

The shift from feed-in-tariffs to tenders is hindering the transformation of the global energy supply to renewable energies

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Hans-Josef Fell, *President of the Energy Watch Group (EWG) and Senior Advisor at DWR eco, served as Member of the German Bundestag from 1998 to 2013. As author of the Renewable Energy Sources Act (EEG), he laid the foundations for Germany's world-renowned energy transition, formulating for the first time ever the basic principles of economically viable feed-in tariffs. He has also made major contributions to the improvement of framework conditions for renewable energy on both the European and global level. His expertise makes him an internationally popular speaker at conferences and conventions on energy policy issues.*

Ralph Tigges, environmental scientist and project assistant at the Energy Watch Group, provided scholarly support and legwork.

1. Executive Summary

More and more national governments are transitioning from successful fixed feed-in tariff models to tendering schemes as the means of promoting renewable energies (RE). Yet the disadvantages of tenders, which operate like instruments of a planned economy, are varied, significant, and long known. To cite a few examples:

- Tenders massively curb the expansion rates of renewable energies and thus unnecessarily jeopardize climate protection.
- In the tendering model, expansion volume and tender design are determined exclusively by the state, hindering free market forces from accelerating renewable energy growth and new innovations.
- Tenders reduce the diversity of actors; private investors, energy cooperatives, and SMEs in particular are virtually barred from making offers given the high application requirements.
- Tenders help cement the market power of oligopolies by large corporations and established energy industry companies, thereby diminishing competition.
- Tenders decrease local public support for renewable energy development by excluding local communities from investment and project planning.
- When tenders replace feed-in tariffs for decentralised civic investments, investment volumes sink because a large number of decentralised, small investments are eliminated. Calls for tender do not promote advanced decentralised solutions, particularly for grid integration and sector coupling.
- Overall, tenders slow the cost reduction of renewable energy technologies: according to the learning curve, specific investment costs decrease only with further increases in market volume; since calls for tender are intended to cap the market volume and keep it lower than it would be with feed-in tariffs, they contribute to a considerable slowdown in the cost reduction of renewable energies.

- Non-transparent procedures and government procurement practices encourage corruption.

For large investments with individual plants over 100 MW, tenders can be quite useful. They give the state the opportunity for targeted intervention – so that it may, for example, promote grid integration or attract large investors. At the large scale, SMEs, energy cooperatives, and private individuals cannot raise adequate financial resources anyway.

Suggestions for national policy: Up to a capacity of at least 40 MW, state support for renewable energies should continue to be based on or return to a basis in fixed, legally guaranteed feed-in tariffs. Should tenders under 40 MW also be desired, energy cooperatives should at least be exempted from the obligation to tender.

Given that the innovative power of feed-in tariffs is considerably higher than that of tenders, new tasks such as grid integration and sector coupling should be addressed with feed-in laws. A *combined power plant remuneration*, which has not yet been implemented anywhere in the world, seems particularly well suited. In this way, the goal of 100 percent renewable energies can be reached quickly and democratically. Furthermore, an approach without arbitrarily set expansion caps and proscriptive tender designs will promote stakeholder diversity and thus create space for additional sources of investment and innovation.

Though many scientific analyses and political experiences of the past two decades have confirmed that tendering schemes produce the negative consequences mentioned above, the German government, along with other governments and the European Commission, have been working increasingly since 2010 for the transition from fixed feed-in tariffs to tenders. Given the negative effects of tenders, those who nonetheless champion them must be driven by other goals and motivations not usually communicated to the public. Curbing the expansion of renewable energies works directly in the interest of the coal, natural gas, oil, and nuclear industries. With every slowing down of renewable energy expansion, with every state-imposed cap for renewable energies, the revenues from fossil and nuclear power plants are sustained for longer. Political support for tendering is thus best understood as a means for protecting the interests of the old energy industry to the detriment of the global climate.

2. Introduction

2.1. Current Situation

In recent years, many governments have increasingly moved away from administrative feed-in tariffs and towards tendering schemes as the preferred strategy in the development of renewable energies. In the 1990s, the UK was one of the first countries to accept bids from electricity producers for certain electricity volumes from specific energy sources at fixed prices as part of its Non Fossil Fuel Obligation (NFFO). In 2009, at least nine countries implemented tenders to promote the expansion of renewable energies. One year later, the number was already up to 21 and in 2013, it grew to 44 (IRENA 2013). At the end of 2015, the latest Global Status Report 2016 identified a total of 64 countries using tenders (REN21 2016). The popularity of tenders still lags behind that of feed-in tariffs, but it's rapidly catching up. At present, administrative feed-in tariffs are still used for about 75 percent of photovoltaic projects and 45 percent of wind projects globally (Yan et al. 2016).

In 2017, projects with a likely total of 5,100 MW of renewable energy sources will be awarded by tender in Germany. Other countries – India, for example – have already distributed a large number of project surcharges through tender this year. And even prior to this year, renewable energy projects totalling up to \$4 billion were selected in Mexico, while Dubai's Electricity & Water Authority recently awarded an 800 MW large-scale project by tender.

A survey of experts in the renewable energy field shows that in the past decade, fixed feed-in tariffs were seen as the most efficient regulatory measure in the energy sector. And yet more and more of these experts are predicting – based on no scientific evidence whatsoever – that the importance of feed-in tariffs will diminish in the coming years and that of tenders and intelligent net metering grow (REN21 2017).

While there are slight differences between the different types of feed-in tariffs, they all share the same core idea of remuneration to ensure the chance of profitability for investors. This is achieved either by means of a fixed compensation or a sliding premium paid to energy producers on top of the current electricity price. Tenders and auctions work the other way around: the government sets a maximum expansion capacity or budget, and the final remuneration is determined by the results of the tender.

The main objective of this paper is to compare feed-in tariffs to tenders and auctions. Both types of quota-based principles will be referred to below as “tenders,” and no explicit differentiation will be made between the various types of feed-in tariffs.

What are the reasons for this accelerated shift towards tenders and away from feed-in tariffs, which have successfully fed thousands of megawatts of green energy into the grid over the last few years? Mohit Anand, senior analyst at GTM Research, sees a clear link to the financial crisis and the large deficits it produced in many European countries (Warren 2016). But the search for austerity measures is not the only reason for the shift. The possibility for governments to artificially limit the expansion rate of

renewable energies according to their own desires and thus to protect conventional energy producers seems to be an even more important factor.

Some experts in the field, such as Joachim Falkenhagen, are sceptical about making direct comparisons between the effectiveness of feed-in tariffs and tenders. Due to the large number of variables at play and the lack of consistent framework conditions during transitions from one model to the other, he can identify no clear advantages or disadvantages to either model (Falkenhagen 2017).

Current developments, however, demand a more thorough consideration of the effectiveness and impact of tenders, the emerging strategic policy instrument of choice for the expansion of renewable energies. The following pages will provide an analysis of the tendering obligation for small and medium sized projects up to a total output of 40 MW versus remuneration through feed-in tariffs.

2.2. Historical context and experiences

Demands for tenders, once referred to as quota schemes, instead of fixed feed-in tariffs have always been made by representatives of the fossil and nuclear energy industries; they are as old as the EEG itself.

In tendering schemes, the bidder with the lowest bid is awarded the tender; in quota schemes, on the other hand, the remuneration consists of the price of electricity and the certificate. It is precisely this that generates a great deal of economic uncertainty for producers. Quota and tendering models are primarily introduced when the state wants to set an upper limit for the expansion of renewable energies; the quantities are then to be met at the lowest possible price (Fell 2013). But caps always lead to weak expansion volumes, far below what could be achieved through entrepreneurial power and society's expansion volumes; they thus hinder the rapid implementation of a zero-emission economy to protect the climate.

Under the feed-in tariff principle, by contrast, the state specifies only that the expansion of renewable energies allow investors to make a profitable investment. Without this assurance, competitive distortions from the nuclear and fossil energy industries could not be overcome. Even today, the old energy producers retain a variety of competitive advantages. External damage costs (air pollution, climate damage, nuclear waste disposal, etc.), for example, are not or not fully transferred to the polluters themselves, but borne by taxpayers. In addition, subsidies have been historically high and are currently massive; in Germany alone, they come to more than 3.2 billion euros annually for the coal industry (ODI 2017). Nicholas Stern, former chief economist of the World Bank, has not unjustly asserted "that climate policy is the best economic policy: it costs only about one percent of the global GDP, whereas forgoing it could cost up to 20 percent." He sees in its foundering the greatest market failure of all time (Vorholz 2006).

Even before the turn of the millennium, Hermann Scheer, former Member of the German Bundestag and President of EUROSOLAR, and I spoke out against the introduction of quota schemes and in favour of feed-in tariffs for electricity from renewable energies (Scheer 1998). In the following decades, both Scheer and I reiterated this call, pointing out that with a fixed quota for renewable energies and

corresponding calls for tender, the electricity companies could exploit their financial clout against new, independent providers and regain their investment monopoly (Scheer 2006). Scheer warned that “if a change in government results in the abandonment of the current guaranteed purchase, it will fast bring to a halt the expansion of electricity produced from renewable sources” (EUROSOLAR 2005). By now, it’s become clear that with the introduction of tenders, the guaranteed purchase was basically abolished for those who couldn’t win the bid. Scheer foresaw the truth to come: investments outside the tendering volume are now virtually non-existent since the guaranteed purchase is limited only to electricity from the tender volume provided that there are not parallel feed-in tariffs in other segments.

In neighbouring Denmark, Preben Maegaard – Danish pioneer, author, and expert in the field – was another early voice against tendering. The decisive argument against the quantity-based tendering model, he contended, is the official determination of a specific upper limit for renewable energies and the uncertainty as to whether or not it will be extended by political decisions (Maegaard 2001).

By the start of the 21st century, it was clear that only those countries that had decided early on in favour of feed-in tariffs – Spain, Germany, and, until 2000, Denmark – were able to achieve real successes. Other countries, by contrast – the UK, Ireland, and France – harnessed significantly less wind energy despite higher potentials (Fell 2003). The UK, for example, despite boasting higher wind potential than Germany, didn’t manage to bring as much power to the grid: a mere 7 GW were installed on the British Isles by late 2011, while in the home of the energy transition, the number was four times as high and achieved at much lower cost – about €0.07 per kilowatt hour as opposed to €0.13 in the UK. The reason for this discrepancy is that in the UK, tenders were used, thus limiting from the get-go the circle of potential suppliers to large companies with high yield expectations (Fell 2012).

In its 2005 report, the European Renewable Energies Federation (EREF) determined that countries that had implemented minimum pricing systems were able to expand their green energy faster and at lower cost than countries using quotas. As a result, many more new jobs were created and increased regional added value was achieved (Bechberger & Reiche 2005).

In 2008, the European Commission issued a working document that found well developed feed-in tariff systems to be generally the most efficient and effective model for promoting renewable energies. It also called for high priority to be placed on eliminating administrative hurdles and ensuring accessible network access for renewables (EC 2008).

In summary, the experiences and scientific findings of the last two and half decades have already clearly shown that feed-in tariffs have a positive effect and accelerate the expansion process towards 100 percent renewables. Tenders, by contrast, can lead only to comparatively less successful results.

2.3. European perspective and legal framework

Despite these clear scientific findings and many years of experience with both models, the European Commission (EC) has for years been pressing EU member states to replace their well-functioning administrative feed-in tariffs with tenders.

Here, too, as so often in the political sector: when political actions are taken in direct opposition to clear and overwhelming findings, then unspoken motivations and interests more dominant than the state of empirical knowledge must be at play. It can only be assumed that the conventional energy industry lobby is so dominant that in direct opposition to the state of knowledge, tenders are being implemented by the European Commission and, increasingly, by nation states within Europe and beyond. It is, after all, clear that tenders slow the expansion of renewable energies and thus serve the interests of the old energy companies twice over: on the one hand, business based on climate-destroying fossil energy can be prolonged, and on the other hand, the progress of many new players in the energy sector is hindered to the benefit of the energy oligopoly.

The European Commission's main justification for its decision is that a well-planned tender leads to the greatest possible level of competition, which renders visible the true costs of individual projects, promoters, and technologies. This in turn leads to a cost effective level of minimum support necessary (EC 2013).

This argument is simply wrong and is refuted by the Commission's own findings in its working paper (EC 2008). Sustained protest against these plans on the part of the renewable energy community, however, has so far been unsuccessful – a clear indication of the strength of the conventional energy industry lobby and the powerlessness of the RE community, which consists of industry associations, environmental associations, and green political actors.

The Commission does, however, provide possibilities for exemptions for smaller plants; these proceed from a written reply from Brussels to a request of the German Wind Energy Association (BWE). The reply clearly confirms the vague formulation used in the Commission's Environmental and Energy Aid Guidelines 2014-2020 (EC 2014) and acknowledges the possibility of exemption from the tendering obligation for projects with a maximum limit of 18 MW of installed capacity. The aim is “to promote demonstration facilities as well as small and medium sized facilities for local and non-industrial use and to free such projects from administrative burdens” (Vestager 2016).

The wind energy industry welcomed the Commission's de minimis regulation, even though it had hoped for a higher maximum limit of 36 MW (IWR 2016). This interpretation was also supported by Germany's Foundation for Environmental Energy Law, which contends that “German lawmakers who draft the next EEG will be on the safe side of the guideline requirements if they exempt wind energy projects with six generating units and an output of up to 36 MW from the obligation to tender” (Münchmeyer & Kahl 2014).

The authors of an Institute for Advanced Sustainability Studies (IASS) working paper also recommend that “to maintain the diversity of participants in the tendering process, the de minimis rules granted by the EU must be fully exploited” and “to

minimise the risk of refinancing facilities and involve small players, sliding market premiums should continue to be put out for tender.”

Legal experts see things similarly and contend that “within de minimis limits, member states [have] leeway to continue working with administratively fixed volumes of electricity from renewable sources if they wish to do so politically. Thus in terms of preserving a diversity of actors, it is quite appropriate to exclude smaller projects from the switch to tenders within the European de minimis limits and in accordance with the aid guidelines” based on the fact that the preservation of stakeholder diversity was expressly enshrined by lawmakers in the Basic Principles of the Law, Sec. 2, Para. 5, Page 3, EEG 2014 and thus must also be observed in decisions by non-legislative regulatory authorities (Kahl et al. 2014).

As to the fundamental question of whether or not the Commission’s aid guidelines are legally mandatory on the national level, the IASS has the following to say: “Since the guidelines are only relevant for actual aid, and the German federal government takes the view that the EEG’s subsidy mechanism does not meet the definition of state aid as provided in Article 107 (1) Treaty on the Functioning of the European Union, it’s questionable to what extent the guidelines apply to German legislators at all.” Thorsten Müller, Chairman of the Board and Research Director at the Foundation for Environmental Energy Law, is even more explicit. For him, “there is no need to introduce tenders from a legal perspective” (Müller 2014).

As early as 2001, the European Court of Justice (ECJ) confirmed that German feed-in tariffs complied with European competition law in its precedent-setting *PreussenElektra* ruling. In its reasoning, the court stated that “the use of renewable energy sources for producing electricity, which a statute such as the amended *Stromeinspeisungsgesetz* is intended to promote, is useful for protecting the environment in so far as it contributes to the reduction in emissions of greenhouse gases which are amongst the main causes of climate change which the European Community and its member States have pledged to combat” and invokes, among other things, the Kyoto Protocol (ECJ 2001).

The ruling rightly points to the necessity of reducing greenhouse gas emissions; these and other external damage costs of conventional power generation have not been sufficiently internalised thus far by existing regulations. In this respect, the introduction of feed-in tariffs provided a first equaliser and thereby created an investment basis for renewables. This argument was further strengthened by the international Paris climate accord of 2015.

And yet on the European level, in opposition to all scientific evidence, there has been a strong commitment to tendering for years; the European Commission in particular has tried to implement its political pro-tender stance in the EU member states – even without clear legal legitimacy.

2.4. Synopsis of the political situation in Germany

Back in 2015, the Green Party faction in the German Bundestag demanded that the “automatic introduction of tendering models, anchored in the EEG for all green electricity technologies starting in 2017, not be implemented” and that instead, “the latitude of the EU aid law be exploited in order that the diversity of actors involved in the development of green electricity continue to be ensured” (DB 2015). The Greens received parliamentary support from The Left, which also invoked the guidelines of the European Commission in its motion for a resolution on the abolition of tenders, arguing that “the change in remuneration to tenders threatens to destroy the diversity of the stakeholder structure for renewable energies, including smaller, regional investors like community energy cooperatives and municipalities, and instead lead to a market concentration of numerically fewer large-scale transregional investors” (DB 2016). In other words, the entire opposition in the German Bundestag vigorously objected to the bill amendments introduced by the reigning CDU/CSU/SPD coalition.

But in spite of prior experience, expert recommendations in committee hearings, and political pressure from the opposition, the CDU/CSU/SPD majority in the Bundestag maintained its ground, calling the Commission’s *de minimis* regulation “not sound, since it also covers many actors that are not subject to protection within the framework of the tender. A considerable number of large developers are also building and developing wind parks with fewer than six plants. Relevant parts of the market could thus fall outside the competitive determination of the aid amount. This would be contrary to the goals of introducing tenders. Furthermore, there is reason to fear that wind parks would be strategically sized; this could lead to a situation in which good and economically efficient potential for developing wind energy is not exploited or larger wind farms are strategically divided into individual companies and thus bidders” (BMW 2015).

Some representatives of the old energy sector have made similar arguments. The German Association of Energy and Water Industries (BDEW), for example, the lobbying arm of the old energy industry, dominated by energy oligopolists, supports the federal government’s decision. For the BDEW, “the introduction of tenders represents a real step towards market integration of renewable energies, because market integration means not only reacting to the price signals of the general electricity markets, but also determining electricity production costs (full costs) in competition.” The BDEW thus calls for an “abolishment of exemption limits or at least a drastic reduction” (BDEW 2016).

That the BDEW, lobby of the fossil and nuclear energy industry, has a particularly large influence on policy can be seen from the response of the German government to a recent enquiry of The Left faction in the Bundestag. The old energy giants RWE, Eon, Vattenfall, and EnBW are by far the most frequent lobbies to visit the Federal Ministry for Economic Affairs and Energy and the Federal Chancellery. By comparison, there have been far fewer appointments with representatives from the renewable energies industry in recent years (Kreutzfeldt 2017).

In Germany, then, the recommendations of the European Commission (and the fossil and nuclear energy companies) for a system change towards tenders are on the

whole being followed, while the possibility for exemption regulations to protect small, financially weaker actors has been ignored, despite political pressure.

3. Main effects of abandoning feed-in tariffs

The following discussion will (a) show that many potential actors are being excluded from participating in the development of renewable energies, (b) examine more closely the pace of development, and (c) reveal the myth of the tendering model as the best instrument for long-term cost reduction. It will conclude with concrete recommendations for strengthening a decentralised approach to the energy transition so that a future without fossil fuels or nuclear power may be achieved. The discussion is deeply influenced by experience of the German energy transition, which has played a pioneering role in the international community.

In 1990, Germany was one of the first countries in Europe to implement feed-in tariffs and successfully promote renewable energies. After the introduction of the Renewable Energy Sources Act (EEG) in 2000, Germany attained a kind of role model function in the world. Indeed, the foundations for the successful development and cost reduction of renewable energies around the world were initially laid by Hans-Josef Fell in his 1999 issue paper for the Greens, where he proposed principles for feed-in tariffs that would eventually be included in the EEG and implemented in Germany for the first time anywhere in the world (B90/Grüne 1999).

3.1. Actors

One of the main arguments in favour of fixed premiums is that they enable fair opportunities for active participation in reaching the goal of 100 percent renewable energy for every possible actor, whether citizen, local community, medium sized company, or multinational corporation. The same cannot be said of tenders, which deliberately exclude many potential participant groups (WWEA 2016). According to an IASS report on international experiences with tenders, the participation of small actors is very unusual (Bayer et al. 2016). Strict requirements, financial hurdles, and discriminatory framework conditions prevent many potential actors from submitting a bid at all. The consequence is a seemingly free market that is in fact marked by unfair conditions, limited to a small number of participants, and an even smaller number of beneficiaries, most of which are already well established companies or large, financially powerful corporations (Farrell 2010).

As one study has shown, projects in South Africa tend to be very large, which has already led to a concentration of a very few industry players on the local wind market (Eberhard & Käberger 2016).

Lessons could already be drawn from the first round of tenders in Germany's solar sector in April 2015 (Fig. 1). A total of 25 winners were selected from 170 bids submitted, and not one of them was a citizens' cooperative, other type of cooperative, or individual project. Instead, all selected bids originated exclusively with major corporations and professional project developers (GmbH & Co. KG, GmbH, AG/SE). An abrupt end was thereby put to the federal government's much vaunted actor diversity.

The results of the second round of tenders a few months later confirmed the trend (AURES 2015).

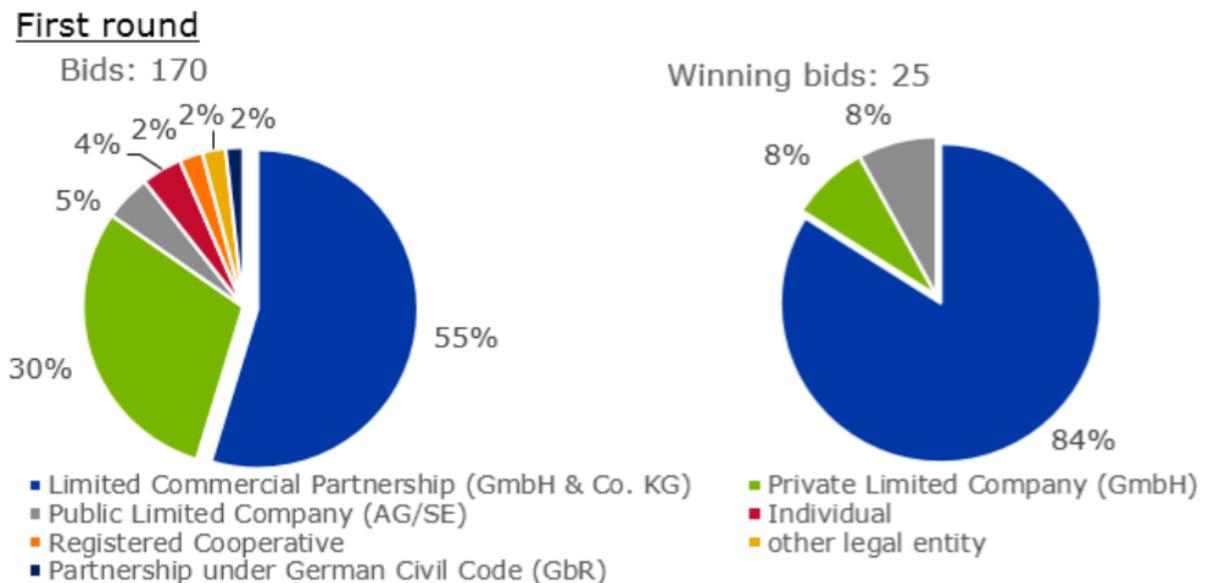


Fig. 1: Comparison of participating actors in the first round of tenders for the German PV sector. AURES (2016), based on data from the Federal Network Agency 2015.

With a handful of exceptions, newcomers and citizens' initiatives have virtually no chance in the tendering model. Europe is currently home to about 3,000 renewable energy cooperatives, or REScoops (Leidreiter 2017), which during the first four calls for tender for solar plants in Germany represented a mere 0.22 percent of the proposed offers based on installed capacity.

In particular, it is the risk of project failure and the associated financial penalty that make participation in the tenders virtually impossible for citizen initiatives (DGRV 2015). Claudia Kemfert, German economics expert in the fields of energy and environmental protection (Kemfert 2016), shares this view. Similar observations have also been made internationally – in Japan, for example, where many citizen energy projects were denied access to the grid after a change in the feed-in tariff law (ISEP 2017).

Another disadvantage of tenders is that in special cases, bribes may be a factor for relevant decision-making bodies or influential individuals. Large-scale projects with high investment volumes through government tender are by nature more liable to corruption than small, decentralised applications. Even when the entire process proceeds in an orderly and corruption-free manner, a non-transparent process can never lead to the same level of acceptance as a consistently accountable aid concept open to all possible actors such as the feed-in tariff.

A prime example of social commitment to the expansion of renewable energies is the citizens' project Windpark Zeewolde in the Netherlands. Here, more than 200 people have joined forces to create a mega wind park with a total of 93 turbines, an investment volume of 400 million euros, and a target output of 1,000 MW (Morris 2017). To put the

dimensions into perspective, consider that the country's total installed wind power amounted to 4,328 MW in 2016 (WindEurope 2017), while the largest facility in neighbouring Germany, the Stößen-Teuchern wind park, boasted just 177 MW total output. The mammoth project was made possible above all by the persistent will of the Dutch people. The Dutch government, through its Stimulerend Duurzame Energieproductie (SDE+) program for expanding renewable energies, is helping to ensure that the community project remains economical. State support in this case operates by means of dynamic subsidies to balance electricity generation prices and current market prices (NEA 2017). This is not, however, a classic feed-in tariff, since the SDE+ defines a fixed annual budget for all renewable energies, with the annual total always determining the budget cap for all renewable energy producers. Bidders compete for the surcharges on the basis of their electricity production costs. As Dutch wind turbine manufacturer Henk Lagerwey reports, a drawback to this approach to tendering can already be seen. "In the first years of SDE, the budget was used up quickly for large projects," he reports. "But many of these projects have still not yet been built" (Bah 2015).

The Dutch example shows clearly that it was not state tenders that helped get the large civilian energy project off the ground, but rather the political and social pressure brought to bear by the people themselves in order to receive adequate support for their civic investment.

It's true that in the last round of German tenders for land-based wind farms, 93 percent of the bids went to citizens' energy cooperatives (BNetzA 2017b), but this will remain the exception, not the rule. Many of the civilian projects this time around were, after all, already highly advanced – they'd been working at local wind farms for a long time and could no longer be implemented under the old EEG. But there will be fewer and fewer cases like this in the future, since there are virtually no new citizen wind park start-ups – the hurdles to participate in tenders are simply too high for newly founded civic cooperatives.

These tendering results provide a more accurate evidence of the slowdown in and reduction of investment volumes: 256 bids over 2,137 MW were submitted, but only 70 offers with 807 MW were awarded contracts. In other words, feed-in tariffs lead to significantly higher expansion volumes, which are imperative for climate protection. The willingness and commitment of many actors, some of whom are championing the energy transition on a volunteer basis, were bitterly undermined by the non-allocation of the bids. Only some will try again; many will give up in disappointment. In six federal states, either no contracts whatsoever (e.g. in Baden-Württemberg) or just a few contracts (e.g. just two in Bavaria) were awarded (Dehmer 2017). In some states, in other words, wind power expansion will be stopped altogether for the moment and drastically reduced in the future.

These experiences demonstrate that it is much more difficult for small actors such as citizens' energy cooperatives to participate in the development of renewable energies under the tendering model – despite the fact that, as the Dutch example of

Zeewolde and the massive participation in the last German tendering round show, the will and commitment of the people is there.

3.2. Pace of expansion

A national government guarantee to financially support any type of renewable energy production for a period of time by means of fixed feed-in tariffs generates security and trust. Investment in renewable energies thereby becomes not a risk, but a solid investment with calculable returns. And yet governments are pushing more and more for tenders, primarily, it seems clear, to protect the stock of fossil and nuclear plants. By introducing tendering requirements, the state can freely control the expansion of renewable energies and thus sustain the use of the old coal and nuclear energy carriers more than is ecologically and economically sensible. The state thereby becomes the driving force of the economy, with a pure and furthermore unsuccessful planned economy as the result. Accurate target quantities are defined and distributed through state tenders rather than left to market forces, and the free market economy is basically overridden – the exact outcome that all major political parties want to avoid.

All this is highly reminiscent of China's Five-Year Plans for economic development. But even the Chinese government has recognised that feed-in tariffs are more promising than tenders. Indeed, the introduction of such tariffs for the expansion of wind power plants in China led to a significant exceeding of the expansion targets. It also ensured the introduction of a feed-in tariff for photovoltaics in 2011 (Fell 2012). China may currently be experiencing a shift towards more tenders, but only for large projects; this year, as announced in the current Five-Year Plan, about 30 percent of the targeted 18.1 GW expansion of solar photovoltaics will be distributed through the state allocation system, while feed-in tariffs will be further cut with the goal of potentially doing away with them altogether by 2020 if grid parity has been achieved. In the coming years however, the Chinese government will retain feed-in tariffs for most plants in order to achieve its solar energy target of 110 GW by 2020, mainly because it has recognised that promoting decentralised facilities accelerates the overall expansion of renewable energies (Haugwitz 2016).

Many development costs and labour hours are lost when a bid is rejected under the tendering model. In the first German tendering round of 2017, almost 70 percent of the bids were rejected, in spite of low prices, because the limit imposed by the federal government on the expansion of photovoltaic plants was significantly exceeded. In addition to stranded investment costs, this model thus also leads to a significant slowdown of renewable energy expansion because caps are set far too low compared to the available investment funds.

Ironically, the opposite issue – targets set too high – is also problematic and, in the case of too few bids, could result in the scrapping of entire projects so that not a single facility is built, as was the case with Indian electricity provider TANGEDCO.

Andreas Wagner from the German Offshore Wind Energy Foundation describes the tendering model for sea-based wind turbines as “cold expropriation” (Wagner

2017). During the first round of tenders in 2017, successful bids were almost exclusively those with zero cent per kilowatt hour subsidy support (BNetzA 2017a). Industry experts are extremely apprehensive about this development and see problems with the legislation. Given the virtual elimination of subsidies, they consider the chances for realisation of the selected projects very uncertain. Once they've secured the rights to plant construction, companies can spend the next few years deciding whether or not they want to use those rights or simply let them expire under unfavourable conditions. This "blockade strategy" slows down the development of renewables even further, since it increases the likelihood that only a fraction of projects will actually ever be implemented. Facilities will only be built if it is economically worthwhile to do so, which will only be the case if costs fall further and/or stock prices rise (Falkenhagen 2017, Meyer 2017). No wonder the president of the German Wind Energy Association describes tenders as "highly speculative instruments" that have supplanted the "reliable instrument of the EEG" and can only be used by large corporations (Albers 2017).

In addition, uncertainty still remains as to whether or not developers can deliver what they promised in their bids. The IASS, for example, has found that only between 14 and 41 percent of all projects awarded through tenders in Brazil and South Africa were completed according to the given timetable – and that only because financial penalties could be incurred in case of lapse (Bayer et al. 2016). But the threat of punishment alone is no guarantee for project realisation. Case studies have shown that comprehensive completion of projects is only rarely achieved, and delays are not isolated cases. Thus in France, Italy, and Brazil, for example, less than half the planned projects have actually been implemented within the indicated timeframe (AURES 2016).

Through tenders, the possibilities for expanding renewable energies are limited depending on political will, which thwarts the transformation of the energy system to 100 percent renewable sources. Maximum targets, particularly when they're set low, are not effective instruments for the expansion of renewable energies, but rather protection mechanisms for investments in fossil and nuclear energy production (Fell 2013).

3.3. Comparison of costs

Advocates of the tendering model argue that their method leads to the highest possible level of competition and consequently to the lowest costs (BDEW 2016). The question remains, however, as to whether the change from private to public tenders actually leads to lower costs.

It is often overlooked that tenders are also issued under the German EEG – not by the public authorities, but by the project operators of green power plants – and that this is a decisive factor for innovation, leading to competition among plant providers for the best technologies and cost reductions without limiting the total sales volume of electricity (Fell 2013). The EEG, in other words, has done much more to promote competition and free market economic forces than do public tenders, whose criteria are determined by state officials who aren't at entrepreneurial risk.

Indeed, renewable energies have experienced an extreme price decline in the past few decades and are now cheaper than conventional energy sources; there has been

a significant cost reduction for decades. Environmental engineer Uwe Nestle of EnKliP has shown that since early 2004, the ongoing cost reduction for free-standing photovoltaic plants has occurred exclusively by means of promotion through fixed feed-in tariffs (Fig. 2).

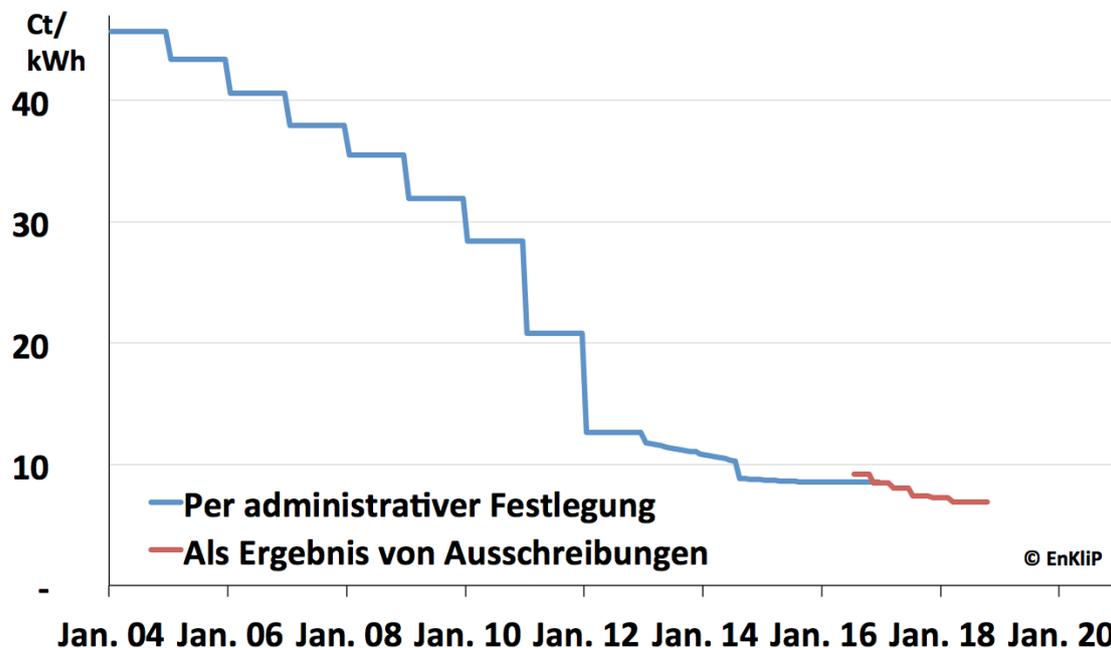


Fig. 2: Comparison of the reduction of EEG remuneration for electricity from photovoltaic systems resulting from administrative decision (until the end of 2016) and resulting from tenders (for plants put into operation from mid-2016 onwards). It is assumed that successful projects go into operation an average of 15 months after winning a bid (own account), Nestle (2017).

The high costs of the early days of promoting the technology have long been overcome – without tendering models, no less. Since prices have already been fixed until late 2018, the direct comparison also shows that in both cases, insofar as providers keep their promises, a continual drop in prices can be observed. Put another way, there is no advantage or faster reduction in costs achieved through public tenders compared to feed-in tariffs.

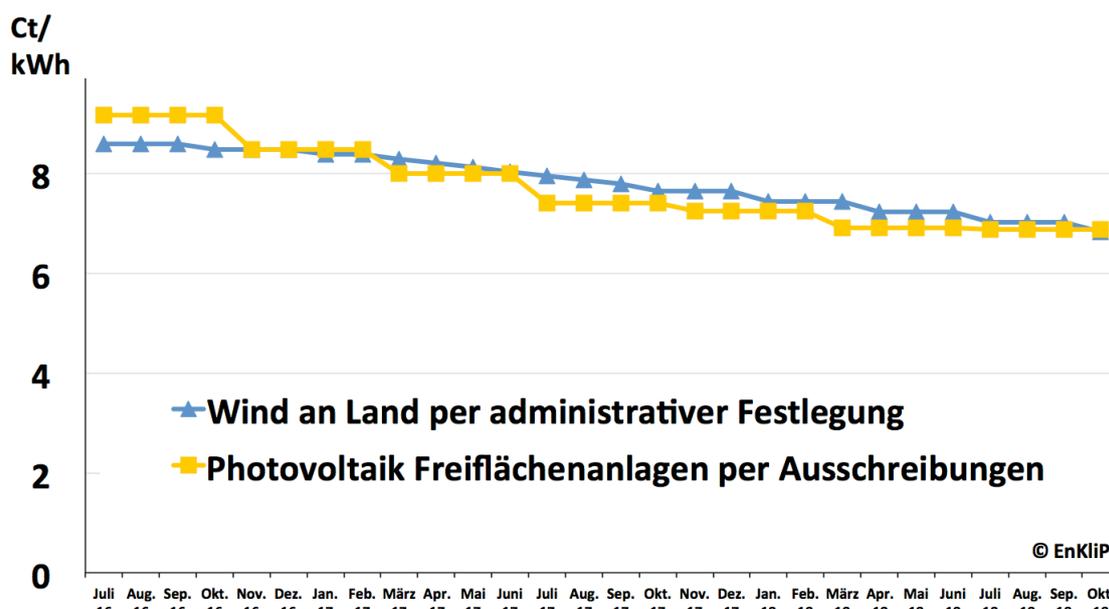


Fig. 3: Comparison of the reduction of EEG remuneration for land-based wind energy installations resulting from administrative decision and the reduction of remuneration for ground-mounted photovoltaic systems resulting from tenders. It is assumed that successful projects go into operation an average of 15 months after winning a bid (own account), Nestle (2017).

A direct cost comparison (Fig 3.) of ground-mounted photovoltaic systems promoted through fixed contributions and land-based wind farms established through tenders shows no discernible difference: the cost curves sink at almost exactly identical speeds. This is easy to explain. Cost reduction proceeds along the so-called learning curve along with technological advances; after that, the prices of the new technology fall with the size of the market volume. Prices will thus also fall in a market supported by feed-in tariffs because market participants search among themselves for the best cost-benefit ratio by way of private tenders. This effect can't be achieved to the same optimal degree though a public tender as it can under free market conditions since public tenders are designed by public officials who, as previously mentioned, do not take on any entrepreneurial risk.

A similar view is taken by other researchers who tend to attribute the cost reduction exclusively to falling technology costs for renewable energies in recent years (Toke 2015). The IASS confirms this conjecture and sees price alone as an insufficient indicator for making an informed statement as to whether or not tenders really lead to lower costs in the long term (IASS 2014).

When considering large and mega projects, however, tenders can represent a sensible option (Grau 2014). This is confirmed by India's Council on Energy, Environment and Water, which is planning to introduce tendering for future large-scale projects while simultaneously maintaining fixed remuneration for decentralised approaches, such as roof-mounted solar systems in several regions of the country (Chawla 2017). For more innovative technologies not yet ready for the market – tidal systems, for example – fixed feed-in tariffs currently offer the greatest incentive for development (Hinrichs-Rahlwes 2017).

Quotas and state tenders are methods of a planned economy that do not bring with them any significant successes for the expansion and cost reduction of renewable energies. Cost reduction is achieved only through advances in technology along the learning curves developed by Winfried Hofmann, also known as “price-experience curves” (Fraunhofer ISE 2017). According to these, investment costs drop with an increase in global market volumes, meaning that tenders not only fail to promote the desired drop in prices for renewable energies, but actually hinder it insofar as they lead to reduced market volumes compared to fixed feed-in tariffs.

4. Conclusion and recommendations

4.1. Ensuring stakeholder diversity for a democratic and decentralised expansion

Fairness is one main reason to implement the energy transition in a decentralised way; rationality is the other. A decentralised solution is both economically and ecologically more efficient given the steadily falling costs and more or less equally distributed wind and solar potential across different areas of a country. With short distances, unnecessary transmission costs and losses are avoided. A great number of small projects also add up fast and go more quickly into the grid than large projects (Farrell 2010). Furthermore, many developing countries are heavily dependent on decentralised solutions for providing their citizens with energy (Gsänger 2016).

Through tenders, a large portion of profits inevitably goes to transnational corporations rather than local companies or citizens’ energy initiatives; this results in negative attitudes towards the expansion of renewable energies. Directly involving citizens makes them direct beneficiaries of renewable energy development and is proven to lead to a higher level of societal acceptance. This was precisely the great success of the German energy transition in its early days – the commitment and enthusiasm of the population (Risse & Herold 2017).

A successful transition to 100 percent renewable energy won’t be marked solely by the fastest possible implementation of the best and most efficient technical solutions. A successful transformation is more than that – it must also be accepted and supported by the majority of society. And people are more likely to accept change when they profit from it directly, whether through financial incentives, job creation, or expanded democratic voice (Gsänger 2016).

4.2. Further incentives necessary: grid integration and sector coupling

The rapid expansion of renewable energies requires the rapid implementation of grid integration – fluctuation compensation by means of sector coupling and storage. The current legislation in most countries does not provide enough incentives to achieve this end. Tenders only incentivise isolated investment in solar parks, wind parks, or biogas plants, when in fact, the necessary interplay in virtual or real combined power plants could and should be organised through combined investments in renewable energies.

Studies conducted by the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg (Henning & Palzer 2010) and IWES in Kassel have shown “that a safe and

stable power supply for Germany based 100 percent on renewable energy sources is technically feasible in the future” and that “as a result of coupling in combined power plants, the room for manoeuvre for renewable energies is expanded to ensure network security” (Fraunhofer 2014).

In order to achieve this, however, legislative incentives for investors are needed that promote not only funding for research, but also market penetration for combination solutions. A combined power plant would create a breakthrough for grid integration. Comprehensive, highly innovative solutions adapted to local conditions would emerge; local, fully grid integrated, 100 percent renewable energies would branch out in a honeycomb shape and achieve from below the self-organising conversion of all energy sectors to renewables. Given that they must stipulate so many technical details, tenders cannot trigger this social dynamic in the same way that feed-in tariffs already have in the development of technologies for individual renewables.

A combined power plan remuneration is the key to achieving decisive advantages; it can, for example, significantly relieve decentralised network expansion of network fees at the regional level and increase the security of the power supply. Since combined power plants themselves can provide system services, new investments in the network operators’ system services will be reduced, which will also help reduce network costs. In addition, the integration of existing EEG facilities will relieve the EEG coffers and reduce costs for the provision of old coal and other power plants.

Another important factor here is that small investors such as citizens’ energy cooperatives are able to contribute in this business segment. That means that not only will regional economies be strengthened, but societal acceptance for renewable energies will grow and the expansion of renewable energies be further democratised. Promoting this combined approach is thus just as important as promoting the various renewable energy technologies individually. A fixed compensation of ten cents per kilowatt hour seems appropriate for plant investments (Fell 2016). The condition must be that the investor covers every hour of electricity demand every day of the year exclusively with renewable energies. This can only be achieved with electricity and heat storage, as well as linking up with the heating/cooling sector and e-mobility sector.

Recent approaches by the federal government to identify and remunerate a limited number of medium sized cogeneration facilities and innovative cogeneration systems via competitive tenders starting in 2018 are far from sufficient. Reliable and fixed government remuneration with no volume cap is required in order to achieve real results. That can mean only a combined power plant remuneration as part of the EEG that provides fixed feed-in tariffs for combined investments.

4.3. Summary & concrete recommendations

All future tenders and auctions for small and medium sized renewable energy projects up to at least 40 MW should be abandoned as soon as possible. At the same time, a system of modernised feed-in tariffs must be developed as the primary tool of RE promotion in order to accelerate the expansion of renewable energies to 100 percent by

2030 in the spirit of true climate protection and in order to ensure the possibility of meeting the 1.5°C or 2°C Paris goal.

Good legislative implementation is of crucial importance here. The various energy sources must be integrated, long-term reliability measures implemented, regular and transparent audits executed, incentives for innovations, scalability, and cost reductions created, and a reasonable return on investment guaranteed. In addition, the remuneration program introduced must be easy to administer and adapt without too many bureaucratic hurdles (Hinrichs-Rahlwes 2017). Bureaucratic hurdles are part of the very nature of tenders; if funding is coming from government subsidies, the state must prove to the taxpayer that the funds are being used appropriately and effectively. This inevitably leads to a variety of technical and economic requirements coupled with high bureaucratic consequences (Fell 2013).

The obligation to tender for projects under 40 MW has a serious negative impact. On the one hand, it further jeopardises climate and environmental protection. Every day that nuclear and coal-fuelled power plants remain in the grid, additional safety risks are taken and greenhouse gasses released, further threatening the flora and fauna of our planet and accelerating climate change. With regard to actor diversity, the large majority of SMEs, energy cooperatives, and private individuals are categorically excluded from participating in the expansion of renewable energies. The high financial risks and uncertainties mean that only large corporations and well established companies can participate. The desired democratic character of the energy transition is thereby completely lost. Few participants will fight for tenders in the future, and even fewer will remain standing. The cementation of oligopolies will no longer be stoppable and will further lead to decreased competition.

All of this is also directly related to poverty reduction, which would be largely suspended should the current policy be continued. In addition, the acceptance of renewable energies in the population will continue to decrease with increasing oligopoly formation. As soon as only a few people benefit while local populations are left behind and no longer involved in the energy transition by means of energy cooperatives, the resistance to wind turbines and solar facilities will grow. Even today, it can be observed in Germany that total investment volumes in ground-mounted PV facilities have been drastically reduced since the shift to tenders. Private engagement is declining as the opportunities for investing in small decentral projects diminish, which is especially detrimental to the goals of grid integration and sector coupling.

Around the world, more than 50 countries have committed themselves to converting their energy systems to 100 percent renewable energies. But they will not be able to reach this goal solely through tenders and the limited expansion volumes associated with them. As shown in this paper, tenders make sense only for large-scale projects in order to promote cost efficiency for large plants. But fixed feed-in tariffs must be maintained or reintroduced as the primary promotion mechanism for small and medium sized projects up to at least 40 MW in combination with additional investment incentives such as combined power plant remuneration.

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