Municipal Energy Concepts: A Sustainable Model for Energy Transition or an Inefficient Distraction?

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Energy transformation, Germany's plan to transform the energy industry into a greenhouse gas-neutral energy supply, is no longer solely a federal government project. Local authorities are beginning to push ahead with energy transition focused on decentralized municipal energy concepts.

> MANY GERMAN MUNICIPALITIES WISH TO UTILIZE THE EXPIRATION OF CONCESSION CONTRACTS FOR ELECTRICITY AND GAS SUPPLIES IN ORDER TO RE-COMMUNALIZE THE ENERGY SUPPLY

As many citizens have borne the cost of energy transformation so far, they would also like to profit from it economically. Terms such as "energy communities", "power self-sufficient municipalities", or "municipal energy transformation" are becoming popular. Many German municipalities wish to utilize the expiration of concession contracts for electricity and gas supplies in order to re-communalize the energy supply. Public utilities run by private operators are again coming under municipal ownership. In many places, energy cooperatives or citizens' wind parks are being established. So-called "tenant electricity models", in which the residents of a tenement house consume the electricity from a solar roof system themselves and are remunerated for surpluses fed into the electricity network are high on the agenda.

RATIONALE BEHIND ENERGY TRANSFORMATIONS

Motives for re-communalizing the energy industry are numerous. For many municipal politicians and citizens, the prospect of energy self-sufficiency, and more political and economic power, is attractive. Many municipalities intend to revitalize the economy and local labor markets with the regionalization and communalization of supply chains. With the takeover of the energy supply, municipalities hope to create a profitable business which will facilitate re-capitalization and cross-subsidization for municipal budgets.

> EVERY GERMAN FEDERAL STATE NOW HAS A CLIMATE PROTECTION PLAN

In addition to the commercial aspects, the implementation of individual climate protection plans also plays a role. Every German federal state now has a climate protection plan. Many municipalities are

> IT IS NOT POSSIBLE FOR A MUNICIPAL NETWORK OPERATOR TO INFLUENCE THE ELECTRICITY MIX OF THE MUNICIPALITY ACCORDING TO ECOLOGICAL CRITERIA

also setting specific targets for decreasing greenhouse gas emissions, intensifying the expansion of renewable energy sources, and increasing energy efficiency for heating supply as well as among local companies.

But how useful are those undertakings from the perspective of citizens? Are the municipalities actually gaining political power, or is there a risk that they might over-extend themselves? Could the resurgence of municipal involvement in the energy industry intensify competition? Finally, there is the question of the consequences of ecologically oriented re-communalization for the costs of energy transformation.

PROS AND CONS OF A COMMUNAL ENERGY SUPPLY

In the ideologically charged debate on energy supply as a basic public service, the answers to important questions come up short: Are municipal energy-economic activities suitable in realizing increased energy-political or financial room for maneuvering? Can they actually have an influence on sources of energy? Can municipalities generate sustainable profits? Do citizens really benefit from lower prices?

In most cases it is not taken into account that the energy policy framework for municipal activity in the energy industry has fundamentally changed over the last decades with the implementation of the EU Electricity Market Directive (EU Directive 2009/72/EC). Electricity market regulation requires a strict separation of electricity generation, the operation of transmission and distribution networks, and electricity distribution, which has considerable consequences for the utilization of municipal management options[1].

MUNICIPAL NETWORKS: HIGH INVESTMENT RISK, DUBIOUS ENVIRONMENTAL BENEFITS

Since the transmission of electricity cannot be refused by the network operator, it is not possible for a municipal network operator to influence the electricity mix of the municipality according to ecological criteria. The citizens decide by their choice of electricity supplier which energy sources are generated. In the case of interconnected networks, the selection of the energy source is limited for technical reasons and, therefore, a calculational reconciliation is utilized.

From an economic perspective, the operation of the electricity network entails considerable risks. The operation of distribution networks requires extremely specific know-how and experience.

[1] Schmidt, H. (2013) "Welche Vorteile kann ein landeseigenes Stadtwerk haben?", *Das Rathaus*, 2013(5).

> GIVEN THE PERSISTENTLY HIGH COST OF THE ENERGY TRANSFORMATION PROCESS IN GERMANY, THERE IS STILL STRONG POLITICAL PRESSURE TO REDUCE THE SCOPE OF SUBSIDIES AND PRIVILEGES OF SUBSIDIZED FACILITIES

New technological territory must be approached regarding the grid integration of fluctuating electricity producers (photovoltaics, wind power) and the construction of an intelligent electricity grid (smart grid). That requires additional, previously difficult-to-predict investments, which over the years burden the public funds of the municipalities. Those costs cannot simply be transferred to network users because the returns and revenues are limited by regulation. The local authorities' prospects for permanently high revenues from network operations are therefore very uncertain.

MUNICIPAL POWER GENERATION: INVESTMENT RISK ENERGY POLICY

In the area of power generation, on the other hand, municipalities can operate successfully. However, whether long-term investment in renewable energy will pay off depends on the federal government's future funding policy.

According to the Renewable Energy Law (EEG), electricity from renewable sources is preferentially fed into the electricity grid and the producers are guaranteed a fixed feed-in compensation. Up to now, German plant operators have been able to assume that the EEG grant would not pose any major business risk. That has changed since the January 2017 EEG reform. Instead of benefiting from state-established feed-in compensation, plant operators over a certain capacity threshold now have to compete for the amount of remuneration.

Only the most economic projects with the lowest remuneration demands are being supported and approved for grants. As a result, prospects for secure project profits have deteriorated. Given the persistently high cost of the energy transformation process in Germany, there is still strong political pressure to reduce the scope of subsidies and privileges of subsidized facilities. Despite guarantees for existing installations, additional charges for the networks and storage facilities or additional technical requirements could affect yields and even cause considerable losses for municipal operators in the medium term.

However, it is not only the instability of the energy policy framework and the constantly changing funding conditions that are a problem for plant operation. The risk of investment is also high because of the unreliability of forecasts for wind and sun.

> LITTLE EVIDENCE EXISTS THAT ADDITIONAL MUNICIPAL INVESTMENT IN POWER PLANTS IS IMPERATIVE FOR COMPETITION IN THE ELECTRICITY MARKET

An empirical study of the profitability of more than 175 wind parks in citizens' projects over a 10-year period drew a sobering conclusion: In 82% of the wind parks, revenues were below projected results, with the result that the dividend paid to investors was only about 1/3 of the value promised in the investor prospectus. The reasons were overly optimistic wind forecasts and too low estimates of operating costs[2].

MUNICIPAL COMPETITION: LOW COMPETITION RESTRICTIONS IN THE ELECTRICITY MARKET

It is often argued that municipal power generators would be necessary to break the market power of large electricity companies. The market share from conventional power generation capacities of the four major German power utilities (RWE, E.ON, Vattenfall Europe, and EnBW) is a high 62%. According to the argument, that enables them to abuse their market power more than a decade after electricity market liberalization. Proponents of recommunalisation claim that fair competition could only be achieved by more decentralized energy providers directly controlled by municipalities or citizens.

The German Monopolies Commission dealt more extensively with the issue of market power of the four large energy suppliers in the electricity wholesale trade in 2015[3]. In their expert opinion, they noted that competition in the electricity market had intensified significantly over previous years and no striking market power problems existed.

Throughout 2014, no single hour could be determined in which one of the big four energy suppliers could meet the electricity demand alone. It is only under this condition that the capacity of a single supplier would be system-relevant and could increase the price because it could no longer be surpassed by other market providers.

Therefore, it can no longer be assumed that the large nationwide energy supply companies have individual market power, and thus, pricing power. The incentives for capacity constraints of individual suppliers would also be relatively low in view of high over-capacities and the generally low price level in electricity wholesale. Accordingly, little evidence exists that additional municipal investment in power plants is imperative for competition in the electricity market.

LOCAL ELECTRICITY DISTRIBUTION: LIGHT AND SHADOW FOR CITIZENS

For a municipality, electricity distribution can be an interesting source of income with low entry barriers. With professional

[2] Daldorf, W. et al. (2013) Praxiserfahrungen mit der Wirtschaftlichkeit von Bürgerwindparks in Deutschland. http://www.energieagentur-goettingen.de/fileadmin/files/downloads/130213_Daldorf_Praxiserfahrungen_mit_BA__1_4rgerwindparks.pdf

[3] Monopolkommission, 2015. Energie 2015: Ein wettbewerbliches Marktdesign für die Energiewende, http://www.monopolkommission.de/images/PDF/SG/s71_volltext.pdf

> THE EXPERTS CAME TO THE CONCLUSION THAT MORE LOCAL VENDORS DO NOT NECESSARILY MEAN LOWER ENERGY PRICES FOR CUSTOMERS

management, relatively acceptable returns can be achieved with comparatively low investments.

Nonetheless, there are strict limits when it comes to intentions to finance acceptable energy prices and municipal tasks from the profits. An internal subsidization of non-cost pricing would require above-average revenue from contracts with customers who are willing to pay. Since they have the opportunity to switch to the most inexpensive provider on the deregulated electricity market in Germany, there is little scope for generating excess profits by price setting.

For a citizen, the municipal energy provider is not necessarily the best choice. Energy utilities under municipal sponsorship have not necessarily proved to be the cheapest providers in the past.

In an empirical survey of retail prices in the energy market, the Monopoly Commission found that municipal providers only offered the cheapest rate without advance payment in 1% of all observed cases in various postal areas[4]. Only when the local provider acted as the basic provider was their average offer marginally cheaper than the big four and other private energy suppliers. The price was, however, still 28% above the average price of the first-place provider. Overall, the experts came to the conclusion that more local vendors do not necessarily mean lower energy prices for customers.

> BECAUSE PLANTS ARE INCREASINGLY BEING PURCHASED ON THE WORLD MARKET AND RUN BY NATIONALLY OPERATING SPECIALIST COMPANIES, THERE IS NO GUARANTEE THAT THE LION'S SHARE OF ADDED VALUE GENERATED IS RETURNED TO THE COMMUNITY

[4] Monopolkommission (2011) *Energie 2011: Wettbewerbsentwicklung mit Licht und Schatten*, Bonn: Monopolkommission. http://www.monopolkommission.de/index.php/de/gutachten/sondergutachten/242-sondergutachten-59

MUNICIPAL ADDED VALUE AND JOBS

New sources of tax revenue, the creation of additional jobs, and strengthening the purchasing power of the regions are cited as arguments for the municipalization of the energy supply. The problem with this perspective is both the one-sided perspective regarding the drivers of local economic power and ignorance of the economic consequences.

Municipal added value is often quantified as the sum of the profits of local enterprises, the income of their employees, and the taxes paid by both. A distinction is usually made between the one-off effects related to investment and subsequent disposal of energy plants, and the annual recurring value during operation. There is the hope that as much of the investment as possible will be put into the hands of municipal enterprises and traders. Municipal policymakers continue to focus on the performance of the local economy.

However, because plants are increasingly being purchased on the world market and run by nationally operating specialist companies, there is no guarantee that the lion's share of added value generated is returned to the community. In the maintenance and operation of facilities, nationwide service providers are also often used for cost reasons.

Regularly overlooked is the downside of value creation from municipal investments which involve a commitment of scarce financial resources. Investment funding for local energy projects is no longer available for other projects, such as social or educational programs. Scarce municipal finances require the highest possible efficiency in their deployment. In the context of existing investment and operating risks related to local energy projects, it is uncertain whether returns can compensate for the shortcomings in other public services.

> FOR THE LONG-TERM ECONOMIC STRENGTH OF A MUNICIPALITY, IT IS NOT ESSENTIAL THAT MANY ECONOMIC ACTIVITIES ARE CONCENTRATED IN PUBLIC FUNDS

In addition, an alternative use of investment and resources could also mean added municipal value, jobs, and tax revenue. The focus on energy projects merely involves a redistribution of resources. Ultimately, it should be clear that local investment and employment represent business costs. Only after several years will it be possible to determine whether the balance of a municipal investment is positive and whether redistribution measures have paid off.

For the long-term economic strength of a municipality, it is not essential that many economic activities are concentrated in public funds. Instead, a framework is needed within which trade and companies can specialize in the production of goods and services with a cost advantage over other locations. A locally financed, inefficient

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economy is at best a flash in the pan and causes a loss of economic power in the long term.

MUNICIPALIZED BENEFITS, SOCIALIZED COSTS

Many municipal energy facilities are only economically sustainable through government subsidies which are financed by consumers, through a levy on electricity prices, or with taxes. Uneconomic energy production from renewable energy sources is worthwhile for the citizens of a municipality merely due to the redistribution of subsidy-costs among all energy consumers in Germany. Grid operators uniformly pass on the difference between EEG payments and the proceeds from stock sales of EEG energy to energy consumers. The EEG levy for remaining consumers increases due to the partial exemption of energy-intensive businesses and existing special arrangements for private consumption.

The same applies to CHP plants as long as their cost-effectiveness is dependent on remuneration under the Act on Combined Heat and Power Generation (KWKG). Within the last 10 years, the levy of EEG subsidy on the price of electricity has risen more than six-fold from 1.03 ct/kWh to 6.88 ct/kWh. Every federal citizen now pays around EUR 300 per year for the subsidizing of renewable energy sources[5].

Additional costs for network integration have not yet been taken into account. With the steady increase of privileged power supplies from volatile wind turbines and photovoltaic systems, and increased spending on the stabilization of electric power networks and expansion and reinforcement of electricity network costs, there has been a significant increase in network charges.

After the average network charges were reduced through regulation, they have risen significantly since 2012. In network areas with highly volatile power generation, network charges on the price of electricity have been particularly high[6]. An assessment by the Düsseldorf Institute for Competitive Economics (DICE) on behalf of the Initiative for New Social Market Economy (INSM) estimates the total cost of energy

[5] BDEW (2017) *Erneuerbare Energien und das EEG: Zahlen, Fakten, Grafiken*, Berlin. www.bdew.de

[6] Bundesnetzagentur (2017) *Netzentgelt, Was ist ein Netzentgelt (auch als Netznutzungsentgelt Bezeichnet)?* https://www.bundesnetzagentur.de/SharedDocs/FAQs/DE/Sachgebiete/Energie/Verbraucher/Energielexikon/Netzentgelt.html;jsessionid=CCA60A737395768FA91F1CA882D6EC56?nn=266668

> THE EEG LEVY HAS CAUSED SUBSTANTIAL PAYMENT STREAMS AMONG THE GERMAN FEDERAL STATES

transition at EUR 520 billion by 2025, which totals EUR 25,000 for a four-person family (Haucap et.al. 2016)[7].

The EEG levy has caused substantial payment streams among the German federal states. States with high energy consumption relative to the energy production of EEG-supported systems pay to federal states where little energy is consumed relative to energy production from renewable energy sources.

In its 2013 annual report on the development of renewable energy in Germany, the Federal Association of Energy and Water management e.V. (BDEW) determined the level of a hypothetical EEG levy, which would be required if each state would only foster its "own" EEG facilities.

In federal states with strong winds but low populations (and therefore low consumption) such as Mecklenburg-Vorpommern, Schleswig-Holstein, Saxony-Anhalt, and Brandenburg, consumers in 2014 would have had to pay a renewable energy levy significantly over 10 ct/kWh, and in Mecklenburg-Vorpommern over 20 ct/kWh given its low power consumption. In Bavaria, with its abundant energy from solar power and biomass, the hypothetical renewable energy levy because of high consumption in the state would have been 7.9 ct/kWh, but this level would still have been higher than the then-valid nationwide level of 6.17 ct/kWh[8].

Owing to the sustained growth of new facilities, those discrepancies are likely to have increased further. Individual municipalities would have to charge far higher surcharges on electricity prices so that municipal electricity generation pays off. The gains in purchasing power made by local and regional economies would be quickly used up by the cost burden of energy consumers in the majority of cases if not for the nationwide redistribution effect of the EEG reallocation charge.

As a rule, the immediate negative consequences of the municipal expansion of renewable energies are often overlooked. Wind turbines damage the landscape, as do large-scale photovoltaic systems. The cultivation of biomass can negatively affect the diversity of flora and fauna. The necessity for grid connections from power plants creates anxiety among the population over the construction of high-voltage power lines. The local quality of life suffers, as does the attractiveness of the municipality for tourism.

[7] Haucap, J., Loebert, I. , and S. Thorwarth (2016) *Kosten der Energiewende, Untersuchung der Energiewendekosten im Bereich der Stromerzeugung in den Jahren 2000 bis 2025 in Deutschland*, Düsseldorf. http://www.insm.de/insm/Themen/Soziale-Marktwirtschaft/Gesamtkosten-Energiewende.html

[8] BDEW (2015) *Erneuerbare Energien und das EEG: Zahlen, Fakten, Grafiken*, Berlin. https://www.bdew.de/internet.nsf/id/20150511-o-energie-info-erneuerbare-energien-und-das-eeg-zahlen-fakten-grafiken-2015-de/$file/Energie-Info_Erneuerbare_Energien_und_das_EEG_2015_11.05.2015_final.pdf

A SHORT HISTORY OF POWER PROVISION IN GERMANY

With the discovery of the dynamo principle by Werner von Siemens began the triumph of electricity from 1866 onwards. At the beginning, every power consumer produced their own electricity. Starting in 1884, the first municipal electricity utilities were built in Germany to supply households and businesses. Their supply networks were mostly operated with direct current and were therefore limited to a very small radius around the power station.

To supply power to rural areas, so-called intercity centers were created, which enabled a comprehensive supply of alternating current. Later, regional suppliers emerged. The majority of electricity companies were owned by the public authorities or were mixed-economy enterprises. That reflected the strong public interest in safe and inexpensive power supply. After the First World War, the networks of regional suppliers were linked to the whole country.

Despite the dominance of the public sector, the electricity industry initially developed under private competition. No state privileges were granted to the companies. Supply areas were the result of the technical peculiarities of the power supply. Distribution and transport networks were largely subject to the conditions of a natural monopoly. Network monopolies were secured by concession contracts and demarcation contracts. During the Nazi era, the power supply was regulated under state supervision by the Energy Industry Law. Soon after, a tariff classification led to the harmonization of consumer prices for electricity. In 1957, the Restriction of Competition Act continued to exempt territorial protection agreements from the prohibition of cartels.

As a result, a three-stage system of public power provision developed in Germany: Affiliated companies produced electricity in large quantities, operated the transmission network and were responsible for frequency stability. Regional suppliers organized the nationwide distribution. Municipalities then distributed the electricity to the final customers.

Only the liberalization of the electricity market in 1998 abolished the permissibility of demarcation contracts and exclusive concession contracts. The liberalization of the electricity industry was initiated by the EU Internal Market Directive 96/92/EC. From then on, network operators were obliged to provide their networks to other power suppliers for the supply of customers. Their aim was to create a European single market for electricity and to strengthen competition in the electricity market.

With the 2005 amendment to the Energy Industry Law, all electricity consumers had the opportunity to change their electricity provider. In addition, the negotiated network access was replaced by an unbundling of production, transport, and distribution of electricity. To this end, a regulatory authority for network access regulation had to be created in Germany. It is responsible for the incentive regulation of network charges. With the third EU single market package, the transmission grids had to be separated from production and trade. Since then, there are four transmission network operators in Germany.

With the liberalization of the electricity industry, the course for intensive competition, production, and trade of electricity was set. That also offers new business opportunities for decentralized municipal energy suppliers.

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Leuschner, U., *Energie-Wissen: Die Entwicklung der deutschen Stromversorgung bis 1998*, http://www.udo-leuschner.de/basiswissen/SB133-002.htm

Also, real estate assets of the population can suffer losses when wind farms or other power facilities are built nearby. The resulting losses affect not only citizens in the investing municipalities, but also the communities in the vicinity. Meanwhile, several federal states have responded to resistance among their populations and increased the minimum distance of wind farms from residential areas by up to 10 times the height of the facility.

Given the current legal situation, individual federal states and municipalities have an incentive to achieve maximum yield from the redistribution mechanism. Macroeconomic interest in a low-cost realization of energy transformation and the corresponding climate protection goals are thus pushed into the background. The end results are inefficient investment decisions and persistently high costs for all energy consumers.

COMPETITION IN THE ENERGY MARKET AS THE BEST PUBLIC SERVICE

Municipal energy generation can contribute to a sustainable, healthy, economic structure and long-lasting, secure employment in a region only if it is profitable without government subsidies and guarantees a secure and affordable energy supply for citizens and businesses. In power generation and distribution, a municipality can only survive the competition if projects are solidly planned, financed, and professionally managed. However, the question is whether it would not be better for municipalities to abandon their own entrepreneurial initiatives in favor of competitive placement of clearly specified public service tasks to private companies.

If the business model of local authorities and private investors involved in municipal utilities is based solely on government grants and the nationwide levies from the EEG or the KWKG, it ties the players into a dangerous dependency on state transfers and energy policy privileges. That does not allow for stable investment conditions for the economy in the long term, and is a burden on citizens should ambitious return expectations not be fulfilled.

To what extent regional interests have already been affected by the necessary reforms in energy transformation is shown by the actions of state representatives in Germany's Federal Council (Bundesrat). In the past, changes to EEG remuneration rates and power regulations have been repeatedly delayed by the Federal Council.

For the majority of electricity consumers and taxpayers, subsidized energy projects are a burden which become greater the more local politicians and private-sector interest groups exert their political influence. So far, the energy policy framework has almost invited municipal energy projects to proverbially cut the ground from under each other's feet. ●

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