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COMMUNITY ENERGY IN GERMANY
MORE THAN JUST CLIMATE CHANGE MITIGATION

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INHALT

1 INTRODUCTION

"The way you turn a disparate people into a community
is you give them a project to build together."

New York Times commentator David Brooks
on God tasking the divided Jewish people with the
creation of the tabernacle in the Bible (Source).

1.1 WHAT IS COMMUNITY ENERGY?

There is no single definition of "community energy." In fact, the term in German is "citizen energy" (*Bürgerenergie*). It can thus cover both groups and individuals – homeowner roof arrays and parent-funded school roofs, for example.

Germany has become known for its history of community energy. Surprisingly, it lacked a legal definition of *Bürgerenergie* until 2013. These projects need not be coöperatives, in which each person gets a vote regardless of their share of invested equity capital. *Bürgerenergie* projects originally got started as limited liability projects, such as the wave of early wind farms in rural areas of northern Germany in the 1990s.

Furthermore, community energy can go beyond renewable energy. Efficiency is one of the main policy aims in Germany. Community energy groups can not only put solar on a school roof, but also renovate the building to save energy costs. And communities also express their political will via municipal governments. Throughout Europe, municipalities have been the driving force behind a transition in transportation, with car-free areas and cycling infrastructure appearing from London to Oslo and Seville and – electric-car sharing cropping up in small Black Forest towns. Furthermore, from Berlin's new Mobility Act to the people-centric cities in Amsterdam and Copenhagen, numerous municipal efforts started off as a bottom-up citizen protest against top-down urban planning for car-centric cities.

This paper presents the German experience with community energy, however, so it refers mainly to projects for renewable energy and efficiency and less to urban planning aspects. One main point of criticism in recent years has been that Germany's energy transition (*Energiewende*) is only an electricity transition (*Stromwende*), not a mobility or heat transition (*Verkehrswende / Wärmewende*). Though the criticism of the Energiewende as a mere electricity transition is not unwarranted, it can also be overstated. Much of the progress in heat and mobility has come from community projects. Heidelberg's Bahnstadt district currently being built will be the largest Passive House community in the world, offering space for up to 6,000 people; the homes are so well built, they can make do with small backup heaters. Likewise, Freiburg's Vauban neighborhood (video and PDF) is largely car-free because citizens forced the city government to find ways around the rule – still generally in place today – requiring one parking space per new dwelling.

"Community" could thus also include the local public sector, though the EU's current Renewable Energy Directive (RED II) does not do so. However, recent Danish and German legislation discussed below requires projects benefiting from special treatment as "community energy" to offer ten percent of shares to the local municipality. This paper therefore broadly defines

"community energy" to include municipal utilities. Some German legislation has directly targeted local governments, making this inclusion all the more appropriate.

The examples given below are not exhaustive. This paper aims to make German experience – good and bad – available to the international audience. Further details are available in the literature listed and linked to, much of which is in German, however.

1.2 WHY DOES COMMUNITY ENERGY MATTER?

Communities are where abstract political targets become concrete infrastructure projects – where adaptation to climate change takes place, but also where these actions detrimentally affect locals, leading to opposition.

On the one hand, more than half of all people now live in urban areas, a figure expected to rise to two-thirds by mid-century according to the UN. Already, roughly two thirds of all energy is consumed in cities. On the other hand, rural areas that might otherwise fall behind during globalization can become energy suppliers to urban areas, thereby not only creating economic opportunities in the countryside, but also fostering more respectful and regular interaction between urban and rural areas.

Community energy therefore matters in three encompassing ways commonly referred to as co-benefits:

- **Local economic returns**: investments flow back into the local economy. Often, however, these benefits are not clearly known or, when they are known, not communicated well. To fill this gap, the AEE helped create a local value calculator.
- **Political trust**: community energy is a way of instilling in people the trust that the state, in all of its official functions, can be made to work for them. A citizen group getting a permit for a project is more likely to have productive suggestions about how the process could be improved than complain about an allegedly corrupt, elite system that doesn't care about them.
- **Social cohesion**: community energy brings together neighbors otherwise increasingly separated from each other. Not surprisingly, numerous community energy groups say most people got involved to meet their neighbors and "save the village first, the planet second".[1]

Kümmerer: the local who "takes care of everything"

The role of the *Kümmerer* has become widely noted in the success of community energy projects in Germany. Translated literally, a *Kümmerer* is a "care-taker"; generally, such people are trusted community members perceived as being not merely motivated by profits, but also genuinely concerned about the community. They flexibly take care of whatever needs addressing and often go beyond their strict job description so the project can address issues that simply make its impact on the community better. In English, such people are sometimes called "champions."

For instance, in the village of Larrieden biomass needs to be taken from the fields to the biogas unit. The transport soils roads, so the farmer sweeps the streets afterwards. There's no financial incentive, no agreement at all for him to do this cleaning. "It's not enough really, but the public perception is tremendous—people really appreciate the effort," he says.

1 *Energy Democracy*, Morris & Jungjohann, Palgrave 2016.

While EU legislation now promotes community energy (and governments, such as the UK's, are increasingly taking social isolation seriously[2]), it often speaks of "consumers" (not "citizens") becoming "prosumers". The EU does define 'prosumers' as "normally refer[ing] to entities such as households, coöperatives and local enterprises that are producers and consumers of energy in one," but in practice 'prosumer' often exclusively means solar homes, possibly with batteries, consuming homemade electricity behind the meter – partly because it is only at the household level that the consumer and producer are one entity behind a single power meter, which is not the case in community wind farms. In the case of group projects, the investors produce energy behind a meter they may not (all) consume from – such as when parents invest in a solar roof on their school. Indeed, parents funding the energy-renovations of schools is another form of community energy arguably not covered under "prosumers."

Fortunately, RED II does not speak of prosumers at all, but instead of "renewables energy communities" and citizens. Speaking of "community" projects and citizens instead of prosumers 1) refrains from reducing citizens to their part-time role as consumers, 2) allows for better consideration of co-benefits, and 3) covers aspects – such as wind, biomass and efficiency – that are less likely to be found behind a residential power meter, thereby allowing community energy to be more significant. Indeed, sector coupling is increasingly becoming part of community energy (Section 5). And RED II specifies that members of community energy groups should be able to sell to and buy from each other without having to be behind a single meter.

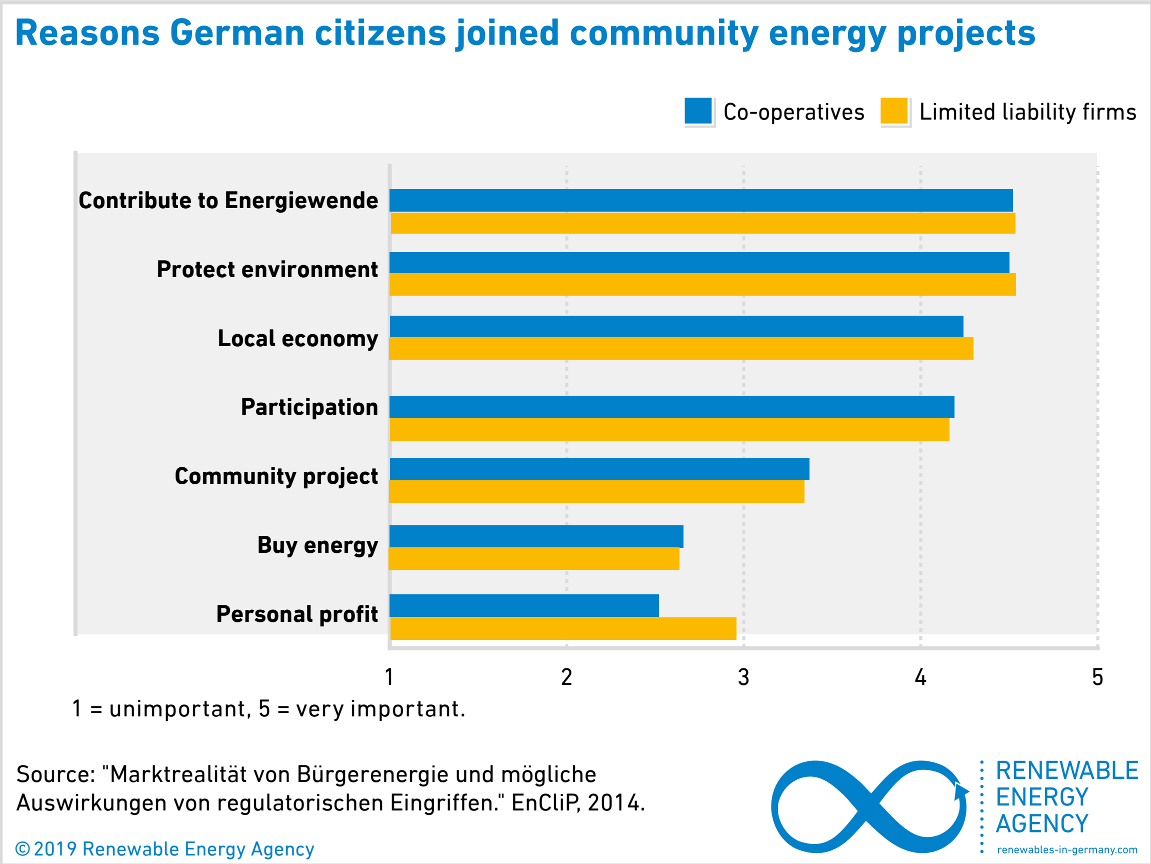


Figure 1 While profit maximization is often held to be the main driver of human decisions, citizens themselves say they get involved in community energy projects because they want to be part of a community and do the right thing for the environment and climate, both locally and globally (Source)

2 Created in 2017, the Jo Cox Commission on Loneliness led to loneliness being added to the Minister for Sport and Civil Society's mandate. In the English-speaking world, the 1995 essay "Bowling Alone" arguably first drew great attention to this issue.

Parents funding energy-renovations in schools

In 1999, parents at the StaudingerSchool in Freiburg collected 280,000 euros to renovate the school building and add a solar roof. Local efficiency expert Dieter Seifried was the Kümmerer: he had calculated that the savings would pay for themselves in eight years.

It worked: power consumption fell by 20%, heat by 30%, and water by 36%. Savings from lower utility bills covered the capital plus interest. After eight years, the city benefited from the savings for the next ten years (until equipment started needing to be replaced again) to the tune of around half a million euros – all of that from just over a quarter million in initial investments.

Furthermore, most citizens who participate in community projects also do so for the benefits the community derives, not solely for the own personal financial gain. People join volunteer fire departments, youth sports clubs, etc. to be a part of the community. Not surprisingly, researchers have found that people asked to rank the reasons for their participation in community energy groups generally placed higher priority on group benefits than personal ones.

2 MAIN LAWS FOR COMMUNITY ENERGY

2.1 NATIONAL CLIMATE PROTECTION INITIATIVE (NKI)

Germany's National Climate Protection Initiative (NKI) focuses on support for community actions. Launched in 2008, the NKI provided more than 900 million euros in funding for nearly 29,000 projects in its first ten years – and had been extended up to the end of 2022 with an annual budget of 200 million euros. The NKI includes several policies for renewable energy and climate protection, the most prominent of which in terms of community energy was the Market Incentive Program for Renewables (see next section), which complemented the feed-in tariffs (FITs) for electricity by covering such things as renewable heat investments. The NKI has, for instance, special funding for small cogeneration units.

In addition to renewables, the initiative covers efficiency and social issues. For instance, the Stromspar-Check is an energy audit campaign. Some 7,000 auditors, themselves previously unemployed, visit primarily low-income households to measure power consumption, provide advice on how to reduce it, and help households apply for special funding not deducted from any welfare payments. The project won the Sustainable Energy Europe Award in 2012.

Special funding is also available for non-profit neighborhood projects. For instance, a project in the Pankow district of Berlin called Upcycling Future Lab raises awareness among locals about sustainable consumption; citizens take part in educational events and then act as multipliers in the community. A similar campaign in Dresden called Climate-Friendly Cuisine (Klimafreundliche Küche) offers cooking classes and seminars to help locals understand the climate impact of their food consumption. In more rural areas, food was also a popular issue, such as 50 trees planted in an orchard in Userin to bind carbon and serve as a meeting place for awareness raising about climate issues.

One main target group of the NKI is municipalities. The Community Directive (*Kommunalrichtlinie*) provides funding for energy conservation and renewable energy in municipal buildings, such as schools. District heat networks are eligible for funding, as are renewable heat sources for such networks. For instance, the town of Offenburg received 2.4 million euros to set up a heat platform so that various sources (industrial waste heat, renewable heat, cogeneration, etc.) can be connected.

Local governments are also able to appoint Climate Managers (another example of Kümmerer) with NKI funding. They not only oversee local projects, but also raise awareness about climate action – a crucial function whose immense value is hard to quantify.

Another crucial policy instrument was support for the creation of Master Plans for 100% Climate Protection. Here, funding is provided for communities that wish to model compliance with the national targets of a 95% reduction in carbon emissions and a 50% reduction in final energy consumption by 2050. A total of 39 Master Plans were drawn up – from the town of Flensburg on the Danish border to the county of Allgäu near Switzerland. The largest cities to participate include Frankfurt, Hannover, and Stuttgart.

Other projects went outside of both renewable energy and efficiency. For instance, the town of Braunschweig is now planting hundreds of trees and "greening" roofs owned by the city in order to bind more CO_2 and improve the local climate. In addition, temporary "energy forests" – fast-growing tree plantations – are to be developed on currently disused land in urban areas (such as commercial zones). This timber will be used to produce woodchips to fire cogeneration units.

The NKI also supports effort for a mobility transition. For instance, the town of Straubing is setting up a system of 50 rental bikes along with new bike paths thanks to 2.5 million euros in NKI funding; the campaign is called Cycling for the Climate (*Klimaschutz durch Radverkehr*). In the small town of Burgwald-Ederbergland, a car-pooling system was established with some 125,000 euros in NKI funding as one of the aforementioned neighborhood projects. From 2016–2018, some 85 million euros was devoted to more than 50 such mobility projects across Germany.

If Germany's national targets are to be achieved, local action of this sort will be indispensable. Furthermore, such planning can require expertise that community governments have yet to develop, making this initial support all the more important.

2.2 MARKET INCENTIVE PROGRAM (MAP)

Launched back in 1993, the MAP promotes use of renewable heating and cooling. It now has a budget of more than 300 million euros annually. MAP funding can be combined with NIK programs.

FITs are not "subsidies"

FITs are often called "subsidies", and they are then treated as something that should eventually be done away with. But the label is misleading – and doing away with them has proven fatal to community energy.

The label is misleading because other examples of prices set by governments in consultation with industry, such as for healthcare in European countries, are not thought of as subsidies (nor as something that should be drawn down eventually). The EU speaks of state aid, not subsidies, and EU courts have repeatedly ruled that FITs are admissible state aid: governments have the right – indeed, the obligation, given the EU's targets for renewable energy – to provide policy support for renewables. Moreover, the ECJ overruled even those interpretations in March 2019, arguing that FITs did not constitute state aid at all – admissible or otherwise – because the state does not control the revenue.

This distinction is important because of the calls for renewables to "do without subsidies" so that FITs are replaced by auctions. Auction winners then often claim that they will generate "unsubsidized renewable electricity." But another immediate result of revoking FITs, however, is a rollback of community energy. In no country have community projects thrived once FITs were done away with – not only in Germany and Denmark, as documented here, but also in the UK.

Solar thermal arrays are eligible up to 40 square meters of collector area, as are biomass units and heat pumps up to 100 kW. Larger systems can apply for support under the KfW's Erneuerbare Energien, Premium plan. The MAP mainly focuses on building renovations, not new builds.

In the latest year reviewed, 2017, more than 60,000 systems were funded (PDF in German). There was a clear shift from solar thermal (down by 31%) to heat pumps (up by 39%). 253 million euros was paid out in 2017, leveraging 1,108 million euro in investments. The MAP support thus made up nearly a quarter of the total investment volume. The annual review notes that much of this funding is concentrated geographically in areas that have district heat networks. The reason is simple: Much as the power grid has facilitated the fast expansion of renewable electricity over the past decade, district heat networks allow heat generators to sell excess heat to the system. Without a district heat network, heating systems are designed and operated to suit each building's needs. With a heat network, sharing and local sales become possible. Roughly 400,000 tons of CO_2 emissions were avoided in 2017 alone.

Almost all of this energy is used for heating purposes. Air-conditioning is rare in Germany and only accounts for far less than 1% of total final energy consumption. Cooling for refrigeration purposes is slightly larger at around 3%. Otherwise, heat makes up roughly half of all energy demand in Germany, with slightly more than half being for space heating in buildings and slightly less than half for process heat in industry.

Germany has a goal of 14% renewable heating and cooling by 2020. In terms of the amount of energy needed to reach that target, 90% had been installed by 2017.

2.3 FEED-IN TARIFFS (FITS) AND FIT PREMIUMS

In 1991, Germany passed its Feed-in Act (*Einspeisegesetz*) for electricity from renewable sources. Initially, only new market players (non-utilities) were eligible, so the law greatly opened the market to new players, including community energy projects. It mainly specified two things:

1. **priority dispatch** – the right to sell renewable electricity to the grid, and
2. a **floor price** for that renewable electricity.

The price was initially defined as a fraction of the retail rate (90% for photovoltaics and wind, 75% for small hydro and waste). Utilities were later made eligible for FITs, and the rates were successively tweaked, but the main change came with the 2000 Renewable Energy Act (EEG). It decoupled the floor price from the retail rate entirely, which made sense from the investor's perspective: after all, profits depended on the cost of the equipment, not the retail rate. Compensation for renewable power based on other power prices reflects the value of that electricity to buyers and competing generators. Wind and solar react to the weather and can only be made to respond to demand to a limited extent. The focus on demand aims to lower costs, but overlooking investor needs might slow down new renewables growth.[3]

3 See the discussion about the value of wind and solar power and the cannibalization effect, such as the Prognos / Ernst & Young study from 2014: "given the merit order effect, [solar and wind] cannibalize the wholesale market prices from which they derive revenues." As that paper argues, FITs make renewables cheaper by reducing interest rates that banks charge to cover risks.

The 2000 EEG set the first FITs above the retail rate for photovoltaics, the principle being that photovoltaics (PV) simply needed much greater temporary support to be profitable. City-level policies had been set at 99 pfennigs (equivalent to 51 cents, several times greater than the retail rate at the time) per kilowatt-hour for solar power, and that price was now adopted nationwide. To prevent a major cost impact, the PV market was limited to 350 MW annually. In 2004, that limit was lifted, and the German PV market exploded, reaching around 7.5 GW annually for three years starting in 2010. Much of this growth was small community systems (including homeowner roofs).

For technologies expected to fall in price (especially wind and solar), FITs were reduced annually for new installations: if you connected to the grid in, say, 2004, you got that year's FIT for twenty years, but the 20-year rate was lower if you connected in 2005. The price of PV in particular fell faster than expected starting around 2008, and the solar FITs had not been designed to drop so quickly. As a result, profits margins for developers were briefly in the double digits, leading to a boom in construction. One result was concern about cost impacts.

Countries like Spain and Italy created budgets for their FITs, but once these budgets had been used up, the market came to a screeching halt – this was no way to support an industry or implement a climate policy sustainably. The opposite – unlimited budgets – also raised spending to levels that caused concern in Germany. Subsequent policy changes led to auctions after a few years of "premium FITs", a combination of a (lower) floor price and a small bonus based on market signals (generally, the merit order).

There are generally two types of premium FITs: in one, a fixed price is set and power is sold on the spot market. The difference between the spot price and the floor price is then paid as a fluctuating bonus. The aim here is to reduce the perceived support payment. The other option is a fixed bonus: the power is sold on the spot market, but a fixed bonus is paid regardless of the spot price. This option also reduces the perceived support sum by the amount of the spot market price but also incentivizes generators to chase demand (when spot prices are high) – after all, they earn more then.

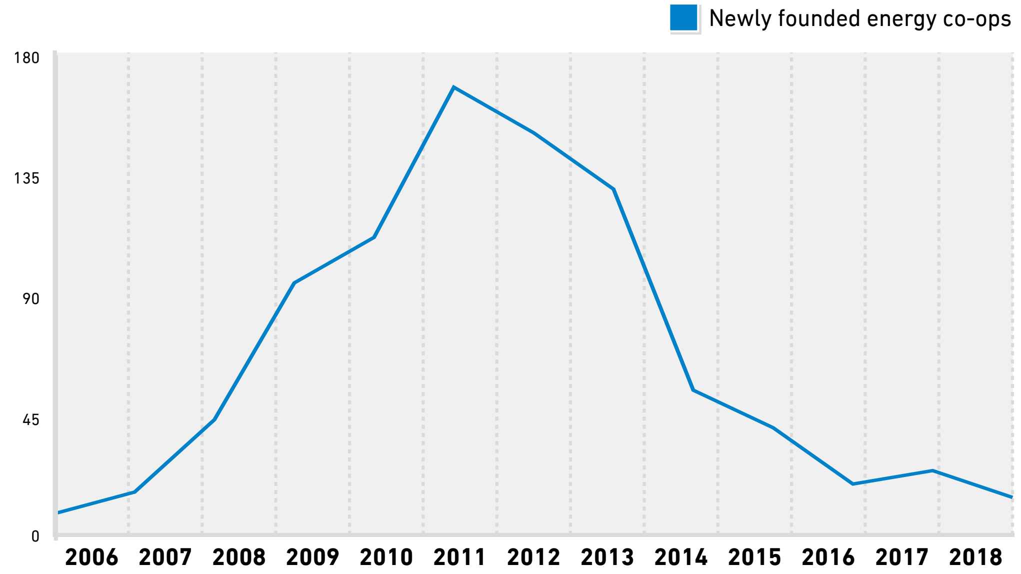
Germany has, however, largely switched to auctions in recent years. Though often thought of much different than FITs, auction prices are essentially premium FITs set by the bidder, not by government administrators. Auctions therefore have great support among free-market advocates averse to governmental price-setting; the policy is thus more politically fashionable today. This fashionableness helps explain why the comparison of FITs and auctions is based on so many misrepresentations.

But before the switch from FITs to auctions happened, another policy change would target community projects in particular: the Coöperatives Act.

2.4 COÖPERATIVES ACT

Revisions to Germany's Coöperatives Act (*Genossenschaftsgesetz*) in 2006 led to a boom in the founding of community energy coöps. Starting with the first FITs in the early 1990s, most community projects – particularly wind farms – had gone into business as limited liability companies (GmbH in German). Such firms are not required by law to spread voting rights equally across all members/investors; they generally provide one voting right per share. The result is one euro, one vote rather than one person, one vote.

Number of new energy co-operatives in Germany by year



In 2006, the Co-operatives Act was amended to facilitate energy co-ops. In 2014, the Renewable Energy Act was amended; biomass was restricted and auctions were implemented for wind and solar projects > 750 kW.

Source: DGRV Jahresumfrage.

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Figure 2 The number of new energy coöps in Germany boomed around 2011 but has dropped to a lower level since.

Although they only provide less than one percent of total renewable electricity supply, renewable energy coöps in Germany are nonetheless considered crucial in terms of public support. Coöperatives have proven to be useful business forms in shifting accountability from shareholders to stakeholders since the concept of coöps was developed in the UK in the early 19th century; it had spread to Germany by the mid-19th century. By 2006, coöps were thus well established in a limited range of sectors in Germany, so the law was amended to facilitate projects related to "social and cultural" projects along with groups aiming to build something specific – which included community renewable energy projects.

Energy coöps focus more on community benefits and less on investor returns. One survey (in German) put the returns at less than five percent on average, far below the expected returns in the corporate sector. Another annual survey of energy coöps from 2019 showed that only 69% paid a dividend in the previous year, and the average dividend was just below 4%. In addition, German energy coöps have far greater equity than corporate projects do on average; the aforementioned survey published in 2014 found that a quarter were completely financed with equity.

A few statistics on energy coöps help explain why they have been so inclusive and helpful in addressing social issues, such as cost impacts (all data from 2018):

- Average number of people in a German energy coöp: 296.
- Average minimum holding: 511 euros.
- Average holding per member: 3,899 euros.
- Maximum holding: 80,000 euros.

During the years when opponents of the Energiewende complained about the cost impact on lower-income households, energy coöps clearly provided a plannable option to the vagaries of the stock market for those looking to invest a small amount in their communities in order to produce tangible local benefits. The main changes in the 2006 Coöperatives Act that brought about the wave of energy coöps were:

- an extension of the minimum time limitation for members to pay their fees from the previous 3 years to 10 years (the executive board can be held liable at that point);
- only three people are needed to found a coöp (down from seven);
- coöps with fewer than 20 members only need a single-person board, not two executive and three supervisory boards members; and
- reporting obligations were reduced for coöps with annual sales revenue below one million euros.

The number of new renewable energy coöps rose after 2006, but new foundings plummeted after 2013. The numbers vary,[4] but they fell to a new low of 14 in 2018.

One main reason for this dramatic downturn was a change in the EEG: auctions largely replaced FITs. Now, the government sets the maximum volume to be built, and bidders determine prices.

2.5 COMPARING AUCTION PRICES AND FITS

	FITs	Auctions
Volume	Set by market[5]	Set by policymakers
Price	Set by policymakers	Set by market[6]

It is often claimed in comparisons of auction prices and FITs that auctions bring prices down considerably. But the comparison is misleading:

1. Auction prices are a bidder's best guess of future prices, whereas FITs apply for systems generating power today. For instance, the "zero euro" bids for offshore wind projects made quite a splash in 2017, but one big winner said the projects would be completed "not before 2024." Thus, we are comparing 2024 prices in auctions with 2017 FITs – on a market with steeply falling prices. [7]
2. Project realization: FITs are only offered to finished projects, whereas auction prices are announced for projects before construction has even begun. Realization rates in Germany have been good for the first PV rounds (though not all winning bids led to completed projects), but reducing the number of unfinished winning bids is a major issue

4 The coöp umbrella group DGRV, with whom the AEE has collaborated to publish energy coöp data, reports lower numbers than BBEn (the Citizens Energy Alliance), which publishes figures from researchers at Leuphana University. Their estimates are more comprehensive because the DGRV data only includes its members. However, the Leuphana numbers are also based on some guesswork. See page 31.
5 Unless the policy has a cap.
6 Up to the maximum price set administratively.
7 The projects that bid zero will still get revenue from spot market power sales; the zero simply indicates there will be no bonus on top. And the companies were not just betting that equipment would become cheaper, but also that spot market prices would increase when Germany switches off its last 6 remaining nuclear reactors at the end of 2022.

in auction design. The most common solution – a large security deposit that is lost if the project fails – is acceptable for large bidders but scares away smaller competitors, such as community projects.

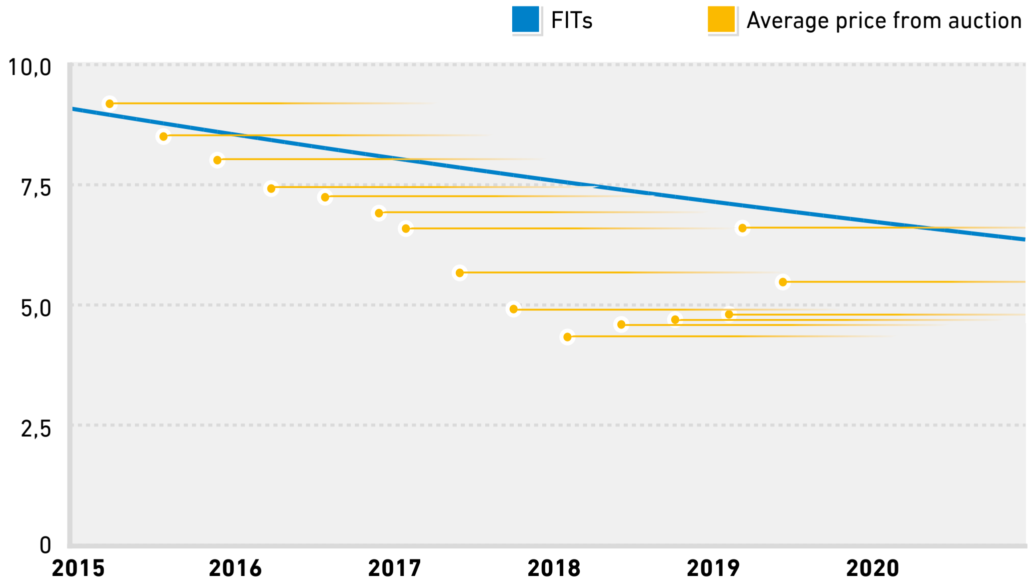
3. Geography: A large factor in lower auction prices is a focus on the best locations. Prices come down as, say, wind farms are all built in the most windy areas. German FITs spread projects across the country more evenly, which may have improved acceptance; the impact may have been perceived to be shared more equally.[8]

4. Losing bids: There can be more losing than winning bids, and the losers forgo their time and money invested in the bid – often a six-figure sum.

Furthermore, there are concerns that very low bids may be predatory to scare competitors off in future rounds or to gain ancillary benefits, such as ensuring access to the German power market.

Finally, German wind prices from auctions are misleading because turbines in less windy areas get paid more; only the reference price is reported.

Prices from German PV auctions compared to continuation of old FIT reductions



FITs are reduced by 0.5% per month from 07/2014, the last month of PV FITs for arrays up to 10 MW. Auction prices are drawn out to the two-year installation deadline.

Source: German Network Agency (BNetzA); 11/2019

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Figure 3 Auction prices seem lower because they are reported long before projects have been completed. By the time the project generates electricity, the prices are sometimes lower, sometimes higher, than the FITs possibly applicable·

8 On the negative impact of concentrated wind farms from auctions in the UK, (Lauber 2012) writes: "[The policy] created a strong movement hostile to wind power. The intensely competitive nature of the process intensified the search for the best locations, disregarding considerations of landscape protection and neighbourhood acceptance".

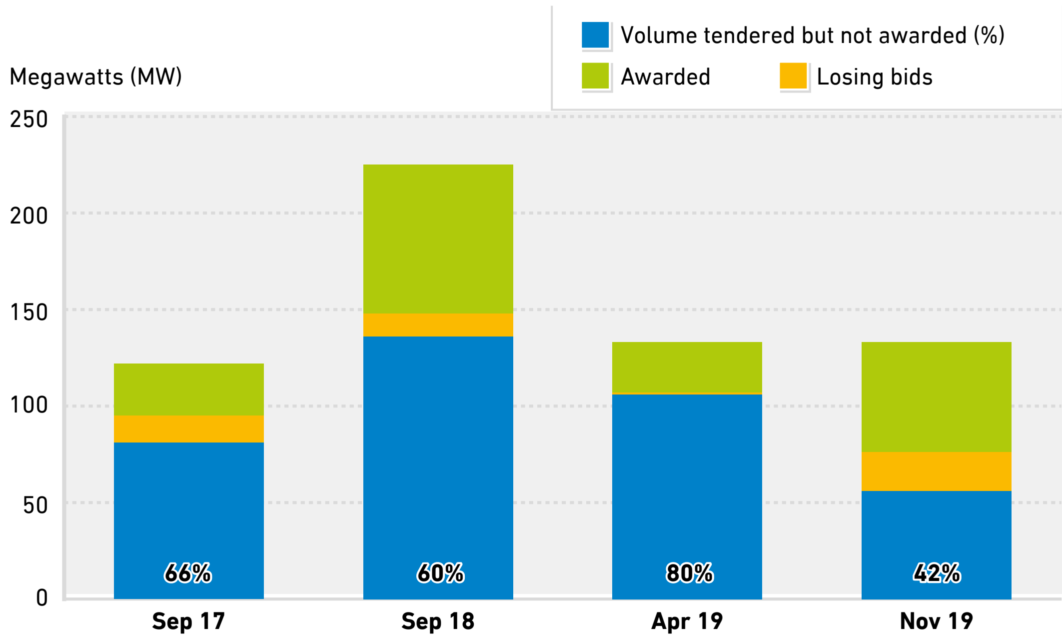
2.6 EFFECT OF AUCTIONS ON COMMUNITY PV AND BIOMASS

The impact of auctions on community energy projects differed according to technology. Germany allows solar and wind projects smaller than 750 kW to be built without winning in an auction, but that limit is awkward for wind power. The average turbine installed in Germany over the past few years was roughly four times larger. The limit thus effectively means that wind projects wishing to remain outside of auctions have to find that rare turbine still smaller than 750 kW (German market leader Enercon's smallest turbine is currently 800 kW) – and then only build one.

PV, of course, is much more scalable – from solar watches to utility-scale power plants. 750 kW is a large array for a community, though not by any means the largest possible. Numerous community PV arrays in Germany are several times larger; one installed in 2013 is more than ten times bigger. Thus, such projects would need to break up into ten subprojects to be theoretically exempt from the bidding requirement. But then, they would also face charges of gaming the system: arrays too close to each other and with similar ownership are considered one project by law in order to prevent developers from splitting their actual project into numerous smaller ones to get around auctions.

Within auctions, community PV projects have not been successful. Analysts at Ecofys found in 2017 that "no cooperative was visibly successful in any of the PV auctions over the last two years." Furthermore, by making projects compete with each other nationwide, only those in

The first four rounds of biomass auctions in Germany



Source: BNetzA, Nov 2019

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Figure 4 Less than half of the biomass volume auctioned was even awarded in the first four rounds; the conditions, in particular the maximum price and the short project completion timeframe of up to 24 months, are unattractive to the market.

the sunniest areas win contracts. In the October 2019 auction for PV, 85% of winning bids came from Bavaria alone. The purpose is to keep the cost of the transition down, but one side effect is that groups are frequently told they cannot build PV in their own community.

For biomass, units larger than 150 kW must participate in auctions. A maximum price was set below the old FITs. As a result, the volume bid has fallen short of the volume auctioned. Because the remaining volume is carried forward, the auction volume is growing. In the April 2019 round, 133 MW was on offer, but only 25.5 MW was bid. However, the market has also shrunk for reasons not directly related to the auctions themselves: new limits for nitrate, for instance, have placed additional requirements on projects.

The lower maximum auction price means that operators of biomass units are looking for ways to optimize heat sales in order to place lower bids for electricity in the auction. In addition, revenue can be calculated from other sources such as the use of residual manure as fertilizer after power and heat have been generated.

FITs and FIT premiums pay a special role for biomass units, which – unlike wind and solar – can be dispatchable. They can thus run in a "flexible mode," generating power when prices on the spot market are high. The auction price only covers 50% of a biomass unit's potential generation capacity; as a result, the units try to run when the spot price – and hence demand – is high. This focus is intended to allow for greater shares of renewable electricity, especially by encouraging biomass units to focus on spot market power prices and markets for ancillary services.

Because the first biomass auctions were held in 2017 and the units have three years for completion, very few auction winners are already in business. It is therefore too early to say already what a successful strategy for biomass in auctions looks like.

2.7 ATTEMPTS TO ACCOMMODATE COMMUNITY WIND IN AUCTIONS

Community energy projects can submit bids for auctions, but they face two main obstacles:

1. Inability to spread losses across multiple projects: Corporations calculate a certain number of losing bids into their business plans; they can thus spread losses across multiple projects. In contrast, citizen groups generally only have one project at a time. If it fails, the citizens are likely to be discouraged to try to compete again at all – whereas companies have no choice but to try again.[9]

2. Geographical inflexibility: Citizen groups focus on local projects. If the given wind or solar conditions do not allow for competitive prices, the citizen group cannot win, nor can they go looking around the country – like companies do – for sites with better conditions without losing their status as a citizen group.

The first wind auctions were tweaked to address 1). The result was the first ever legal definition of *Bürgerenergie*. To qualify as *Bürgerenergie*, wind farm projects had to fulfill the following requirements:

9 The Yonmenkaigi System Method (YSM) from Japan addresses this factor by encouraging citizen groups to pursue, at least initially, goals that are likely to be reachable rather than grand objectives, lest non-attainment lead to resignation. YSM thus "fosters small and modest" goals.

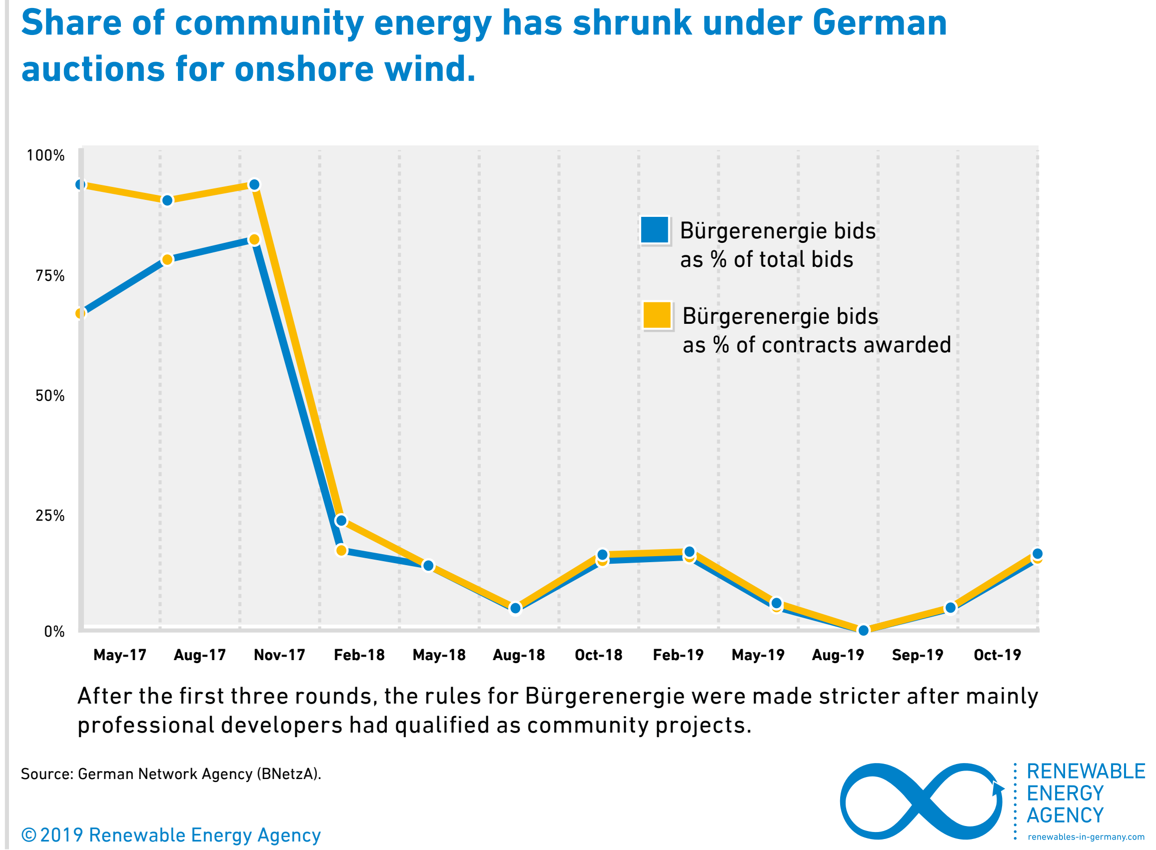

Figure 5 Community energy in onshore wind auctions.

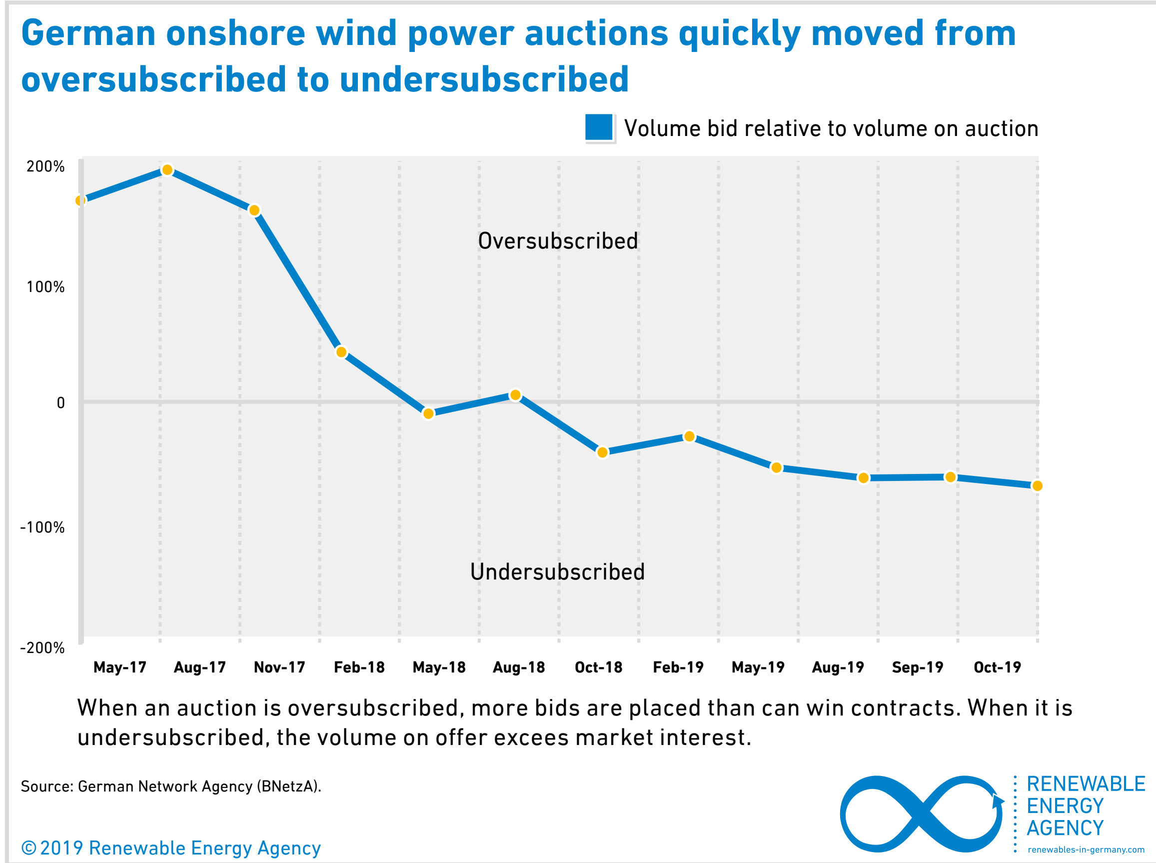

Figure 6 German onshore wind auctions are undersubscribed.

- at least 10 citizens had to be involved, and no shareholder could own more than 10% of the project;
- citizens had to have at least half of the voting rights; and
- at least half of the voting rights had to belong to natural persons living in the county where the wind farm would be built.

To protect citizens from losing high up-front costs, these *Bürgerenergie* groups were allowed to bid without having already conducted an environmental impact assessment (though one was needed for construction to begin). And second, *Bürgerenergie* groups have 54 months to complete their wind farms, compared to 30 months for everyone else.

Under this policy, groups that fit the above definition of *Bürgerenergie* won 90% of the volume on the second round of auctions after getting 96% in the first – and few were happy. Community energy proponents argued that the groups that won were not genuine citizen groups (see *Der Spiegel*). For instance, in the first round, employees of one wind farm developer were behind all 13 of the winning bids in Brandenburg; the employees then contracted their own company to do the actual work. In the second round of auctions, a single firm won around two thirds of the auction volume almost exclusively with projects that qualified as *Bürgerenergie*.

The third round of wind auctions in 2018 resulted in even greater dominance of *Bürgerenergie*, with 60 of 61 contracts awarded to such groups, many of whom were widely viewed as "stooge" citizen projects. The number of projects that community energy supports would have labelled *Bürgerenergie* was far smaller; one study on the first three rounds of wind auctions identified only a single project out of 190 winners as "an actual citizen wind farm."

In 2019, another study found that "it was not always possible... to tell which of these Bürgerenergie winners were not collaborations between citizens and project developers, with the former hardly being able to influence policy design." The study also found that the project groups had stuck close to the legal requirement of "at least ten citizens"; 85% of them had fewer than 20 members. The law itself further incentivizes small groups, the researchers explain, by ruling out membership for anyone who was part of a winning bid in the previous twelve months. Otherwise, the main findings were that:

- citizens in the project were "often" employed by the wind farm developer;
- in a "large number" of cases, the developer had approached the citizens – i.e., there had been "no citizen group before the policy switch to auctions";
- the longer timeframe and exemption to the environmental impact assessment for *Bürgerenergie* bids allowed such groups to plan with future turbine types that would reduce prices further; and
- only three of the 61 people interviewed saw greater "acceptance" as a driver behind their bid as *Bürgerenergie*, and even then not as a main one.

After the third round in 2018, the conditions for *Bürgerenergie* changed. The new benefits were:

- *Bürgerenergie* groups now had to submit an environmental impact assessment like everyone else, and their 54-month construction timeframe had been shortened to 30 months as for everyone else.
- While all bidders normally have to transfer 30 euros per kW as a security when placing a bid, the initial amount for *Bürgerenergie* is only 15 euros, which rises to 30 euros once the project is awarded a contract.
- *Bürgerenergie* groups were eligible for the "uniform price," which is essentially the highest winning big price (also called a "clearing price" on spot markets). In contrast, non-exempt bidders had to build at their bid price ("pay as bid").

By the eighth round of auctions in May 2019, some 90 percent of all wind turbines were built north of the Main River (which flows through Frankfurt around the center of Germany); the geographical concentration in auctions continues. But prices had gone up from 4.02 cents in the third round to 6.04 cents in the eighth. In addition, whereas the large number of bidders in the first rounds was seen as a sign of great interest in auctions, that interest had quickly plummeted. One reason was that the maximum bid price was reduced in round four from 7 cents to 6.3 cents, when the bid volume dropped by some 60 percent. In every round since, the volume awarded has fallen short of the auctioned volume; in first five rounds of bids in 2019 (up to and including October), only 42 percent of the volume auctioned was even covered by bids. In the "technology-neutral" round in November, in which solar and wind competed against each other, no bids for wind were even tendered; 20 of the 37 contracts awarded

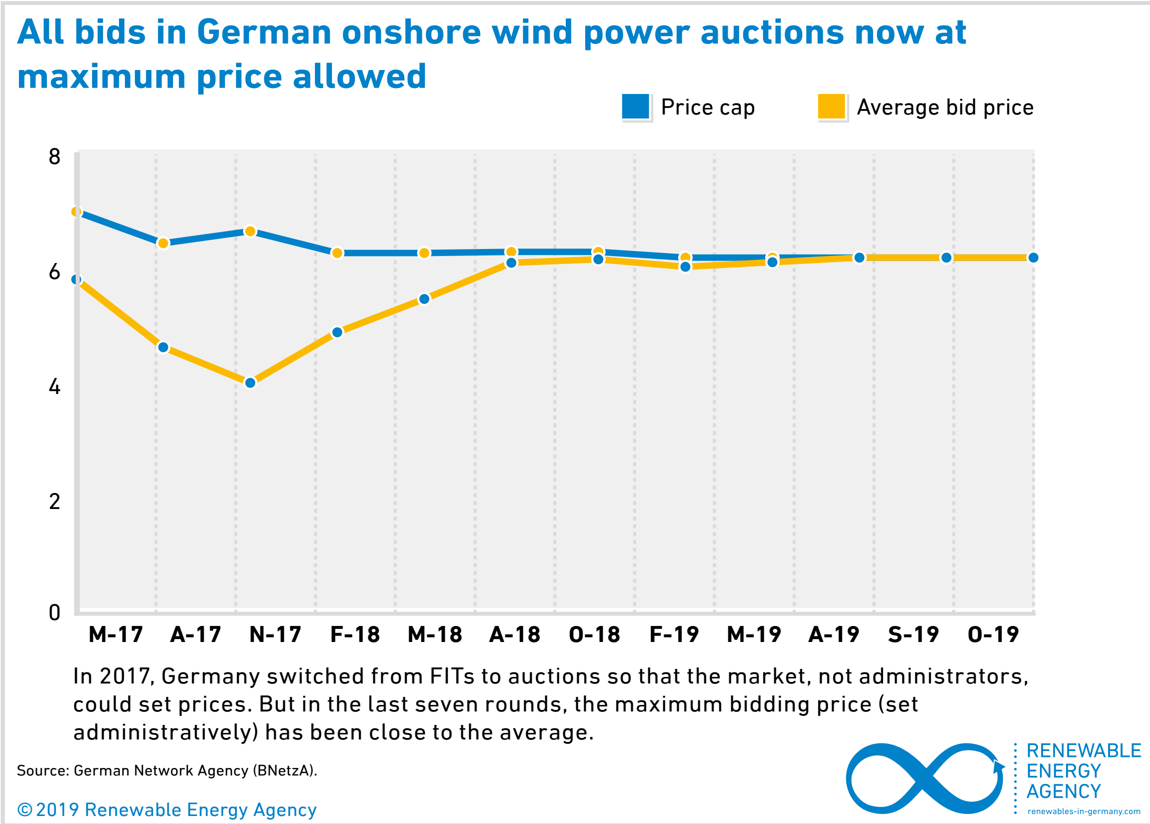

Figure 7 The first rounds of auctions for wind power assured everyone that the policy would lead to lower costs, but in the end the average price has risen. By 2018, the average bid price was above the last average FIT. The main cost savings have come from reducing the market volume, i.e. building far fewer turbines.

were for solar in Bavaria. "We are now in crisis," says Stefan Gsänger, Secretary General of the Bonn-based World Wind Energy Association.

Auctions have also stopped reducing the price: the average bid now regularly comes in at 6.19 cents per kWh, while the maximum bidding price is 6.20 cents. No *Bürgerenergie* groups won contracts in August 2019.

Despite the dominance of *Bürgerenergie* in the first three rounds, the situation nonetheless looked menacing even then to community energy projects. After all, roughly two out of three community efforts were not awarded a contract. The signal was clear: place a bid, and you are more likely than not to lose a lot of time and money. Auction proponents interpreted the large number of bids as evidence that the auctions were popular on the market and led to greater competition.

The situation has changed considerably since, however. By the fourth round of wind power auctions, almost all *Bürgerenergie* groups were awarded contracts; since the fifth, all of them have – but the number of bids remains miniscule because of the fear of placing a losing bid.

2.8 THE 18 MW LIMIT FOR WIND

The EU's Directorate-General for Commission had long viewed FITs with skepticism, preferring auctions – the reason being that governmental price-setting is considered antithetical to free markets by many economists. But under Commissioner Margrethe Vestager, DG Competition also acknowledged the risk of auctions detrimentally impacting community projects. And Vestager and her colleagues like community energy. The new "de minimus rules" adopted under Vestager's predecessor Joaquin Almunia, stipulated that "small" projects would not have to participate in auctions. Each member state was free to define "small."

Therein lies the rub: Germany defined the limit as 750 kW, whereas the 2014 Guidelines on state aid for environmental protection and energy unclearly spoke of "up to 6 MW or 6 generation units" for wind power. But wind turbines were already on the market at capacities of 6 MW and larger. If six of them could be built, a wind farm could have as much as 36 MW outside auctions.

So the German wind energy association BWE asked Vestager for clarification. They got it in January 2016, when she explained that DG Competition had assumed an average turbine size of "2.5 to 3 MW," putting the maximum for a project at 15-18 MW. A study done in 2014 found that the average (mean and median) German wind farm built in 2011-2012 had "fewer than 5 turbines and a total capacity clearly below 10 MW". The small size is a testimony to the strong role of community energy. But the findings also meant that most German projects would thus have been exempt from auctions under Vestager's 15-18 MW limit, making the policy switch ineffective. And indeed, the results of onshore wind auctions show that the average project size remains small: in the August 2019 auction (without any *Bürgerenergie*), the average project size was 6.5 MW. Berlin therefore retained the much lower limit for FIT eligibility; i.e., exemption from auctions.

While community energy proponents hoped that projects smaller than 18 MW would be exempt from the auction requirement, the 18 MW limit for wind power cropped up in the definition of *Bürgerenergie* within auctions.

2.9 POSSIBLE IMPROVEMENTS TO COMMUNITY ENERGY DEFINITION

In 2016, the Bonn-based World Wind Energy Association (WWEA) published its own definition of community energy, which was later taken up by IRENA. Two of three conditions needed to be met – local added value, codetermination, and participation options. More specifically,

- "local stakeholders own the majority or all of a renewable energy project;
- voting control rests with a community-based organization; and
- the majority of social and economic benefits are distributed locally."

This definition is fine as a descriptive. Encoded in law, it needs to be enforceable and hard to game. How is "local" defined – within a radius? If it is defined as within a certain county, what if the renewable energy project is built on the border so that more people from an adjacent county are affected than within the project's county? What constitutes a "community-based organization"? And hardly any projects have ever measured the geographic distribution of their social and economic benefits – what do the metrics even look like?

Two German organizations, Bündnis Bürgerenergie (Citizen Energy Alliance or BBEn) and the DGRV, have published joint recommendations on rules for community energy. They call for a 25 km radius, which would include people who cannot even see a project from home. Locals would need to make up 60% of both voting rights and investments, and at least 50 locals (instead of the current 10) would need to have invested. Finally, the two organizations call for citizen energy groups to be exempted from auctions or at least allowed to build at the volume-adjusted average price of the last three auction rounds.

The 25 km radius pops up in another BBEn paper, where the organization calls for "green community energy" under the EU's new definition of "energy sharing" as community energy (22.2.b in Directive 2018/2001).

No German group has called openly for a return to FITs, though the "average price from auctions" essentially is an FIT set by bidders rather than administratively. More than ever before given the recent ECJ ruling, FITs remain an option in the EU but seem to be anathema to policymakers in Germany. For instance, in a list of eight demands WWEA calls on German lawmakers meticulously avoids the term FIT, calling instead for the "creation of a non-discriminatory remuneration system beyond auctions, in [sic] Europe in accordance with the decisions by the European Court of Justice" – which is another way of saying FITs, especially given the reference to the ECJ.

Finally, there is general agreement among community energy advocates that Germany should allow small projects (for instance, those below 18 MW) to be built outside of auctions, as allowed by the EU exemption. The German limit of 750 kW is felt to be too restrictive.

2.10 *MIETERSTROM:* TENANTS PURCHASE POWER FROM THEIR OWN ROOFS

In 2016, an organization representing building owners argued in court that owner-occupied apartments could not buy solar electricity from their own (shared) roofs without having to pay the full EEG surcharge, whereas homeowners and businesses who consumed their own solar power "behind the meter" (called "self-consumption" in industry) were 60% exempt from the EEG surcharge if smaller than 10 kW and 100% exempt if larger.

In late 2016, the Bundesrat agreed that the current policy discriminated against tenants of all kinds, and work began on new legislation. The law produced does not allow tenants to own the array they buy power from; it has to belong to a third party (such as the landlord), an aspect that tenant and community advocates have criticized.

The law requires sellers of tenant electricity to operate as nearly full-fledged power providers, however, including ensuring that electricity is provided when the sun is not shining. The German tenants' association Mieterbund and housing coöperatives cosigned a call for better *Mieterstrom* conditions in mid-2018. Community energy groups like the BBEn support these demands.

In mid-2017, the Mieterstrom terms went into effect. For solar arrays smaller than 100 kW behind the meter (without touching the public grid), a small (but fluctuating) bonus of around 2-3 cents per kWh is provided (oddly, the EEG surcharge – the reason for the original protest – still applies in full).[10] In return, landlords then have to sell the electricity to tenants at 10% below the local power provider's "basic price." Tenants cannot be forced to purchase this electricity, however; as consumers, they retain the right to choose their power provider.

The market potential may seem fairly big; after all, the share of renters in Germany is the highest in the EU at around 50%. But one estimate put the number of households that might benefit from Mieterstrom at only 3.8 million, fewer than 10 percent of Germany's 44 million dwellings.

The demand for Mieterstrom was not as great as the potential. In September 2019, a review of the first two years from mid-2017 to mid-2019 found that only 1% of the annual budget of 500 MW had been used (13.9 MW).

Supporters of tenant electricity argue that the policy's current requirements are odious: providers of small amounts of power carry the same responsibility as large ones. The argument for such requirements is one heard in numerous countries: people who consume their own solar power behind the meter remain just as reliant on the grid when the sun doesn't shine. In countries like Germany, however, the fixed costs of the grid are a surcharge spread across the kWh purchased. One solution would therefore be to switch such fixed costs to a fixed fee, not one based on volume. But that option has its own drawbacks; primarily, it makes the monthly hook-up fee much higher. Those who consume little power thus pay more per kWh; in this way, the policy penalizes low consumption.[11]

10 The building must be at least 40% residential by floor area; businesses cannot purchase *Mieterstrom*.

11 The Netherlands is an outlier here; the Dutch put the fixed costs for the grid almost entirely on a monthly connection fee. Other EU countries have more of a mix leaning, like Germany, towards a surcharge on the amount of energy consumed.

There may be another reason for the low demand: As we saw above, there have long been numerous ways for people to get involved in community energy projects regardless of their personal housing situation. Tenants who have invested in a wind farm and switched to a green power provider may not feel a need to purchase electricity from their own roof. Others may not be interested in the topic.

For more on this complex topic and the implications for social policy, see the recent work by Tim Schittekatte and Leonardo Meeus, especially Figure 3 and, for a more detailed discussion, Schittekatte's dissertation from 2019.

3 COMMUNITY ENERGY AND "ACCEPTANCE"

"Acceptance" is the term commonly used to describe public approval of infrastructure projects. The term implies public passivity, with experts doing the real work. Yet, Germany's Energiewende started off as a grassroots movement in the 1970s. One could easily argue that the German public has gotten their politicians and business leaders to accept the transition – not the other way around. More importantly, we need people to take ownership of, not merely accept, infrastructure projects that affect them: people want to identify with the places they call home. Nonetheless, "acceptance" is the word used in the discussion, so we use it below.

One main reason often stated for the lack of wind power bids since 2018 is public opposition hampering the permitting process. Increasingly, project developers face pushback from communities. Legal challenges from citizen groups have slowed down permitting procedures. Without a permit, developers cannot bid.

It is generally assumed that community projects increase public acceptance. As the head of German cooperative organization DGRV put it:

> "Citizen participation in energy projects shows how to increase acceptance. But active participation also motivates people to think about how they personally consume energy and to learn about energy efficiency. Energy coöperatives are very important for individuals to change their behavior. So if auctions reduce the participation of energy coöperatives, these effects will also shrink."

The demise of community energy in recent years was therefore expected to reduce acceptance: without local *Kümmerer*, projects have no one with clout to speak for them when citizens voice concern about possible negative impacts. Out-of-town developers are unknown, not community members.

The connection between community participation and public acceptance is well established in sociology. Risk expert Ortwin Renn summarizes the research consensus about the four requirements for acceptance:

1. **Transparency and understanding**: From the outset, people have access to evidence demonstrating that the project is needed and better than the alternatives; acceptance increases.
2. **Self-efficacy**: People fatalistically tolerate projects if they feel they "can't do anything anyway." But if they feel they can make a difference, there are two possible, opposing outcomes: participation and resistance.
3. **Benefits**: to quote Renn, "Acceptance is more likely when people believe the planned project will benefit them or groups and individuals they appreciate – including the community at large."
4. **Identification**: if people have an emotional attachment to a project, acceptance increases. For instance, people tend to be proud of centuries-old windmills as part of their heritage (though modern wind turbines still elicit mixed reactions).

Perceptions matter here as much as facts: a community may demonstrably benefit from a project, but if no one knows of the connections between the benefits and a project, the benefits may not increase acceptance. The facts therefore need to be communicated.

It is noteworthy that community energy ticks all of the boxes above. First, since the projects are planned by citizens themselves, there is potentially complete transparency from the outset; the project doesn't come about unless this information is shared. Second, it follows that community energy projects channel self-efficacy into productive participation and away from resistance. One citizen developer who eventually built ten turbines explained why he started with three (video): "If we had wanted to put up ten at once, people would have said no. Our strategy [of gradually adding turbines] ensured that public acceptance remained high." When such developers are locals, it is easier for them to convince, or at least get acquiescence from, concerned citizens, who are their neighbors.

Third, the financial benefits are open to everyone who invests, and those not willing or able to chip in at least profit from revenue that flows back into the community. Fourth, when a community develops a project, it belongs to the community emotionally as well. People talk about how their input improved the original plans and how the debates brought them together with their neighbors, strengthening the community spirit.

Here, we finally see that it's not just an assumption that community energy makes Energiewende projects popular; we see how it makes them popular.

The failed German "citizen power lines" project

In 2011, a project attempted to apply the community renewables idea to the grid. As the project was similar to some schemes now being tested for wind, it is worth investigating why it failed.

The idea was to have citizens co-invest in new high-voltage grid lines. In the areas where the lines were to be built, some 90 percent of the wind farms were community projects, so initially there was great interest. But the interest turned into criticism when it was revealed that the grid operator's return was guaranteed at more than 9%, while citizens were told to expect 4-5%. The grid operator would thus retain around half of the profits from citizens' investments. Instead of up to the expected €150-300 million in funding from citizens, €833,000 was pledged. Consumer advocates had warned against the deal because institutional investors would have been served first in case of a bankruptcy. A rating agency also gave the package a modest BB+.

The grid operator stepped away from the project altogether, and all four of Germany's high-voltage grid operators stated that they had no interest in pursuing the idea further. From their perspective, the cooperation was unattractive anyway: they could get loans at lower interest.

The goal was to increase acceptance, not get funding. The proposal instead caused an uproar.

3.1 COMMUNITY PAYMENTS FROM RENEWABLE PROJECTS

Numerous policies have attempted to get community buy-in for renewable energy projects. Below, we briefly discuss some of the main issues. The gist is that there does not seem to be a silver bullet; each scheme comes with its own pitfalls, some more than others, and an international review suggests that what works in one place might not in another.[12]

The Scottish Community and Renewable Energy Scheme (CARES) is perhaps the most blended form of community ownership and community benefits from non-community projects. In the former case, grants and loans are provided for a range of community entities wishing to develop their own projects; in the latter, (corporate) projects pay benefits to local communities.

As projects truly driven by communities become rare in Germany, the Germans have also begun looking for ways to allow communities to at least benefit financially from third-party projects. For instance, in June 2019 the state of Brandenburg adopted a plan to require project developers to pay 10,000 euros annually per turbine to communities within three kilometers.

The main pitfall is here that mere payments to individuals and/or local communities might come across as bribes: people might feel they are being told to take the money and shut up. Payments can thus backfire. The Brandenburg proposal only addresses Renn's requirement 3 above. It does nothing (1) to convince locals that a project is best located near them and little (4) to help people develop an emotional attachment to the project.

An important distinction is made between compensation for damage and payments made to share benefits; since intentions are not visible in the amount on your bank account, they must therefore be clearly communicated. Payments made to cover impacts perceived to be negative further reinforce the notion that the perceived impacts exist and justify compensation, even if scientific literature suggests otherwise. For instance, different German states have different distance requirements between wind turbines and residential buildings, but no correlation has been found between the distance and the level of acceptance; one study finds more acceptance beyond a certain distance, while another finds it within that radius (Wolsink 2012). Building wind turbines further away does not automatically ensure that perceptions of detrimental impacts decrease.

A German survey from 2018 added another dimension – the number of turbines – and found that the concentration of turbines might be as significant for public opinion as their distance is. But other researchers warn not to make the matter too complex. "In order to get statistically significant results, you have to have a very large number of cases to study. The more variables you add in, the more noise you get," researcher David Toke of the University of Aberdeen stated for this report. He reminds us of yet another dimension: "Encouraging local ownership is, of course, always a good idea." And another aspect is worth keeping in mind: the further away we build wind turbines, the greater the potential conflict with nature conservation.

12 For an overview of this complex topic, start with (Kerr 2017). For more on the German debate about community payments schemes for wind power, see IKEM's recent study. For an EU-wide review of community compensation schemes related to the grid, see "Community payments: case studies from across Europe" (PDF).

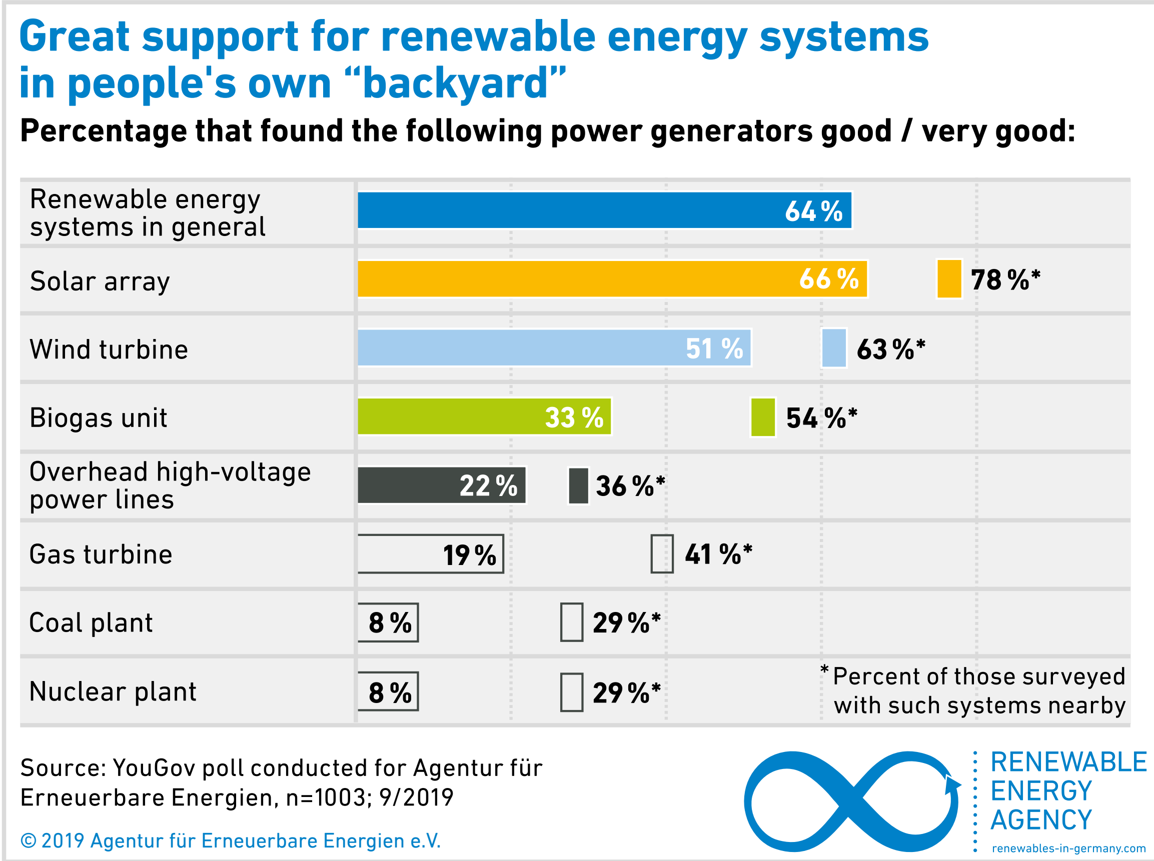

Figure 8 A typical survey showing that various forms of renewable energy are popular – and specifically that the popularity of all the items listed is higher when people have experienced such projects nearby. But such surveys are sometimes misread as indicating that there should be little opposition to specific projects.

One Danish expert, Birgitte Egelund Olsen, fears that such compensation for wind power in particular may create a double standard (Olsen, p. 205):

> "… wind turbines are treated differently from all other large or intrusive infrastructure projects such as highways, biogas installations and landfill sites. These only give rise to compensation if the activity results in an unreasonable interference which exceeds the 'tolerance limit' (tålegrænsen) under nuisance law. This in itself seems to indicate that wind turbines cause a great deal of disturbance even if the public law assessments and the distance requirements for the construction of wind turbines are adhered to. The scheme thus emphasizes the negative local impacts of wind projects and does not focus on the overall societal benefits of the carbon free energy source."

Olsen adds that people may feel that compensation for property value losses is unfair if it gives those with valuable property more compensation that those whose property is less valuable receive.

Furthermore, policymakers should be careful not to offer payments to pacify impacts for which there is no scientific evidence, such as the alleged infrasound impacts of wind farms. Any payments made should be clearly communicated as not covering such alleged damage, and the lack of evidence for such damage should be clearly communicated as well.

3.2 DANISH PARTICIPATION MODEL GERMAN STATES ARE COPYING

The Danish wind market originally consisted largely of community projects; at the end of 2002, 40 percent of the market belonged to coöperatives, but policy changes in 1999 and 2002 put an end to their strong role. One result was growing opposition to wind farms. In 2009, the law was amended to require projects to offer 20% to local citizens (within a 4.5 km radius) in the hope of increasing acceptance. To prevent gaming, no single citizen can invest more than around €25,000 in a project.

In April 2016, the German state of Mecklenburg-Vorpommern adopted a similar requirement: developers must offer 10 per cent of each project to citizens and another 10 per cent to municipalities (up to 20 per cent in total) within a 5 km radius (Yildiz 2018).

It's too soon to assess the policy's impact on acceptance in the German state, but as of August 2019 no community had bought in – three years after the project was launched. The results are mixed in Denmark. Only eight of the first 15 wind farms were even able to sell all 20% of the shares, for instance (Olsen, footnote 34 ff.). Likewise, developers see the requirement as a "bothersome process [that worsens] their profit performance" (Olsen, p. 200). Olsen finds the incentive here counter-productive: developers get to keep those shares the public doesn't buy. Why try to sell something you want to keep?

One study on the Danish policy found in 2016 that "local people might be inclined to associate [wind] projects with something damaging that they need to be reimbursed for, but then be disappointed by the small returns that can be made." As Olsen puts it, "there is a very delicate balance between compensation and 'bribery', and local opposition to a specific project may be intensified if compensation is perceived to be bribery" (Olsen, p. 203).

Overall, Olsen depicts the Danish public co-ownership model as being reactive, not proactive: the public is only asked to participate after the project's final approval and thus has no input into the its design phase. Sociologists call this flawed approach DAD: decide, announce, defend. People who don't like the project are then told: you can still invest in it. The sales pitch is rare: if you don't like it, buy it! In other words, the Danish policy does not tick all four of Renn's aforementioned boxes.

3.3 NIMBY: A LABEL THAT UNDERMINES PUBLIC TRUST

NIMBY has come to stand for opposition to infrastructure projects in general. If it were true in the literal sense (not in my backyard), such infrastructure as wind turbines could simply be built further away from people (but then also closer to nature), and acceptance would increase (provided people don't object to the greater impact on nature) – but researchers don't always find a correlation between distance and acceptance. What's worse, "further away" is not a useful concept in land use rules, where limits need to be expressed in meters.

Local opposition is often seen as contradictory to the general popularity of renewable energy. Developers and politicians express surprise – if not disbelief – when locals oppose a project whose technology they otherwise accept in a global, general sense. Researchers speak of a "confusing 'social gap' between high levels of public support for renewable energy and frequent local hostility towards specific project proposals" (Devine-Wright 2011) – confusing, that is, to energy sector experts, not to social scientists.

The latter have criticized the NIMBY concept going back at least to the 1990s.[13] For scholars, NIMBY is a way of insulting people, not describing a conflict; it's a label that "technocrats" use to get out of having to take people's concerns seriously (Wolsink 2012).

In popularity surveys, people are, for instance, asked to say whether they like solar, wind, biomass, coal, gas, and nuclear. But when a specific project comes to town, developers don't ask locals whether they would prefer a wind farm or a gas turbine. Rather, they tell (not ask) local people that a wind farm is coming. These people then correctly perceive their options to be before and after: the status quo or the new wind farm.

Any criticism people may have of the project is then not pegged to the question of "wind turbine or gas turbine" (which was not posed), but rather to the project stages. As Wolsink puts it, "Decision-making is not a situation, so acceptance is also only relevant as part of a process." The possible questions range from: Is the wind farm really needed? Is this really the best location? Do I trust this company, or are they just socializing impacts and privatizing profits? As Olsen explains, impacts (noise, birds, etc.) are not the only issue:

> "… resistance to renewable energy projects may not be solely directed at the infrastructure itself and the nuisance it causes, but may instead be aimed at the developer, the formal decision-making process, or the public authorities that approve the development plans and grant permits for individual projects… Critical attitudes may

GERMAN COURT RULES AGAINST MUNICIPAL BUYBACK

A court case in the Black Forest town of Titisee-Neustadt may have occasioned the DIW study. In 2011, the town had awarded the concession to a local entity called EnTN, 60% of which belonged to the city, 30% to EWS Schönau (the nearby grid buyback success story, which had provided consulting services for Titisee-Neustadt), and 10% to a citizen coöp. The holder of the previous concession from 1993-2011, a subsidiary of then privately owned EnBW, contested the decision in court and won. The court ruled in 2015 that the city had written the new tender in order to unfairly disfavor EnBW, the only other bidder. Specifically, the court complained that prices, efficiency, and supply security had not been sufficiently taken into account. The DIW paper thus argued indirectly that there was no reason for the court to believe that efficiency would be higher if EnBW held the concession, thereby also calling into question whether prices and supply security would be worse under a municipal arrangement.

The city then challenged the court's ruling based on the principle of municipal autonomy, but the appeal was not heard. In the repeated call for tenders, the city once again awarded the concession to the new municipal provider, and the EnBW subsidiary announced in April 2019 that it would not challenge the decision any further, though its concerns remained. At the same time, German citizens have the right to select their power provider regardless of what company owns the grid, and only 17% of Titisee-Neustadt residents have switched to the new municipal utility (in German).

13 One of the earliest such studies was (Wolsink 1994). Books like *Nimby is beautiful* (Hager 2015) focus on counter-examples: when public pushback improves projects. Also see *Die Konsultative* (Nanz 2016) for examples from the German-speaking world.

> also be triggered by suspicion of the developer's motives, particularly if the developer has no local connection, which would be the case with large or multinational energy companies."

Bowdler (2012) is especially scathing (though not alone) in his critique of those who label their opponents as "ignorant and selfish". He specifically calls out a former British Climate Change Minister for saying: "Opposition to wind farms should become as socially unacceptable as failing to wear a seatbelt".[14] He argues that "fairness... has become the primary problem with wind farm noise" and attributes the concern about infrasound to a problem "many acousticians know about from personal experience" – the stress from being treated like an idiot:

> "... non-acoustic factors contribute to the annoyance people feel. That annoyance brings stress which produces the symptoms described. The non-acoustic factors are largely attributable to the manner in which wind farms are developed, in particular, governments' dismissal of a few people with a real problem as antisocial."

"In all renewable energy acceptance cases at all levels, there is only one common factor," writes Wolsink: "trust. Systematically offending communities by levelling a charge of selfish NIMBYism is very counterproductive for building and maintaining such trust."

EWS Schönau: the Electricity Rebels

Before there were any FITs, before there were any community energy projects, there were the Electricity Rebels of Schönau. Their story inspired many other German citizen energy projects to pursue big dreams.

In the wake of the Chernobyl accident in 1986, a group of nine citizens in the small Black Forest town of Schönau met, feeling helpless, to discuss what they could do about local radioactivity from Ukraine. Eventually, one result was a plan to have the city buy back the power grid when the concession expired. Their story made national headlines throughout the 90s; power markets would not be liberalized until 1998, so the Electricity Rebels (as they came to be popularized) were ahead of their time. But their unwavering struggle won them sympathy and support across Germany and into neighboring countries.

Today, staff at EWS Schönau (as the new utility is called) serve nearly 200,000 customers nationwide with 100% renewable power and provide consulting services to other communities, like Titisee-Neustadt. But they are not and do not aim to become the biggest green power provider in Germany. True to their community origins, they prefer to help others help themselves rather than expanding into new territory.

14 At the time, infrastructure developers in the UK were quick to insult citizen opposition by calling people NIMBYs; The Saint Consulting Group, for instance, conducted an annual survey, which found in 2008 that "nearly nine out of 10 people in Britain are NIMBYs." No such surveys are known in Germany, which may be evidence of a more respectful public debate).

Above, this paper argues that policymakers should avoid giving credence to concerns about the alleged infrasound impacts of wind farms. It should now be added that people concerned about such things may have justified doubts about the decision-making process itself. And people will not believe the message ("no evidence of infrasound impacts") if they don't trust the messenger.

Renewable energy projects are often thought of in the context of climate change mitigation. Community projects also help heal rifts in society and build trust in the overall political system and between citizens and decision-makers, partly by making those two camps indistinguishable.

Stadtwerke Schwäbisch-Hall

In 1990, Johannes van Bergen began working at the municipal utility in Schwäbisch-Hall (population: 37,000). Up to his retirement in 2018, he would focus the company on district heat, efficiency and renewables. By 2014, other municipals that had banked on fossil and nuclear energy had begun struggling with the success of the Energiewende, but Schwäbisch-Hall was doing fine. It had even placed its natural gas assets firmly in heat supply, cooking, and vehicles – not primarily in the power sector, where gas would struggle throughout the decade. For these efforts, van Bergen won such awards as Energy Manager of the Year and Germany's Solar Prize.

In 2017, Schwäbisch-Hall generated 60 GWh of power from cogen, 56 GWh from PV, 78 GWh from biomass, 8 GWh from hydro, and 65 GWh from wind. Its EBIT was €15.1 million in 2017 after €12.3 million in 2016 (Geschäftsbericht). These profits were partly invested in such local amenities as swimming pools. Citizens thus see that the money made off their energy consumption creates good local jobs and funds high-quality public services.

Schwäbisch-Hall's success has not only set an example in Germany, but not also internationally: in 2018, it began cooperating with a community in India to transfer German best practices to an Indian municipal utility.

4 STADTWERKE: MUNICIPAL UTILITIES AS COMMUNITY ENERGY

4.1 FROM EARLY MICRO-GRIDS TO CURRENT UTILITY BUYBACKS

From New York City to Berlin, the first power generators installed in the late 19th century served only a few city blocks, similar to the micro-grids now coming back into fashion. Small generators are particularly useful because their waste heat can more easily be used to heat nearby buildings and as process heat for nearby industry. Combined heat and power (CHP) is still unbeatably efficient today, as up to 90% or more of the energy used is converted into electricity and heat during combustion. Conventional large-scale power plants, on the other hand, lose more than half of the energy they produce as waste heat for the lack of a heat buyer in the vicinity.

But the sector quickly consolidated. In 1911, there were 2,504 electricity suppliers in Germany. Two decades later, there were half as many. After World War II, politicians pushed for further consolidation. In 1964, a law was passed that made the construction of power plants smaller than 300 megawatts more difficult. In 1962, more than half of all power plants in Germany were smaller than 200 megawatts; in 1984, it was only one fifth. Though this market concentration is rarely discussed today, energy transition literature from the 1980s explicitly calls for more co-generation and greater local ownership of energy infrastructure.

Starting arguably with the campaign for citizens in the town of Schönau to take back their grid in the 1990s, a trend towards "recommunalization" of municipal utilities has drawn

SECTOR COUPLING

The term "sector coupling" is a loan word from the German Sektorkopplung. In English, one speaks more often of "system integration" – but the German term stresses not just integrating large shares of renewables, but specifically electrifying heat and mobility.

Excess wind and solar electricity would then be used to charge EVs and power trains and trams. It would also be used to generate heat – because heat is easier to store than electricity is. In addition, electric applications are generally much more efficient. For instance, the best heat pumps have a COP (coefficient of power) exceeding 3, meaning they provide 3 times more heat than they consume electricity. Likewise, electric motors are around 90% efficient, compared to only 20% for internal combustion engines. As a result, the British grid operator National Grid estimates an only 15% increase in power demand if EVs make up 90% of the car fleet.

Sector coupling offers municipalities and smaller market players genuine opportunities. The solutions tend to be local and require clout – which local officials tend to have – to convince people to adopt not only new technologies, but also new habits. These innovations also mean there are market niches to conquer – exactly what SMEs do well. As the Energiewende progresses towards 100% renewables, communities thus stand to play ever larger roles.

attention in Germany in recent years.[15] Communities that take over their utilities generally wish to determine how their heat and electricity are generated (ruling out coal and nuclear, for instance) and have profits reinvested in the community rather than sent to far-away corporate headquarters. These goals were specifically stated in the (failed) buyback campaign in Berlin and the (successful) campaign in Hamburg (Germany's two largest cities). In both cases, citizens wondered why profits made off of them should be sent out of town instead of invested in improving the city. Recommunalization is, however, by no means limited to large cities; it is arguably more common in smaller towns, where municipal utilities have a strong tradition. However, the road to recommunalization has not been smooth, and its success can be overstated.

The wave of community utility buybacks largely started around 2010, when many of the concessions that cities had signed with energy providers around twenty years earlier expired.[16] In the early 1990s, Germany underwent a trend towards privatization efforts; in the wake of the fall of communism, corporate ownership was seen as the best way forward. Privatization was also sometimes interpreted as being a goal of the subsidiary principle, which was incorporated in the Maastricht Treaty for the EU in 1992. Though the Treaty does not mention privatization, the idea behind subsidiarity is that centralized state power is not a goal in itself, which some interpreted as meaning the state at any level shouldn't do anything the private sector could do better or as well.[17] A lot of these concessions were thus signed with corporations. A survey nonetheless found that 81% of citizens trusted their local municipal utility, compared to only 26% who said they trusted corporations. One argument against municipal privatization was that utilities are a public service that should not be left up to profit-seeking entities (i.e., that private entities cannot provide better services); this argument has come back to the foreground in the current recommunalization trend.

However, a study by German economics institute DIW put the alleged wave of recommunalization into context and found that the number of privately owned utilities[18] had risen even faster: from 2003-2012, an increase of 49 percent, compared to 17 percent for municipal utility buybacks. Not surprisingly, the share of municipal utilities in total revenue had shrunk in that decade. The researchers found no significant difference between the efficiency of municipal and private energy suppliers; no evidence was found to support the "general assumption that private firms work more efficiently." In other words, municipal utilities focus on serving their community instead of returning profits to investors without reducing the overall service quality.

Today, municipal utilities remain efficient in another way: like a century ago, CHP remains common. In 2017, it made up 44% of generation capacity at municipal utilities, several times the level at larger power providers.

15 In France, a similar trend has focused on water supply, including in Paris, but in Germany the main bone of contention has been ownership of local grids.

16 The study only covered the southwest state of Baden-Württemberg, but the results will have been similar elsewhere in Germany.

17 For the EU, subsidiarity meant that Brussels should leave as much as possible up to the member states; in federal countries like Germany, it meant the federal government should leave as much as possible up to the state level, which should in turn leave as much as possible to the municipal/county level.

18 By "privately owned utilities," the aforementioned study speaks of firms that English-speakers would call "publicly traded companies." In German, firms listed on the stock exchange are referred to as "private", whereas public (*öffentlich*) is reserved for companies that truly belong to the general public, not just a small group of individuals who invested. Specifically, "going public" and IPOs (initial public offerings) are not categorized as *öffentlich*.

4.2 TRADITIONAL AND NEW ROLES FOR MUNICIPAL UTILITIES

Municipal utilities are ideal as implementers of sector coupling; as service providers for heat, water, mobility, and electricity, they can tap the synergies of various sectors in-house. And as trusted local companies servicing the general needs of the public, they are seen as *Kümmerer* – people who take care of the community.

German municipals are numerous – around 800 – but also run the entire gamut in size: from white-label municipals (single officials in city hall handling contracts with the actual service providers) to giant firms, the largest of which in terms of revenue is Stadtwerke München (Munich). It is a bit of a global player, also owning shares in foreign projects, such as the Gwynt y Môr offshore wind farm off the coast of Wales.

Not all municipal utilities are doing well in the energy transition. Those with close ties to coal giants, for instance, have seen revenue dry up, as have those who invested in combined-cycle gas turbines (CCGTs). The latter only generate electricity and run best in baseload mode; utilities that banked on open-cycle gas turbines (OCGTs) have fared better as these units generate more heat than electricity. As wholesale power prices have fallen, demand for heat has kept these units in the black. The result starting in 2014 was reports about the Energiewende as one cause of bankrupt municipal utilities.

Five years later, municipal utilities have realized that they will need to focus on other core services for income; as one municipal director put it in 2019, "in the long run, profits will not be possible from sales of power and gas." Fortunately, municipalities have always provided a wide range of services, from electricity to heat supply, water, and public transportation. Now, municipals are combined these fields with smart grids and IT to assume new roles on power markets and in sector coupling.

For instance, in the Bavarian region of Franken, nine Stadtwerke have joined forces to roll out smart meters in a project called Frankenmetering. A larger example of an umbrella group for municipals is Trianel, which brings together nearly 60 utilities in Germany and neighboring countries, serving some six million people in total. Until recently, it saw conventional power as an option for the future. In 2008, it began construction of a new coal plant in Lünen, which made international headlines when it went online in 2013. But another Trianel coal plant scheduled to go online in 2012 in Krefeld was blocked by climate protesters. Since then, Trianel has positioned itself more as an energy trader, helping municipals navigate the coming digitalization of the energy sector and provide new services for the market.

The old feed-in tariffs were criticized starting in 2013 for allowing people to "produce and forget": the electricity was paid for, but these generators assumed too little responsibility for supply security. Many of the projects that municipals are now working on pertain specifically to this issue – including cooperation between utilities and citizen groups.

For instance, 24 community groups joined forces in 2014 a new organization called Bürgerwerke (a portmanteau of Bürgerenergie and Stadtwerke) – a kind of "citizen utility." The goal was to start selling renewable electricity after the era of FITs, whose end had been heralded in with the EEG of 2014. The company now brings together more than 90 community groups from across Germany and has expanded to offer such services as EV charging stations.

Other examples of community groups joining forces with municipals include the cities of Jena and Münster. In Jena, citizens formed BürgerEnergie Jena to purchase two percent of the local utility when the concession ended in 2011. The original goal was to buy ten percent, but the city did not wish to forgo so much of the revenue from the utility. The community group at least now has a seat on the board and helps determine the utility's strategic direction. Because the municipal housing authority, which rents 14,000 homes, is a subsidiary, projects include district renovation efforts for conservation and sector coupling.

In Münster, the municipal utility itself helped found the citizens group Unsere Münster-Energie in 2014. Within 40 hours of its opening, the new entity took in 1.5 million euros in citizen investments. The municipal pursued this course in order to continue developing renewable energy projects; it had just completed three wind turbines, which were now sold to Unsere Münster-Energie. Citizens were thus able to benefit from the utility's expertise; it got a small turnkey wind farm without any hassle. In return, the utility got an influx of equity and built closer relations to its customers and the community. The citizens group lacked the expertise to operate the turbines and therefore contracted the utility to perform this task. The expected return for citizens is 3.5% annually – more than most banks are currently likely to offer at such low risk. People were able to buy up to ten shares at 500 euros per share. In addition, they could provide up to 25,000 euros as subordinate loans.

In 2016, the AEE also helped create an overview of cooperation between municipals and their citizens. The examples include an early form of *Mieterstrom* in the town of Burg.

5 CITIZEN ENERGY: BEST PRACTICES

5.1 TWO VILLAGES COLLABORATE FOR DISTRICT HEAT

In Külz and Neuerkirch (population: around 500 and 300, respectively), citizens have built a 1,400 m2 solar thermal array connected to a district heat network service roughly 140 households. In the winter, two heat generators fired with wood chips cover the heat load; the wood chips are made from locally sourced residual forest timber (wood waste). In the summer, the solar array covers the entire heat load; over the course of the year, 20 percent. The effort offsets consumption of some 300,000 liters of heating oil annually.

The district heat network has six kilometers of underground pipes. Fiber-optic cables for high-speed internet were laid when the digging was done in order to save costs. At present, only 5% of homes in Neuerkirch have fossil-only heating systems.

The motivation was one found in many community projects: "The very active working groups in both towns aim to keep the bond strong and lively between the two communities," explains the local mayor. The community provides up to 4,000 euros per household for a switch to renewable heat. The funding comes from profits posted by eighteen local wind turbines.

5.2 SMART HEAT IN DOLLSTEIN

In the winter, a lot of heat is needed; in the summer, a lot of solar heat is available. How can a system run efficiently under such conditions?

In the town of Dollstein, an energy cooperative set out to solve this problem in 2011. The solution was a network of systems that allowed heat to be provided at 30°C in the summer but at 80°C in the winter, when demand is much higher due to space heating. At lower demand levels in the summer, the losses would exceed demand if the district heat network ran at 80°C.

At 30°C, a 15,000-liter storage tank is used. At 80°C, a 27,000-liter tank is added. The lower temperature is still too cold for most applications, such as hot showers, which is where the smart heat concept comes in. The low-temperature heat flows into smaller household tanks (around 300-liters, for instance), where it can be brought up to the usual household hot water temperature of 70°C by heat pumps powered by photovoltaics. Solar thermal arrays on municipal and private buildings also help the system run in the summer. To make all these options work efficiently, the large storage tanks know the temperature level of the smaller household tanks. In 2016, the cooperative completed its next project: two wind turbines.

5.3 JÜHNDE: GERMANY'S FIRST "BIOENERGY VILLAGE"

In 2005, the village of Jühnde became Germany's first "bioenergy village." It gets 100% of its electricity and more than 50% of its heat from a biogas unit powered with local energy crops. To ensure sustainability, no more than 25% of farmland is devoted to these energy crops, which are usually corn. The entire plant is consumed, not just the fruit as in ethanol production; indeed, the corn is harvested before the fruit is even ripe.

For the 50% heat target, residents had to agree to cofinance a new district heat network and replace their existing heating systems, not all of which had reached the end of their service lives. Enough people signed on to make the system feasible.

Signed on the project's tenth anniversary, the Jühnde Declaration of 2015 complains, however, that its success can no longer be repeated since the 2014 EEG made it much harder for biogas units to run profitably. What it says about bioenergy is also true for community energy projects in general: "Bioenergy projects generally start off as volunteer efforts."

5.4 WILDPOLDSRIED: THE TOURIST MAGNET OF ENERGY COMMUNITIES

The New York Times has reported on the village twice. The Economist made a video about it. And the village's website speaks of 400 groups that have visited from around the world.

Although the Economist video says Wildpoldsried produces "five times more energy than it needs", the video clearly conflates energy and electricity. Part of the village (map) has district heat; the network length is some 3.5 km. Wildpoldsried gets some of its heat from renewables, and locals still drive cars with combustion engines. But the village has combined wind power from nine locally owned turbines with biogas for power supply, and numerous roofs in the area have either photovoltaic or solar-thermal panels, if not both. The holistic thinking is truly remarkable.

The website also explains: "Wildpoldsried can thank a few 'idealists' for the success of renewables here." Today, the village in the Allgäu region of southern Germany (population 2,500) is a net exporter of green electricity. In fact, it generated roughly seven times more electricity than it consumed in 2018. Germany's Sonnen, a manufacturer of battery systems for solar power storage, calls Wildpoldsried home.

Because of its dedication to renewables, the village has been part of numerous exploratory projects. For instance, one project completed in 2018 investigated Wildpoldsried as a theoretical microgrid. There is also currently a three-year project for peer-to-peer power trading via blockchain.

5.5 FELDHEIM: A VILLAGE ON THE EDGE OF A WIND FARM

Thanks partly to its location just an hour outside Berlin, Feldheim is one of the most visited energy communities in Germany – some 4,000 visitors a year. It has also made international headlines for years, such as in the Guardian in 2012.

In 2010, it became the first energy-independent village in Germany for electricity and heat. Each household paid a few thousand for the transition, but €1.2 million came from the EU. The village has around 130 residents.

But the story started in 1993, when a student realized that Feldheim was on a bit of a plateau and offered good wind conditions. Today, the wind farm has 55 modern turbines. One could say that the wind farm produces more than 100 times more electricity than locals consume – or that more than 99% of the wind farm's production is sold to the grid.

Like Schönau, Feldheim wanted control of the local grid, but the grid operator – one of Germany's Big Four electricity companies – refused to sell. So Feldheim secured EU funding for its own local parallel grid.

In addition to wind, Feldheim has been home to a solar array since 2008 that is itself big enough to power the village net several times over. In 2015, Europe's largest grid-attached battery system was built in Feldheim.

And as with Wildpoldsried, numerous reports speak of "energy independence" in Feldheim. "Some experts believe Germany could get 100 percent of its energy from renewable sources by 2050," Deutsche Welle wrote in 2015. "That might seem like a distant goal - but it's one that's already been achieved in a tiny village in Brandenburg." It's a bit of an overstatement: Feldheimers generally drive normal cars, whereas the German goals for 2050 include mobility.

5.6 SAERBECK

The town of Saerbeck (population: 7,300) in Steinfurt county was one of two winners of the Energy Community of the Decade Award announced by the AEE in 2018. By 2030, the town aims to get all of its energy from renewables in a net calculation; the amount of green electricity exported should equal the fossil fuels still consumed for heat and mobility.

In 2011, the town took over a former Bundeswehr munition depot, where 222 kW of photovoltaics is now installed on seven buildings. A coöperative funded these arrays along with wind turbines in the Bioenergie Park. And of course, the park contains biogas units. By the end of 2017, the park alone generated electricity for 19,000 households – far more than in the town itself.

The town's other buildings also produce renewable power. In 2009, pupils from a local school conducted a survey to help determine the roof potential for solar in the town itself, which led to numerous arrays being installed. And in 2010, a new "glass heating plant" opened near the school. Via a heat network, it provides the school, a municipal sports center, and a kindergarten with heat from wood pellets. The "glass" aspect means that the facility can be viewed behind a glazed façade to further education about and awareness of renewable energy. The Bioenergie Park also operates as a learning center, offering further training and tours for visitors.

5.7 RHEIN-HUNSRÜCK COUNTY

Towns like Kappel (population: 470) have made this county – the other winner of the Energy Community of the Decade Award – not only a leader in climate auction, but also financially sound in the otherwise struggling rural county of Rhein-Hunsrück. Kappel uses local biomass to fire a biogas unit connected to a heat network run by a coöperative. A wind farm has also been built.

Two decades ago, Rhein-Hunsrück made almost no energy. In 2018, it got the equivalent of 300 percent of its power consumtion from local renewables. In 1995, the first wind turbine had been built. By 2018, the county had 271, and 60 of 131 municipalities reported revenue from wind power. A solar roof atlas was created in 2010, leading to 4,400 PV arrays in the county covering 18% of demand.

Some of this money was used to balance the budget; some, to incentivize further progress, such as a switch to LED street lights in ten municipalities. The county covers up to 30% of the cost of a solar array with battery storage.

Citizes have helped build a total of 16 heat networks in the county. And even that is not enough to accomodate more than half of the available biowaste in the county. Clearly, there is growth potential.

The county is now also focusing more on sustainable mobility, the biggest challege for rural areas. One option being discussed is shared electric vehicles.

But perhaps the most interesting thing locals have done with revenue from renewables is help finance construction of what, at the time, was Europe's longest suspended footbridge: the Geierlay Bridge. For those who can stomach the adrenaline rush, passage across the bridge is free, but the number of new tourists coming to it has brought customers to locals hotels, restaurants, and shops. And from the bridge itself, you can marvel at the wonders of technology – the wind turbines themselves – that helped fund the bridge.

Figure 9 Geierlay Bridge. Source: Gilbert Sopakuwa, CC BY-NC-ND 2.0

6 CONCLUDING THOUGHTS

Community energy is multifarious. Hardly anyone openly opposes it; who could be against communities? Rather, the strongest criticism is that it is fine in and of itself but can never cover a large part of total energy supply – and that citizen projects can't do everything. Both of those things may be true; it certainly is true that the renewable technologies built by community groups in the 1990s are now big industry. And another thing has changed: the energy firms that once ignored renewables now want to drive the transition themselves.

Yet, even as energy markets become more complex, the list of things that community projects haven't done yet continues to shrink. More importantly, if it's true that citizen groups can't do everything, the reverse is also true: we can't do much without communities, as evidenced by the current blowback in Germany against wind farms developed without community leadership.

Nonetheless, "community energy" is hard to define, a classic example of "I know it when I see it." German policymakers have attempted to define it in law – to few people's satisfaction. Researchers have fared no better: the famous 2013 Leuphana study also split Bürgerenergie into two categories: "narrowly" and "broadly" defined.

Policies to support community energy are diverse, and concepts are not always easy. Sometimes, there is a bottom-up push; if not, top-down policies struggle to foster grassroots engagement. German FITs are a great example: they were exported to numerous countries in the hope of recreating grassroots renewable projects everywhere. But the German law didn't create Germany's grassroots movement; the movement created the law. And thus, copying & pasting German FITs has often benefited established energy sector players who monitor policy changes; citizens not calling for the opportunity to make their own energy before the law was changed are not necessarily interested in the new freedom when they get it (see the example of Ontario).

The cost of distributed electricity is often found to be higher than electricity from central clusters connected by longer power lines. In return, the exact benefits of community energy are hard to quantify. On the one hand, there is general agreement that local value is created in community projects, but few studies have been conducted to put hard numbers behind these assumptions, and the numbers in one study can be hard to compare to another. Who exactly benefits? Are inequalities worsened? Likewise, the main benefits of community energy probably lie outside the energy sector in things hard to measure as numbers: trust in the political system (not populist revolt), knowing your neighbors (not loneliness), volunteer civil engagement (not apathy), and social cohesion (not divisive tribalism).

Of course, we should refrain from projecting all our hopes into community energy lest we overburden such projects. At the same time, we should also recognize their potential beyond mere energy production and climate action. Energiewende policymakers have justifiably focused on reducing costs in recent years, and the cost of renewable energy is now lower than anyone would have expected a decade ago. Trust and social cohesion? Also lower.

Community energy therefore still has an important role to play in the coming decades even though renewables have now become big industry. Indeed, most of the things that still need to be done will require group, not individual "prosumer" effort.

To come back to the David Brooks quote: If we want to heal the rifts in our increasingly divided societies, we can give the public a project to build – the energy transition. Communities are where citizens engage.

LESSONS LEARNED

1. Allow community energy projects to be built outside of auctions in line with EU state aid rules.
2. Anticipate "gaming" when defining exemptions for community groups in the law:
   a. the minimum number of locals involved should be large;
   b. the geographical scope of those qualifying as local should be wide; and
   c. the design of shareholding and voting rights should prevent capture by large individual investors in order to protect small investors.
3. Do not restrict the size of community projects unnecessarily.
4. Establish a revolving fund to cover losses from early activities (feasibility studies, permits, etc.).
5. Create a one-stop consulting shop to provide community groups with expertise and to act as a single entry point for applications.

7 RECOMMENDED READING

The following is not an exhaustive list of the URLs used in this paper (please simply click on the links above to access them from the PDF version of this document). Rather, the works below are recommended for further reading and/or not otherwise available online. Please also note, if you do not read German, that many of the sources used above are in German PDFs and hence not easily machine-translated.

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