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ERCCT Online Paper Series:

"Energy Prosumers ":
The Emerging Motives for Autonomous Energy in Taiwan –
A Comparative Analysis with Germany and Japan

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June 2015

– Young Scholars Workshop 2015 selected collections –

The CCKF-ERCCT wishes to express its gratitude to the Ministry of Foreign Affairs (Taiwan, R.O.C.) for generously supporting the Europe-Taiwan Young Scholars Workshop.

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The Emerging Motives for Autonomous Energy in Taiwan- A Comparative Analysis with Germany and Japan

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Abstract

This essay traces how Taiwanese citizens build up their own energy system and what their potential motives are, by analyzing the divergence of the renewable energy policy from the top-down and the calls for the autonomous energy from the locals. The following points of focus will be analysed: 1) the strong dependence of the Taiwanese government's Renewable Energy Policy on the foreign experiences and the possible problems of its 'adaptability' in Taiwanese society; 2) the factors which influence the rising awareness of creating 'community-based' energy systems in Taiwan; 3) bringing the Taiwanese locals into the contract with international communities, by means of comparison of motives, participatory process and

economic and social conditions among different communities within the autonomous energy field; 4) the collisions between the macro and micro level of policy making, due to their distinct

mindsets on the issue of renewable energy; and last but not least, providing practical suggestions for synergies between both sides.

Key Words: energy prosumer, motives for autonomous energy, renewable energy policy, participatory process

"Power Not Empowered"- Renewable Energy Policy from the Centre

The terms Decentralised Energy, Autonomous Energy or Democratisation of Energy, either as an ideal or practice, symbolise people's ownership of the rights and abilities to produce electricity actively (cf. Rifkin 2011, Gottlieb 2013, Roberts 2013). It is believed that this trend has prospered in the past ten years in developed countries and also shows great potential for application in developing countries (Schott 1997, Fan & Olofinbiyi 2013).

A prerequisite of decentralised energy is the government's empowerment of enterprises, and the public's right to produce energy. Electricity is produced by the cogeneration of the public, instead of one single provider such as a monopoly company or government. This turnover is labeled the empowerment of electricity. Regarding the roles of the public, a 'prosumer' denotes the active participation of local people. This refers to the one-way empowerment from the government, as well as from the bottom-up, such as individuals, communities, local-based enterprises and other related organisations struggling for autonomous energy.

Liberalization of Electricity Market and its Limits

The British Electricity Act 1989, created to encourage competition in the generation and supply of electricity as well as to regulate the prices of transmission and distribution, played a founding role for a fully liberalized and privatized electricity market in the UK (Hassan and Majumder-Russell 2014). In contrast to the U.S. paradigm of governing the generators to keep prices low enough to prevent

undesirable entry, the retail and competitive electricity network in England and Wales has been fairly effective due to the massive entry of new generating capacity, which broadly replaced the existing, but almost retired, predecessor. Moreover, the market in England and Wales have proved to become more competitive in terms of the improvements in labor productivity and service quality in electric distribution systems since the late 1990s. (cf. Green and Newbery 1992, Joskow 2008).

The European Commission's Green Paper of 2006: "A European strategy for sustainable, competitive and secure energy" was designed to create an internal energy market and a common external energy policy in order to become the world's second largest energy market. With the advent of competitive markets, investments in generation capacity to meet peaks in demand will be encouraged. In addition, increasing investments in infrastructure, linking the various national grids, building up a more clear-cut unbundling of the generation, transmission and distribution of gas and electricity are also basic requirements for an internal energy market (EURL2006).

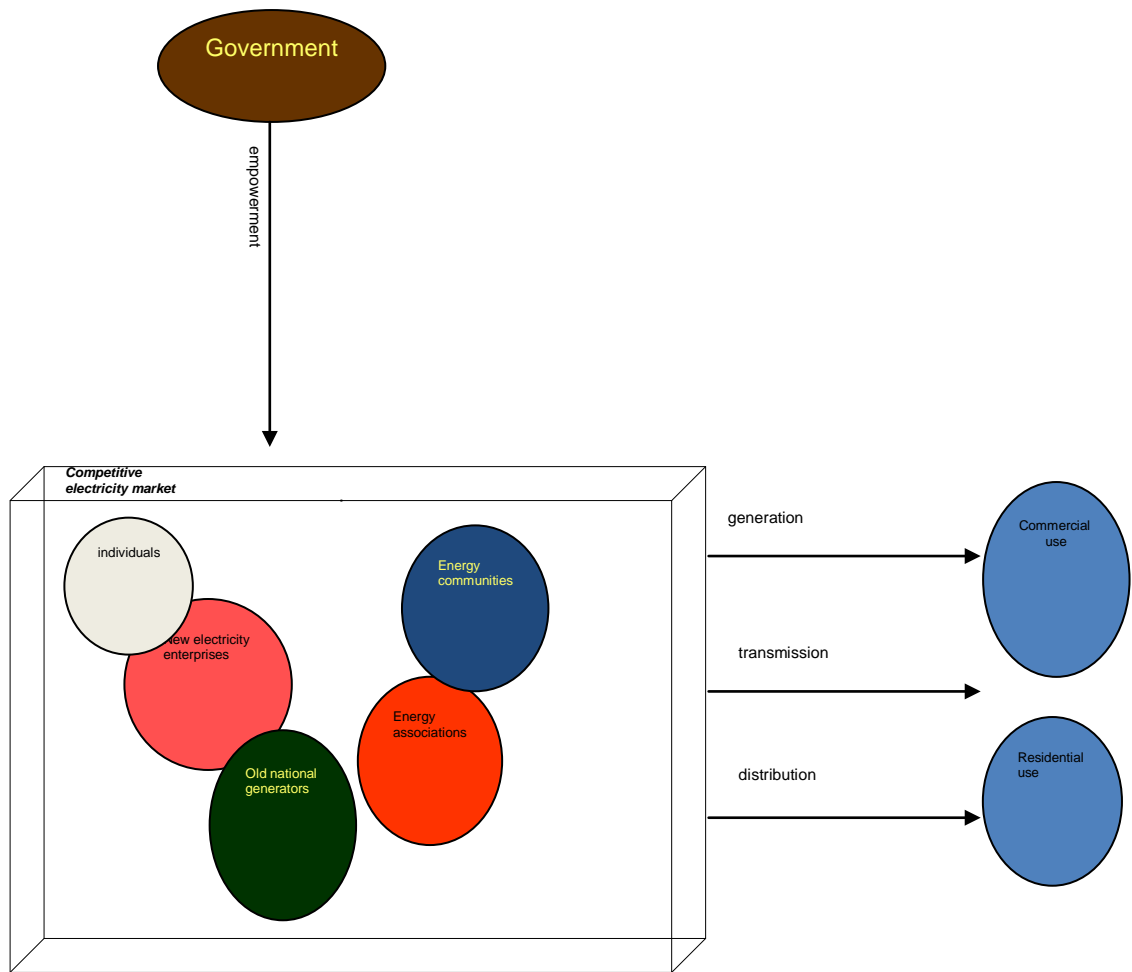


Chart 1. Liberalization of Electricity: a cure?

A liberalized and privatized electricity market, however, does not lead to an absolute decrease in the price of electricity, as that is determined not only by the factor of the existence of the liberalized market, but also depends on both global and local prices of fuels and tax levels (cf. Streimikiene, D., Bruneckiene, J., Cibinskiene, A. 2013). Although one of the ultimate goals for opening up the electricity market is to bring the benefit from the competitive prices to the customers, some studies prove that the price advantage for customers is still limited (Lanzavecchia, E., Leona, A. 2007). Dooley J.J.'s (1998) research also showed that a large number of industrialized countries were unwilling or unable to invest in energy R&D after they started deregulating the energy market, and this decrease of investment in turn has caused

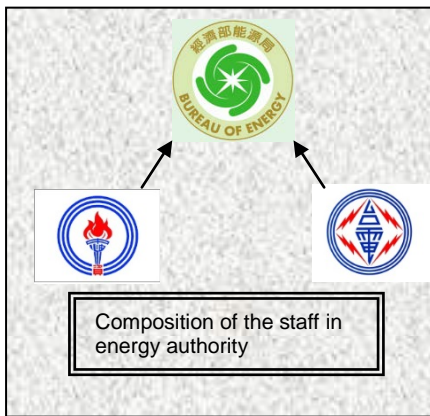
the unexpected result of competitiveness concerns for the economy and other fields of science and technology.

Liberalisation of Electricity in Taiwan: Trend and Challenges

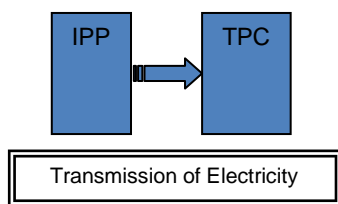
The liberalisation of electricity as an amendment to the Electricity Act has been discussed by the legislative Yuan in Taiwan since 1995. However, the electricity system is still controlled by the Taiwan Power Company, whose systems of power distribution and power production have not been separated (Taiwan Institute of Economic Research 2013). On the other hand, electricity produced by Independent Power Producers (IPP) is required to be sold solely to the Taiwan Power Company according to the Power Purchase Agreement (Annual Report 2013, Bureau of Energy). In regard to 'the lack of liberalisation of electricity', the biggest problem lies in the lack of participation from citizens in the production of electricity, and also to the above mentioned centrally governed electricity system, as people have not been permitted to choose from various electricity providers.

The composition of the staff of the energy authority and the contents of the Renewable Energy Policy also displays features of central governing of energy policy. The Bureau of Energy under the Ministry of Economic Affairs, which is the administrative center in charge of energy policy, electricity tariff calculation and the development of energy industries, was reorganized in 2004. According to Art.11 of the Rules of Organization, the Bureau of Energy, former staff of the Chinese Petroleum Corporation, Taiwan (CPC) and the Taiwan Power Company (TPC) could all be transferred to the reorganized Bureau of Energy. A look through the Renewable Energy Policy implemented by the Bureau of Energy reveals that main concepts of decentralized energy, for example, small scale energy, combined heat and power

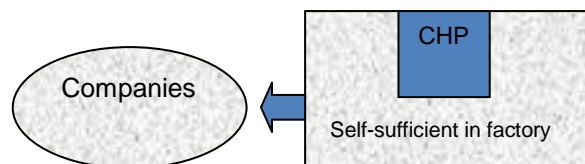
(CHP) and smart grid are included in the Energy Policy Act. However, their application can make a significant difference with those utilized in other countries. For example, the main application of Combined Heat and Power Policy is to provide manufacturing industries with self-sufficient industrial energy means, and only seven out of sixty companies with combined heat and power facilities sell extra steam to other companies (Industrial Development Bureau,2013). In other words, the usage of the Combined Heat and Power Policy is industry oriented and does not extend to households in Taiwan. The CHP market in Taiwan, the ownership and the structure of the stakeholders of the cogeneration companies, is dominated by big electricity companies and seldom goes to the end users. For example, one of the Taiwanese Combined Heat and Power companies, Taiwan Cogeneration Corporation (Taiwan Cogen), is composed of six Taiwanese companies as shareholders with the biggest shareholding ratio possessed by the Taiwan Power Company (27.66%), which is made up of five cooperative foreign companies from Japan (Taiwan Cogen 2015).



1)



2)



3)

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- 3) **the usage of the Combined Heat and Power (CHP)**
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Chart2. The lack of liberalization of electricity: current status in Taiwan

The concept of the liberalisation of electricity is clearly stated in the current regulations from the Taiwanese government, including: the Electricity Act, the Renewable Energy Development Act, the Power Purchase Agreement and the Measures for the system of the Combined Heat and Power. However, the Bureau of Energy, Ministry of Economic Affairs, and the Taiwan Power Company have the overall authority to execute the provision and the distribution of electricity, which have barely been extended to include the Independent Power Producers and Taiwanese citizens.

Emerging Motives for Autonomous Energy in Taiwanese Society

Decentralised energy also implies tense collision as well as divergent interpretations between the top-down driving forces and bottom-up demands from the locals. While stakeholders and participants including traditional energy supply systems and newcomers, tend to be becoming progressively more involved and are creating their own unique strategies in 'the market of decentralised energy' (Burger & Weinmann, 2012), the complexity of the nexus these stakeholders has increased, and even gone beyond the dichotomy of top-down vs. bottom-up in this analysis.

The rising motives of autonomous energy can be traced back to several sources or groups from the locals in Taiwan, such as anti-nuclear movements, nature protection groups and the social enterprises (HAND e.V.2015, Taiwan NGO Social Enterprises Co.2015). Of these, one was different from the regular institutions and contributed greatly to the growing of autonomous energy, namely the Self-Help Group from the YuanLi township, Miaoli County. The citizens of the YuanLi Self-Help Group appealed to stop illegal wind turbine constructions in the district of YuanLi and increased regulations to ensure minimum distance between wind turbines and housing neighborhoods.

YuanLi Self-Help Group emphasized that 14 wind turbines had been built along the township's 2-3 km coastline, with a distance between each turbine of about 200-250m. According to the YuanLi Self-Help Group, high dense wind turbines resulted in serious wind turbine syndrome on residents, along with serious damage to fishery and Egret Reserves. The Bureau of Energy of Ministry of Economic Affairs continued to side with the InfraVest GmbH (Taiwan branch of German Wind Power Co.), letting InfraVest's submit a false survey of the Difference of Environmental Impact (DEI), began construction through illegal and compulsive means and filed

lawsuits against members of YuanLi Self-Help

Organization. In 2013, an experimental hearing without legal validity was held by the Bureau of Energy, however, they asked for a more transparent and equal consultation process so that voices and rights of residents would be respected. Therefore, they further demanded the government pass stricter environmental laws and specific Environmental Impact Assessment (EIA) about setbacks from wind turbines, ensuring the safety of people living in coastal regions in Taiwan, protecting ecological resources in the Pacific Islands, and also to find better green policy solutions (cf. Infra Vest 2006, ISSUU 2012, Green Energy and Environment Research Laboratories 2012).

The calls from the YuanLi Self-Help Group were questioned during the resistance campaign between 2012 and 2014. One argument from the Bureau of Energy and the wind turbine investment company, InfraVest GmbH (Taiwan branch of German Wind Power Co.), was that the YuanLi's citizens were taking a stand against clean energy and siding with nuclear power. This claim, to some extent, influenced the impression of the Taiwanese society of the actions of the YuanLi Self-Help Group. However, in return it also made the YuanLi Self-Group go further than simply demanding the government to amend the regulations on the secure distances of the wind turbines in Taiwan, and sparked the discussions about autonomous energy: "If not relying on the government's control of energy, how can we do by our hands to produce clean energy? (YunaLi Self-Help Group, 2014)".

In July 2014, two of the four illegal wind turbines were removed after YuanLi Self-Help Group and the Bureau of Energy reached a consensus wherein which the YunaLi Self-Help Group would stop their resistance movements, and the Bureau of Energy would remove two wind turbines along the coastline of YuanLi and agreed to reassess the appropriate distances between wind turbines.

Perspectives from people have now been incorporated into the National Energy Summit held annually by the Ministry of Economic Affairs. Although nuclear issues

and renewable energy policy were the core of the discussion, the ways to decentralize energy and increase citizen participation in energy policy-making were still left out of the talks. Along with the increase in people's awareness of energy, whether the top-down aggregation of information, such as the National Energy Summit, meets people's need is still debatable. In addition, renewable energy as a way of energy transition and the possible dangers it may cause will need to be further evaluated in the future, along with the differences between policy-led renewable energy and community -based autonomous energy.

International Comparative Studies: Participation in Energy Production and Consumption among different Locals

Concerning the future of decentralised energy, one question has to be addressed: to what extent would decentralised energy be geographically diffused or widely applied? If a group or community can function as a successful autonomous energy example but the basic requirements behind it are unable to be learnt, then its specific background must be discussed. As to the causes of decentralised energy communities, natural disaster may be a common factor, as well as the different 'opposites' which the communities encounter, including large international companies, project-led foundations and external investment projects. Are communities comparable? To answer this, this section explores the basic requirements of decentralised energy communities and analyses characteristics such as motives, participatory forms and local knowledge of each community.

A Methodology for the Analysis of Participation

In the decentralized energy research field, 'participation' has been highlighted as an essential concern (Walker G. 2007, Mickwitz P. 2006, Reed M.S. 2008, Radtke J. 2013). To monitor the participatory progress over time, the various stakeholders involved in the decision-making need to be examined against certain indicators (Adrian J.C. 2001). The focus of participatory analysis is to examine the network built by the stakeholders. This implies that the way the different stakeholders interact with each other and which political and social backgrounds lead to which kinds of participatory forms needs to be clarified (Radtke J. 2013).

One of the strong points in participatory analysis is the elaboration of the related stakeholders. However, there are two significant weaknesses of this approach. The first is that it evaluates public participation based on democratic principles, namely the proportion of citizens in the decision-making process, the controlling interest and the people's right to vote (Radtke J. 2013). However, the 'community' or 'people' in this perspective is homogenized and not dynamically analysed with other involved actors or factors (Walker G. 2007). In addition, this approach fails to interpret the bottom-up mobilization to examine which factors give rise to the establishment and the change in the decentralized energy communities or what are the main causes or reasons for cooperation or conflicts between the diverse stakeholders. Therefore, to refine the participatory theory into a more applicable methodology is also a main concern of the thesis.

This essay adopts 'participatory indicator-based' approaches to elucidate the weakness of participation of the three cases in Taiwan, Japan and Germany, particularly focusing on interactions between the decentralised and non-decentralised actors (including bigger companies, outside facilitators, energy investors, and governments).

In long-term studies in the agricultural research field, the analysis of the farmers' experiments and the power structures 'inside villages' has been the main concern. 'Practical application' has been regarded as the easiest way as well as the most important criteria to assess whether the sustainable agricultural methods provided by experts and scientists closely meet local needs (Hagmann J. 2000, Yegbemey R.N. 2014). By inviting farmers and agricultural extension officers into discussion groups, the Participatory Indicator Based (PIB) approach aims to incorporate their viewpoints into the sustainable agricultural indicator output. In this approach, an understanding of the sustainable agriculture expectations from the farmers and agricultural extension officers is emphasized and allows them to have a voice to propose measurable and relevant indicators (Yegbemey R.N., 2014).

The strength of the PIB approach lies in its participatory nature and flexibility (location-specific indicators), which is conducive to the decentralized energy applications within communities. Unfortunately, this approach tends to neutralize the researchers' positions as it is the coordinators who are charged with finding solutions and reaching a consensus in a debate. To resolve this problem, the Participatory Extension Approach (PEA) suggests that the roles of 'outsiders' be better reflected. The PEA approach calls for an equal partnership between farmers, researchers and extension agents by identifying problems and devising solutions together, as well as suggesting that extension workers simply help farmers to help themselves.

Compared to the long-term development of citizens' participation in other fields, such as agriculture and welfare, decentralized energy has been recently progressing. However, the awareness of people to participate autonomously in agriculture, welfare care or in energy production symbolises a very strong power from the bottom, under which a newly forming social-economic structure has been recognized. The key players deserve to be analysed because they have an important

role in the initiatives of every decentralized energy community or groups. It also helps to address the possibility of the expansion or the transregionalization of decentralized energy.

Wind Power as a Common Topic of Conflict between Top-Down and Bottom-Up

To compare Germany and Taiwan, the biggest conflicts of the application of decentralized energy in Germany and in Taiwan both lie in wind projects. In Germany, the Renewable Energy Law and the public tender went against the demands of locals, and sided instead with the large-scale wind projects led by the corporations (Fesa 2013, Flieger 2014). In Taiwan, in the absence of legal forms for public participation on the decentralized energy, and also because of the lack of the corresponding measures and experiences, the top-down renewable energy project became the only option until public awareness in Yuan Li, which represents the first public outcry in Taiwan, demanding a thorough examination of the energy policy and called for autonomous energy in Taiwan.

Both cases showed the divergent interpretations of decentralized energy and different considerations for economic and political factors from the top-down and the bottom-up. In terms of the divergent interpretations of the criterion of sustainability, the environmental evaluation report proposed by the German and the Taiwan governments were partial to the interests of the corporations, which in turn neglected the local knowledge from the residents, the fishermen and environmental protection organizations (ISSUU 2012, Naturpark Soonwald-Nahe 2014). This reflects a weakness that both cases lack the legal mechanism to integrate local environmental evaluations into any renewable energy blueprint of the government. In addition, the public hearings which should have served as a legalized democratic procedure did not function well (Taiwan Environmental Information Center 2013).

Why would democratic deficiency occur in the planning of renewable energy both in Taiwan and Germany, even though the two countries possess different political and economic conditions for their development of decentralized renewable energy? This essay claims that it involves not only the participatory problem but also refers to the different considerations for political and economic concerns from the top-down and the bottom-up. From the top-down perspective, decentralized energy acts as a part of national renewable energy policy. Due to high degree of energy import dependency and the goal of carbon mitigation commanded by international bodies, both governments have been under pressure to enlarge their country's autonomous energy production. For this purpose, 'scale' and 'speed' are the most important sustainability indicators for renewable energy (Furukawa & Huang, 2014).

Mautz and Byzio (2004) also point out, that the core dispute of the renewable energy policy nowadays no longer lingers on the traditional issue of 'economic vs. ecological', instead conflicts of interests emerge from the competitive ecological goals: 'nature conservation vs. climate protection'. For example, the environmental organizations in Germany now face the dilemma of 'mixed interests' and have to evaluate which serves environmental protection more: the large-scale deployment of renewable energy, such as the off-shore wind projects invested by corporate groups, or the sustainable ways on the community-level, which generally refuse to regard the large-scale renewable energy as a kind of decentralized energy?

Communities in Taiwan and Germany encountered very similar problems, however, their institutional structures in the energy field are totally different. Therefore, some legal forms which stand between German locals and the government, for instance, energy related associations and networks will also be analyzed in the following part.

Participatory Forms and Networks of Decentralized Energy in Germany: Advantages and Challenges

Legal forms dealing with decentralized energy can be categorized into three types in Germany: GbR, GmbH & Co. KG, eG (Die eingetragene Genossenschaft) und AG. The original and the most well-known form is GbR (Civil-Law-Partnership/*Gesellschaft bürgerlichen Rechts*) referring to solar plants (Bürgersolaranlage). In contrast to other forms, GbR is the fastest, the easiest and the cheapest to set up and can be simply established by two people with an informal contract without minimum capital. Furthermore, all shareholders represent the GbR together. However, the largest disadvantage lies in its liability risk because all shareholders are responsible for the liability with their personal assets.

GbR overall manages well with small-scale facilities, whereas the other legal form GmbH & Co. KG with its limitation of liability and risk cover better suits large-scale energy projects (UM, 2012).

The GmbH & Co. KG, meaning a mixed form of limited company (*Gesellschaft mit beschränkter Haftung*) and a limited partnership (*Kommanditgesellschaft KG*), possesses the advantages of not only the limit of liability of the involved, but also makes integration among investors easier. Both of these are necessary for larger projects, such as large-scale photovoltaic installations, wind power and biomass energy. However, as Jörg Radtke (2013) points out, GmbH & Co. KG can be regarded as a financial *Genossenschaft* (UM, 2012), and due to this, possible participatory deficiency in projects of large-scale facilities can be higher than those in *GbR* and *Genossenschaft*.

The third type is eG (*Genossenschaft/Cooperative*). eG did not originate in the energy field but rather from housing associations, credit cooperatives and other

sectors, such as health and education associations. In 2010, cooperatives boomed with one to two establishments in one month, constituting 23% of all start up of eG (cf. Volz R. 2010, Walk H. and Schröder C. 2011).

The history of eG shows it emerged in times of crises and turmoil. For example, the first cooperative in the late nineteenth century arose from retailers and craftsmen in reaction to the endangered industrial sectors, and also to help the citizens in need. The emergence of eG indicates an advantage of eG and its cooperative character, in which members share interests altogether and distribute risks equally to every member (Walk H. and Schröder C. 2011). Another reason why eG became common in the energy field is related to the different virtues of communities or regions from the proceeding trend of globalization. One of the contemporary founders of the *Energiegenossenschaft*, Burghard Flieger, defines *Energiegenossenschaft* as the "local engagements as opposite pole to globalization" , he expects *Energiegenossenschaft* to be user -rather than investor -oriented. Small-scale electricity eG were confronted with the drive for monopolization of electricity markets of that time. And eighty years later, *Energiegenossenschaft* built up and organised themselves in order to help provide renewable energy (Flieger B. 2011).

The reasons for the high praise of the eG lie in its democratic principle, the reliability as the legal form of eG and the opportunity it offers for many projects to be bundled under one roof (cf. Flieger B. 2011, Walk H. and Schröder C. 2011, UM 2012, Radtke J. 2013). According to the *Satzung Solar-Bürger-Genossenschaft* (Articles of Solar-Citizens-Cooperatives), the *Solar-Bürger-Genossenschaft* positions itself as an umbrella organisation above local groups, who are interested in practicing their own energy facilities. It also has the right to join other companies and set up its branches and local offices (SolarGeno 2011/2013). Under this mutual roof,

Energiegenossenschaft provides electricity from solar-, wind- or hydropower, operates combined heat and power and manages cost-saving measures. It can also sell heat and electricity directly to its members (UM 2012). Compared to GmbH & Co. KG, members of eG have the right of codetermination and every member has a vote independent from an individual capital share (cf. Walk H. and Schröder C. 2011, Radtke J. 2013).

<i>GbR</i> (Civil-Law-Partnership)	Informal contract Liability risk Small-scale facilities High participatory opportunity
<i>GmbH&Co.KG</i>	Limit of liability Large-scale facilities Possible participatory deficiency
<i>eG</i> (Cooperative)	Limit of liability Small- to- middle scale facilities "One member one vote" Umbrella org. above local groups

Chart3. Legal forms of citizens' participation in renewable energy

Another trend in network-building of decentralized energy is the exchange of management techniques among *Energiegenossenschaften* from different regions. Engaged actors such as fesa e.V. has been promoting networks of energy-initiatives between federal states for many years. In 2012 at the Network Convention, the project manager of fesa e.V. mentioned a common problem citizens face in the global climate change process when they are dedicated to energy autonomous communities: "a single and unattached initiative could persistently face the same problem which cannot be solved and should be supported by the networks with demand-oriented offer of information"(fesa e.V. 2012). One of the challenges in the cooperation between different local cooperatives lies in its lack of an information platform. As a problem proposed by a participant at the exchange program for the discussion of "The Promotion of a citizen' energy project" (*Förderung von Bürger-Energieprojekten*) in Endingen organised by the RegioNetz Südbaden and fesa e.V.,

"Meetings of information exchange are often mere formality, what we need are the telephone numbers of every expert here and if once we got any problems while running our organisations, we can call them immediately"(RegioNetz Südbaden and fesa e.V.,2014).

Spaces of cooperation between local energy companies and local energy cooperatives also exist, however, the benefits both receive are not always synergistic. For example, Badenova, the energy company based in Freiburg, provides the regional

grid operators at the minimum of 200 kW power with the direct marketing of electricity of combined heat and power which guarantees higher prices than the compensation based on the index of the Act on Combined Heat and Power Generation. The advantage for the operators lies in the extra bonus of marketing from Badenova, and in the meanwhile, Badenova benefits from this offer by adding the electricity gained from the combined heat and power into its electricity mix and retailing it, which it hopes will aid in meeting its goal to be nuclear-free as soon as possible (Badenova 2015). Whether this offer from Badenova should be treated as an attempt to integrate the markets or reveals its intention of monopolization, remains a question. Due to the requirement of large-sized combined heat and power generation up to 200 kW Durstewitz (G. 2013), the offer of Badenova supports large-scale plans, as it targets contracting partners such as municipal utilities, indoor swimming pools or school centres more than small households (Badenova 2015). Under such circumstances, *Energiegenossenschaften* are barely qualified because of their small capital projects. In this context, the new offer from Badenova can mean that companies tend to enlarge the scale of facilities and increase financial capital so that they no longer have any intention to incorporate local energy cooperatives into their plans.

Decentralized Energy Embedded in a Regional Economy: The case of Higashi-Ohmi in Japan

Higashi-Ohmi is a city located in the eastern part of Japan's largest lake "Biwako". In the 1970's, Biwako was extremely polluted by industrial sewage and house wastewater, therefore, some housewives in the region started to organize self-help groups and began recycling bottle caps and used cooking oil (cf. Fujii A. 2004, Mizuguchi S., Ohta K., Yamaguchi M., Nishimura 2014). The task of protecting Biwako

became a source of the environmental movement in the region. Following this, a larger NPO project dealing with biodiesel fuel namely the “Nanohana- Eco- Project” was established in 1998, which presented a prototype of “local production for local consumption of food and energy” movement in Higashi-Ohmi (Ai-Eco Club 2012).

Proceeding from this idea, the Citizen’s Electric Power Cooperative of Higashi-Ohmi was designed to be a part of the regional business cycle, which makes it significantly different from other citizen’s electric power cooperatives (Hashimoto K., Nakagawa S., Okumura S., Nishimura T. 2009). Generally speaking, the first step for citizens in setting up a Citizen’s Electric Power Cooperative in a region is to raise funds and then to install solar panels. Contributors then share the profits. A possible weakness of this system is that contributors can use the profits freely and consequently the earnings might flow outside the given region. Another weakness is that investments might become a financial burden for the contributors.

In order to solve these problems, the “Model of Higashi-Ohmi” attempted to lay equal stress on ecology and economy with the idea of a regional coupon and future fund (Hashimoto K., Nakagawa S., Okumura S., Nishimura T. 2009). Under this design, contributors receive the coupons as the earning distributions instead of cash. The Chamber of Commerce operates the issue of coupons and cooperates with 400 shops in the region so that contributors can custom these shops with limited time offers (cf. Hashimoto K et al. 2009, Mizuguchi S., Ohta K., Yamaguchi M., Nishimura 2014, Chamber of Commerce of Yokaichi 2014). Through this mechanism, the Citizen’s Electric Power Cooperative will remain embedded in regional economy and also to some extent promote the cycling of money into regional business. The idea behind the future fund was to raise 1% of power consumption fees of related companies and citizens and put it into the “Wind and Light’s Future Fund” in order to support the overall renewable energy facilities in the city (Hashimoto K. et al 2009).

In regard to regional public affairs, participants of Higashi- Ohmi cannot be entirely divided between "official /non-official" because the identities of a single participant can sometimes be multiple. For examples, some officials attend local meetings as residents but not on behalf of their government bodies or some officials are still tightly involved in the local affairs after they have retired and some even leave their positions in the office and started a new career on the local level. This shows that public affairs in Higashi- Ohmi were not created mainly by the officials, but local people have also played an important role in initiating plans and incorporating officials into their meetings.

An important figure in the Higashi-Ohmi development was Nomura Masaji, the current representative director of the Restaurant of the Nonaka and the codirector of the Welfare Mall (Fukushi Mall), and one of the directors of the city hall and the director of the Rape Blossoms Eco Plaza of Aito. In 2009, a local resident Ohta Seizo started the idea of the Welfare Mall, suggesting people in this region should help each others in their daily lives. Nomura Masaji attended the discussion as a resident of the region and also as a member of NGO, while he was still the director of the Rape Blossoms Eco Plaza of Aito. After the idea of Welfare Mall was completed and become a legal organization, Nomura Masaji gave up his career as an official and became the director of Restaurant Nonaka. The Manager of the farm house hostel, Sigetaro Ueda, who provided accommodations and demonstrated planting to teach young generations about farming life, has been working at the Ministry of Agriculture, Forestry and Fishery for 37 years. After he retired in the year of 2000, he was elected as the councilor of the Aito town, and three years later as mayor. In 2006, he became the director of the Rape Blossoms Eco Plaza of Aito. He also turned to be the board chairman of the organic supermarket, Margueritte Station in 2011. To this day, he has been a key man for connecting younger key people to promote the regional

economy.¹

Since decentralized energy is an emerging concept in this region, related public sectors also present their abilities to adjust and keep pace with this new demand of local people. Some regulations were amended to resemble plans. For instance, after the Citizen's Electric Power Cooperative No.1 and No.2 were raised by residents from Higashi Ohmi in 2003 and in 2010 respectively, part of the regulation on the "Usage Fee of the Administrative Assets in Higashi Ohmi" was turned into "Guidelines of Facilities of Renewable Energy as Public Domain of Higashi Ohmi", in which regional groups, NPOs and specific authorized corporations were targeted as the subjects of the regulation. The aims of these guidelines are to combine the facility of electricity in the city, the regional and non-profit activities and regional coupons released by economic organizations in the city (Department of Environment in City Higashi-Ohmi, 2014).

In sum, the concept of "regional economics" formed the basis for developing the Citizen's Electric Power Cooperative and this provides a wider framework for understanding why and how local people are involved as prosumers in decentralized energy.

Conclusion: Collision and Synergy between Top-Down and Bottom-Up

The case of Higashi-Ohmi and the building up of decentralized energy in Germany demonstrate that both bottom-up environmental consciousness and top-down empowerment of electricity are indispensable for sustainable and effective

¹ Interviews conducted by author in Higashi-Ohmi in Nov. 2014.

decentralized energy. Although the liberalisation of electricity is necessary for autonomous energy, it does not absolutely lead to a decrease in the price of electricity or autonomous energy; environmental consciousness which has emerged from locals and residents' participation are even more essential to activating and maintaining various kinds of decentralized energy.

In comparison, legal forms relevant to decentralized energy in Germany have proven to be trustworthy and stable for groups who are willing to establish networks of decentralized energy. However, local groups such as *Energiegenossenschaft* are not satisfied with the German Renewable Energy Act or the law executors, especially when it comes to large-scale renewable energy projects.

The main conflicts of interests in decentralized energy hinge neither about the central government nor locals. The divergent considerations from stakeholders largely result in different interpretations of decentralized energy and bring about laws which go against the will of the locals. As mentioned above, concerns from the centre on carbon mitigation and the reduction of energy imports can be unbeneficial to the locals' demands for equal participation and ecologically and regionally oriented economy and decentralized energy. This circumstance pushes locals to strengthen the above links and improve their ability to get involved with a larger-scale facility, such as communal wind power.

The case of Higashi-Ohmi highlights its uniqueness that other cities in Japan are unable to follow when implementing their own Citizen's Electric Power Cooperatives. The most specific requirements of Higashi Ohmi are the cross-border synergy of the two key players, officials and local residents, along with their strong common belief in taking care of people, local foods and autonomous energy and finally their efforts in integrating them into the regional economy. Welfare Mall in Higashi Ohmi is now regarded as a model of an integrating system of care, food and energy. Though the

uniqueness of Higashi-Ohmi can be a possible constraint when trying to replicate, the receptiveness of the key players and local people promotes the following developments in nearby regions.

Decentralized energy in Taiwan has so far been promoted by the Bureau of Energy, however, the implementation by the locals are still rare. The case of YuanLi represents a major emergence in the development of the autonomous energy in Taiwan. Foreign investments with unsound participatory mechanisms and incomplete regulations on renewable energy have caused the conflicts of the government, the investors and the citizens of YuanLi. During the resistance, citizens of YuanLi changed from the responses to the wind turbines on the coastline, to an amendment of the regulations on the secure distances of wind turbines. Inch by inch, they called for the overall reflection on the renewable energy policy, as well as raising the possibility of establishing autonomous energy from the locals. In terms of this last point, the case of YuanLi should not be regarded as a single event of "Not in my Backyard (NIMBY)", but a turning point of the citizens' awareness of building up their own capability to build up their own renewable energy system.

REFERENCES

- Burger, C. and Weinmann, J.(2012), *The Decentralized Energy Revolution: Business Strategies for a New Paradigm*, Palgrave Macmillan.
- Citizens' Environmental Department of City Hall (2014). 地域力の向上をめざして, 市民発電所の普及促進をはじめとする自然エネルギー活用, Higashi Ohmi: Citizens' Environmental Department of City Hall,1-23.(Japanese)
- Dooley J.J. (1998), *Unintended Consequences: Energy R&D in a Deregulated Energy Market*, *Energy Policy*,26(7), 519-584.

- Fan S. and Olofinbiyi T.(2013), *Role of emerging countries in climate-smart agriculture*, Climate Action: United Nations Environment Programme (UNEP), 121-124.
- fesa e.V. (2012). 1. Netzwerktreffen Energieinitiativen Sübaden. Freiburg: *SolarRegion*, 3/2012. (German)
- fesa e.V. (2013). *Gemeinsam Wind ernten – Energiegenossenschaften erschließen das Geschäftsfeld*, *SolarRegion*, 4. (German)
- Furukawa K. and Huang H.T.(2014). Naturschutz und Energiewende: Windräder als Konfliktthema im Naturschutz (Conservation of Nature: Wind Power as Topic of Conflict on Nature Conservation)(Proposal of Seminar 'Naturschutz und Gesellschaft', University of Freiburg). (German)
- Flieger B. (2011). Energiegenossenschaften. Eine klimaverantwortliche, bürgernahe Energiewirtschaft ist möglich. In: Elsen, Susanne (Hrg.): *Solidarische Ökonomie und die Gestaltung des Gemeinwesens- Perspektiven und Ansätze der Ökosozialen Transformation von unten*. Neu-Ulm, 305-328. (German)
- Fujii, A & Rape Blossoms Project Network (2004). *Eco Revolution of Rapeseed Blossom. (Na-no-Hana-Eco-Kakumei)*(菜の花エコ革命) Tokyo: Sōshinsha. (Japanese).
- Green R.J. and Newbery D.M.(1992). *Competition in the British Electricity Spot Market.*, *Journal of Political Economy*, 100(5), The University of Chicago Press, 929-953.
- Hagmann, J., Chuma, E., Murwira, K., Connolly, M.,(1998), *Learning Together through Participatory Extension: A Guide to an Approach Developed in Zimbabwe*, AGRITEX, pp65.
- Hashimoto K., Nakagawa S., Okumura S., Nishimura T. (2009). 東近江モデルを適用した市民共同発電事業.Osaka: *Society of Environmental Conservation*

Engineering. (Japanese)

Hassen M.,Majumder-Rusell D. (2014). Electricity Regulation in the UK: Overview.

Association of Corporate Counsel.

Joskow, P.L. (2008), *Lessons Learned from Electricity Market Liberalization*, Energy Journal, Special Issue, 9-42.

Lovely Town eco Club Aito, Aito Eco-Plaza Nanohana-Kan (2012). 東近江市菜の花プロジェクトの取り組み(Japanese)

Lovely Town eco Club Aito (2012). mi-chi-bu-shi-n: Town Planning through Strength, Intellect and People's Power. Higashi Ohmi: NPO Lovely Town eco Club Aito, 2-46.(Japanese)

Mautz R.and Byzio, A. (2004). Der Einstieg in die Offshore-Windkraftnutzung als Prüfstein der Energiewende-Konfliktthemen und Konfliktodynamiken, SOFI-Mitteilungen, 32, Soziologisches Forschungsinstitut: Göttingen, pp111-127. (German)

Mickwitz P., Melanen M., Rosenstroem U., Seppaelae J(2006),“Regional Eco-Efficiency Indicators- A Participatory Approach“, Journal of Cleaner Production,14, pp1603-1611.

Mizuguchi S., Yamaguchi M., Nishimura T.(In Press). *Higashi-Ohmi, Restoring Nature, Economy and Community through Transition Management*, Rotterdam: Dutch Research Institute for Transitions (DRIFT).

Mizuguchi S., Ohta K., Yamaguchi M., Nishimura T. (In Press). *Interactions among Multiple Niche-Innovations and Multi-Regimes: The Case of Welfare Mall in Higashi-Ohmi* , Rotterdam: Dutch Research Institute for Transitions (DRIFT).

Radtke J.(2013), *Bürgerenergie in Deutschland - ein Modell für Partizipation? Die deutsche "Energiewende" nach Fukushima : der wissenschaftliche Diskurs zwischen Atomausstieg und Wachstumsdebatte*.Marburg: Metropolis, 139-182.

(German)

Reed M.S.(2008), *Stakeholder Participation for Environmental Management:*

Literature Review, Biological Conservation,141(10),2417-2431.

Rifkin J.(2011). *The Third Industrial Revolution: How Lateral Power is Transforming*

Energy, the Economy, and the World, Palgrave MacMillan.

Schott D.(1996). *Energie und Stadt in Europa : von der vorindustriellen „Holznot“*

bis zur Ölkrise der 1970er Jahre = Energy and the city in Europe , Internationale
Stadtgeschichts-Konferenz. (German)

Solar-Bürger-Genossenschaft (2013). *Satzung Solar-Bürger-Genossenschaft*, (June 7,

2013),Freiburg. (German)

Storz, N.,Oelsner, G.,Müller, T., Milkowski, N., Jenssen, T.,Hentschel, T. et al.(2012,

November). *Bürger machen Energie, Rechtsformen und Tipps für*

Bürgerenergieanlage, Karlsruhe/Stuttgart: Ministerium für Umwelt, Klima und
Energiewirtschaft Baden-Württemberg. (German)

Streimikiene,D., Bruneckiene,J., Cibinskiene,A. (2013), *The Review of Electricity*

Market Liberalization Impacts on Electricity Prices, Transformations in Business
& Economics, 12(3:30), 40-60.

Volz, R. (2010). *Stand und Entwicklungsmöglichkeiten von*

*Bürgerenergiegenossenschaften in Deutschland. Aktuelle theoretische und
empirische Beiträge zur Genossenschafts- und Kooperationsforschung*, 29.

Stuttgart: Forschungsstelle für Genossenschaftswesen an der Universität
Hohenheim.pp37-65.(German)

Walk H. & Schröder C. (2011). *Solidarität und Nachhaltigkeit in Städten: Die Rolle*

*der Genossenschaften.(Solidarity and Sustainability in the Citites: The Role of
Cooperatives)* Schriften zur Ökologie,18. Berlin: Heinrich Böll

Stiftung.pp90-93.(German)

Walker G., Hunter S., Devine-Wright P., Evans B., Fay H. (2007), Harnessing Community Energies: Explaining and Evaluating Community-Based Localism in Renewable Energy Policy in the UK”, *Global Environmental Politics*, 7, pp64-82.

Yegbemy, R.N., Yabi, J.A., Dossa, C.S.G., Bauer, S.(2014). *Novel Participatory Indicators of Sustainability Reveal Weakness of Maize Cropping in Benin*, *Agron. Sustain.Dev.(Agronomy for Sustainable Development)*

Yokaichi Chamber of Commerce and Industry (2014). 東近江市 Sun 讚プロジェクト, Yokaichi, November 2014. (Japanese)

Electronic References

Annual Report 2013 (2013), Bureau of Energy under Ministry of Economic Affairs.

Retrieved from

http://web3.moeaboe.gov.tw/ECW/populace/content/ContentLink.aspx?menu_id=137 &sub_menu_id=358

badenova AG & Co. KG (28 April 2015). Für Stadtwerke und Private Anlagenbetreiber:

Badenova Vermarktet Strom aus Blockheizkraftwerk.

[Pressemitteilungen]Retrieved from

https://www.badenova.de/web/de/ueberbadenova/presse_1/pressemitteilungen/Pressemitteilungen-Details_957504.html

Gottlieb J. (2013). Power to the People (Literally): Energy Decentralization and

Democratization in the UK. Retrieved from

<https://joinmosaic.com/blog/power-people-literally-energy-decentralization-and-demo-craticization-uk/>

Green Energy and Environment Research Laboratories (2012)

<http://wind.itri.org.tw/Thousand/ThIndex.aspx>

HAND e.V.(2015) . Retrieved from <http://www.hand.org.tw/#!-/cndy>

Industrial Development Bureau under Ministry of Economic Affairs (2013). Retrieved from

<http://www.moeaidb.gov.tw/external/ctrl?PRO=news.NewsView&id=13584>

Infra Vest. (2006). Retrieved from

<http://infravest-twonline.com/infravest/TC/news-060219.html>

Infra Vest. (2006). Retrieved from

<http://infravest-twonline.com/infravest/TC/news-060723.html>

ISSUU (A World of Publications) (2012). Retrieved from

http://issuu.com/ivanliu73/docs/_____idontwant18

Lanzavecchia, E., Leona, A. (24 October 2007). Domestic Electricity Market

Liberalization and its Impact on Pricing, Alumni Association Italy, Milan Energy Forum (INSEAD Report VPRI-071024-AILeon-PO),1-20. Retrieved from

http://www.valuepartners.com/downloads/PDF_Comicati/071024_domestic_electricity_market_liberalization_and_its_impact_on_pricing.pdf

Naturpark SOONWALD-NAHE (2014). Naturpark Soonwald-Nahe erhält Kernzonen

/ Keine Windkraft in sensiblen Bereichen. Retrieved from

<http://www.soonwald-nahe.de/aktuelles/Kernzonen.asp?jahr=2014>.

Roberts D (25 Feb 2013), The next big thing in energy: Decentralization. Retrieved from

<http://grist.org/climate-energy/the-next-big-thing-in-energy-decentralization/>

Solargeno.(2011,January 28) Satzung Solar-Bürger-Genossenschaft. Retrieved from

<http://sbg.solarbuergergenossenschaft.de/downloads/dokumente/item/507-satzung>

Summaries of EU legislation. (2006, March 8) *Green Paper: A European strategy for sustainable, competitive and secure energy* [Announcement] July 5, 2006

on the World Wide Web:

http://europa.eu/legislation_summaries/energy/european_energy_policy/l27062_en.htm

Taiwan Cogeneration Corporation (Taiwan Cogen). Retrieved from

<http://www.cogen.com.tw/tw/Default.aspx?TreeMenu=0001&SubDir=%2f%e5%85%ac%e5%8f%b8%e7%b0%a1%e4%bb%8b%2f%e5%85%ac%e5%8f%b8%e6%a6%82%e6%b3%81%2f%e8%82%a1%e6%9d%b1%e7%b5%90%e6%a7%8b>

Taiwan Environmental Information Center (2013). Retrieved from

<http://e-info.org.tw/node/87147>.

Taiwan Institute of Economic Research (2013). Retrieved from

<http://www.tier.org.tw/comment/tiermon201305.asp>

Taiwan NGO Social Enterprises Co.(2015) Retrieved from

<http://www.ngose.tw/charityCont.aspx?sno=10>

Interview

Interview with Dr. Burghard Flieger (innova eG, Freiburg). Conducted

with Prof. Dr. Shu-Pin Liu, Soochow University (July 2014).