or impeding planning and approval procedures. Local processes of negotiation and deliberation should draw in local experts, and draw on the expertise they have developed, allowing them to participate in shaping the *Energiewende* from the ground up, rather than having them work against it. Failing to do so runs the risk of further marginalizing people affected by local energy conflicts in East Germany.

2) citizen energy, i.e. local ownership of power generation units, is made obligatory in renewable energy production

Monetarily, Brandenburg's residents are strategically disadvantaged. In combination with the increase of size and costs for wind turbines and parks, citizen wind parks and citizen solar parks in form of partial local ownership need to be increased and made obligatory. Failing to do so is a lost opportunity to empower residents confronted with the industrialisation of their surroundings and to strengthen the social legitimacy of the energy transition.

3) regional planning takes the vertical dimension of wind energy into account when realigning distance regulations.

[46] https://www.erneuerbareenergien.de/brandenburg-leitet-zweites-moratorium-gegen-windparks-ein
[47] https://www.maz-online.de/Brandenburg/Ausbau-der-Windenergie-in-Brandenburg-stockt

Advancing the Energiewende and moving out of nuclear and fossil fuels requires the increase of renewable energy production. Technical development contributes to this advance. However, it must not be pushed through at any cost without adapting the parameters set to ensure protection of involved stakeholders.

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