Decentralized Energy: Grassroots, Participatory Forms and Mutual Shaping with Regional Economies in the cases of Freiburg, Higashi-Ohmi and YuanLi

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Summary

Decentralized energy, or Citizens' energy, is demonstrated as a grassroots power against big energy enterprises which implies an alternative to global capitalism. Instead of being confined into the dichotomy of top-down vs. bottom-up frameworks, the dynamics of decentralized energy shows its vitality to penetrate the borders of stakeholders and create possibilities in cross-sector/cross-border collaboration as well as the ability to stimulate the flexibility of law, and therefore, it interplays with top-down forces spirally and dialectically.

Citizens' participation in renewable energy production and consumption in the sense of decentralized energy has never been an independent event, but rather, it has emerged from a series of local activities related to appeals to regional autonomy, whereby "energy, care and food" integrate as a matter of vital basic needs that people living together and nearby strive to handle by themselves. Freiburg (Germany), Higashi-Omi (Japan) and YuanLi (Taiwan) all possess different legal systems, beliefs and mentalities, and historical, technical and economic conditions which lead to their unique compatibilities when decentralized energy is taken into practice.

Through comparative studies, this thesis compares participation in energy production and consumption among different localities. It traces how German, Japanese and Taiwanese citizens build up their own energy systems and what their potential motives are, by analyzing the divergence of top-down renewable energy policy from local calls for the autonomous energy. The following points of focus will be analyzed: 1) the factors which influence the rising awareness of creating "community-based" energy systems; 2) bringing the locals into the contact with international communities, by means of comparison of motives, participatory process and economic and social conditions among different communities within the autonomous energy field; and 3) the collisions between the macro and micro level of policy making due to their distinct mindsets on the issue of renewable energy.

Zusammenfassung

Energiegenossenschaften wie auch andere Formen von Bürgerbeteiligungen der dezentralen Energieversorgung werden zunehmend als Alternative zu industriellen, von Shareholdern geprägten Energieunternehmen gesehen. Anstatt in der klassischen Dichotomie von Top-down- und Bottom-up- Konzepten zu verharren, zeigt die Dynamik von dezentralen Energiebeteiligungsformen, dass es möglich ist, die Grenzen der klassischen Stakeholder geprägten Strukturen vielfältig zu überwinden und unter Nutzung der gesetzlichen Vorgaben kreativ neue, grenzüberschreitende Kooperationen zu schaffen. In diesen Sinne wird das Wechselspiel von top-down und bottom-up Kräften dialektisch neu interpretiert.

Bürgerbeteiligungen an erneuerbarer Energieerzeugung und -verbrauch waren niemals ein abgegrenztes, unabhängiges Betätigungs- und Themenfeld, sondern sind vielmehr eingebettet in eine Reihe von lokalen, partizipativen Aktivitäten, die im Zusammenhang stehen mit weiterführenden Themen von sozialer Fürsorge, alternativen ökonomischen Modellen, Versorgung und Ernährungssicherung als elementaren Grundlagen der Lebensführung und Lebenssicherung. Oft sind sie auch von stark regionalistischen Tendenzen überlagert. Die gewählten Fallstudien in Freiburg (Deutschland), Higashi-Ohmi (Japan) und YuanLi (Taiwan) besitzen alle unterschiedliche Rechtssysteme, Überzeugungen und Mentalitäten sowie historische, technische und ökonomische Bedingungen. Die Kernfrage dabei ist, ob und wie sich dieser unterschiedlichen Kontexte auf die Umsetzung und den Ausbau dezentralisierter Energieversorgung in der Praxis auswirken.

In der vergleichenden Analyse werden die potenziellen Motive aufgezeigt, wobei immer wieder auf das Spannungsfeld von offiziellen Top-down und lokalen Bottom-up - Aktivitäten und Initiativen der Erneuerbare-Energien-Politik eingegangen wird. Folgende Schwerpunkte werden analysiert: 1) die Faktoren, die das steigende Bewusstsein für die Schaffung von "gemeinschaftsbasierten" Energiesystemen beeinflussen; 2) die Kontaktaufnahme und Vernetzung von lokalen Initiativen mit internationalen Gemeinschaften. Dies erfolgt über einen Vergleich von Motiven, partizipativen Prozessen und wirtschaftlichen sowie sozialen Bedingungen zwischen verschiedenen Initiativen im

Bereich der autonomen Energie; und 3) die Kollisionen zwischen der Makro- und Mikroebene der Politikgestaltung aufgrund ihrer unterschiedlichen Denkweisen auf die Frage der erneuerbaren Energien.

Contents

Chapter 1

Introduction

1.1 Background and Context

The terms ‘decentralized energy’, ‘autonomous energy’, ‘citizens’ energy’ or ‘democratization of energy’, either as an ideal or practice, symbolize people’s ownership of the rights and abilities to produce electricity actively (Gottlieb, 2013; Rifkin, 2011; 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 (Fan & Olofinbiyi, 2013; Schott, 1996).

Decentralized energy, focusing on the regionally scattered provision of energy and local participation, has been seen as a way to achieve the goal of energy transition. Why has decentralized energy been seen as a possible alternative? The practiced history of decentralized energy has demonstrated advantages in reducing CO2 emissions and its indispensable role which cannot be achieved by traditional methods of centrally provided energy.

However, decentralized energy also triggers tense collisions as well as divergent interpretations between top-down driving forces and bottom-up power from the locals. While stakeholders and participants have progressively, including traditional energy supply systems and newcomers, tended to be involved and build their own different strategies in ‘the market of decentralised energy’(Burger & Weinmann, 2013), the nexus of these stakeholders has become increasingly complex and extends gone beyond the dichotomy of top-down vs. bottom-up in this analysis.

Energy transition indicates a rough line to achieve. Under the same convictions as climate adaptation, sustainable development or environmental protection, there is a big gap between centrally planned blueprints and locally formed decentralized energy, especially when the concepts of decentralized energy are put into concrete practices and policies. With different routes to decentralized energy, the top-down will and the bottom-up roots develop simultaneously and affect each other from both sides. In Germany, locality has been strongly affected by the central government with regard to amendments of related laws and rules for renewable energy. On the other hand, local practices from different regions have formed enough credibility to negotiate with the central government in strong and irreversible ways.

However, the dichotomy between central and local provision of energy simplifies the complex picture of how decentralized energy develops and how it interacts with centralized energy systems. The diversity of the roots of decentralized energy and the dynamics of its current development present this complexity. While local production and regional participation become more and more correct at satisfying local needs, different forms of energy production opposite to traditional energy enterprises emerge on the one hand, while the diversity of locality, including local groups and the concept of locality itself, arise on the other.

The decision making of public tenders, concession agreements and some disputable cases of the deployment of renewable energy highlight the multiplicity of interest groups and their conflicts among each other. When taking local renewable energy's company into account, conflicting interests between local companies and local energy cooperatives can appear. Although a local renewable energy's company is green and local, it has been often criticized by local cooperatives as a monopoly based on its exclusion of the opportunities of local cooperatives or single participants. Therefore, disparities between top-down and bottom-up approaches are apparent but the line is ambiguous, which means competition and cooperation coexist between both sides. Locality cannot be reduced to a homogeneous concept but one which contains competition and cooperation from different local actors and groups as well.

To achieve the goal of CO2 reduction, organisations and local people have to cooperate and build a network, so that we can imagine a geographically scattered but relationally tight network which promotes decentralized energy together. The speed of the cooperation from different regions can be way lower than the top-down and policy-oriented decentralized energy, but more sustainable. The way it develops is still very dynamic and embedded in regional context, such as in the local medical care system, agricultural production, ways of consumption and communication. Within regions, energy often does not play a leading part but interplays with other requirements. Under this development model, a regional economy gradually forms in a certain area and interacts with other areas.

To analyze the dynamics of decentralized energy, we have to analyze a package of questions first: how a regional economy emerges, the common requirements of decentralized energy from different regions and the specificities, the compatibility of cases, local voices, complex stakeholder involvements, the disputes about issues of renewable energy, and the dynamics between top-down and bottom-up methods.

1.2 Research Question and Objective

This thesis aims to clarify the dialectics between decentralized power from the top and bottom. The cases of Taiwan, Germany and Japan show that locals and energy-autonomous communities kept articulating the divergence between policy- and local-based decentralized energy. Nevertheless, instead of emphasizing the conflicts with the outside energy investors or projects, locals announced the need to invite and cooperate with the 'outsiders'.

Through comparative analysis of the cases, a basic question emerges: Are communities comparable? To what extent could decentralized energy be geographically diffused or widely applied? To answer this, this thesis explores:

1) general concepts on decentralized energy: How could the same words be used differently in different contexts and by different stakeholders?

2) basic requirements of decentralized energy communities based on three case studies, including characteristics such as motives or the causes of the decentralization. For example, a natural disaster may be a common origin, as well as the different 'opposites' which the communities encounter, such as 'The Big Four' traditional energy corporations in Germany or the project-led foundations and external investment projects which affect local development. Moreover, how do these opposite roles and the communities collide and collaborate with each other while both sides seek to expand the energy network?

3) participatory forms. Observations during interviews reveals two new growing participatory forms of decentralized energy communities, pragmatic- and political-oriented forms, which demonstrate the possible divergence inside communities. When multiple actors are involved in energy production, enterprises or organizations become competitors. Therefore, the term "participation" no longer refers to the multilateral involvement of actors but means that stakeholders of the traditional energy providers and newcomers become involved in non-neutral or non-equal participation.

4) ‘intermediary roles’. How do researchers (including myself) interpret them? What is the bias of these observations? What roles do the project coordinators or community representatives play?

Through analysis of these four arenas, this thesis seeks to better conceptualize the different methods and related challenges surrounding decentralized energy communities.

1.3 Literature Review and Theoretical Framework

Dialectical Issues on the Dynamics of Decentralized Energy

Renewable energy development as a conflicting issue has been discussed in several aspects when it is put into practice. First, issues surrounding the concept of locality emerge. When talking about locality, the scale of renewable energy can be the core of the controversy. Large-scale renewable energy does not perfectly suit the needs of the locals, and sometimes it can even be harmful to them. Also, when the settings of renewable energy are not located properly, the voices from locals can be completely opposed to the green development. Another serious problem regards the consensus between local people and the investors of the deployments, as it is the local people who will live among these deployments. Related controversial issues have been sometimes addressed under the issues of locality vs. green or NIMBY (not in my backyard). Whether a local renewable energy company is local enough, or actually is a monopoly, often comes down to the issue of which one is more important: being green or having participation from locals.

Another issue regards technical inventions. While a large number of deployments of renewable energy rely on technical innovations or high-tech development, it is debatable whether renewable energy presents a sustainable way of life or is the outcome and understandings of scientists. Whether natural and social resources have been factored into the invention of renewable energy techniques is still full of controversies.

The traditional and most controversial issue surrounding renewable energy is the opposing interests of economy and ecology. The balance between economic and ecologic has been the main topic since renewable energy has come into being, however, even though the costs of renewable energy have shrunk, price remains a concern and makes many roles conflict with each other. For example, when it comes to the question of who pays for the investment of the setting or machine, the landlords and the tenders can often stand in opposition. “Price says the truth”.

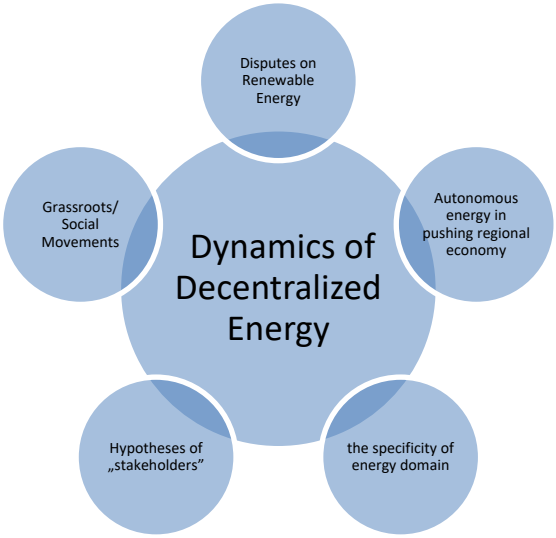


Fig. 1.1: Focal Points for Studying the Dynamics of Decentralized Energy

1.3.1 Top-Down Renewable Energy Policy vs. Bottom-up Decentralized Energy?

The rise of decentralized energy has usually been seen as a result of local movements working against industries of conventional energy resources as well as mutual benefits co-constructed (colluded) by central governments and energy industries. From the perspectives of the locals, the disadvantages of industries of conventional energy resources are not limited to the polluted resources they use, but also the fact that large-scale power plants stand far from residences which leads to the waste of energy on the one hand, and on the other hand, pushes away the participation of the residents because the decision-making is unreachable for the locals (Devine-Wright, 2005).

Along with the development of decentralized energy against conventional energy resources, related techniques for renewable energy have been established as a substitution. Much literature on renewable energy hypothesizes that renewable energy represents a new epoch in the stead of conventional energy resources under which the framework of "conventional energy resources vs. renewable energy" has also been formed.

However, the line between decentralized energy and renewable energy has been left unclear. By comparing decentralized energy and renewable energy, especially the roots and the tracks of their development, significant differences can be found. These two lines intersect at some points but differentiate in many aspects, such as the energy forms built from both sides, the alternatives of renewable energy being chosen and the way the relations between technique and society are perceived. The grey area between renewable energy and decentralized energy remains unclear, but along with the growing gap between centrally promoted renewable energy policy and locally emerged decentralized energy, their different "essences", concerns or initiatives are worthwhile for further analysis. The differences between renewable energy and decentralized energy show the different paths that they have, but also have been hypothesized under the framework of a dichotomy between "top-down renewable energy policy vs. bottom-up decentralized energy".

This chapter tries to clarify that the methodological approaches to examine the dynamic expansion and shrinking of decentralized energy should at least surpass the oversimplification of the above hypothesis. Decentralized energy is not only a research objective but provides a sharp perspective with which to historically and dynamically analyze an autonomous movement which is based on locals, and initiated by and embedded within the local needs. The dynamics of decentralized energy also explain why it is more long-lasting than policy-oriented decisions and, at the same time, remains open and more accessible to people and sectors which interweave with each other.

To discuss the reasons for the rise of decentralized energy, it is important to note that although the big enterprises, the centralized system and pollution from traditional energy production are the key opposing roles of decentralized energy, to define them as the sole reasons for its rise would be too arbitrary. These roles and the development of decentralized energy connect and develop simultaneously and dialectically, not sequentially.

1.3.2 Hypotheses of „stakeholders”

How to Analyze Participation?

In the decentralized energy research field, 'participation' has been highlighted as an essential concern(Mickwitz, Melanen, Rosenström, & Seppälä, 2006; Radtke, 2013; Reed et al., 2009; Walker, Hunter, Devine-Wright, Evans, & Fay, 2007). To monitor participatory progress over time, the various stakeholders involved in the decision-making need to be examined against certain indicators (Smith, Voß, & Grin, 2010). 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 their political and social backgrounds lead to which kinds of participatory forms needs to be clarified (Radtke, 2013). One of the strong points in participatory analysis is the elaboration of the related stakeholders.

However, there are two significant weaknesses to 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, 2013). Yet, the 'community' or 'people' in this perspective is homogenized and not dynamically analyzed with other involved actors or factors (Walker et al., 2007). In addition, this approach fails to interpret the bottom-up mobilization to examine which factors give rise to the establishment of and changes to the decentralized energy communities or the main causes for cooperation or conflict between the diverse stakeholders.

In longitudinal 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, Chuma, Murwira, & Connolly, 1998). 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 these actors are granted a voice to propose measurable and relevant indicators(Yegbemey, Yabi, Dossa, & Bauer, 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. For example, the previous roles of agricultural extension workers could be changed from teachers to facilitators. As one extension worker stated, 'We learned that most of them (farmers) were unhappy because of their past experiences with 'outsiders' coming into the community, doing what they wanted to do, then going away, thus leaving the community feeling abused without seeing any tangible results' (Hagmann et al., 1998). To refine this process, 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.

Borders of 'Stakeholders'

Just as with theoretical frameworks applied by many researchers of social sciences, the conception of stakeholders is commonly used to analyze the relationship and development of the objectives being observed. Actors such as central governments, municipalities, corporations, local enterprises, communities, households, individuals, etc. stand in a spectrum of stakeholders where their interests define whether their interplay presents as conflicts or cooperation. The conception of stakeholders seems necessary and hard to avoid if the interaction among different actors is to be described.

However, stakeholders as an analytical tool tend to see each actor as a homogeneous unity, while in reality, many cases show that the boundaries of actors are not very clear. For example, the case of Higashi-Ohmi in Japan shows that one person can assume different positions at the same time or sequentially, which means that to separate actors and analyze their interaction based upon their interests will be untrue to the reality and complicates the picture even more because the boundaries of the actors can overlap. To put it more clearly, people themselves do not see each other as stakeholders, but might be neighborhood or acquaintances in the region, and could even possess different interests among these groups. Simply imagine if some leaders

of a municipality retired and entered other fields of works, such as NGOs or the touristic enterprises; when the leader of the NGO can be the former leader of the current one in the enterprise, then the relationship between these institutions cannot be simply described as the relationship of stakeholders. Therefore, one of the objectives of clarifying the theoretical framework of stakeholders is to know to what extent it satisfies the researchers themselves but might be contradictory to the real picture of the relationship and concerns of their research objectives. From this perspective, it is very important to know how the research objectives see each other or how they define borders, if any exist. On the other hand, this clarification helps us to avoid oversimplifications while theorizing and helps us see that the dynamics of the interplay are not limited in the form of competition and cooperation.

After clarifying the hypothesis of stakeholder analysis as well as highlighting the possible borders defined by the research objectives themselves, some related questions remain. 1. If researchers conduct interviews or investigations, they have the access to knowledge of the relationship between the people whom they have contacted, at least to some extent. But is it operationally possible to determine the relationship if researchers analyze their objectives only through literature? Is there only the framework to be avoided or are there some suggestive principles to be followed? 2. If rise, expansion and shrink can roughly define the dynamics of the development of decentralized energy, what we would like to know is how well or to what extent can the involved actors determine the dynamics of the development of decentralized energy? Or can it be the opposite way around, in which the dynamics determine the interplay of the actors, which also implies that focusing on actors might be insufficient to analyze the dynamics and implies a wider range of causes which might imbed the actors in the dynamics.

Position of Researchers (myself): Observing or Intervening? How to be Honest?

The methodology of Participatory Rural Appraisal (PRA) focuses on the attitudes and behavior of outsiders(Chambers, 1994). They emphasize that analysts should be like students who learn from the local people. However, during the participation in welfare mall in Higashi-Ohmi and solargeno in Freiburg, I also felt that I was expected to contribute, and therefore I decided to be

not only an outsiders but a participant. But what shape will the relationship take if the outsiders become a part of their research objectives or become partly influential?

Subaltern studies state that small voices should be treated as equally as those of elites. However, the way that researchers empower the small voices can also be in itself elitist. Researchers' perspectives to define 'small and big' can be dominant and arbitrary. How can we define the consciousness of the subalterns? One concern is that if the voices of the local people were triggered by the outsiders, do the voices still belong to the locals? Can the outsiders speak of the local people at all? "I am sure that is what they are thinking of, even if they do not speak out" (Spivak, 1985). As Guha stated, "We propose to focus on this consciousness (of the subaltern) as our central theme, because it is not possible to make sense of the experience of insurgency merely as a history of events without a subject"(Spivak, 1985).

1.3.3 The Specificity of Energy Domain

One of the reasons to analyze the dynamics of decentralized energy is that there is a big gap in constructing the techniques of renewable energy and in practicing activities related to sustainability. It has been commonly doubted whether the investment of green technology can fulfill the needs of local people and become a real benefit for a friendly environment (Rohracher & Späth, 2013).

When analyzing the dynamics of the development of decentralized energy, it makes sense to clarify the specificity of energy domain because there surely exist different constraints to people's participation in energy production than joining other fields, such as farming. As utilizing techniques is only one of the basic requirements in building up a renewable energy system, other corresponding conditions such as the legal system, investment climate, etc. may co-constitute a fortress which prohibits the majorities from joining in(Genus & Coles, 2008).

The Strategic Niche Management approach (SNM) claims that technology actors neglect social aspects when developing technology(Schot & Geels, 2008). In our analysis, we can broaden the analysis on technology developers into a wider analysis of roles such as technology adopters, like policy makers. We can further ask, what are the considerations of citizens when facing the utilization of technology for the purpose of sustainability? In what ways do citizens neglect

technological innovations? What are the connections among technological developers, adopters and users?

Some research focuses on how different types and different scales of renewable energy technology affect the acceptance of their users. For example, PV may be more acceptable than wind turbines to small users, as small-scale technologies get fewer disputes than large-scale ones.

As to the involvers: for personals, local organisations, enterprises and governments, what makes them take into account different renewable energy techniques as a source of energy production or a way to reach sustainability?

The consideration of whether to adopt large- or small-scale renewable energy can be vividly presented in the decision-making process, such as in the tendering system. Also, imported technology has different meanings from locally-produced ones, especially from the perspective of the local economy. In this sense, the scale and the trade of renewable energy make the application of renewable energy hold some specific meanings, which combines closely with the consciousness of local people and the concept of locality. If local people start to care about environmental issues, will they think of techniques as a start to change? What will happen if renewable energy technologies from outside confront local people? When renewable energy technologies are injected into locals, to what extent and for what reasons will local people accept it?

Another way to approach the specificity of energy domain is to compare different cases with different conditions. Case analysis shows the common and different requirements in implementing decentralized energy. Factors can be political, institutional, economic and cultural.

1.3.4 Grassroots / Social Movements

Danger of Purifying the Grassroots Power

In decentralized energy analysis, grassroots power has been regarded as an essential requirement. The power from the bottom-up against monopolies of energy providers symbolizes the core of energy autonomy. However, this strong belief tends to homogenize the concept of the grassroots power regardless of whether it is united as a community, a self-help group or a group of participants of social movements.

Sometimes conflicts are oversimplified in power analysis. One hypothesis goes that "if a 'main conflict' exists, other conflicts do not make any sense"(Ludden, 2002). Ranajit Guha(Guha, 1998) critiqued that this perspective is usually hypothesized in Statism. The social movement of YuanLi proved this perspective by showing that right after the social movement ended, conflicts inside the group took place.

Intermediary Roles/ Gender

Subaltern studies reminds of the danger when the research objective is homogenized, especially when the homogenized grassroots power is regarded as correct or 'pure'. This leads to more excuses for speculators and business. Under this perspective, the intermediary roles which stand between the 'inside' and the 'outside' groups should be thoroughly examined, because intermediary roles possess more opportunities to represent the group and can exchange favors with external actors. This pushes more investigation into the dynamics of the inside, for example: how have relationships of the members developed or the interactions among genders changed after participation in the social movement? During my investigation in YuanLi, I strongly felt that the roles of women and men changed after their participation in the resistance, and this change even lasted after that.

‘Locality’

‘Locality’ in the analysis of decentralized energy is also very hard to define, however, either as an emergence or as the purpose, locality is a core essence which is unavoidable. The historian Arif Dirlik critiques that locality is actually an ambiguous concept because multi-national corporations can easily act locally and create their own local features in order to earn more profits(Dirlik, 2007). Besides, ‘policy-oriented locality’ is also common among the political strategies. Once locality as a concept becomes ‘correct’ or irreversible, it further becomes easy to manipulate.

NIMBYism as a Myth of Locality

Devine-Wright (2005) highlights the shortcomings of empirical studies on public perceptions of wind farms through reexaming their methodological approaches, assumptions and proposed questions. Devine-Wright P. deconstructed a common hypothesis of NIMBYism by citing Wolsink’s analysis of causal factors driving to wind farm resistance. According to Wolsink (2000), NIMBY’s belief contributes only 4% to unacceptance of wind turbines while other factors, such as visual perceptions of the scenic value of turbines, determines mostly the attitude to a local wind farm. Other factors that helped to explain the resistance in Wolsink’s analysis are the perception of interference with nature, the environmental clean benefits of wind energy, political efficacy and general attitude towards a local wind farm. Furthermore, Wolsink revealed the myth of NIMBYism by proving that those opposed to local wind turbines also disliked the wind farms in other places. Devine-Wright P. also argued that NIMBYism has been commonly used as a tool to describe the tense relationship between general support for wind farms and local resistance to local wind turbines, which has been inferred that those who are in favor of local wind farms also like general development of wind farms. However, this hypothesis failed to explain that those who are against local wind facilities and also against the general development of wind farms (or perhaps those who are in favor of local wind farms but not their general development), which is not in the scope of the analysis.

1.3.5 Decentralized Energy and Regional Economy: Which Occurs First in the Locals?

Decentralized Energy Embedded in Regional Economy

The binding between decentralized energy and regional economy often takes the form of environmental or energy problems happening at the local level, which awaken people to join actively in regional events and regional economics. If the situation were upside down, where the regional economy is at first beginning the core of the locals, and autonomous energy is integrated after the regional economy develops, then the development of autonomous energy is usually less successful than in the former case. This is because in the latter instance, the bottom-up force to initiate autonomous energy is not strong enough. Imagine a situation in which a regional economic plan wants to integrate an energy field, then what role can energy play in the plan? Will autonomous energy be as successful as that in the former case? Can the former case be successfully duplicated by the latter?

Some questions arise: Why is decentralized energy usually embedded in the concepts of locality and regional autonomy? Is it because of a kind of ideology, or does it symbolize an alternative way of living? How has been the concept of decentralized energy been embedded in regional economy?

How did the concept of "energy" come into the minds of the local people? What defines energy? Does the concept of energy extend beyond the narrowed idea of electricity or heat, combining with local natural resources with which local people are familiar? Through local participation and local initiatives, citizens build up a decentralized energy system based on several options of renewable energy which fulfill their local needs. A place with more natural resources has less job opportunities, besides, people are more connected. The conditions are well-suited to the emergence of decentralized energy. If people in counties have more reasons and initiatives for energy autonomy, what are reasons to build up decentralized energy in the cities if it fails all the conditions?

What are the differences between the energy development strategy under the concept of a low-carbon city and energy development strategy embedded in the regional development? To the latter point, for example, some local people are not aware of developing a low-carbon city, but are very sensitive about the usage of local resources and alternative energy. Who creates the concept of "low carbon economy"? Who is using it? How has it been accepted, digested or implemented into local communities?

How do local people think about the concept of economy? Are traditional meanings of economy, such as income or job generation, considered the most important for the local people? Do local and urban people perhaps have different definitions for economics? As the club of Rome mentioned, sustainable development should be regarded as no-growth. How do locals think about the idea of no-growth as a result of sustainability?

If we separate the local decentralized energy into two phases, one being how it emerged (the former stage) and the other how it developed after it became mature (the expanding stage), what parts continued as they were from the beginning and what changed? As Jacob and Stott indicated, there could be three phases of environmental policy when considering the involvement of governments. Given the different involvement of different stakeholders, the essence of decentralized energy could change(Jacobs & Stott, 1992).

'Small but Open' - The Openness of Local Economy and its Interaction with Globalization

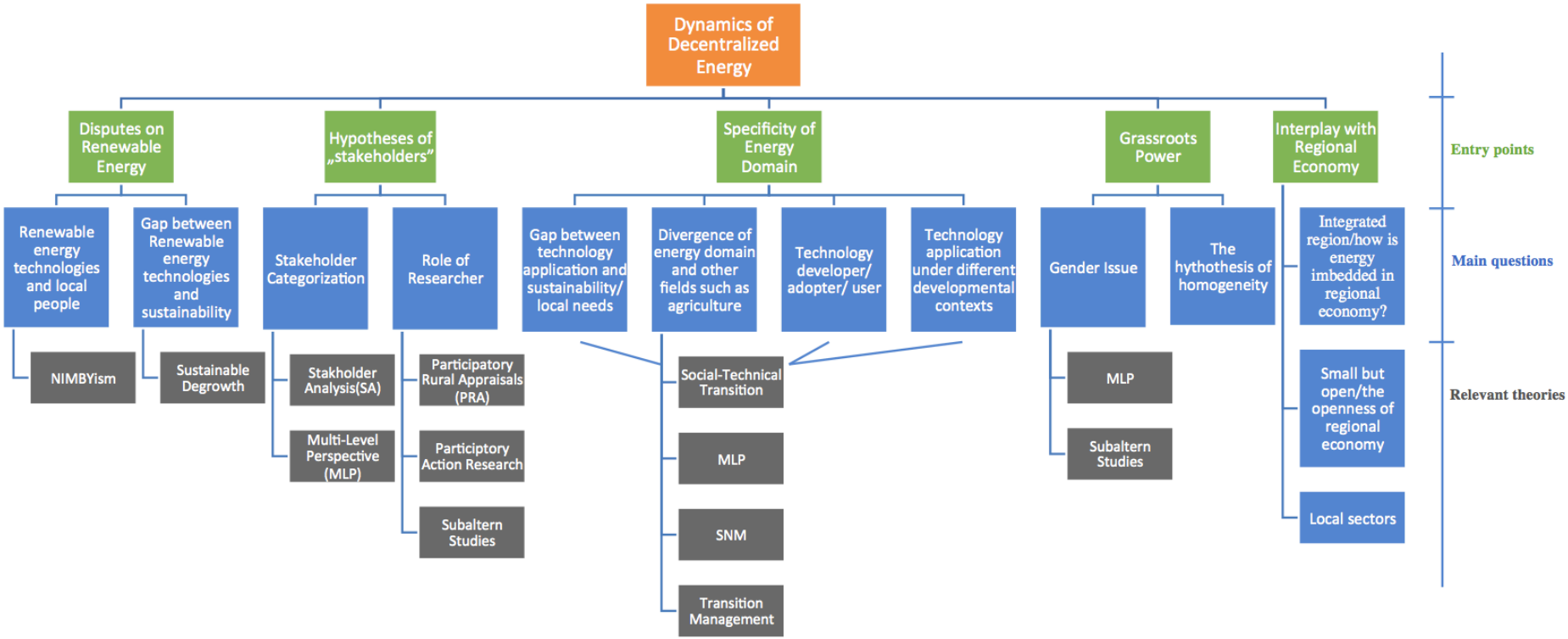
During my interviews, I found that local people are more willing to connect with other regions and are more aware of creating independent activities. It turns out to be a question: from local people's points of view, what will the relationship be between regional economy and global economy? What would be the result if they reach out for cross-region or transregionality?

The trend of locality and globalization is not paradoxical because a local system is also imbedded into the global economy. Through innovative activities, local nodes can be built into global networks, and a local community can even become local suppliers.

Local Sectors

As sustainability becomes a mainstream of urban planning at the municipal level, the role of local sectors has been not only theoretically discussed but also practically tested with divergent adaptation strategies. The social environmentalism approach focuses on the mutual shaping of sustainability and economic growth, particularly how the power of local authorities affect local businesses and the local economy (Jacobs & Stott, 1992). Kitchen and Marsden also discussed potential sectors of rural eco-economy (Kitchen & Marsden, 2009), while Shimada, Tanaka, Gomi, and Matsuoka (2007) emphasized that the scale of a city or local can be decisive in this mutual shaping(Shimada et al., 2007). Gibbs & Leach also raised a general question on the position of municipalities: at the policy level, should a green local economic strategy be leading or integrated into a local policy? Should local governments play proactive or reactive roles? Can they put pressure on the central governments (Gibbs & Leach, 1994).

As a Spanish official who attended the InContext (2013) summit on sustainability of Öko-institut declared, the relative roles between government and citizens should gradually change: "Time changed. In the past, the government held most information, but today it is people who reach information. So, roles of citizens and ways of participation should also change.... Government has got false facts or assumptions of their citizens: they are not not-motivated but illed and unhealthy." She suggested that officials can raise simple questions to discuss with their citizens, such as, "What do you want to do in a city?", instead of talking about the definition of sustainability.


Dynamics of Decentralized Energy
Disputes on Renewable Energy
Hypotheses of „stakeholders"
Specificity of Energy Domain
Grassroots Power
Interplay with Regional Economy
Renewable energy technologies and local people
Gap between Renewable energy technologies and sustainability
Stakeholder Categorization
Role of Researcher
Gap between technology application and sustainability/ local needs
Divergence of energy domain and other fields such as agriculture
Technology developer/ adopter/ user
Technology application under different developmental contexts
Gender Issue
The hythothesis of homogeneity
Integrated region/how is energy imbedded in regional economy?
NIMBYism
Sustainable Degrowth
Stakholder Analysis(SA)
Multi-Level Perspective (MLP)
Participatory Rural Appraisals (PRA)
Participtory Action Research
Subaltern Studies
Social-Technical Transition
MLP
SNM
Transition Management
MLP
Subaltern Studies
Small but open/the openness of regional economy
Local sectors
Entry points
Main questions
Relevant theories

1.4 Fieldwork Methods

Snowball Sampling

The interview subjects relate to what related activities I participated in. The way the interviewees were chosen or could be chosen followed the tracing route of accumulation, where the later interviewees could be an acquaintance introduced to me by the former interviewees. The contents of the interviews provided clues which informed the content of the next interviews, such as when the interviewees referred to particular agents or persons(Prell et al., 2007). The entire process of interview conduction lasted about three years, starting in Taiwan and then followed by Germany and Japan. Among these interviewees, key persons of projects and important promoters were the main targets, as some of them are citizens involved in the projects and who did not refuse to offer their opinions.

Following is the time mapping for approaching the case in Higashi-Ohmi:

In June of 2013, I met Japanese journalist Satoru Mizuguchi at a conference in Berlin, who was a member of an institute DRIFT (Dutch Research Institute of Transitions) of the Netherlands. He introduced the project of Welfare Mall in Higash-Ohmi. I was very curious about the FEC concept of the project: food, energy and care, and thinking that these three core issues were very important within a region or community. However, these issues have been considered separately in most sustainability studies. After I thought it through for about one year, I asked Mr. Mizuguchi if I could visit the place. He supported me and connected me to a researcher of Tokyo University, Dr. Kyoko Ohta. We then had a meeting with the researcher in Tokyo together with the journalist and the director of DRIFT, Dr. Niki Frantzeskaki who also had a talk at the Tokyo University during those days.

My translator, who was also my younger female cousin Liu, and I arrived on a night in November 2014. We were picked up by a minivan car of the manager of Welfare Mall, whose name is Mr. Nomura, and his secretary, Miss Maru. My cousin was very anxious and angry at me, because I had given her little information about what was to happen. In fact, the information I gave to her was the only information that I had before we entered. The reason that I mention

this is because I found that I have developed many hypotheses before entering a place, and because of insufficient knowledge, I used social science disciplines to preconceive the picture of Higashi-Ohmi. This process was not very proper and it pushed me to reflect more on my methodology, which I will mention later.

During our first time in Higashi-Ohmi, we visited the key persons of the environmental movement, including the manager of Welfare Mall, directors of two NPOs, congressmen, director of the project of Green Empowerment at City Hall, individual consultants and the head of the Chamber of Commerce and Industry. And we also spent most of our time joining in local events and trying to get to know people who have been working on farming, cooking and day-care. The second time, my cousin Liu and another translator friend Liao and I visited Higashi-Ohmi (March, 2016). In addition to the key persons we met last time, we also interviewed the founder of Nanohana eco project as well as the co-founder of the Welfare Mall. At that time, we focused more on the residents and members of organizations so that we could get closer to local responses.

Hypothesis-Breaking

Both theoretical perspectives and research methods aim to refine and reflect some hypotheses which have been frequently used for the analysis of renewable energy, such as the framework and concepts of stakeholders, and the homogeneity of the concepts of local people. Through the breaking of these hypotheses, another main hypothesis will be touched: the dichotomy of top-down and bottom-up in enacting decentralized energy. Theoretical methodologies focus on two extremes, especially gaps from perspectives of the international agenda and the local organizations. CO2 reduction, sustainability and democratic participations have been regarded as the reasons to promote decentralized energy in both agendas, however, the way these concepts are put into the narrative context or the policy is very different. Through analysis, the different assumptions on the same concepts from both perspectives can be found. Afterwards, the roots of how decentralized energy originated and embedded into local and international fields are to be addressed.

Highlighting the Gap between Researchers and the Interviewees

To highlight the position of researchers, I used a stakeholder plotter with a comparative analysis. One version shows the way that I reached them, and the other shows the result I observed after conducting the interview. The former represents the research method, and the latter is the methodology with theoretical perspectives. The positions of the research objectives or the network were based upon certain criterion of my hypotheses, therefore should be shown on this comparison. This method communicates the position of the researcher (the relation between the researcher and the research objectives, the limitation of the researcher) on the one hand, and the hidden hypotheses of the research objectives on the other (such as implications or suggestions from the local people, including "who are more important, more reliable or more relevant to the issue" or "there are no certain key persons; everyone is important"). We can also show the stakeholder map drawn by the policy makers through highlighting the findings during interviews, textually researching the contents of interviews, or through more interactions with related people to show how the latter picture has been built.

Mapping the Key Persons

Compared to the long-term development of people' s participation in agriculture and welfare care, decentralized energy was progressing lately. However, the awareness of people to participate autonomously either in agriculture, welfare care or in energy production symbolises a very strong power from the bottom, which came to be recognized as a newly forming social-economic structure of this field. The key persons deserve to be analysed because they play an important role in the initiatives of every decentralized energy community or group. It also helps to answer the possibility of the expansion or the transregionalization of decentralized energy. Further, during the investigations, I realised how critical the concept of "regional economics" could be, and this provided a wider framework to understand why and how local people are involved as prosumers in the decentralized energy. The list of the interviewees is attached to the appendix.

Chapter 2

Grassroots Power and Disputes on Renewable Energy Policy

2.1 Roots of Environmental Movement in Germany and its Conflicting Issues on Renewable Energy

2.1.1 Environmental Initiative in Freiburg: Historical Heritage

The many environmental endeavors and achievements of Freiburg can be traced back to the year 1975, when the anti-nuclear protest against the nuclear power plant in Wyhl took place. This history played an important role because it established the heritage and reputation of a green city in Freiburg and laid the foundation for environmental advancement.

As municipal officer of the Environmental Protection Bureau of Freiburg Thomas Dresel stated, the anti-nuclear protest in 1975 was actually a congregation of several kinds of protests as well as an aftermath of the student movement of 1968. In 1975, the state government of Baden Württemberg had planned to build a nuclear power station outside of Freiburg on the river Rhine, in Wyhl, just after the 1968 student movement.

> "It was the time which was highly politicized. Every day there were demonstrations against this and against that and against nuclear. 1975, there was a good crowd of people to protest against this nuclear power station. Who were these people? Not the majority of the population, largely students of course, and left wings, socialist, communist oriented students. But not only, and this is important. Not only students but also farmers, the wine growing people of Kaiserstuhl. So it was a mixed thing, not a purely student thing, but normal people as well.(Dresel, 2015)"

The participation of the wine growing farmers from Kaiserstuhl, on the west side of Freiburg, was also a very important element for citizens' initiatives of the region. Women's rights in Kaiserstuhl had arisen during their participation in the protest against nuclear power plant (ENGELS, 2002).

The occupation of the construction site of the nuclear power plant included an accident: the hair of a 70-year-old farming woman was grabbed by a policeman, which aggregated more support and widespread sympathy from all sides who initially may have had no idea of the issue of nuclear power (Sheehan & Bachman, 2014). As Thomas Dresel said,

> "The point is, it was not just demonstrations but more or less like a civil war. And it was the first in the German history, this was the first popular protest against the big technology project. And this protest was successful. So the very first, the protest in Freiburg was successful.(Dresel, 2015)"

These aggregated activists not only created a cultural and spiritual heritage for present-day Freiburg but also brought practical results, such as job vacancies related to environmental protection. Thomas Dresel stated:

> "Now, not only the nuclear power station would not be built, but Freiburg itself became a symbol. So if you lived in Germany at the time, and you say I am interested in environmental questions. Where would you go? Of course to Freiburg. There are more people with the environmental interests in Freiburg than in the US. And again this started on the occupied building site of the power. In order to keep this occupied, they open the university, lectures every evening, lectures on every subject of environment etc. Who gave these lectures? They invited the specialists, or another experts from Yale. And they have documents, sheets, papers, photos copies from California or something. What I mean is, starting from there, Freiburg attracted specialists. Eco-institute was the direct result of the anti-nuclear protest .(Dresel, 2015)"

Until now, Freiburg has been regarded not only as a green city but also as an advanced one. Citizens in Freiburg are largely constituted of educated persons who believe in changing society, or those who reflect critically on the existing commercialized ways of consumption. This atmosphere draws more and more people with similar interests to the city and also creates alternative living styles. It can be said that the culture of the city nowadays is a part of the greater heritage of its history.

Photo 2.1: Nuclear Power Plant in Fessenheim is now the nearest nuclear power plant to Freiburg. Anti-Nuclear Campaigns in Fessenheim date back to the 1970's. After the Fukushima disaster, they have been launched every year in March.

Photo 2.2: A group of residents from Kaiserstuhl joined the anti-nuclear march in 2014.

2.1.2 National Renewable Energy Plan in Germany: Focus and Disputes on Offshore Wind Turbines

The German federal government sees offshore wind turbines as a key development project for renewable energy. According to the Renewable Energy Act, Germany will reach 15,000 MW of offshore production by 2030 (NABU, 2015). 2013 marked a new phase of the development of offshore and onshore wind energy. By and large, the current plant portfolio in Germany generates a total of 34,179 MW, of which 6,890 MW are deployed on 2,245 offshore wind turbines in 90 offshore wind parks. In the case of onshore wind energy, the cumulatively calculated power reached 33,658 MW due to the penetration of the turbines of the 3-5 MW class in the German onshore market (Fraunhofer, 2013).

By the end of June 2015, the German Coastal Exclusive Economic Zone (200 nautical miles) had approved, with the Federal Marine Fisheries and Hydrology Department, 34 offshore fan programs. This constituted a total of 2,292 fans, of which there are set up in the North Sea 31 plans, for a total of 2,052 fans, with another three plans to set up 240 fans in the Baltic Sea. Even though two of the Baltic applications were rejected, it is estimated that after the completion of the installation the potential power generation capacity of these projects is up to 9 gigawatts. Germany's exclusive economic zone is expected to have 89 new plans, the North Sea 75, and the Baltic Sea 14. In 2015, two offshore wind turbines were further set up in the 12-mile territorial waters area(WIKIPEDIA, 2015).

Safe Distance

Riffgat offshore wind field is located in the North Sea of the Polkum Island coast, was set up in 2013, and has a total of 30 wind turbines. Its total power supply is 3.6 megawatts, providing 120,000 households with electricity. The wind farm is located 15 kilometers northwest of Polkum Island and is still within 12 nautical miles. Its wind field plane covers a range of about 6 square kilometers, and because the outer surface must additionally be around 500 meters' safe distance (meaning sea traffic based on the safety distance must be maintained at 500 meters), Riffgat offshore wind field's total area is 13.2 square kilometers. Within the scope of the water, its depth is between 18-23 meters. The distance between the three rows of fans is 600 meters, and the distance between the fans is 554 meters(EWE, 2016).

Network Expansion

In the field of onshore and offshore wind, network expansion is becoming the central challenge, namely, the increase in the electricity-carrying and receiving capacitances, since an ever greater amount of electricity is generated from wind energy (Bernhardt, 2013). According to § 12 EEG, network operators have to compensate customers in the event of a power failure, and the cost of the compensation payment has risen to € 33.1 million due to the increase in the cut-off of PV plants (Fraunhofer, 2013).

The grid expansion of the power line also means that more interest groups are affected, thus the use of wind power becomes a conflict issue. Firstly, environmental protection associations emerged as a result of planning dilemmas surrounding the expansion of offshore wind farms. Further, the environmental protection associations play the role of climate protection workers who advocate for offshore wind power usage and consider this an important way to continue the energy recovery. On the other hand, if the wind power operators want to build wind turbines in economically important locations, the environmental protection associations serve a different function than conservationists who try to stop the plan of the wind power companies with their greatest effort (Mautz & Byzio, 2004).

Secondly, there are more and more citizens and municipalities against large wind farms. According to Burghard Flieger (B. Flieger, 2014), the conditions for the tendering of the wind power on the forest areas in Baden-Württemberg were beneficial to corporations. Although the Green Party's leading government always claims that it supports the citizen's energy,the most cases were decided by the consideration of finance. This means that most citizens have little chance of participating in the construction of the wind farms in the forest because they simply cannot afford the costs of participating in the project.

2.1.3 Renewable Energy as a Conflicting Issue in Germany

Case of Soonwald-Nahe: Conflict on the Land Use for Wind Turbines in the Natural Park

"Soonwald-Nahe" is a natural park at the Hunsrück in Rhineland-Palatinate. Currently there are 13 wind turbines with an altitude of 200m in operation and they are used as a part of the wind farm Ellern. The state government of Rhineland-Palatinate consists of two different parties: SPD and Bündnis 90 / die Grünen. And according to SWR, until the year 2030, the red-green state government in Rheiland-Palatinate wants to supply 100 percent of the country with electrical energy from renewable sources (SWR, 2013). It is evident that the wind turbines in the Nature Park Soonwald-Nahe for the plan of the regional government are important. However, there are serious problems including the excess height of the wind turbines, their location in a natural park, and others(Furukawa & Huang, 2014).

There are various nature conservation associations addressing this problem, such as "Citizen Initiative Windforce-Free Soonwald" and "INITIATIVE SOONWALD." These associations claim that there are protected animal species in this natural park and that the park also functions as a recreation area. This means that this natural park plays an important role not only for the animals, but also for the people of the region. For this reason, citizen movements such as demonstrations were created by the aforementioned conservation associations and others. In May 2014 it was proclaimed that "the Natural Park Soonwald-Nahe gets two core zones." This means that these core zones are "the most sensitive areas" and in which wind turbines are not to be built (Furukawa & Huang, 2014; SOONWALD-NAHE, 2014).

A Disputable Case on Renewable Energy in the Near of Freiburg

Hydroelectric Power in Schluchsee

From January of 2017, the company Badenwerk planned to dig another one meter of Schluchsee in order to gain more water energy production. Before the implementation, the company had to receive the permit (*wasserrechtliche Genehmigung*) from the Regional Administrative Council (*Regierungspräsidum Freiburg*). Conflicts arose between the company and the citizens living in the surrounding area. From the perspective of the citizens, the minimum water level would get higher due to the construction and damage their business and living, especially activities

such as sailing and fishing. The company claimed that Schluchsee power station is the biggest reservoir lake in Germany, but citizens doubt that the plan to expand is for anything besides its own profits (Rüskamp, 2016).

The other construction site near Schluchsee, Atdorf, is of disputable ecological problems. The planning permission is from 2012 and the public discussion is set for October 1st, 2017. The site planned for Atdorf is the source of several rivers. When their sources were cut off, the water also runs out. Citizens believe that the construction will then change the area's whole ecology and also influence Bad Säckingen. Further, there was already an artificial lake on the mountain, and the mayor found the project to be not economically necessary(Held, 2017).

2.2 Emerging Motives for Autonomous Energy in Taiwanese Society: Case YuanLi

The rising motives behind 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 social enterprises (Hand, 2015; Taiwan-NGO-Social-Enterprises, 2017). Of these, one was different from the regular institutions and contributed greatly to the growth of autonomous energy, namely the Self-Help Group from the YuanLi township, MiaoLi County.

Since September 2012, the citizens of YuanLi have been protesting against Infravest's wind turbine (a German-based company) on the west coast of Taiwan. The main incentive motivating citizens in YuanLi was the density of wind turbines. A total of 14 wind turbines were built on the 3 km long coast. According to citizens, the distance between wind turbines and dwellings is too short (between 60 and 250 m), which caused the so-called wind power syndrome (Business-&-Human-Rights-Resource-Centre, 2013). InfraVest stressed that no European countries have legislations that dictate the lowering standards between the wind turbines and the place of residence, but instead regulate them according to the criterion of noise. That is why InfraVest rejected the demand for construction to be a safe distance from citizens in YuanLi.

2.2.1 Stakeholders

Central Government

The construction of the wind farms was promoted under the plan "thousands of wind turbines on the land and sea" by the Ministry of Energy for Economy. According to the Kyoto Protocol, renewable energy in Taiwan is expected to reach 12% of electricity; Of which 6% are accounted for by wind power (InfraVest, 2006b). In order to generate 215.9 MW of electricity, about 1000 wind turbines are to be built. According to the plan, about 600 wind turbines will be built between 2015 and 2030 by the sea (Green-Energy-and-Environment-Research-Laboratories, 2012).

Company of Wind Turbine- InfraVest GmbH

InfraVest GmbH of the VW AG Group, a German company, is responsible for the construction of wind turbines on the west coast. InfraVest began doing business in Taiwan in 2000 and was the only wind power company in Taiwan at that time (United-Daily-News-Group, 2009).

Since the beginning of its engagement in Taiwan, InfraVest has been confronted with a number of concerns on the part of Taiwan's policy makers. When InfraVest invested in Taiwan, there was no renewable energy law (Renewable Energy Law went into effect up from July 2009). As a result, the Taiwanese government's contribution was very low, which meant that InfraVest had to make a loss in its business. In addition, InfraVest did not manage to obtain enough capital from German banks. In 2006, the government issued a bid in Taiwan, but the local companies competed for construction work. InfraVest has invested over 125 million euros according to the bid (InfraVest, 2006a). Since 2006, the wind power market in Taiwan has begun to flourish.

Citizens in YuanLi

As planned, 9 wind turbines were built in YuanLi in 2006, but this number could be increased to 14 because of the environmental impact assessment, as claimed by the government. Thereupon the citizens in YuanLi began to protest against the construction of wind turbines, since the government had previously not discussed the project with the citizens and simply had informed them about the upcoming erection of the wind turbines (Taiwan-Environmental-Information-Center, 2013). It was only in a declaration session, convened by the government,

that citizens were informed that the wind turbine No. 20-2 would be built very close (about 100 meters) to a place of residence; in addition, the citizens had not been granted any right to participate in the decision-making process.

2.2.2 Environmental Pollution Caused by Wind Power Plants in YuanLi

The controversial pollution was a problem for offshore fishing, which serves as the main source of income for many citizens in YuanLi. According to the fishermen, the number of eel larvae had gradually decreased and egret reserves were damaged since the wind farms were built. Secondly, the setup of wind turbines on the windbreak forest resulted in a significant increase in the amount of wind sand. Furthermore, the salt content in the drinking water became too high, and the landscape would become polluted if the metal ion from wind power plants fell into the sea (ISSUU, 2012).

High-density wind turbines resulted in serious wind turbine syndrome on residents. A member of the Self-Help Group whose house is 500 meters from the wind turbine declared that the north-east monsoon caused a frequent ‘Hong-Hong’ sound during the daytime, and while the wind became lighter in the evening, he heard the voice throughout the rest of the day (YuanLi, September 2013). Despite numerous environmental problems, there was no investigation into the correlation between low-frequency noise and the decline in fishing in the environmental report by InfraVest.

Photo 2.3 : Wind turbines were set up on the windbreak forest on the west coast.

Photo 2.4 : Short distances between wind turbines, YuanLi.

2.2.3 Three Parties' Wrestling- Testimony from the Self-Help Group

The residents of YuanLi alleged procedural injustice when the establishment of the wind turbines started.

"In the past, residents did not know what the risk of the wind turbine could be" (Q. Chen, March 2016). Self-Help Group leader Qinghai Chen once raised a question in the General Assembly about the location of the wind turbine, however, the town office and other units avoided answering it. In September 2011, prior to the pre-construction instructions, Qinghai Chen asked if the wind turbines should be moved in the event that they are too near homes. InfraVest responded that it would take nearly three years for the moving, to which Chen responded, "Even it takes five years it should be moved" (Q. Chen, March 2016). Residents completed the petition by the end of September of that year, but InfraVest did not respond and began construction on October 18th. On that day, the Self-Help Group was established.

Chen also claimed that InfraVest intervened using political force, which was totally illegal:

> "The reason why the inhabitants of YuanLi are united is mainly because InfraVest does not fully incorporate the views of the people and is only willing to communicate with the 'local representatives'. The InfraVest and the police had a good cooperation during the protest. Folks met a lot of pressure from the police and litigation: about 20 people were prosecuted in a day. In the first half of the fight, the outside world completely ignored the situation in YuanLi, that's why we began a hunger strike protest in order to cause their attention… (Q. Chen, March 2016)"

The violence exerted by the police was based on illegal instructions. During my first investigation of YuanLi in September 2013, the incident of violence had taken place less than half a year prior. The residents were still living under the fear of the incident.

> "The police stood on the consortium's side, and the Energy Bureau did not belong to the Energy Bureau, but InfraVest's energy bureau. In April 2013, while the security guards which were employed by the InfraVest's mauled the students and the folks, the police were standing back to them and pretended seeing nothing. The other night, the

construction workers hired by InfraVest secretly worked on the site of wind turbine without permission, and one of our folks on site was mauled by five security guards in the dark place. These security guards did not show up during the ten days when this folk stayed in the hospital but showed up until he left the hospital. We believed the security guards obviously wanted to provoke conflicts. (Q. Chen, March 2016)"

Furthermore, "In the presence of the conflict, InfraVest instructed the police to arrest this and that person by claiming that they violate the Assembly and Parade Act. However, some arrested people have not even joined the fight." (Fri.philo, 8 Aug 2015)

2.2.4 The Legitimacy of the Appeals from the Self-Help Group

The appeal from the Self-Help Group has changed over the course of the battle. In the beginning, they demanded that the government and InfraVest completely reverse the construction project, or at least reduce the number of built windmills along the coast. 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.

Therefore, they slowly realized that the core issue was insufficient planning and preparation by the government, which should consider all the factors. That is why the citizens then appealed to the government to ensure a safe distance between wind turbines as well as a safe distance between wind turbines and houses, and this sparked new 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?" (YuanLi, September 2013)

2.2.5 Aftermath

Demolition of the Wind Turbines

After two years of stubborn resistance from the citizens, which manifested itself in the form of hunger strike, clashes between the police and the citizens, and accusations of illegal assemblies, the company InfraVest and the YuanLi citizens agreed for two wind turbines on the coast to be demolished. In May, both sides could negotiate a compromise that two wind turbines, which very much affect the nature of YuanLi, are soon to be demolished. The Bureau of Energy reached a consensus wherein 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 agree to reassess the appropriate distances between wind turbines. One of them was already demolished on July 13th, 2014, and the other is to be removed from the net according to the plan in September 2014 (World-People-News, 2014).

According to InfraVest, the demolition of the wind turbines was based on one hand on the fact that the wind power could not produce as much electricity as expected. On the other hand, they argued that the coast was already sown because of the construction of the wind turbines and is now to be freed from sand. This is why they were able to reach an agreement with the self-help group.

Internal Division

According to the Self-Help Group, members of the group faced criticism from the 'outside' after negotiating with the government on 'saving two, demolishing two' wind turbines. The criticisms argued that the Self-Help Group had received bribes from the government and therefore did not fight until the last moment. When I was visiting YuanLi for the second time during March 2016, the daughter of the leader of Self-Help Group told me she was very surprised that I still visited and trusted them, because the negotiation led to their division from the student group who had fought for them as the student group now believed that they received huge sums of money from the government. The daughter claimed that the Self-Help Group could not influence the decision on the two demolished wind turbines because InfraVest already

signed an agreement with the residents near these two wind turbines and the residents had agreed on the implementation of the plan (H.-M. Chen, March 2016).

‘Democratic’ Procedure

In 2013, an ‘experimental hearing’ without legal validity was held by the Bureau of Energy, however, the Self-Help Group asked for a more transparent and equitable consultation process so that the voices and rights of residents would be respected. Therefore, they further demanded that the government pass stricter environmental laws and specific Environmental Impact Assessment (EIA) regarding setbacks from wind turbines, thereby ensuring the safety of the people living in coastal regions in Taiwan, protecting ecological resources in the Pacific Islands, and also finding better green policy solutions (Green-Energy-and-Environment-Research-Laboratories, 2012; ISSUU, 2012).

After the fight, perspectives from people have been incorporated into the National Energy Summit, which has been held annually by the Ministry of Economic Affairs. Although nuclear issues and renewable energy policy made up the core of the discussion, 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, actually meets people's needs 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.

During the Climate Change Conference in Warsaw in November 2013 (United Nations Framework Convention on Climate Change), I did a petition on the issue of safe distance of wind turbines based on the case of YuanLi. The attendants gave me suggestions on the proper distances between the residential houses and wind turbines, the preferred methods of environmental evaluation, and also questions on the diagnosis of ‘wind turbine syndrome’. At the end, after a seven hour- petition separated into three days, the numbers of signatures attained was 115. The following is the petition letter (see Fig. 2.1).

Petition to Formulate Regulations on Setbacks from Wind Turbines

To

Office of the President, Republic of China (Taiwan)

No.122, Sec. 1, Chongqing S. Rd., Zhongzheng Dist., Taipei City 100, Taiwan (R.O.C.)

Date

9 Nov. 2013

Summary:

- Increase regulations to ensure minimum distance between wind turbines and habitations.
- Stop illegal wind turbine constructions in the district of YuanLi, Miaoli County.

We, the undersigned, demand the government to pass stricter environmental laws and specific Environmental Impact Assessment (EIA) about setbacks from wind turbines, ensuring living safety of people in coastal regions in Taiwan and protecting ecological resources in the pacific islands.

14 wind turbines were built along the township's 2-3 km coastline, with distance between each turbine about 200-250m. High density wind turbines resulted in serious wind turbine syndrome on residents, besides, fishery and Egret Reserve were seriously damaged. The Bureau of Energy of Ministry of Economic Affairs kept siding with the InfraVest GmbH (Taiwan branch of German Wind Power Co.), letting InfraVest submit falsifying surveys of Difference of Environmental Impact (DEI), proceeding construction with illegal and compulsive means and filing lawsuit against members of YuanLi Self-Help Organization. This year, an experimental hearing without legal validity was held by the Bureau of Energy, however, we ask for a more transparent and equitable consultation process so that voices and rights of residents would be respected.

We urge the government to investigate the matter in YuanLi, set strict regulations on setbacks from wind turbines as well as find better green policy solutions.

Initiator:

Hui-Tzu Huang

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This petition is agreed upon by the following signatories:

Full Name	Signature	Address	Comments (optional)	Date

Fig. 2.1: Petition on the Wind Turbine Issue of YuanLi, conducted in Warsaw.

2.3 Wind Turbines' Development and Natural Disaster in Japan

Influence of the Wind Turbines on the Landscape

The destruction of natural resources by wind power plants in Japan could be roughly divided into three categories: influence on the landscape against the aesthetic feeling, influence on the ecosystem and danger from damaged wind turbines (Furukawa & Huang, 2014).

The dispute over the construction of wind turbines on Shinji Lake is infamous. Since the end of 2013, there have been 1,934 wind turbines in Japan with a total output of approximately 2,710,000 kW (NEDO, 2014). Of this, 26 wind turbines with a power of 3,000 kW per wind turbine were built near Shinji Lake(Japan-Power-Academy, 2013).The Shinji Lake is located between the town of Matsue and the town of Izumo in Shimane, a prefecture in West Japan, and this lake has been considered one of the 100 most beautiful landscapes in Japan since 1927. However, the construction of a wind power plant behind the "Shinji Lake landscape design area" began in 2006 and in April 2009 "Shin Izumo Wind Power Plant", the largest wind power plant in Japan, was put into operation(Furukawa & Huang, 2014).

From the very beginning of the planning phase of this wind power plant, there were some problems. According to the first blueprint, the wind turbines would have shunted the landscape at Shinji Lake because of their height, number and location. Eurus Energy Holdings, the company that has set up this wind turbines, wanted to build 28 wind turbines with a planned altitude of 110 to 115m(Ministry-of-Environment, 2010). If the wind turbines had been built as planned, they would not have been visible from Izumo. But there was a remaining chance: six wind turbines would have been visible from the town of Matsue, from which one could enjoy a good view during the evening(Furukawa & Huang, 2014).

Based on the scale and the directives of the environmental assessment, a blueprint was drawn up. After this plan was submitted to the administration of the Shimane Prefecture, four advisory committees were held on landscape design because of the many looming problems, such as the height or position of the wind turbines. The city of Izumo decided to build this wind farm because it hoped that the wind power plant would be able to curb global warming, boost the

economy in the region and create new jobs. However, Matsue and eight clubs such as the Association for Wild Birds of Japan, Shimane Prefecture Conservation Society, and others, reviewed the wild birds and landscape of Shinji Lake. According to the advisory committees and the citizens' movements, Nobuyoshi Sumita, the governor of Shimane, asked Eurus Energy Holdings Corporation to review the blueprints, and the altitude and location of the wind turbines were reviewed and amended. As a result, only 26 wind turbines with a height of 65 to 75 m were erected(Furukawa & Huang, 2014).

Impact on the ecosystem

In Japan, wind power plants are often built on mountain crests because there are many mountains in Japan, the wind conditions are good, and the population density is not as high as in the rest of the country (Agency-for-Natural-Resources-and-Energy, 2013). In 2013, the population density in Japan was 340 people per square kilometer (Teikoku-Shoin, 2013). In this case, trees for the development and construction of wind power plants must be felled, forest paths must be expanded and the soil must be compacted and embedded. As a result of these changes, there have actually been some cases in Japan in which small landslides occurred because water was able to float more easily. This can lead to greater erosion. At the same time, the habitat of animals and plants becomes threatened and changes to the original ecosystem can occur.

There are also examples of birds and bats in Japan. The word "bird strike" actually means "violent impact of a bird on a flying plane". But here, this word means "violent impact of a bird on the rotating wind turbines"(Dudenredaktion). This is a very serious problem because it has a great influence on the ecosystem. Since 2000, the office of the Japanese Ministry of the Environment in Kushiro, a city in the Hokkaido Prefecture, has been investigating how many sea eagles and giant sea eagles are hurt or killed in Hokkaido Prefecture and what is the reason for this(Furukawa & Huang, 2014).

As a result, it was found that 182 sea eagles were hunted or killed in Hokkaido from 2000 to 2011, and that 24 sea eagles died as a result of birdwatching (Prefecture-Okinawa, 2011). In Japan, sea eagles and giant lake eagles are on the red list and are, according to the Law on Cultural Protection, also counted among the natural monuments. If more birds were to die

because of the birdcocks, it would be possible that these irreplaceable species would die out. And as mentioned above, the construction of the wind farms and the development of the area lead to the destruction of the habitat of the animals and of the plants, thus contributing to the extinction of the species. There are also problems related to blocking the flight route of migratory birds(Furukawa & Huang, 2014).

Natural Destruction by Damaged Wind Turbines

Toru Nakao, the head of the Japan Wind Power Generation Association's Information Technologies Division, addressed five problems of damage. These are: destruction by natural phenomena such as lightning or hurricane, damage by bad designs and building works, human failure, and damage to the system as well as unexplained and other causes. According to the study of this association from 2004 to 2007, "natural phenomenon" and "unexplained and other causes" were most frequently demarcated in the case of the failure of a wind turbine, and the proportion of natural phenomena was 34.5% (Furukawa & Huang, 2014; JWPA, 2011) (see Fig. 2.2).

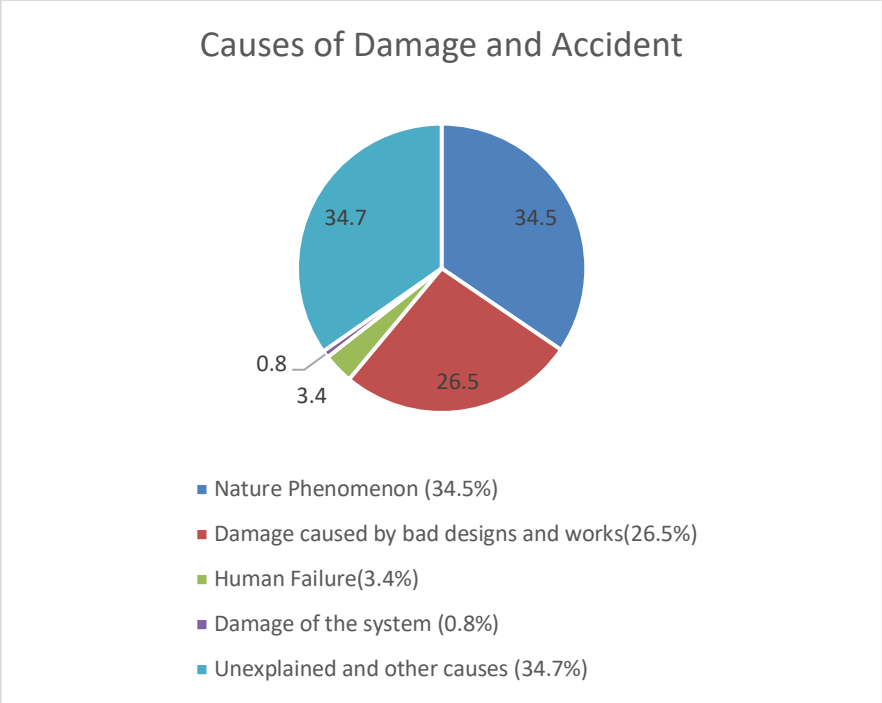

Fig. 2.2: Natural destruction caused by wind turbines. Data Source: JWPA (2011)

Of this, the lightning stroke amounted to about 25%. Toru Nakao mentions that in the winter, particularly on the side facing the Japanese lake, there is an increase in lightning strikes (JWPA,

2011). And the "Organization for the Synthetic Development of New Energies and Industrial Engineering" comments on the different frequency of lightning strikes and the damage to the wind turbines in Japan, "damage to the rotor blades and brakes due to the lightning strike occurs not only in winter, but also within a year on the side facing the Japanese Lake, is the most frequent in the middle of Japan" (JWPA, 2011). In addition, as mentioned above, wind power plants are mostly built on mountain crests in Japan. Damage can easily occur from this exposed position, and after the rotor blades have been destroyed due to a lightning strike, it is possible that the damaged parts crash or fly through the area(Furukawa & Huang, 2014; NEDO, 2008).

2.4 Discussion: Wind Power Generation as a Complex Environmental Issue

2.4.1 Conflict between Top-Down and Bottom-Up

When comparing Germany and Taiwan, the biggest conflicts of the application of decentralized energy in Germany and in Taiwan 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 federal government and corporations(fesa, 2013; Flieger, 2014). In Taiwan, in the absence of legal forums for public participation regarding decentralized energy, and also due to the lack of the corresponding measures and experiences, the top-down renewable energy project became the only option until public awareness in YuanLi, representing the first public outcry in Taiwan, demanded a thorough examination of the energy policy and called for autonomous energy in Taiwan.

Both cases demonstrated the divergent interpretations of decentralized energy and different considerations of 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 Taiwanese governments were partial to the interests of the corporations, which in turn neglected the local knowledge of the residents, fishermen and environmental protection organizations (ISSUU, 2012; 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? It might be that it involves not only the participatory problem but also refers to the different political and economic considerations from the top-down and the bottom-up. From the top-down perspective, decentralized energy acts as a part of a 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).

2.4.2 Climate Protection vs. Nature Conservation?

With regards to the dependence on energy imports, Taiwan ranks first with 98%, followed by Japan with over 80% and Germany with more than 70% (Taiwan-Institute-of-Economic-Research, 2013a). The high dependency of these three countries on energy imports explains why they are under such urgent pressure to develop renewable energy. On the other hand, the intention of the Kyoto Protocol and the requirements of the UNFCCC influence domestic policy to mitigate CO2 reduction. But over the course of the implementation of climate protection policy, in which governments try to reach a certain percentage of renewable energy supply, a great deal of differences between the policy of governments and the wishes of citizens and nature conservation associations became clear.

The above examples show that there is a considerable discrepancy between the government's desired results of the wind power plans and reality. From the perspectives of the German, Japanese and Taiwanese governments, the wind power plan serves as an inevitable and, at the same time, an ideal step for its climate protection policy. The case of the wind power plan in the "Soonwald-Nahe" nature park in Germany shows that the state government of Rhineland-Palatinate considers the plan to be one of the most important ways to ensure that the renewable energy completely covers its own energy needs. The Izumo government in Japan also thought in this way: before reviewing its project, it believed that the blueprint must necessarily promote

the weakening of dependency on energy imports and the promotion of regional economies. And the wind power plan in YuanLi was also seen as closely related to the '1000 wind power policy', which aimed to reach the mitigation goal of the Kyoto Protocol. In a nutshell, the governments' wind power policy is under pressure from the international community, and also takes into account domestic policy and the economy.

The environmental pollution and damage caused by wind turbines, however, cover another issue that is posed by governments' climate protection policy, which nevertheless emphasizes the conceptual distinction between climate protection and nature conservation. The environmental pollution and damage could easily be divided into the overexploitation of nature and the loss of the bases of life of the peas. The example in Japan shows that not only are the eagles and bats directly threatened by the construction of the wind turbines, but also that the changes in forest paths and land use were also caused by the plan. This accelerated the involvement of nature conservation associations and the commitment of citizens to request the review of the location and size of the wind force directions.

The three examples show that while nature conservation associations and citizens in the movement have stood up against the government, their positions still include deep dilemmas. During the movement against the construction of the wind turbines on the coast in West Taiwan, the citizens of YuanLi found it hard to prove that they wanted to protect not only their own interests, but also the environment in general. In the development of offshore wind farms, German environmental protection associations also encountered complicated environmental problems. According to the analysis by Mautz and Byzio, the problem is not just the "normal" environmental conflict, in which ecological goals and economic interests are clearly separable. The environmental protection associations are now dealing with a complicated ecological question in which the two objectives of nature conservation and climate protection compete with one another.

In general, governments are under stress from achieving the target of CO2 reduction to the so-called climate protection policy, while the 'bottom-up' movements, on the other hand, play the role of monitoring the effects caused by the wind power policy. But that does not mean that the difference in interests between governments and citizens as well as nature protection associations can be simplified into the framework of ‘climate protection vs. nature

conservation'. The compromises between both sides after the movements shows that all interest groups recognize the wind power development plan to be a complicated environmental issue.

2.4.3 Find the Solutions?

Environmental Evaluation

How can stakeholders find a balance between renewable energy policy and nature conservation, namely the win-win situation for both sides? On the one hand, the scientific environmental evaluation is very important in any case. From a rational point of view, environmental evaluation could reduce the risk, and by comparison, governments, investors and societies for policy change and environmental damage should pay even more if they develop their wind power plans without comprehensive environmental assessments. The cases mentioned showed that the Taiwanese and Japanese governments were not active in analyzing the relevance between their wind power plans and environmental impacts. After the movements, the Taiwanese and Japanese governments reduced two wind turbines, but in both cases the fake environmental assessments are missing. The loss in the case in Taiwan was arguably even higher because not only the cost of construction but also its demolition was paid for, and these extra costs involved the Taiwanese government, the German company InfraVest and also the citizens of YuanLi.

Moreover, the objectivity of the wind power-natural-effect investigation is not enough. For example, it is not easy to seek the appropriate distance between wind forces and the inhabitants because it varies according to different natural and moral conditions. That is why governments cannot easily copy a successful example abroad in their wind power plan, as it could be very dangerous for their development. However, the investigations are still becoming more and more complete after the movements increase, therefore, the long-term investment for the environmental assessment is a must, so that the topic is not only a myth but should be systematized.

However, in Germany, there are already general rules on environmental protection with which wind turbine companies should comply. For example, the construction of wind turbines should follow the rule of compensation. According to the ecological compensation measure, each company must follow the rewetting measure (*Wiedervernässung*) and plant trees at other places.

Companies should save money at a bank, and when wind turbines have been torn down, this money would be taken out from the bank to be put towards the reconstruction of the area. If a place is a swamp or water meadow near a river, then it should be avoided as a site for construction, for example, as swamps may contain peat and can be an origin of coal (Windpark-Prechtaler-Schanze, 22.Oct 2016).

Integration of Landscape Issue and Renewable Energy

Regarding the issue of wind turbines' effect on landscape, numerous citizens start the initiatives against wind turbines. In Germany, the phenomenon that wind turbines destroy the landscape is called the '*Windmühlenwahn*' or the '*Verspargelung der Landschaft*'. Also controversial are the facilities of the high wind turbines, maize monoculture and large-scale solar parks.

Landscape is not only natural, but also cultural. Landscape is thus about aesthetics, and as Lucius Burckhardt says, it is from the mind of the observer which varies across cultural values and ways of living. In the 16th century, aesthetics of nature originated with political and legal meanings but did not have anything to do with spatial aesthetics. Thereby, the new energy landscape reveals to our society that it is a kind of blindness towards us. The wind turbine, solar panel and maize field are not unfamiliar, not hostile, and not bad, but rather have something to do with living style. These facilities contribute to the production and service of electricity, and are a part of our culture-landscape-defining agriculture, however, we as a society have not agreed on the value and price of these provisions. The assumption of the 'former intact landscape' highlights this dilemma (Fezer & Schmitz, 2012).

History shows that people adjusted themselves to the technical transformation. For example, in the 1970s, people regard the freeway interchange as living standard. This does not happen to be the case for wind turbines. The discrepancy between the aesthetic perception and the social use of landscape is growing. Landscape is not about the positive space of the future, but about the romantic project screen. Once it loses its function, it will be regarded as beautiful.

The challenge nowadays is to find out an aesthetic form for the new- energy-landscape. Apart from the fossil and atomic facilities, the renewable energy should work with, and not against, the landscape, because the elements of renewable energy such as wind, sun and water belong to the landscape. This also gives greater opportunities to artists, designers and architects (Fezer & Schmitz, 2012).

Incorporation of Citizens' Voices in Decision-Making

Another important solution would be the promotion of participation in the political decision-making process and energy-autonomous municipalities. The aforementioned obstacles show that citizens are sensitive to disturbances and the changes in their surroundings, and they also show that nature conservation associations are more controlled about environmental development in specific natural areas. If the opinions of citizens and nature conservation associations are properly integrated into the decision-making process, they can make a valuable contribution. In addition, the number of opposition movements after the construction will be reduced.

Secondly, the promotion of energy-autonomous communities could be a good way to reduce the conflict. In Germany, this development is relatively more mature than that in Japan and Taiwan, but the municipality in Germany still fought against the wind power groups. German citizens are already able to generate and sell electricity with PV, biomass and cogeneration, etc., but they use little with regards to their own wind power stations. Citizens can already well notice that the government's wind power plan is good for corporations because the EEG amendment is still unfair for citizens, and the government has also invested more for the wind turbines. It is possible that the difference between citizens and wind power companies in the future will be even greater. One possible solution may be that the government will amend the EEG law and support more energy-autonomous municipalities, and hold exchange meetings for energy cooperatives so that they can share their technology and information.

Along with the enlargement of the development of wind turbines projects in Germany, the service of wind turbine companies already has followed some general rules, which to some extent reduce conflicts between wind turbine companies and residents. First, usually wind turbine operates for at least 20 years. But in the contract, it can be written as 20+X years. If the wind turbine still works after 20 years, it can keep working (according to the '*Weiter-Betriebsprüfung*')(SGS, 2017), but the X years belong to the service of the company. Second, if the area is owned by many citizens, then this precondition is written in a tenant agreement (*Pachtmiete*). Third, the sensors and remote control should at least contain sonogram, vibration, and continual supply for hydraulic oil for gearing (Westermayer, 2017).

In sum, scientific evaluation on renewable energy facilities effects on environment and design of democratic participatory procedures have been generally credited as basic steps to decrease conflicts among stakeholders, but the related rules are hard to simply replicate according to specific and divergent conditions, for example, natural resources, participatory experiences on renewable energy facilities and even political conditions.

Chapter 3

Liberalization of Electricity System: A Basic Requirement of Decentralized Energy?

3.1 Degree of Autarky of Energy Systems and its Effect on Decentralized Energy

In this chapter, we discuss the basic requirements of achieving decentralized energy. The liberalization of electricity systems has been regarded as the most important requirement to achieving decentralized energy. It is also assumed that the more the electricity system liberalizes, the higher participation of citizens can be. However, this assumption simplifies the different levels of liberalization of electricity systems, which can be separated into energy production, conversion, transmission, distribution, storage systems and electricity markets. It also neglects how the formation of energy systems connects to economics, culture, society and politics in different ways, which strongly affects peoples' participation.

3.1.1 Liberalization of Electricity Market and its Limits

Decentralized energy begins by liberalizing the provision of electricity. A prerequisite to decentralized 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 by one single provider such as a company or government. This turnover is labelled the empowerment of electricity. Regarding the roles of the public, a 'prosumer' denotes the active participation of local people. This refers to one-way empowerment from the government as well as from the bottom-up, such as individuals, communities, local-based enterprises and other related organizations struggling for autonomous energy (see Fig. 3.1).

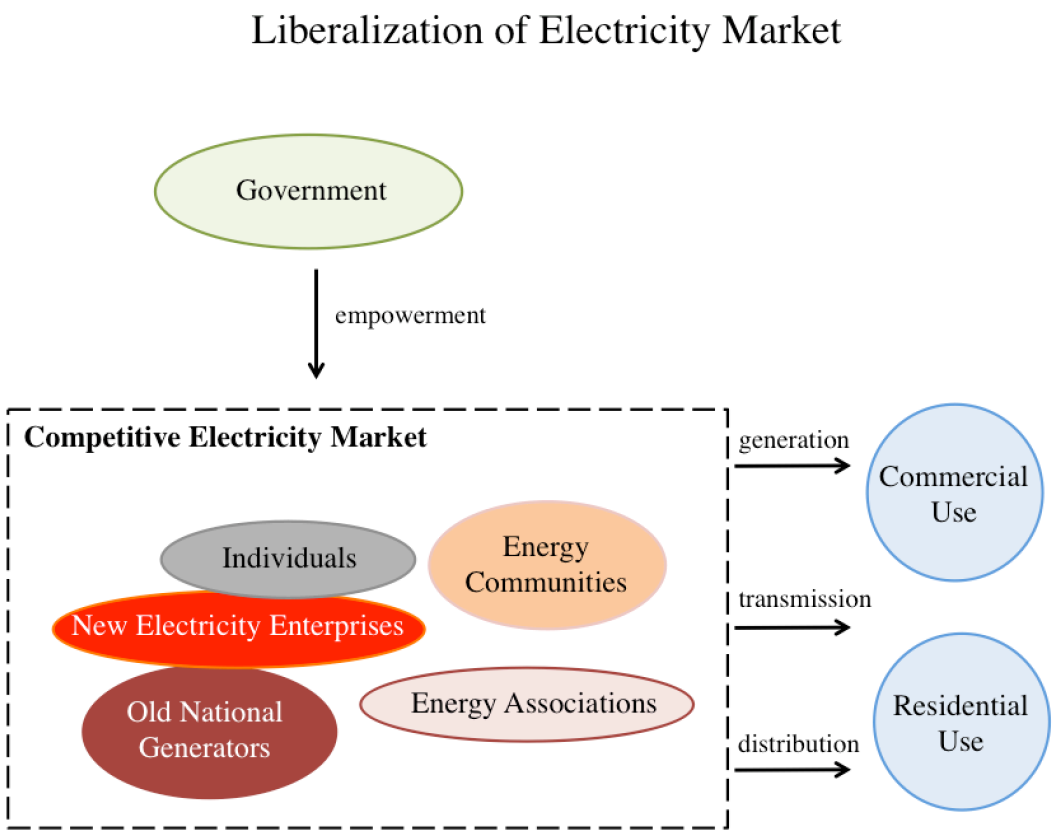

Fig. 3.1: Empowerment of electricity and the forming of liberalization of electricity market

The British Electricity Act of 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 & 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 proved to become more competitive in terms of the improvements in labor productivity and service quality in electric distribution systems since the late 1990s (Green & Newbery, 1992).

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 and 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 (Appelrath, Kagermann, & Mayer, 2012).

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 existence of the liberalized market but also by both global and local prices of fuels and tax levels (Streimikiene, Bruneckiene, & Cibinskiene, 2013). Although one of the ultimate goals for opening up the electricity market is to bring the benefits of competitive prices to customers, some studies prove that the price advantage for customers is still limited (Lanzavecchia & Leona, 2007). Dooley (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 in investment in turn has unexpectedly resulted in competition concerns for the economy and other fields of science and technology.

3.1.2 Paradigm Shift: Deregulation of Electricity Systems

Table 3.1: General comparison of features, advantages and disadvantages of centralized energy system and decentralized energy system.

Centralized Energy	Decentralized Energy
Features	
Huge power plants	Renewable energy
High-voltage power line	No long supply lines
Control of grid	Smart grid
Advantage	
Always-on and base load power	Reduction of transmission losses
	Increased security supply
	Smaller capital amount
Disadvantage	
Safety problem	Storage systems too expensive
Enormous capital	
High costs for government and cooperate financing	

The left image shown is the centralized electricity system. As we can apparently see from the image, this system requires long supply lines. These lines combine electricity production, transmission and distribution. Electric power is generated here at a power plant. It is then sent to electricity substations through transmission lines. Here transformers may be used to alter the voltage levels from high transmission voltages to lower distribution voltages. When transmission lines are interconnected, they become a power grid or network (BATTAGLIA, 2012). Distribution is the final stage in the process of delivering electricity to end users such as commercial buildings, factories and households. Taiwan features one example of this model(see Table 3.1).

This system prioritized an always-on and base load power. However, a big concern of the centralized system would be that if one part of the system fails to work, it can lead to a wide range of power shutdown and become a serious safety problem. Further, to maintain a constant supply of fuel and to provide the vast amount of transmission infrastructure requires enormous concentrations of capital and control of power generation and grid. The costs of centralized production can only draw on government and corporate financing (Farrell, 2011). This is typical of 20th. Its disadvantages explain why decentralized models emerge.

Decentralized energy is a completely different system, as its name suggests, in which electricity is produced close to where it will be used. Because wind, solar and geothermal resources are available everywhere, each local area should be able to generate their entire electricity needs within a certain region. Decentralized energy systems encompass a diverse array of generation, storage, energy monitoring and control solutions (SIEMENS, 2017). The advantages of decentralized energy systems would be that they reduce transmission losses. Security supply is increased because customers do not have to share a relatively large and remote power plant. Further, it requires a much smaller capital amount, thus allowing households and small-scale companies to join in (E.ON-UK, 2017). However, storage systems are so expensive that not all households can afford to it. Denmark and Germany are two examples of this. The shift from centralized to decentralized systems has been now called the paradigm shift, and it is seen as the hope of energy transition.

3.1.3 Degree and Levels of Liberalization of Electricity System

Energy Self-Sufficiency / Energy Liberalization

Energy self-sufficiency often combines with the concept of energy security, which implies national security of independence from the overseas energy source because the high import of energy supply can reduce national security. Energy liberalization refers to the liberalization of the energy market and has indirect relations with energy self-sufficiency. For instance, even a house is highly energy-liberalized, for example, even with PV, PV storage systems, pellet heating systems, and heat and electricity cogeneration systems without any electricity pipe connecting to the outside, the heat and electricity cogeneration system can still need natural gas in order to generate its heat and electricity. In this case, the house is energy-liberalized but not energy self-sufficient, because the natural gas needed here might be imported from overseas.

Electricity Liberalization in Germany

As mentioned above, an electricity system can be separated by two parts of energy producers and energy consumers. In the past, before electricity systems were liberalized, energy producers managed both parts of energy production and energy transmission. After the system is liberalized, the whole system should be separated at least into different parts for energy production, transmission, conversion, distribution and consumption. However, if an electricity system is liberalized, it can be liberalized in different levels. In Germany, for example, energy production is a liberalized market while energy transmission is held by four transmission operators for electricity in four parts of Germany, namely 50Hertz, Amprion, TenneT and TransnetBW. Therefore, when considering different levels of energy liberalization, different parts of an energy system should be addressed separately.

When I was interviewing the BürgerEnergie Berin cooperative (eG), they were still looking for support to change the monopolized electricity transmission networks. They emphasized that energy networks belong to the citizens' hands, and to achieve this purpose the first step is to find enough investment capital from the citizens. The Berlin House of Representative holds the final decision regarding who is to have the electricity network in the future. During the concession, SPD and DIE LINKE agreed on 're-communalization', but Green Party showed

support for the pure cooperation of city and energy cooperatives. The Pirate Party also supported decentralized energy but believed that the city could make it safer(Futterlieb, 2016).

Grid - Connected (GC) and Stand-Along (SA) Systems

If we distinguish decentralized energy by types of transmission systems, it can be differentiated into grid-connected (GC) and stand-along (SA) systems (Paramashivan Kaundinya, Balachandra, & Ravindranath, 2009). Stand-along (SA) systems are often more independent than grid-connected (GC) ones, and are settled on hilly or countryside areas which electricity grids can hardly reach. The advantages of the SA system lie in its suitability for local needs and its benefits for far-reaching areas. However, the GC system does not necessarily benefit local needs, as one type of GC system is local needs-oriented with the surplus of electricity fed into grids, while the other type does not prioritize local needs because surplus fed into central grids(Paramashivan Kaundinya et al., 2009).

3.2 Liberalization of Electricity in Taiwan: Trend and Challenges

The liberalization 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, 2013b). On the other hand, electricity produced by Independent Power Producers (IPP) is required to be sold solely to the Taiwan Power Company in accordance with the Power Purchase Agreement (Bureau-of-Energy-under-Ministry-of-Economic-Affairs, 2013) (see Fig. 3.2).

With regard to 'the lack of liberalization of electricity', the biggest problem lies in the lack of participation of citizens in the production of electricity, and also in the aforementioned centrally governed electricity system, as people have not been permitted to choose from various electricity providers.

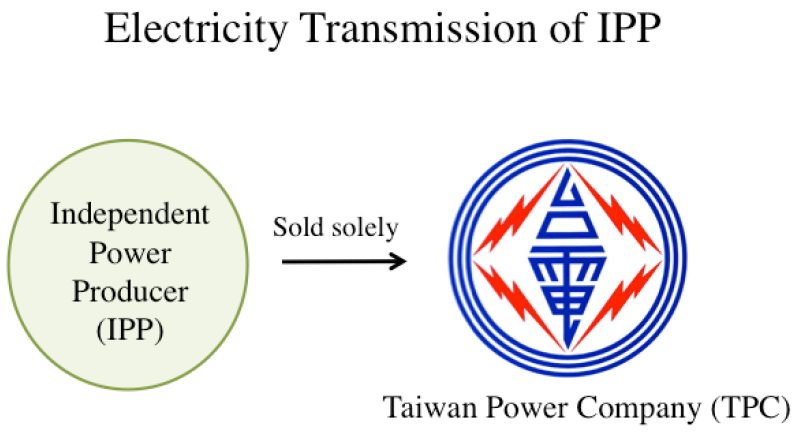

Fig. 3.2: Electricity produced by Independent Power Producers (IPP) is required to be sold solely to the Taiwan Power Company.

The composition of the staff of the energy authority and the contents of the Renewable Energy Policy also display 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 calculations and the development of energy industries, was reorganized in 2004. According to Article 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 (see Fig. 3.3).

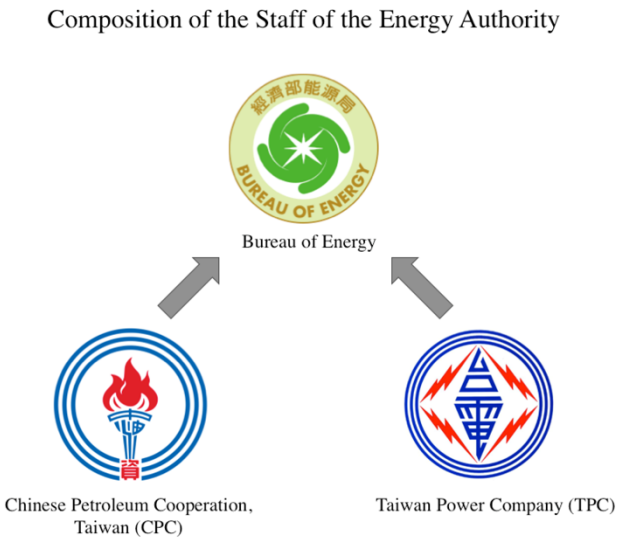

Fig. 3.3: After the reorganization of personnel, the Chinese Petroleum Cooperation and Taiwan Power Company were centrally governed by the Bureau of Energy.

A look through the Renewable Energy Policy implemented by the Bureau of Energy reveals that main concepts of decentralized energy, such as 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 compared to 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-under-Ministry-of-Economic-Affairs, 2013). In other words, the usage of the Combined Heat and Power Policy is industry-oriented and does not extend to households in Taiwan (see Fig. 3.4).

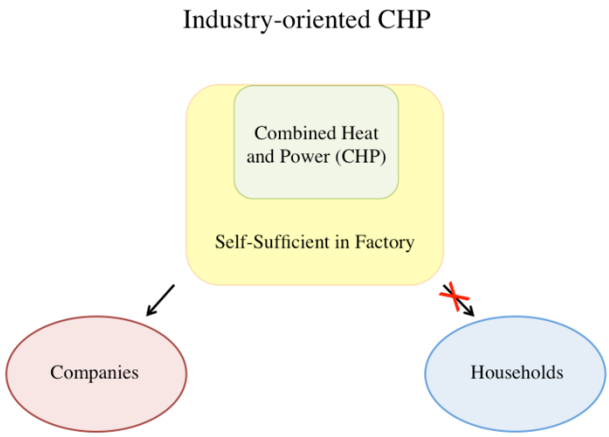

Fig. 3.4: Cogeneration of heat and power system is industry-oriented in Taiwan, and not liberalized to the households.

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 reaches 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-Cogeneration-Corporation, 2013).

The concept of the liberalization 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 measures for the system of 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.

3.3 Electricity System's Reform in Japan

3.3.1 Court's Decision on the Outage of Nuclear Power Plant

When I was visiting Higashi-Ohmi the second time in March 2016, it was also the 5th year following the 311 Earthquake. Related discussions focused on the emergency shelter of 170 thousand people. Further, the court's decision on the outage of the nuclear power plant Takahama No. 3 at that time also aroused the concern of the whole nation.

On the 9th of March, 2016, the Otsu District Court issued a provisional disposition order: "We should not operate the Takahama Nuclear Power Plant No. 3 and No. 4". This decision primarily affected the profits of Kansai Electric Power Co., causing the huge financial loss of three billion Yen, and therefore was called 'Otsu Shock'(Yomiuri, 11 Mar 2016).

The order was based on the residents' claim that operating the Takahama No. 3 and No. 4 machines held an explicit risk of infringing on moral rights, and asserts that the possibility of the infringement of moral rights will become a reality. A law office later explained and agreed with the decision from the Otsu District Court, stating that

> "Moral right is the right not to infringe on personal character, such as life, body, etc. Specific dangers leading to infringement of personal rights include the fact that the new regulation standards are unreasonable, that the assumption of earthquake ground motion is too small, that the tsunami assumption is inadequate, that spent fuel pits are robust and not covered, and the effective evacuation plan was not made etc. (Yoshihara, 2016)"

Further, the court believed that the response from the Kansai Electric Power Co. did not sufficiently address the arguments from the residents' side. When asked for a refutation to the claim of the residents before the due date, Kansai Electric Power Co. answered, "We believe that explaining our safety efforts will prove that there is no specific danger of infringement of personal rights… I will examine it, but first of all I will explain our safety initiatives" (Yoshihara, 2016). The claim of Kansai Electric Power was regarded as "insufficient assertion and understanding" by the district court, leading to the final court decision.

The decision on the outage of the nuclear power plant Takahama No. 3 and No.4 gave hope to residents who had fought against the nuclear power plant nearby, especially in the case of the Ikata nuclear power plant, which received permission for reactor installation in November 1972 and started operation in 1977. Meanwhile, in August 1973, 35 residents around the Ikata Nuclear Power Plant No. 1 filed an action in the Matsuyama district court, seeking cancellation of the installation permission. As the representative of the plaintiffs of the anti-Ikata Nuclear Power Plant said, "This result of the Otsu District Court has a great influence on the national anti-nuclear power plant movement and gave us great courage"(The-Asahi-Shimbun, 11 March 2016).

However, Takahama No. 4 started operations again in May 2017 and Takahama No. 3 also re-started operation in June 2017. Although this decision has been widely criticized, the statements given for their resumption to some extent demonstrate the serious problems of high electricity prices and insufficient production, which have been long-lasting and unsolved in Japan even after the complete liberalization of electricity systems in April 2017 (Sanke-News, 2017).

3.3.2 The Gradual Steps of Electricity Liberalization

From 1 April 2016, 'Liberalization of Retail Electricity Sales' went into effect, which has been called the beginning of the 'Epoch for choosing electricity'. Under this framework of comprehensive electricity liberalization, retail electric companies including citizens' co-owned power plants can sell surplus electricity to households, companies or factories, instead of the only receiver being the ten general (monopoly) power plants in Japan, as was the case in former times. The registered number of retail electricity companies in Japan has reached over 414 by August 2017(Agency-for-Natural-Resources-and-Energy, 2017a).

From the consumers' side, shops and households were the most limited before the entry of 'Liberalization of Retail Electricity Sales', in which they had no choice but to accept the electricity transmission from 'general' electricity power companies such as Tokyo or Kansai Electric Power Companies. Only after 'Liberalization of Retail Electricity Sales' went into effect could they freely choose their electricity provider from various companies according to their lifestyle, values, and economic considerations. Under this framework, consumers can also choose electricity providers from other areas. For example, residents living in cities can buy

electricity from nearby rural areas or purchase electricity from a nearby citizens' co-owned power plant to support the ideal of 'locally produce and locally consume'(Agency-for-Natural-Resources-and-Energy, 2017c).

From the electricity producers' side, the delivery objection of retail electricity companies changed due to past legal restrictions and the gradual liberalization of the electricity market. The first retail electricity liberalization started in March 2000, when factories, department stores and office buildings in the category of 'super high voltage (2000kW)' could start to choose electric power companies freely, including new entrants (Agency-for-Natural-Resources-and-Energy, 2017a; Kepco, 2017). In 2004-2005, the targets expanded gradually to include medium- and small-scale factories and companies which belong to the 'high voltage (50-2000kW)'category. From 1 April 2016, retailing electric companies can also be selected for households and shops in the 'low voltage(<50 kW)' category (Kepco, 2017) (see fig. 3.5).

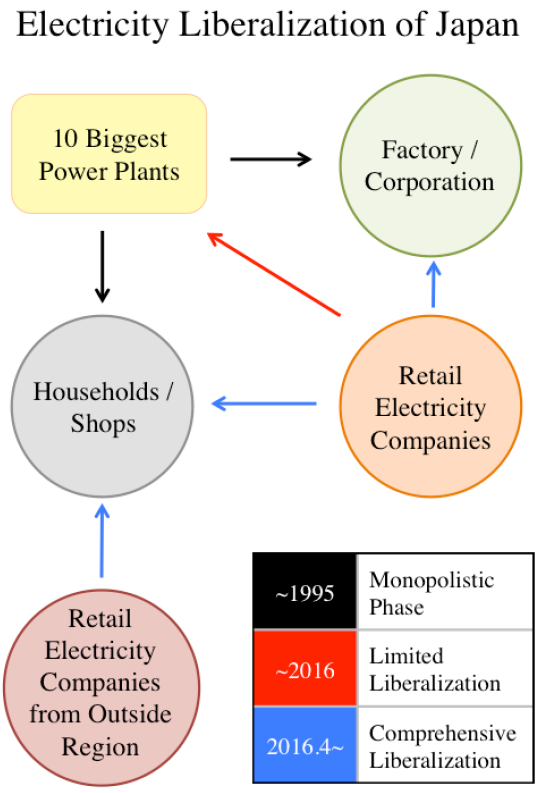

Fig. 3.5: The gradual steps of electricity liberalization in Japan

Retail electricity companies also serve as electricity service contractors who should communicate directly with consumers, including each household, and provide 'fee menus' and services in order to satisfy the needs of their consumers.

In summation, the policy of 'Liberalization of Retail Electricity Sales' aims to boom up various companies in the electric retail market and also revitalize competition among the electricity providers in Japan. Under this new policy, several related services are expected to increase, such as set discounts by a combination of electricity and gas, electricity and mobile phones, point service, and household energy saving diagnosis services (Agency-for-Natural-Resources-and-Energy, 2017b) .

3.4 Mapping Public Tender Procedures of Decentralized Energy in Germany

This section analyzes the peculiarity of public tenders of decentralized energy. The first and second part focuses on the involved players and the procedures of the public tender of decentralized energy. This part emphasizes the question: by whom and how has a public tender procedure been decided? The third part analyzes the flow of capitals as well as risks related to citizens or small investors who are involved in a public tender procedure of decentralized energy. The last part mentions the first round of public tender in Germany in 2017 and its related criticisms (NRW-Attendees, 2017).

3.4.1 Analyzing the Decision-Making of Public Tender

The ideal of governments' provision of public tender lies in its openness or 'democratic governance' to empower private sectors to join in public infrastructures, instead of the government itself assuming overall responsibility. Ideally, through fair and competitive principles, various possible actors should get opportunities to win the bids. However, why should the main involvers of decentralized energy claim that the market-based public tender system go against their development and benefits? And after the first round public tender in Germany in 2016, both small-and large scale involvers claimed that disadvantages of the design of public tender affected them (NRW-Attendees, 2017).

The Market Premium Model (Direct Marketing), has been introduced in 2012 in Germany in order to replace the former Feed-in-Tariff-Model. From the perspectives of various players, critical sides including natural protection institutes, consumer-cooperatives and PV companies criticized on its negative effects on consumers, whereas the Federal Association of Renewable Energy and the Federal Association of Energy and Water Industry believe it could bring the integration of energy market (Walter, 2012). This market-oriented trend shows its tendency and favor for large-scale renewable energy investments. The overall trend of renewable energy policy during the past five years leaned on a market-based orientation no matter the Direct Marketing System or the Public Tender System, however, it has been criticized as excluding the small participants and resulted in the opposite goal as it has aimed: to incorporate divergent players into an integrated market.

What determined the design of the public tender concerning renewable energy plans? Germany's tendering system has been decided mainly by top decision-making bodies, with the EC's setting the highest target and Germany's government implementing the EC's targets together with its own adjustment policies based on national interests. During the decision-making process of the design of the tendering system, Germany's consulting institutes on energy policy and research and development units of renewable energy played the decisive roles in providing suggestions. On the other hand, small-scale investors were obliged to follow the set plans, but they deviated from the interests oriented by the tendering design system and proposed diverse options favorable to small-scale investors. These showcased different preferences from consulting institutes, research and development units, the Germany's government and the EU targets. However, their opinions hardly entered the decision-making process.

Political concerns are decisive factors in affecting public tender systems (regardless of which fields or public infrastructures) both in the tendering design-making process at the national level, and in the implementation process at the municipal-level. An observation of Nordic tendering systems of social and welfare services showed that on the one hand, party politics strongly affected politicians' attitudes towards public tender: tendencies for or against the market-based public tender reflected the political ideology of right- or left-wing positioning. More precisely, right-wing parties favored tendering systems more than left-wing parties and used competitive tendering policy as a strategy to disperse social-democratic initiatives, whereas left-wing parties generally keep a distance from competitive tendering systems.(Cruz, Martins, & Marques, 2011)

However, several other intervening factors, such as municipal employment and the economic situation of municipalities, affect local politicians' attitudes towards tendering systems and might decrease the effect of the traditional right-left spectrum. For example, informal interest groups have been commonly formed among municipal employees, which tended to avoid public-sector reforms like tendering systems because these kinds of market-type solutions implied more job insecurity and less favorable working conditions. On the other hand, fiscal austerity pushed local politicians to go for competitive tendering. For example, the Finnish local governments faced a problem of the shortage of professional employees, such as medical doctors and social workers, which forced them to purchase services from private providers regardless of costs so as to follow the requirements of rules or laws. (Fredriksson, Hyvärinen, Mattila, & Wass, 2010) Another study showed that public sectors got benefits through building up partnerships with private sectors because private sectors had the financial ability to manage the upfront sunk costs and ensure the service quality, which results in a lower cost than a public sector can provide.(Cruz et al., 2011)

3.4.2 EC's Tendering Policy: The Realization of the 'Market-Based' Principle

In 2014, the European Commission announced "New Guidelines on Environmental and Energy State Aid for 2014-2020" (EEA Guidelines), emphasizing the support for competition policy. The European Commission stood for the principles on a market-based mechanism. It reflected on certain measures of Member States' aid, including public funding, feed-in tariffs, and subsidies, and it referred to these measures as distortions of competition. The European Commission implemented the EEA Guidelines by shifting from a support scheme to market mechanism, and also restricting the subsidiary items of states' aid (European-Commission, 2014).

As 'State aid' has been defined as "measures containing a selective advantage granted through Member State resources which threatens to distort competition within the internal market and affects trade between Member States" (EUR-LEX, 9.July 2016), rules to affect internal markets and promote trade between Member States have been regarded as a core tool. However, the

definitions of ‘selective advantage granted through Member State resources’ and something which ‘threatens to distort competition’ remained unclear.

On the same date that the EEA Guidelines were adopted, Vice President of the European Commission responsible for Competition policy, Joaquin Almunia, made a short clarification for the Guidelines with very clear market-based implications (European-Commission, 2014). The philosophy was based in the fact that subsidies granted by Member States have caused significant cost increases of electricity users which weakened price signals and distorted market competition within and amongst Member States. On the other hand, based on the market-based principle, a competitive bidding process has been defined as an allocation mechanism for public support (EWEA, 2015). EC gradually put the bidding system into practice. During 2015-16, at least 5% of planned renewable energy capacity was intended to pass through competitive bidding processes, and from January 2017, all awards of public support for renewables were to be operated through bidding processes with only some exceptions.

Most disputes in Germany focused on the exception conditions of public bidding process, and only small parts criticized the existence of public tender. The former standpoints give different revised versions and details of the bidding process contents, whereas the latter groups believe the bidding system squeezes out the benefits of small involvers or investors.

3.4.3 Tendering System to Small-Scale Investors: Capital Flows and Impediments

The shift of the rules on the tendering system resulted in greater risks for small-scale investors. For smaller investors, if their projects do not win the tender, then the whole investment in the preparation for satisfying the conditions of the tender would be wasted, which generally consists of wind measurement, assessment of security (i.e. birds), land acquisition, costing for the facilities, ground survey and personnel costs. If these small investors participate in several public tenders but fail to win the tender in the end, these costs can become a threat to the survival of small investors (Nestle, 2015).

According to the rule of Ein-Projekt-Ansatz, the failed project cannot be refinanced and the losses cannot be spread into a wider portfolio (E. Hauser et al., 2015). The other is the risk from the delay of operation.

According to the aforementioned risks, small investors assume higher risks under the new tendering system by paying the cost of the preparation for the project, whereas big energy companies can offer a project even with low profits because of their higher capital. The result ends up being in opposition to the goal of the Federal Ministry for Economic Affairs and Energy, which promotes the law of the tendering system, as well as the designers of the system (see Table 3.1).

The principle referring to the small and big participants in the tendering system says,

> "Through the principle of competition in the tendering system, the achievement of cost-efficiency is of paramount importance. The risks for the bidder associated with the tendering procedure and the administrative burden on the tenders will be reduced, so that the financial costs will not increase. (BMWi, 2014)"

And the principle for supporting the participation of the small investors states,

> "The diversity of the participators will not be affected because of the change of the tendering system, so that the wide range of participation of citizens in the trend of the expansion of renewable energy can remain. This is necessary not only for the maintenance of a high acceptance for energy transition among people, but also for the prevention of market concentration and the collusive behavior among big energy groups. (BMWi, 2014)"

The principles of market mechanism went against those from decentralized energy. For example, to build up a plan of citizens' power is time-consuming because it needs the acceptance of its participants, while a project going through a public tender needs to be realized by a short-term procedure which is not available for the plan of citizens' power (E. Hauser, Weber,A., Zipp. A, Leprich, P, Hofmüller,S. & Kochems, J., 2014).

3.4.5 First Round Public Tender in Germany in 2016 and its Implications

The German government amended the Renewable Energy Act on the 8th of July, 2016, agreeing on the shift from FIT scheme to the public tender procedure. The amendment entered into force on the 1st of January, 2017. Successful bidders will have a 20-year contract for selling electricity in which the price will stay fixed at the level decided during the tendering process (International-Energy-Agency, 2017). Its effect on the renewable energy development in Germany and on small-scale investors is still under discussion. Following is the related reflection.

Covering up the Interests of Nuclear and Coal Power Plants

The amount of renewable energy in the public tender has been limited to 2800 MW in the first year. One of the reasons to set up the cap of the annual expansion of renewable energy in the public tender would be to wait until the corresponding transmission network is built. However, one criticism is that this limit is so low that it might benefit the nuclear and coal power plants and lead to the further expansion of traditional energy.

Disputes on the 'Cooperation' of Big Renewable Energy Companies and Citizens' Energy

Whether citizens' energy with the support of big renewable energy companies still remains citizens' energy, is in dispute. Evidence shows that big energy companies strategically support citizens' energy in order to join the public tender under special rule. As H. Brösamle from an onshore wind energy company (WPD) implied, manufacturers and big planners stand behind many associations and organizations of citizens' energy in order to cover the many risks that they have to face (Brösamle, 2017).

Surely, several cooperative forms among enterprises and associations of citizens' energy have been created particularly after the public tender law was issued. However, how greatly will this trend affect the development of citizens' energy in the future or shake the 'real' existence of citizens' energy?

The 'Fairness' of the Special Rule (*Sonderregelung*)

The special rule allows citizens' energy cooperatives to enter a public tender system with different entry requirements, such as joining without a license before tender or having a longer period in which to complete their facilitation. The good intentions of differentiating enterprises and citizens' energy cooperatives in entering a public tender were more obvious in the sense of promoting citizens' energy by setting a lower threshold, however, the details of the measures are disputable.

Under the new regulation of public tender, BImSchG-License (*BImSchG-Genehmigung*) plays a very important role in differentiating the entry requirements in public tender between the citizens' energy and non- citizens' energy (commercial energy suppliers). After the result of the first-round public tender, in which associations of citizens' energy won the most bids, commercial renewable energy suppliers regarded the BImSchG-License as decisive for the bidding result, and with this differentiated threshold big suppliers must develop new strategies to apply to the new regulation (Clashausen, 2017).

During the first-round offshore wind tender, around 95% of citizens' energy groups adopted the BImSchG-License, in which they should only submit the license after winning the bid. The advantages for the citizens' energy groups were that they could avoid risks of higher investment costs for the license. However, it is very hard to evaluate in the early stage the effect of BImSchG-License on citizens' energy. In terms of actor variety, it has been suspected that this design led to the death of the 'real' citizens' energy while non-citizens' energy groups tried to create an identity of citizens' energy in order to avoid submitting a license before tendering (Broers, 2017). It is possible that the interests of 'real' citizens' energy will be squeezed out by the compositely disputable groups.

Concerning the fairness of competition between citizens' energy and non- citizens' energy groups, it is still very hard to decide which is fairer: to put all eggs in one basket with a special rule such as the current regulation, or to differentiate two groups with different entry requirements from the beginning before implementation of tendering, while at the same time setting a bid cap for each group?

Cross-border Tendering System

Regulations on EU cross-nation (EU-wide rules) of public tender systems permit each EU country to accept the applications of tender from other EU countries without discrimination on registered location of the companies, specific brands, trademarks or patents, and ask for fair distribution of information among EU countries (Your-Erope, 2017). Based on the draft of cross-border Pilot-Tendering from Federal Ministry for Economic Affairs and Energy, Germany has implemented a pilot-tendering for PV together with Denmark in 2016, in which Denmark has won the bid. However, this draft for a cooperative cross-border tendering system is still controversial because determining factors and conditions among countries which cooperate are very hard to compare (Neue-Energie, 2017).

Table. 3.1: Effects of renewable energy tendering system on small-scale involvers and suggestions.

Source modified from SolarPowerEurope (2016) and EWEA (2015)

Design	**Effects**	**Suggestions**
Prequalification: material and financial criteria	The purpose of Prequalification is to prevent speculative bidders. However, if the criteria is too restrictive, competitiveness will be damaged and smaller players will be hesitant to join the tenders	De-minimis (EWEA 2015)
Prototype technologies	Different types of renewable energy technologies have their own specific ways of generation and different cost profiles	Technology-specific tenders should be applied so that the targeted and diverse types of renewable energy technologies can join the tendering system (Solar Power Europe 2016)
Transferability of awarded bids	If a commitment is not allowed to be transferred to a secondary market, flexibility would be lower and risks higher (Solar Power Europe 2016)	In the secondary market, the transferability should contain two sides:, in which one is to allow one project to be transferred to another project in the portfolio of the same project developer. Further, it should allow one developer to transfer to another who fulfills the requirements of the preselection
Size of systems		Smaller size (solar power: smaller than 1 MW) should be excluded from tendering system (Solar Power Europe 2016)

3.5 Discussion

In the time spectrum of the liberalization of electricity systems, Germany stands in first place to open its electricity market to the entry of individuals, cooperatives and small-scale enterprises from the 1990s. While Japan also started its electricity system's reform in the 1990s, it did not completely open the production and sale market until April 2016 with the implementation of 'Liberalization of Retail Electricity Sales'. Compared to the two countries, Germany gradually went in the direction of complete liberalization of its electricity system, starting from the energy production and sales to the current struggle for liberalization of electricity transmission. However, Japan not only spent more time to reach a liberalized market of energy production and sales, but also took a risk by going back to the traditional electricity system which was dominated by the biggest ten power companies. This situation is caused by the fact that the diverse players did not accumulate enough capabilities such as investment capital or networks to compete with the traditional power companies. When a region faces electricity insufficiency which brings about big financial strains, the energy policy quickly gives priority to big companies and is even supported by the society.

The left effect of traditional electricity companies on society explains that the liberalization of electricity system is a core requirement, but not the only element to support a sustainable decentralized electricity system. Except for the prerequisite of a liberalized electricity market, a decrease in electricity price also depends on prices of fuels, tax levels and continuing research investment in electricity deregulation. However, the case of Taiwan shows that without the liberalization of the electricity system as a prerequisite, the retailing market would find it difficult to enter the energy production market even when the technical requirement is already met.

The EU Commission and Germany's government hold the principles of free market and diversity for public tender of renewable energy. However, those who stand at the side of the small-scale investors criticize the details of new laws. They point out that when these details work against small-scale involvers, the principles of free market and diversity cannot exist.

Through the analysis of the transformation of the former subsidiary feed-in tariff system to the current market-based tendering system, the hidden conflicts between renewable energy and decentralized energy have been highlighted. The small-scale investors in renewable energy

ultimately faced more challenges while large-scale investors contradictorily got more benefits under the current system.

Chapter 4

Participatory Forms and Networks of Decentralized Energy

4.1 Legal Forms of Energy Participation in Germany: Advantages and Challenges

Legal forms dealing with decentralized energy can be categorized into three types in Germany: GbR, GmbH & Co. KG and eG (see Table 4.1).

GbR

The original and the most well-known form is GbR (Civil-Law-Partnership/ *Gesellschaft bürgerlichen Rechts*). In contrast to other forms, GbR is the fastest, easiest and cheapest to set up and can be simply established by two people with an informal contract and minimal capital. Furthermore, all shareholders represent the GbR together. Its 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 plans (Storz, 2012).

GmbH & Co. KG

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 entailing less liability for those involved but also making 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 Radtke (2013) points out, GmbH & Co. KG can be regarded as a financial *Genossenschaft* (Storz, 2012), and due to this, the possible participatory deficiency in projects of large-scale facilities can be higher than those in *GbR* and *Genossenschaft*.

One of the investors in the Ökostromgruppe Freiburg GmbH, Brigitte Kremer, who lives in Waldkirch, claimed that her investment was based on her support for renewable energy in the region and that the profit never outweighed her initial investment. The manager conducted a site investigation of the planned wind turbines in Lahr and Seelbach and also joined this

protocol. Firstly, she invested 2000 Euros, and the first year she got a return of 4%, or 50 euros. But it then decreased to 3% and to 2%. This project was with 50% share from badenova AG & Co. KG. The wind turbine burned down in September of 2013, and she said that the investment never come back. I asked why she did not want to join another project, and she said that there were two reasons: one was that she did not hear of similar information anymore except for from the Ökostromgruppe, and the second was simply that there was so little return on her investment, and she is now retired and has to save money(Kremer, 2017).

Manfred Westermayer, another investor on the wind turbine project of Ökostromgruppe Freiburg GmbH, compared his investment on solargeno eG and solarcomplex AG. He shared that he had more participatory opportunities with solargeno eG for every project, and less participation in solarcomplex AG, with only an annual general assembly. As for Ökostromgruppe Freiburg GmbH, the participatory opportunities seldom were accessible to non-shareholders(Westermayer, 2017).

eG

Origins of eG

The third type of legal form is eG (Cooperative/ *eingetragene Genossenschaft*). eG did not originate in the energy field but rather from housing associations, credit cooperatives and other sectors, such as health and education associations. As the energy field in Germany develops, eG is exploding this decade. In 2010, cooperatives boomed, with one to two new cooperative establishments per month constituting 23% of all start-ups of eG (Volz, 2010; Walk & Schröder, 2014). However, given the history of energy systems in Germany, cooperatives played a critical role in encouraging people's cooperation on electricity generation. As Philipp Späth said,

> "So there is a long tradition in Germany where also networks of cooperation and generation of electricity was one in the beginning and then you have got some networks which have still, like, cooperatives and some generation capacity and so on, Cooperations, where users and founders are the same members and that is the idea of Genossenschaft. It's not that you have some users and some provide service and there is a market in between. The potential users and the one who delivers the service and the one who brings in in capital are one membership. So that is the idea. You can also say the community energy or consumers of electricity for example, also become producers. (Späth, 2015)"

However, this grassroots power has been replaced by another voice to separate the whole electricity system, which also brought out the emergence of big energy corporations.

> "People said heat production and electricity production have to be separated and have to be both on the national scale and that was like 1911 or 1909 when this was decided and then it was separated from each other. And from then on, there were big corporations delivering the services and electricity services …Some networks that was still operated by cooperatives but it was very few. It was becoming less and less.(Späth, 2015)"

The history of eG shows that it emerged in times of crisis and turmoil. For example, the first cooperative arose in the late nineteenth century from retailers and craftsmen in reaction to the endangered industrial sectors, and also as a means to help 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. 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. Eighty years later, *Energiegenossenschaft* built up and organised themselves in order to help provide renewable energy (Flieger, 2011).

Features of eG in energy domain

The reasons for the high praise of eG lie in its democratic principle, reliability as the legal form of eG and the opportunity it offers for many projects to be bundled under one roof (Flieger, 2011; Radtke, 2013; Storz, 2012; Walk & Schröder, 2014). 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 operating their own energy facilities. It also has the right to join other companies and set up its branches and local offices (Solar-Bürger-Genossenschaft, 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 (Storz, 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 (Radtke, 2013; Walk & Schröder, 2014).

Network-building

Another trend in network-building of decentralized energy is the exchange of management techniques among *Energiegenossenschaften* from different regions. Southern Baden has been promoting networks of energy-initiatives between 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, 2012).

When dealing with an innovation project which combines several players such as builders, landlords and tenants, eG as a project manager and coordinator has to always ask, “What are the motives among them? How to make the involvers satisfied?” A successful project should be based on good communication among these sides, and some common rules have been already developed. For instance, according to the energy performance certificate for residential buildings, before a construction company starts to build, it must show what percentage of renewable energy the building will use, and when a landlord rents or sells a house, they must show a certificate enabling the tenant to count the possible expenditure of the energy of the building.

One of the challenges to cooperation between different local cooperatives lies in its lack of a shared information platform. This problem was proposed by a participant at the exchange program for the discussion of “The Promotion of a citizen’s energy project” (*Förderung von Bürger-Energieprojekten*) in Emmendingen, organised by the RegioNetz Südbaden and fesa e.V.. The participant shared that "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, 2015).

Photo 4.1: Cross-regional networks have been built up among energy cooperatives, workshop at the City Hall of Emmendingen.

Spaces of cooperation between local energy companies and local energy cooperatives also exist, however, the benefits that both receive are not always evenly balanced. For example, Badenova, the energy company based in Freiburg, provides the regional grid operators a minimum of 200 kW of 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 meantime, 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). It remains uncertain whether this offer from Badenova should be treated as an attempt to integrate the markets or reveals its intention of monopolization.

Due to the requirement of large-scale combined heat and power generation up to 200 kW. 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 their financial capital, such that they no longer have any intention to incorporate local energy cooperatives into their plans.

Table 4.1: Features of the legal forms in Germany: GbR, GmbH& Co.KG and eG. Source modified from Storz (2012)

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

4.2 'Business Models' in Describing the Diverse Participation in Decentralized Energy

Legal forms of energy participation are not sufficient enough to describe the variety of involved players and the complex participatory pictures they form. As described above, legal forms of energy participation incorporate variables of the scale of investors' capitals, ways of members' participation and their degree of influence in decision-making. However, when considering more involvers who actually affect the network of energy participation, such as house management, housing associations, facility operators, property owners, landlords, tenants, municipal utilities etc., the categorization and the correspondent network would be more complex and more flexible. Possible 'business models' categorized according to the interplay of the involved players, including Operator Model, Cooperation Model, Multi-Family Housing and Leasing Revenue Model, will be analyzed in the following part.

4.2.1 Operator Model

Compared to the traditional method of product sales, the peculiarity of Operator Model lies in its sale of services instead of products. Under this model, customers pay for their usages instead of the products. In the domain of energy, energy suppliers sign a contract with business enterprises, through which the defined temperature of heat and light of a building are provided. Normally, the costs for the energy suppliers are based on square meters of living areas, which explains why the energy providers strive for the utilization of the most energy-efficient facilities. Customers can just calculate their expenditures on energy(Business-Wissen, 2017) (see Fig. 4.1).

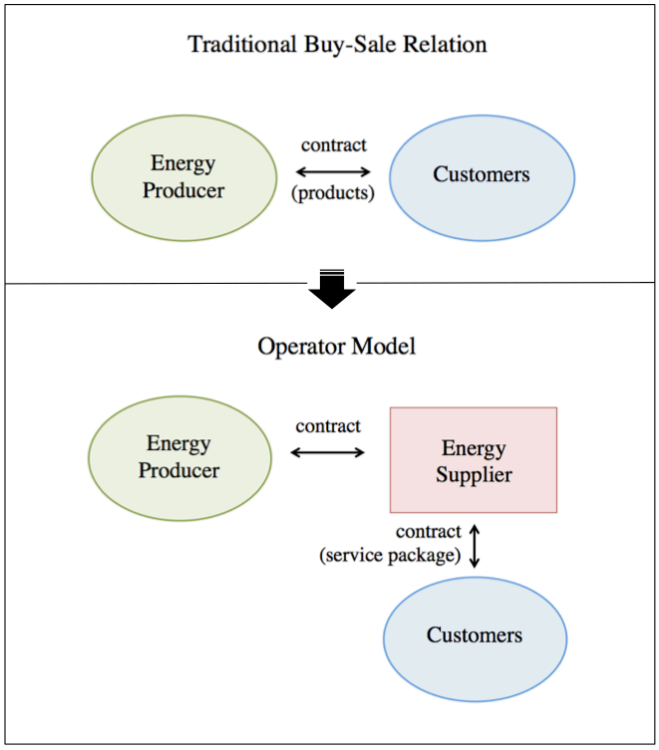

Fig. 4.1: Under Operator Model, energy supplier provides customers with services of renewable energy and signs a contract with an energy producer.

4.2.2 Public Private Partnership (PPP) Model

Public Private Partnership (PPP) has been regarded as a demonstration of this model when the buy-sale relation lies between public and private sectors. In this model, the governmental sector

assigns private companies a plan with commission or concession related to street construction, hospital or waste management, which has been previously engaged by the governmental sectors themselves. Under this model, the relationship between citizens and governmental sectors would also change. Instead of simply paying taxes to the government, citizens also have to pay the fees for using the facilities to the private companies, which now stand between governments and citizens (Business-Wissen, 2017) (see fig. 4.2).

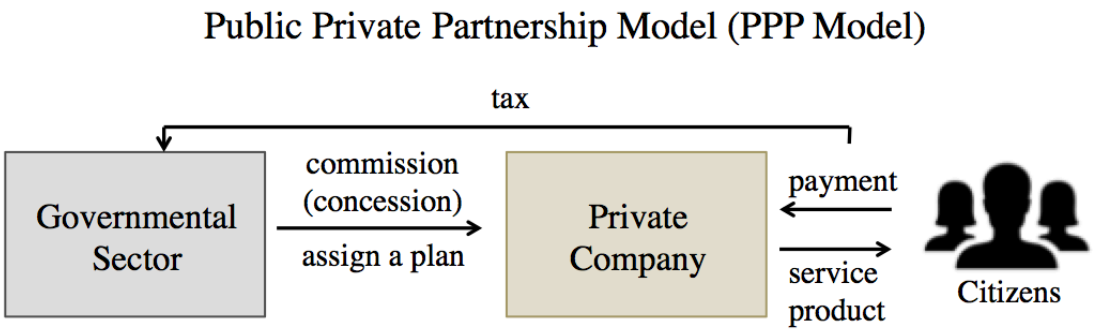

Fig. 4.2 Under PPP Model, the governmental sector assigns private companies public plans while citizens pay the companies for their services. Renewable energy can be an item of the services. Source: modified from Business-Wissen (2017).

What would be the relationship between providers and users of the Operator Model according to the criteria of participation? Will the participatory degree of consumers decrease if the consumers take the whole service package? What are the roles of citizens and their relationship with the government and private sectors under the PPP Model?

The Operator Model changes the traditional roles of producers, distributors and lessors as well as governments with their public infrastructure plans. As renewable energy consumers, service or a so-called service package provides them with convenience to facilitate renewable energy without investing too much time and money on facilities. Customers are supposed to benefit from simpler accounting, no workload risks, usage-dependence and calculable costs, and less bureaucracy (Business-Wissen, 2017). However, the replacement of the provision of products with the provision of the service package under the Operator Model does not change the logic of sell-buy between companies and customers.

In a nutshell, customers buy service instead of products from service companies through contracting, through which customers gain the convenience of the service and service companies provide their professional competence under the Operator Model. However, the degree of participation by customers decreases in comparison to direct participation in energy production and provision.

4.2.3 Cooperation Model

The Cooperation Model tends to correct the deficiency of participation under the Operator Model by integrating customers with the service company, in which customers are members of the service company. One of the most important intermediary roles is energy cooperative, which engages in energy service in cooperation with companies such as associations of housing cooperatives for their clients and plays a role as a 'carrier' to incorporate the clients into their members (Flieger, 2015; Mertens-Stickel, 2014)(see Fig. 4.3). From this perspective, the Cooperation Model is an extension of the Operator Model, which extends its cooperative partners to companies. One of the advantages of this model lies in the reduction and the dispersion of risks related to gearing ratio or the threats of tax exemption of rental cooperatives, through outsourcing part of its activities to other partners. Further, resources of involved participants such as financing and ways of energy consumption integrate through participatory cooperation (Radtke, 2016).

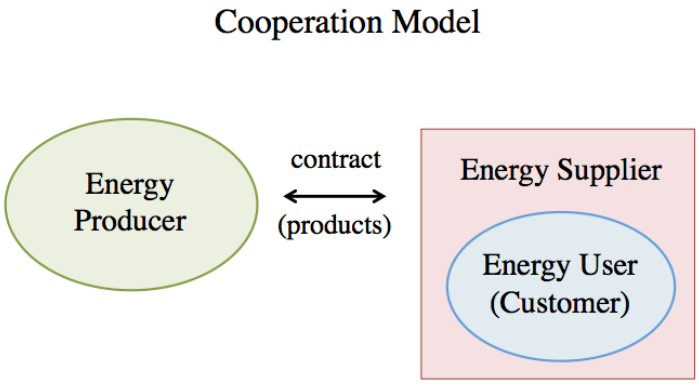

Fig. 4.3: Under Cooperation Model, customers are integrated as an energy supplier. Energy cooperative is an important intermediary role which cooperates energy producers and customers.

Under this framework, the users of the energy service should be the members of the energy cooperatives when possible. Therefore, members of energy cooperatives would be also the clients of their own contractors. Energy service under this framework will not draw its attention to the investment of its users but rather to the efficiency of usage (Flieger, 2015). However, Flieger (2015) described the energy cooperatives under this cooperation approach as 'tender shoots'. Especially when a single cooperative has to bring many companies together into a strategical cooperation, it usually faces the problem of lack of knowledge of financing and investment in spite of putting in great efforts.

Cooperation between energy cooperatives and housing cooperatives in the real estate field shows its advantages from both sides in which on the one hand, energy cooperatives possess the know-how for operating an energy project, and on the other hand, housing cooperatives engage in maintenance and further development of building stocks (Flieger, 2015). It has been long-term predicted that building stocks have great potential for achieving the goal of energy transition, for which the combination of electricity and warmth are of paramount importance (see Fig. 4.4).

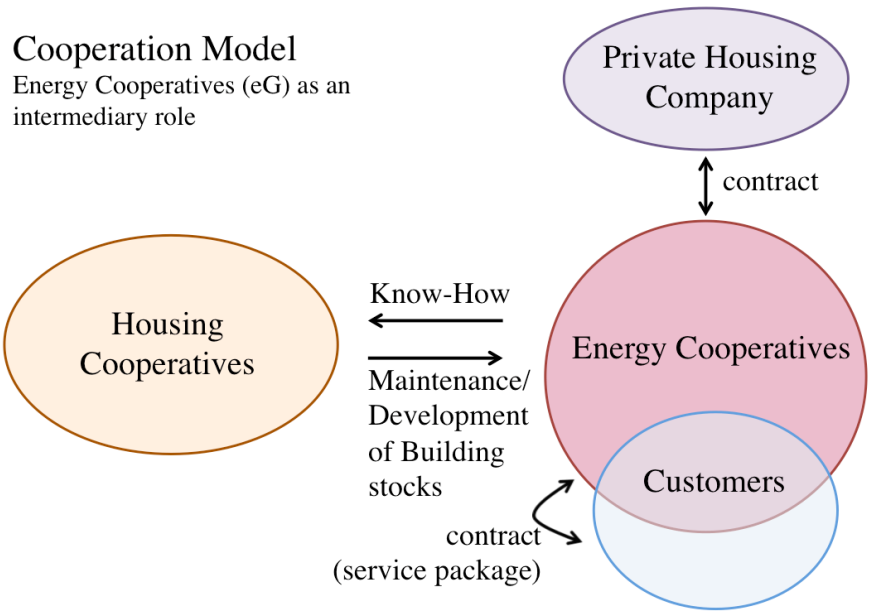

Fig. 4.4: Energy cooperatives as an intermediary role under the Cooperation Model

An example in Loccum (situated near Hannover) showed how a Cooperation Model can be realized through the cooperation of the associated power company, project implementation from housing cooperatives and also usage with the aid of software (Loccumer Tagung, Mar 2015) (Göppel, 2015).

4.2.4 Multi-Family Housing

Most of the energy-efficient houses belong to single family houses (*Einfamilienhäuser*) in Germany, however, Multi-Family Housing (*Mehrfamilienhäuser*) symbolizes a trend to strive for energy efficiency, through which a network with several involved actors, including apartment builders, producers of installations and apartment owners, has been also forming. Multi-Family Housing also relies on urban planning with the cooperation of architects, urban planners and engineers (Fisch, 2013).

The core concept of Multi-Family Housing lies in the balance of supply and need for energy in the building, and therefore, energy efficiency would be necessary to reach the goal. Compared to a single family houses, need is higher than supply within Multi-Family Housing because of its higher residential density. M. Schaede and M. Groß took Multi-Family Housing in Frankfurt am Main (Cordierstraße 2-6) as an example. The coverage ratio of energy demand is reached through the usage of solar thermal energy, rooftop PV, storage systems and cogeneration of heat and power (CHP) with bio-methane. Measures to reduce consumption of electricity can be also partly from pre-installations such as energy-efficient lighting, standby switches or dry refrigerators (Schaede, 2014) (see Fig. 4.5).

In this model, the apartment builders or the producers of installations would be the energy providers of the residents, and residents can choose their own energy providers freely (Fisch, 2013).

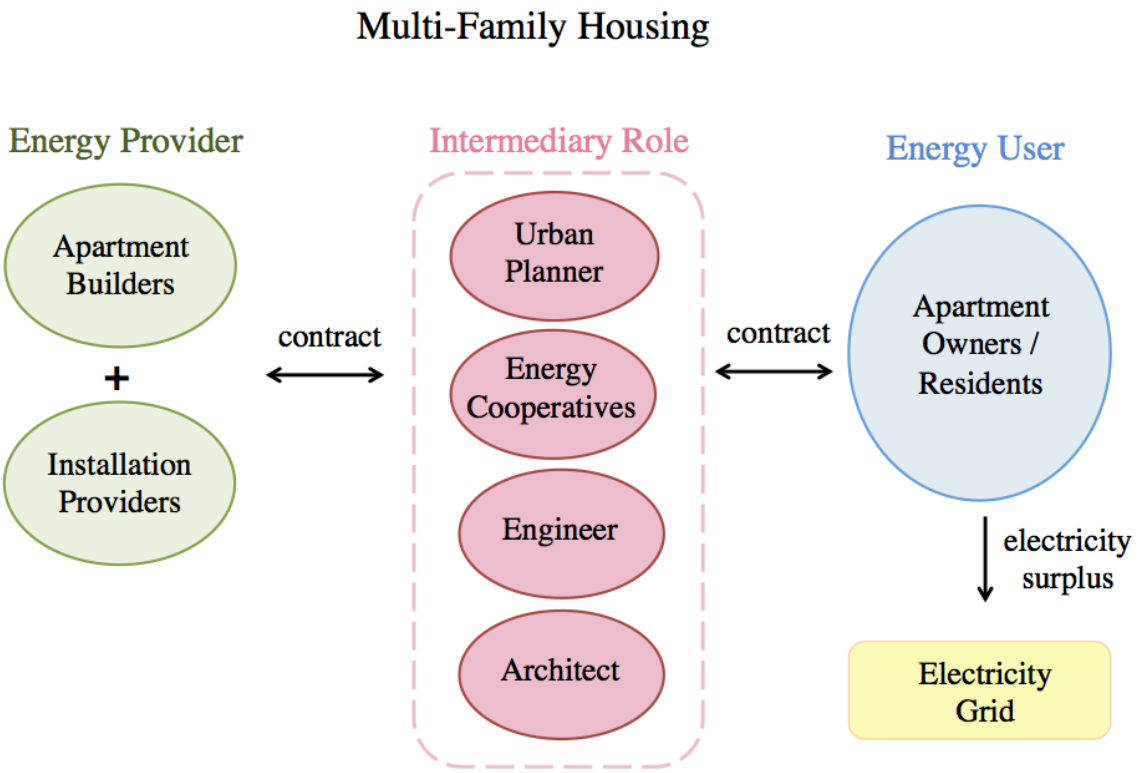

Fig. 4.5: Multi-Family Housing Model symbolizes a trend for energy efficiency, which is based on a network with several involved actors.

4.2.5 Leasing Revenue Model

In the clean energy or medical technology field, leasing between sellers and buyers is very common because large-scale devices can create revenue streams for sellers while the advantage for customers is avoiding buying entirely through long-term contracts. Financers play an intermediary role between sellers and buyers, who receive the equipment and devices transferred from sellers and make a contract with buyers for a certain period for leasing the equipment. Under this three-party relation, financers are leasers and buyers are leasees in the leasing agreement, whereas between sellers and financers there exists a service agreement which guarantees the service from sellers during the leasing agreement (MaRS-Library, 2013; Rödel&Partner, 2016) (see Fig. 4.6).

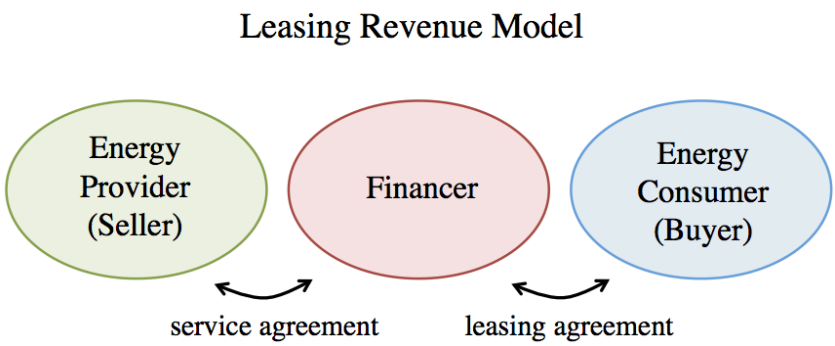

Fig. 4.6: Leasing Revenue Model suits well for the large-scale renewable energy project. Financers play an intermediary role between buyers and sellers.

4.2.6 Energy Contracting Solution

Energy contracting is a general concept in energy service that is realized through contract agreements. According to different cost-saving measures, energy contracting can be categorized into at least four types. The most two common forms are Energy Delivery Contracting and Saving Contracting, while the other two forms, Financing Contracting and Management Contracting, are less used.

Energy Delivery Contracting

Energy Delivery Contracting, or Facility Contracting, refers to projects through which the contractors plan, finance and establish the heat-generating plans, or manage the current energy-operating facilities and take responsibility for the contracts. The contractors arrange the business, await the facility, overhaul and operate it. They buy the operation-energy and sell the used energy.

Saving Contracting

Saving Contracting refers to the condition wherein contractors not only plan for the heating-generation plant, but also how they plan, finance, operate and maintain the energy distribution, energy use facility and the energy consumption of relevant devices. The integration of the users from contractors to creating concepts and the training of users are part of the regular maintenance of the service. There are also variations by which the contractors manage the current technique in the building and guarantee the energy savings potential. The savings function as the basis of refinancing of the investment and the expected profits of the contractors. If it does not reach the agreed savings, it will end up as a burden for the contractors. After a certain duration, the contracting taker will benefit from the savings.

Financial Contracting

Financial Contracting refers to the condition in which the contractors plan, finance and operate for heating supply for the buildings. The operation-and-maintenance responsibility lies in the users and the owners of the buildings, which is different from the energy delivery and savings-contracting systems. The contractor receives fees as reward for the energy supply. The users and the owners of the buildings assume all other costs of the business.

The cost of the heating constitutes 40% of the households' expenditures, and the old infrastructures make the cost even higher. Energy-contracting provides some benefits for the decrease of the price. However, while this contracting is beneficial to the commercial or open real estates, it is still difficult for the households because of the gap between landlords and tenants. Further, because some people offer the heat for higher prices under very bad conditions, the reputation is made even worse. However, there are also some critiques for the contracting, for example, the potential removal of the congestion of the renovation in German basements, greater energy efficiency and so on (Storz, 2012).

The federal government has also tried to change the regulation of the heating costs so that landlords and tenants in Germany can both benefit from it. KfW followed the German Banking Act (Kreditwesengesetz), in which 80% of the finance is from the federal government and 20% from Germany's 16 states. Usually a city or county administration can apply for some financial support for projects (e.g. Freiburg, Gundelfingen), while individuals can apply for a loan from the KfW through some banks such as GLS and Volksbank as well.

Especially for the owners of corporations which need renovations and which oftentimes match the liquidity shortage, energy-contracting companies regard it as an opportunity to employ new strategies. They declare that they can offer the new facilities at a reduced price for investment and finance costs, and conversely, they make long-term commitments regarding the supply of heat. Along with attractive prices for heat and new technology, they also offer the bulk purchase of oil and gas. As a result, the entry level price is sometimes lower than the cost of the clean energy of the community. At first glance, it seems that the new heat comes with the free value-added service, and customers can overlook the collateral regulations and the risks.

The current advisors provide homeowners with guidelines so that they can understand the drafting of the contracts and compare offers. The goal is to clarify the related meanings of the Energy-Contracting, especially with regard to the technical procedures, the legal evaluation and management and potential pitfalls. They also help customers to compare not only the heating price but also other parameters, such as the duration, the price clause, the supply limit, the maintenance requirements, and the nature of the heating facilities under the completion of the contract. In order to better protect the owners of the houses, the federal government has promoted the aforementioned advisors.

Technology Improvement

The buildup of networks develops along with the provisions of alternative technologies. The ability to reach a certain kind of new technology also means a possible build-up of a social network. The internet payment system Bitcoin, for example, provides a channel for energy providers and customers in which the distance between both sides would be shorter and intermediary roles who earn commission in between are eliminated. If this invention worked within the energy field, it would be a social transformation whereby a newly forming exchange society is possible.

Photo 4.2 : A dwelling in Freiburg shares Cogeneration of Heat and Power (CHP) at their basement.

Photo 4.3: Combination of PV on the roof and Cogeneration of Heat and Power (CHP) at a dwelling in the city centre of Freiburg.

4.3 Investigation on the Energy Cooperative: solargeno eG

4.3.1 Composition of the Staffs and Personality

The ‘personality’ of the solargeno group is willing to help and flexible with regards to cooperation. When cooperating with their project objections, they try to understand the needs of customers or potential customers as well as the standpoints of other cooperators. They reconsider the problems and try to figure them out, be they technical, economic, legal or participatory problems, and also discuss how to react afterwards. They do not confine their contact persons to customers or renewable energy consultants but also reach out to local renewable energy enterprises and municipalities. They do not set strict lines between ‘stakeholders’ but remain open to different possible cooperators. During my participation, I experienced their strong enthusiasm for helping the community’s development (e.g., the district heating system of Kappel), and they remained optimistic even if they did not get the project from communities. From my perspective, their standpoint for cooperation was strongly determined by the belief in pushing up the autonomous power for renewable energy production and consumption.

Solargeno has regular discussions every two to three weeks. Discussions were practically-oriented, focusing on topics such as installation problems, calculations, adaptation to regulations, communication with clients and so on. This pragmatic characteristic can be because of their main composition of occupation such as engineers, businessmen or retired businessmen. The solargeno association is led by a female director, Kaj Mertens-Stickel, who is also the main permanent office personnel, executing the overall business functions while other members take charge of their projects too and come either regularly or irregularly to the office. Kaj Mertens-Stickel has a strong will for project execution and high acceptance of outside contacts, while other executers and members, such as Arnold Löffler, Herbert Krickl, Uwe Müller, Wolfgang Roos, Christoph Schings and so on, backed up for domain knowledge, problem solving and communication. In terms of gender participation in the decentralized energy field, the rate of females as executors was low, especially in events of cross-region summits where only key members of the local renewable energy associations were present. The other key player, Burghard Flieger, who was also the board director and the co-founder of solargeno, manages

mainly farsighted plans such as sector and cross-regional cooperation, international interactions, talent fostering and energy production's integration with other local autonomous activities. Compared to other members focusing on project business, he paid more attention to the issues of the expansion of decentralized energy and connections among related groups, which was relatively 'politically strategic-oriented'.

Photo 4.4: Members' of solargeno discuss their projects every two weeks.

4.3.2 Main Business- Project management and challenges

The main business of solargeno focuses on the renewable energy projects, cooperation with other players, extension activities and the creation of new ideas, as examined below.

In terms of technical categories, solargeno focused more on PV and combined heat and power plants (CHP) facilitation for their projects, but nevertheless, they also managed to expand other types of renewable energy such as small-scale hydroelectric power, biofuel and other energy storage systems as a main facilitation or supplement. Their project objection (customer) targeted mainly the proprietor of a building, homeowner, industry or association.

1) Challenges in project Lehenerstr.

Solargeno experienced tension when dealing with the project of Lehenerstr. in Freiburg. In the beginning of 2016, solargeno was hurried to start the project because on the one hand, solargeno had already invested for a long time into preparation, and on the other hand, the PV facilitation works more efficiently in spring and summer, thus they wanted to start the project before the start of spring (Work group discussion, Jan. 2016).

2) Project Littenweiler

Another case showed tension derived from diverse interests when solargeno sought out investing in new projects. At the end of 2016, when solargeno was trying to win one of the projects from a public tender which involved a new urban development area with 16 houses and 120 flats in Littenweiler, they observed a rising problem: which kind of renewable energy should they offer? This dilemma had much to do with the preferences of different involved stakeholders, for example, the five different building owners of this area were not interested in CHP because CHP would entail too many stakeholders and technical and space problems, and thus was seen as simply too complicated. The City Hall of Freiburg, however, promoted CHP as the main approach and solar power for a subsidiary role. Solargeno assumed that the City Hall's preference for CHP was because of CHP's economic beneficiary (Work group discussion, Nov. 2016).

3) Project Hebelstr. in Gundelfingen

Another problem was the continuous financial loophole. The settlement account in Jan. 2016 showed that the annual deficit of solargeno amounted to 1,000 Euros, and the annual deficit of the project of Hebelstr. in Gundelfingen amounted to 2,000 Euros every year (Work group discussion, Jan. 2016). The BHKW in Hebelstr. was established during the second half of the year 2013 by solargeno when the old oil heating system of the building required renovations. The new system of BHKW then provided the residents with both the needed electricity and heat. The annual savings on the electricity expenditure was around 6-13%. The total investment capital was around 80,000 Euro, 20% of which was public funding and 80% of which was financed through bank loans. The equity consisted of cooperative shares of solargeno and subordinated loans, and the rate was 1:4, with solargeno providing a 3% interest rate for the subordinated loans within 15 years. Every package could be provided for 2,000 Euros, which included 1,600 Euros in subordinated loans and 400 Euros of solargeno (4 shares). And, everyone can be an investor (Mertens-Stickel, 2014).

By the end of 2016, they summarized some possible reasons for their financial problems. One was that the electricity purchasing amount that participants (investors) had bought was double the amount of electricity that non-participants had consumed, while the optimal condition would have been striking a balance between both sides (Work group discussion, Nov. 2016). In 2017, they uncovered another reason for the financial shortcomings which regarded the accuracy of the electric meter. The whole residential building of this project had a main electric meter which connected all single-phase electric meters from each household. However, the consumed electricity shown on the main electric meter was too high, therefore, they suspected that either the main electric meter or the single-phase electric meters were malfunctioning. After consulting with an expert of engineering and metrology, they found out the single phase electric meter had no indication of accuracy at all.

4.3.3 Cooperation with other players

Assembly of National CO2 Emission (CO2 Abgabe e.V.)

On 27 March 2017, six members of solargeno attended the foundation event of the Assembly of National CO2 Emission in Freiburg, the date of which overlapped with their regular Monday discussion group. They joined the vote for the foundation and represented both individually and institutionally the donation of annual amounts of 60 and 100 Euros, respectively; the latter passed with the approval of the work group of solargeno (Work group discussion, Mar. 2016).

District Heating System of Freiburg-Kappel

In September 2016, solargeno prepared for the talk with the Environmental Protection Authority of the city of Freiburg, made the report on Kappel's condition and approved sending round the assessment from the experts of badenova (Work group discussion, Jun. 2016). In October 2016, they visited the Schauinsland School and the surrounding area in Kappel. The participants of the project in Kappel offered the expected gross costs that they could accept, including one-off construction costs, annual basic prices and the price of heat. The prerequisite was that solargeno gained at least 60 single-family dwellings in close vicinity to the school.

Before that, they did the preliminary evaluation related to the suitable size of the machine complying with Renewable Energy Heating Act and the Combined Heat and Power Act, the heat density based on Eco-concept, the approximate participation rate, restructuring measures to facilitate the CHP machine and so on (Wiedemann, 2016).

On the other hand, the initiative of the district heating system in Kappel aroused discussions either through individual talks or neighborhood discussions or meetings together with the association of the multi-family houses. The purpose of solargeno among these discussions and participation of Kappel was to make sure that it was integrated from the very beginning of the project. The city of Freiburg also held events in Kappel in which the citizens' network initiative presented their discussions.

So far, players from outside Kappel included solargeno, the city of Freiburg and badenova, where solargeno played the role of a potential project manager of the district heating system, the city of Freiburg provided discussion platforms and also a potential higher decision maker, and badenova was to some extent a temporary knowledge provider. However, the decision was made by the citizens' network initiative of Kappel.

4.4 Patterns of Citizen's Electric Power Cooperatives in Higashi-Ohmi

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, Nakagawa, Seiwa, & Nishimura, 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 on the contributors (see Fig. 4.7).

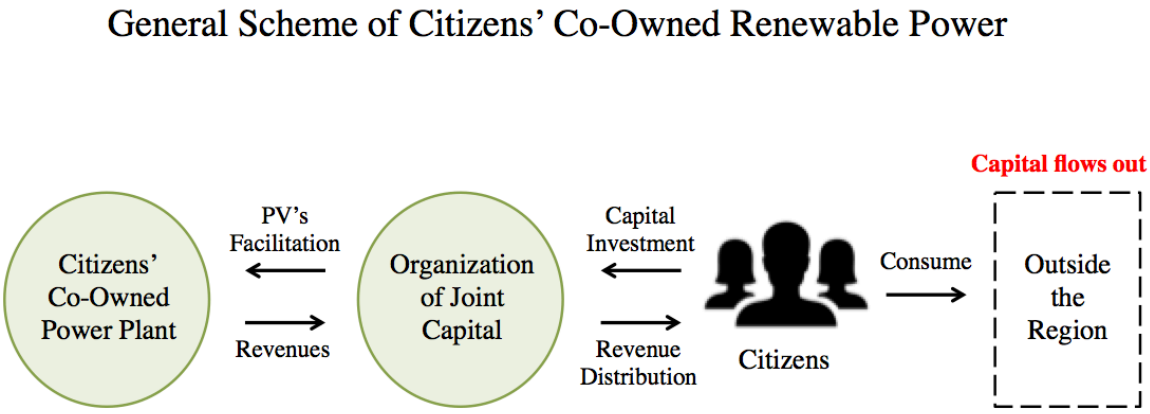

Fig. 4.7: One possible weakness of the general citizens' co-owned renewable power plants: capital flows out of the region. Source: modified from Hashimoto et al. (2009)

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 et al., 2009). Under this design, contributors receive the coupons of the earning distributions instead of cash. The Chamber of Commerce operates the coupons and cooperates with 400 shops in the region so that contributors can consume in these shops with limited time offers (Hashimoto et al., 2009; Mizuguchi, Ohta, Beers, Yamaguchi, & Nishimura, 2016; Yokaichi-Chamber-of-Commerce-and-Industry, 2016). Through this mechanism, the Citizen's Electric Power Cooperative will remain embedded in the 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-Sun Future Fund" in order to support the overall renewable energy facilities in the city (Hashimoto et al., 2009) (see Fig. 4.8).

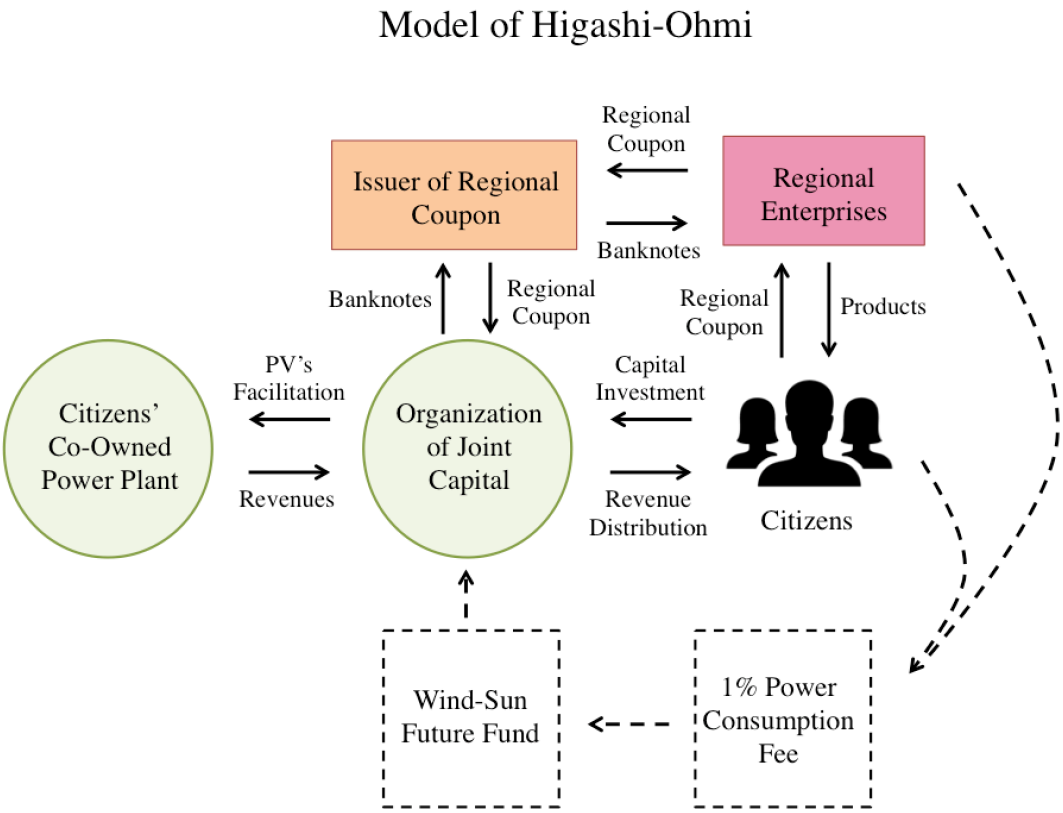

Fig. 4.8: Under the Model of Higashi-Ohmi through the combination of regional currency and Citizens' Co-Owned Power Plants, money is cycling in the region. Source: modified from Hashimoto et al. (2009)

4.4.1 Impetus for the Build-Up of Citizens' Co-Owned Renewable Power Plants

311 Disaster

Strong impetus for the build-up of Co-Owned Renewable Power Plants in Japan must be traced back to the nuclear accident of 311 in 2011 at Fukushima, although the first Co-Owned Renewable Power Plant of the whole Shiga Prefecture had already been built in 1997, and the first one in Higashi-Ohmi was built in 2003. Compared to the 13 Co-Owned Renewable Power Plants built during the 12 years before the 311 earthquake, the number of newly built power plants has increased to 28 built after the 311 earthquake during 2011-2017 in the Shiga Prefecture (Prefecture-Shiga, 2017). In terms of nationwide Co-Owned Renewable Power Plants, after the first PV Co-Owned Renewable Power Plant built in Miyazaki in 1993 and the next two built in Shiga, Co-Owned Renewable Power Plants have been built gradually in Japan until 2012 and the number has increased rapidly from 400 to about 800 in three years (Toyoda, 2016).

Due to the large-scale blackout and atomic disaster after the 311 Earthquake, small-scale and distributed renewable energy have been seen as the best alternatives (Nishimura, 2013). Especially academic literature and official reports used to combine the concepts of disaster reduction and mitigation with Co-Owned Renewable Power Plants (Nomura, 2013; Yokaichi-Chamber-of-Commerce-and-Industry, 2016); the former has long been adopted as a major policy while the latter served as a new strategy to drive it forward.

Feed-in Tariff (FiT) Scheme

The other impetus was the implementation of a Feed-in Tariff (FiT) Scheme (fixed price purchase system) for Renewable Energy in 2012. According to Yosuke Toyota's questionnaire survey on the Co-Owned Renewable Power Plants in Japan, the biggest challenges that occurred after building up the power plant were fund procurement and fund management. Related staffs also believed that support for fund formation and fund procurement would be necessary for the prevalence of Co-Owned Renewable Power Plants (Toyoda, 2016). Under this condition, Feed-in Tariff plays a role as economic guarantee for investment. Nevertheless, if Feed-in Tariff

payments are set to a lower level, impetus or practical projects concerning Co-Owned Renewable Power Plants will be delayed or canceled (Colthorpe, 2017).

Grassroots Power of Rural Area

Citizens' or regional Co-Owned Renewable Power Plants have been tackled as a grassroots power while economic efficiency was not secured until the FiT Scheme was implemented (Toyoda, 2017). As Nakajima E. said, grassroots activities which emerged from citizens' movements have a long history in Japan. Instead of losing their regional peculiarity under large-scale agriculture, Japanese rural areas preserve their uniqueness and vitality when dealing with the diversity of natural resources. This grassroots power could be regarded as a kind of social business of Japanese style that has also been embodied in citizens' power plants. For example, Citizens' Wind Power Plant in Aomori injected a part of its revenues into an environmental fund which helped the selling of local agricultural products such as apples. This idea was developed out of the expressed interests of investors of the power plant (Nakashima, 2009).

Interviews suggested that compared to other types of renewable energy resources, solar power has been found to be less approachable as a method of environmental protection than other activities such as used oil recycling, wood reuse or farmland revitalization. The reasons why local people invested in the Co-Owned Renewable Power Plants were mainly related to trust in the initiators and also a belief in creating something good for the region together. Therefore, compared to other activities in which they could spend time together or share experiences and values, Co-Owned Renewable Power Plants were not a prior activity which particularly caught people's attention and passion. In other words, Co-Owned Renewable Power Plants were embedded into the concept of collective participation that pushed residents in the neighborhood to create joint activities and common wealth, and cannot be separately regarded as a goal that residents determined to pursue. In the following cases, the pattern of Aito Fukushi-Mall (Welfare Mall) Citizens' Co-Owned Renewable Power Plants especially demonstrated this intention.

Despite the common features among regional- and economic- orientations, following patterns of Citizens' Co-Owned Renewable Power Plants still showed their differences with regard to both purpose and design.

4.4.2 Patterns of Citizens' Co-Owned Renewable Power Plants: Shiga-Prefecture

Pattern 1: 'Sun Zan Project' (in Higashi-Ohmi) -
Connecting Citizens' Power Plant and Regional Business

The investment capital of the Sun Zan Project was based on joint investment. The Yokaichi Chamber of Commerce and Industry and the Higashi-Ohmi City Society of Commerce and Industry co-financed and established the Sun Zan PJ Co.,Ltd., and obtained investment through private placements from citizens. This investment capital was used for the deployment of Solar PV, and the income of selling electricity returned to the investors with regional coupons (regional money). According to calculations by the end of 2013, the total construction cost was 16.2 million Japanese Yen, and private placements from citizens during the construction phase amounted to 150,000 Japanese Yen per citizen, with total numbers of 85 citizens/108 units (privately placed bond from March 2013 to March 2014) (Yokaichi-Chamber-of-Commerce-and-Industry, 2016).

The administrative jurisdictional area of 'Chamber of Commerce and Industry' is higher than that of 'Society of Commerce and Industry', as the former extends to city and the latter includes town and village. Both are forms of business networks, while 'Chamber of Commerce and Industry' serves as a regional comprehensive economic organization and support not only for small and medium enterprises but also for international affairs such as international commerce arbitration, and Society of Commerce and Industry puts more emphasis on small-scale businesses and their management and business progress. Both administrative organizations belong to the Ministry of Economy, Trade and Industry (METI), and the Sun Zan PJ has been established with a new legal form of company limited (Co.,Ltd.). Sun Zan PJ was the first and only Citizens' Co-Owned Renewable Power Plant held by the Chamber/Society of Commerce and Industry and the 18th facility of Citizens' Co-Owned Renewable Power Plants in Higashi-Ohmi.(Central-Federation-of-Societies-of-Commerce-and-industry)

The specificities of Sun Zan PJ Co.,Ltd. contain at least two parts. First, the bonus interest remains 2.0% regardless of changes in the revenues from selling electricity. Second, in terms of the business of Citizens' Co-Owned Renewable Power Plants, Yokaichi Chamber of Commerce and Industry is not only responsible for the Sun Zan PJ Co.,Ltd. but also manages the bonus return project (Sanpo-Yoshi Coupon) for all Citizens' Co-Owned Renewable Power Plants in Higashi-Ohmi (see Fig. 4.9).

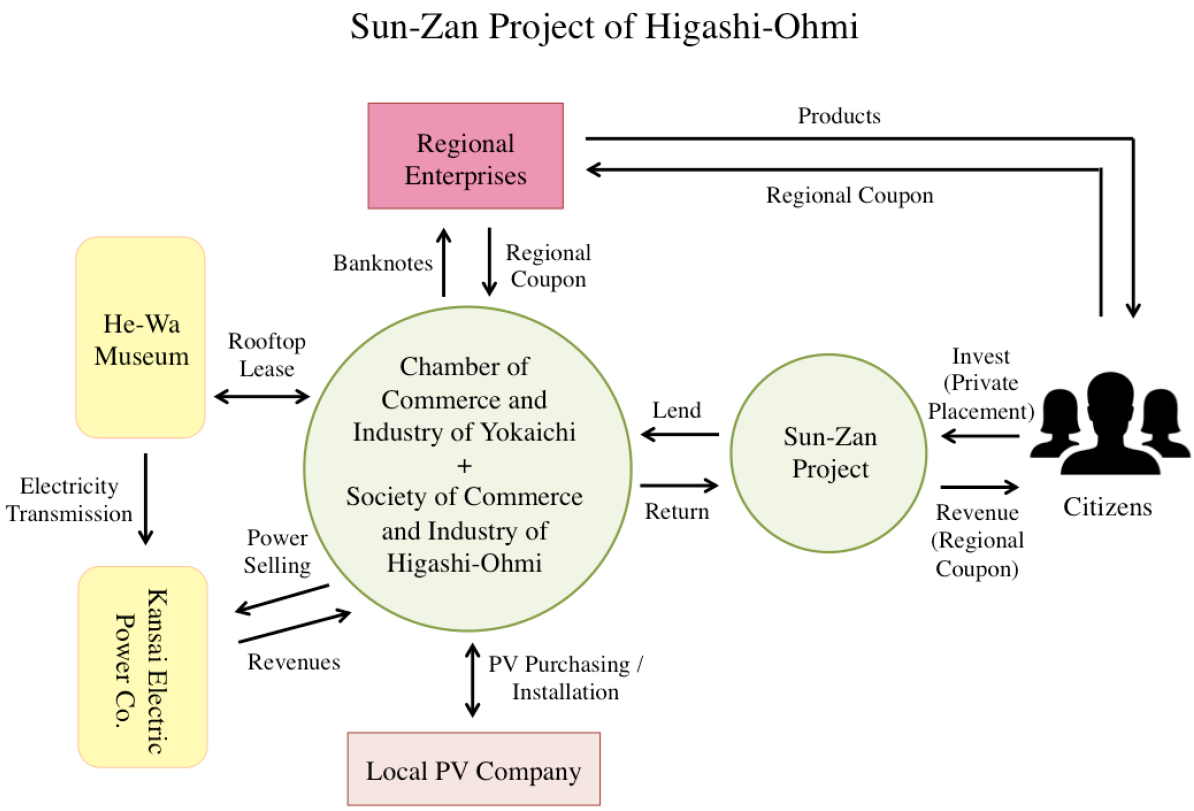

Fig. 4.9: Chamber of Commerce and Industry is the issuer of regional currency and the joint owner of Citizens' Co-Owned Renewable Power Plant. Source modified from Prefecture-Shiga, 2016,2017; Yokaichi-Chamber-of-Commerce-and-Industry(2016)

According to the Guideline for the Public Property of Renewable Energy Facility of Higashi-Ohmi City legislated in 2012 (Higashi-Ohmi City), the Chamber of Commerce and Industry contracted with Heiwa Museum of Shiga Prefecture with a 20-year roof rental. The rental fee is 1.0% of total annual revenue. The bonus returns to investors are calculated with the principle of 'equal monthly payments with interest' over 20 years (Yokaichi-Chamber-of-Commerce-and-Industry, 2016).

150,000 Japanese Yen/Unit, bonus 2%, duration of return 20 years
Total bonus interests:
30,000 Japanese Yen = (the principle 150,000 Japanese Yen/2)* bonus 2%* 20 years
Total proceeds:
180,000 Japanese Yen= amount of redemption 150,000 Japanese Yen+ Total bonus interests 30,000 Japanese Yen
Annual amount of money received:
9,000 Japanese Yen= 180,000 Japanese Yen/ 20 years

Pattern 2: Citizens' Co-Owned Renewable Power Plants of Welfare Mall (in Higashi-Ohmi)

Integration of 'Food, Energy and Care' (FEC)

Welfare Mall established the following goal from the beginning: "In order to create a safe and comfortable living environment, we should be able to provide food and energy for ourselves, and adequate care is necessary" (Nomura, 2014). The activities of energy sufficiency include the reuse of wood, the heating system and PV installation. Roughly every two weeks, some members of welfare mall, members from the Nanohana project and other local people drove to the 'Mori Yama' forest for forest land remediation and restoration. Through investigating the species of the trees, removing outside species and planting, they could ensure that various species would grow in the forest. During their work, some members cooked and used wood for fire. They sold the wood too, and the bonus returned to the workers. They even brought extra wood pieces back to the café of the Welfare Mall so that workers at cafe could use it for heat or make it into products to be sold.

The heaters were produced locally, because heaters from abroad could only apply to a broadleaf forest, which was not suitable for the environment there. Therefore, Welfare Mall appointed a local enterprise to produce these heaters. They thought that it was valuable to create local employment and encourage more self-sufficiency(Nomura, 2014).

In order to install PV on the rooftop of the Welfare Mall, it raised the funds of their staff members for two months in 2012 with three information sessions. Welfare Mall aimed to reach 100 units (100,000Japanese Yen=90-100 Euro/unit) when it launched the project, and it ended

with 110 units (110,000Japanese Yen), with a total of 63 investor members (each investor can invest one to ten units). In 2013, they started to install solar panels on the three buildings of the Welfare Mall, including the restaurant, the day care center and the café, with electricity generation of 23.2 kW, 5,8 kW, and 5.8 kW, respectively. And the total electricity generation was 34.8kW. In 2015, the annual total electricity generation reached 39.874kW, accounting for 66.3% of the total use amount of the Welfare Mall (Welfare-Mall, 2016).

The allocation of the profits of selling electricity was separated into three parts: about 10% remained as the repairing and management fees for the Welfare Mall Power Plant, such as the insurance against damage, hardware rehabilitation fees or inspection fees. Another 20% was regulated to contribute to regional development or talent training. And the remaining roughly 70% flowed back to the investors (Nishimura, 2013). Regional Coupon was the only medium for bonus sharing. Investors received coupons as rewards for selling electricity and could use them in over 500 shops in the region of Higashi-Ohmi.

Welfare Mall collaborated with a local enterprise ‘Kyo Se Ra’ for its PV installation, and the electricity generation would deliver back to the nearest power plant Kansai Electric Power, which provided electricity to the central and western parts of the main island of Japan (see Fig. 4.10).

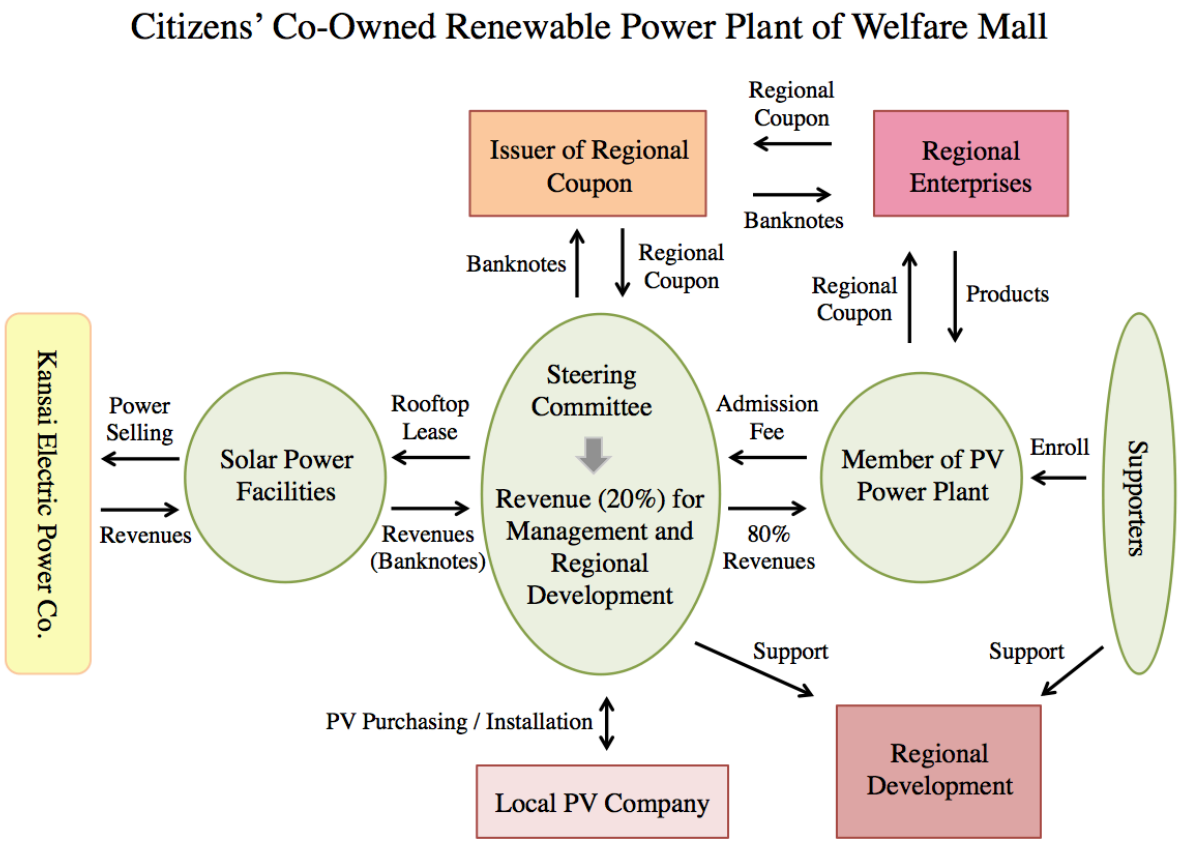

Fig. 4.10: 20% of Welfare Mall's revenue from energy production will contribute to regional development. Source modified from Nomura (2013); Prefecture-Shiga (2017)

Comparison of Sun Zan Project and Welfare Mall

Investor Relations

The differences between Welfare Mall and 'Sun Zan Project' can be examined in at least three parts. Instead of obtaining investment through private placements from citizens, Welfare Mall found investors from their staff members or acquaintances of members who also had confidence in the ideals of Welfare Mall. Therefore, the term 'citizen' of the Citizens' Co-Owned Renewable Power Plants here of Welfare Mall could be to some extent different from that of the Sun Zan Project; the relationships between Welfare Mall and their investors or acquaintances were much closer than that of the Sun Zan Project, whereas Sun Zan Project's investors to their implementer were more distant and could be regarded in a real sense as 'citizens'.

Allocation of Bonus

The bonus for the investors of the Welfare Mall followed the real revenue of electricity selling, instead of the fixed interest rate based on the investment capital as the model from Sun Zan Project. Therefore, if the revenues of both power plants rose, only the investors of Welfare Mall receive higher amounts of bonuses, whereas those from the Sun Zan Project would remain with the same amount of bonuses. However, investors of the Sun Zan Project would bear lower risks if electricity generation decreased sharply or management of the power plant failed. The other part of the specificity related to bonuses was that 10% of the total revenue had to flow back to the Welfare Mall as management fee and 20% for regional development.

Meaning of 'Energy' in the Project

'Energy' was imbedded differently into the principal business of Sun Zan Project and Welfare Mall. While the Yokaichi Chamber of Commerce and Industry and the Higashi-Ohmi City Society of Commerce and Industry have been established as business networks initially and contributed to the regional economic development, and Sun Zan Project was an additional project launched afterwards which served the same purpose as well as went with the flow of environmental development; 'energy' had been already integrated into the concept of 'FEC-Food, Energy and Care' when Welfare Mall started its business in which 'care for people' and 'healthy food made from local resources' were the driving concepts.

Pattern 3: Cooperation of Neighborhood Association and Nursing Home

Kawanami Town's Citizens' Co-Owned Renewable Power Plants (in Higashi-Ohmi)

The cooperation between the Shimizuen Nursing Home and the Kawanami Neighbourhood Association started with the 'Agreement on Disaster Prevention', wherein both organizations at the Kawanami Town in Higashi-Ohmi were willing to promote renewable energy in their region and to ensure an emergency power supply in the event of a natural disaster. In 2012, Kawanami Neighbourhood Association proposed the project of Citizens' Co-Owned Renewable Power Plant, which went into effect the next year in December 2013 (Prefecture-Shiga, 2016). Since the power plant was co-built by the both organizations, the lease on the rooftop of the building Shimizuen Nursing Home was cost-free.

Before the establishment of the power plant, 24 members of the Neighbourhood Association set up a 'voluntary group' first and then raised funds from October 2012 to November 2013. On the authority of Article 21 of the Constitution on the right of freedom of association in Japan, 'voluntary group' belongs to 'non-corporate type NPO'. Compared to 'corporate type NPO', a 'voluntary group' does not have to accept the supervision from the government and can enjoy certain tax benefits (Yu, 2014) . However, it cannot open a bank account, rent an office or buy a car. Therefore, a 'voluntary group' belongs to an 'incorporated association' in accordance with tax law. According to the rule of the voluntary group, every investor was limited to invest up to three 'unit' capital (every 'unit' equals 100,000 Japanese Yen). The establishment costs reached 4,432,000 Japanese Yen with a total of 45 units (24 persons). The revenues of selling electricity will be charged as individuals' membership dues of the voluntary group.(Yu, 2014)

Pattern 4: Donation Inter Vivos

MORIYAMA Citizens' Solar (in Moriyama, Shiga prefecture)

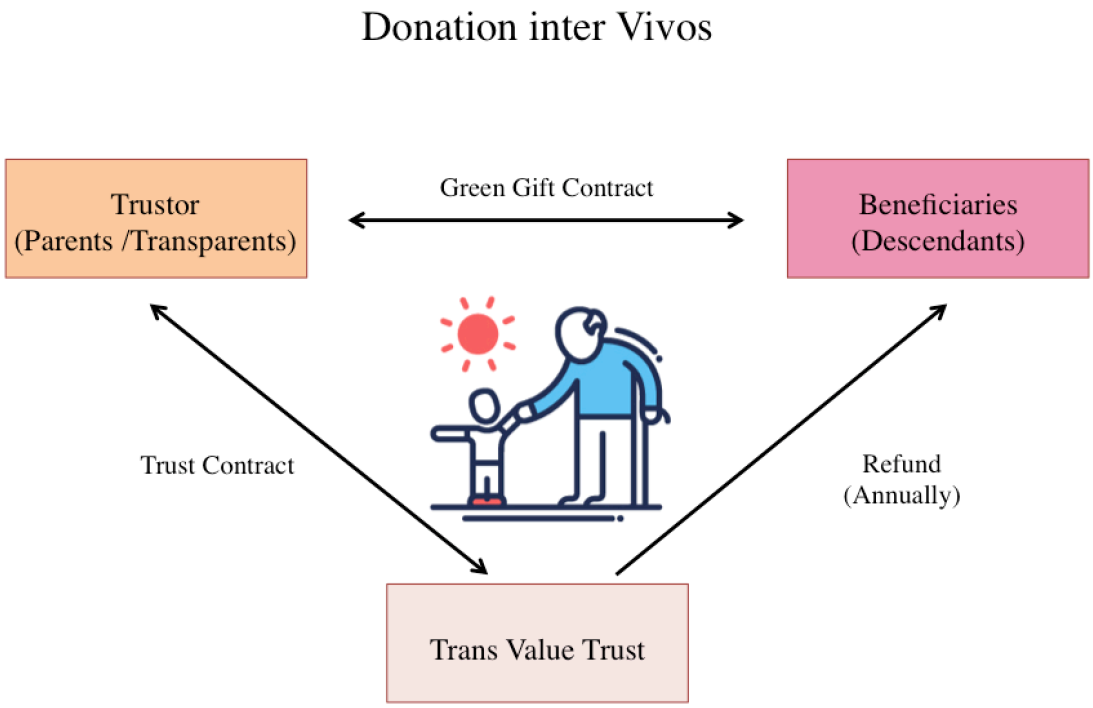

Fig. 4.11: Under the Green Gift Contract, the trustors have to designate their descendants to accept the 'green gift'. Source: modified from Prefecture-Shiga (2017).

Donation inter vivos refers to a lifetime gift consented mutually both by a giver who divests himself of the gift given in order to transmit the title of it to the donee, and the donee, who accepts it and acquires a legal title to it (Legal-Dictionary). The 'Green Trust' of the Moriyama

Citizens' Solar has been designed as an over 18-year long-term contract trusted by the elders who hesitate to enroll in the Citizens' Solar. As MORIYAMA Citizens' Solar was raising funds, the trustors had to designate their descendants to accept the 'green gift' under the trust contract. The nontaxable limit amount of the lifetime gift will be transacted into the bank accounts of the appointed descendants according to the revenues generated from selling electricity (see Fig. 4.11).

The idea of the 'Green Trust' was to pass on both assets and co-owned renewable energy to future generations. After the MORIYAMA Citizens' Solar was established by the 'Council for promoting Co-Owned Renewable Power Plants' in 2013, the other citizens' solar facility with the same pattern was built up the following year (Prefecture-Shiga, 2017). This project had a rooftop lease agreement with Kawanishi kindergarten in Moriyama town. The investors included 36 individuals (10 people belonged to 'Green Trust') and two corporate bodies.

Table 4.2: Features and Operation: Four models of Citizens' Co-Owned Power plants in Shiga Prefecture

Name	Legal status	Investment capital (Japanese Yen)	Profit distribution	Main features
Sun Zan Project	Co.,Ltd. (stock company)	13,800,000	Interest rate 2.0% (based on investment capital)	Connecting Citizens' Power Plant and Regional Business Fixed profit distribution
WelfareMall	Co.,Ltd. (stock company)	11,000,000	70% of revenues of selling electricity	Integration of 'Food, Energy and Care' (FEC) profit distribution follows revenues
KAWANAMI	voluntary group	4,432,000	Revenues served as individuals' membership fee	NPO implementer Per investment capital limited to 300,000 Japanese Yen
MORIYAMA Citizens' Solar	council	8,800,000	Return goes to the bank accounts of descendants	Lifetime gift

4.4.3 Role of municipalities and local renewable energy enterprises

Corresponding to the electricity liberalization reform of 'Liberalization of Retail Electricity Sales', four new local electricity companies in Shiga prefecture were set up. The Konan Ultra Power Co. Ltd., for example, was set up in May of 2016.

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

but that local people 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 co-director of the Welfare Mall, and one of the directors of the city hall and the director of the Rape Blossoms Eco Plaza of Aito. In 2009, local resident Ohta Seizo started the idea of the Welfare Mall, suggesting that people in this region should help each other in their daily lives. Nomura Masaji attended the discussion as a resident of the region and also as a member of an 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 2000, he was elected 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 became the board chairman of the organic supermarket Margueritte Station in 2011. To this day, he has been a key figure in connecting younger key people to promote the regional economy(Nomura, 2014; Ohta, 2016).

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 (Yamaguchi, 2014b).

The projects of Citizens' Co-Owned Renewable Power Plants in Higashi-Ohmi were initiated by the implementers of the projects themselves and proposed to the municipality. In an interview with the section chief Yamaguchi, she emphasized that these cooperative relations were realized by the initiators themselves and have little to do with the central or prefectural government. "This was because of their (local initiators') common hope"(Yamaguchi, 2014a),

and local municipality plays a supportive role. Before 2015, KyoCeRa was the only Solar PV company in Higashi-Ohmi, therefore, the municipality in Higashi-Ohmi also supported it by providing funds. KyoCeRa won the bids in the public procurement with the lowest prices and cooperated with different Citizens' Co-Owned Renewable Power Plants in Higashi-Ohmi.

The municipality of Higashi-Ohmi also supported the local initiation through amending and regulating rules. For instance, the renewable energy lease agreement of public facilities was regulated in June 2012 due to the increasing participation in renewable energy facilitation from the regional groups and NPO. Following the needs of these local groups, the 'Guideline for Renewable Energy Facilities of Public Property in Higashi-Ohmi' was drawn up by the municipality and applied to regional groups and NPOs which satisfy the following conditions: (1) their main purpose is to lease rooftops of public property for the purpose of facilitating renewable energy, (2) constitute regional activities and non-profit activities inside Higashi-Ohmi and (3) issue regional coupons managed by economic groups of Higashi-Ohmi. In sum, the basic requirements are that these projects should be set up for the purpose of the common wealth of this region such as the co-owned PV.

4.5 Comparative Analysis

The main conflicts of interests in decentralized energy hinge neither upon the center vs. locals nor a conflict between large-scale and small-scale renewable energy projects. The divergent considerations from stakeholders largely result from different interpretations of decentralized energy and bring about laws which go against the will of the locals. As mentioned above, concerns from the center on carbon mitigation and the reduction of energy imports can be unbeneficial to the locals' demands for equal participation and an 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 interplay between different stakeholders are shaping and developing. Despite relatively fixed rules, there are still some spaces left for those involved to engage in either cooperation or collisions.

The case of Higashi-Ohmi highlights its uniqueness and the way that other areas in Japan are unable to duplicate the Citizen's Electric Power Cooperatives of Welfare Mall. 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 food and autonomous energy, and finally their efforts towards integrating them into the regional economy. Wellfare Mall in Higashi-Ohmi is now regarded as a model of an integrated system of care, food and energy. Though the uniqueness of Higashi-Ohmi can be a possible constraint when trying to replicate this model, the receptiveness of the key players and local people promotes the following developments in nearby regions.

Compared to Freiburg, Higashi-Ohmi focused more on the concept of regional economy when initiating their Citizens' Co-Owned Renewable Power Plants through regulating the reward of electricity production back to the region by using regional money (coupons).

Communal energy in Germany refers strongly to the role of the municipal utilities, which differs from citizens' energy (*Bürgerenergie*). However, the definitions or usages of the terms used in Japan are relatively vague. This points to the fact that patterns and networks of the citizens' power plants in Germany are more diverse than those in Japan, which also develops a specific usage of terms.

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 energy cooperatives are not satisfied with the German Renewable Energy Act or the law executors, especially when it comes to large-scale renewable energy projects.

Chapter 5

Mutual Shaping of Decentralized Energy and Regional Economy

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

Preface on NANOHANA Eco Project

Higashi-Ohmi is a city located in the eastern part of Japan's largest lake, “Biwako”. In the 1970s, Biwako was extremely polluted by industrial sewage and house wastewater, and as a result, some housewives in the region started to organize self-help groups and began recycling bottle caps and used cooking oil (Ayako Fujii, 2004; Mizuguchi et al., 2016). The task of protecting Biwako became an instigator of the environmental movement in the region. Following this, a larger NPO dealing with biodiesel fuel, namely the “Nanohana Eco Project”, was established in 1998, which presented a prototype of the “local production for local consumption of food and energy” movement in Higashi-Ohmi (Nomura, 2013).

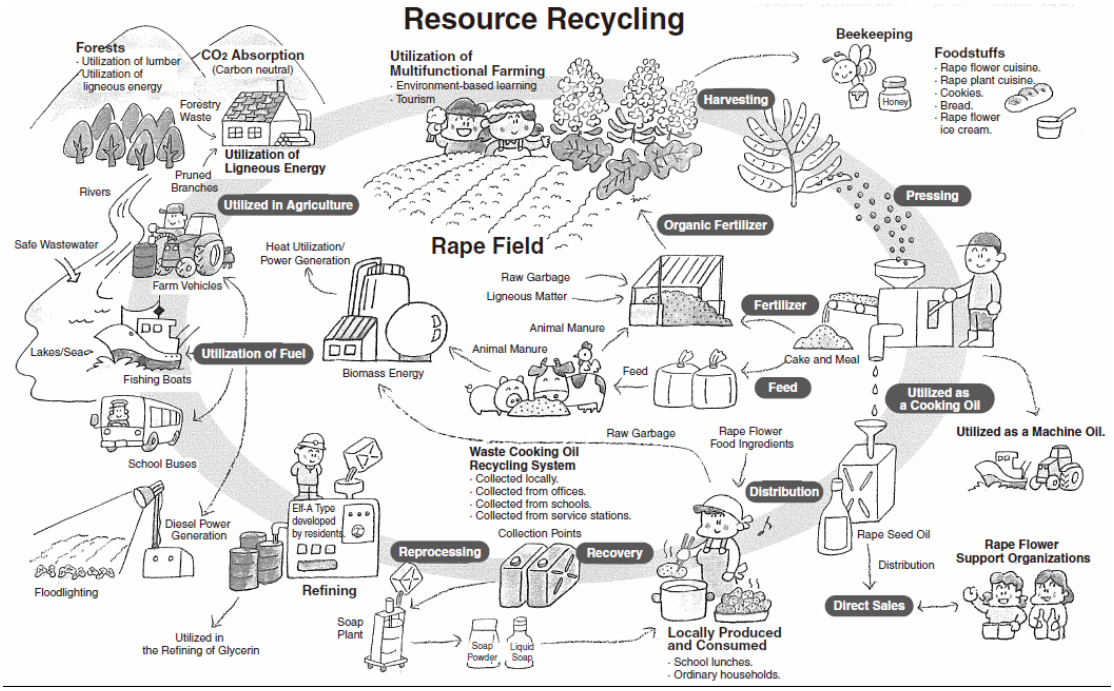

Fig. 5.1: Resource recycling in Higashi-Ohmi started from reproducing used oil into detergent, followed by BDF production. Source from: Nanohana-Project-Network (2006)

5.1.1 Pollution of the Lake Biwako

From 1977, red tide occurred in Biwako. The pollution caused local people to worry, especially when they used water from the tap in the morning and began to think, “Our generation might be the last generation”. Biwako has been thought as the mother’s water for the Shiga prefecture, because the water from Biwako was used not only for cleaning but also for drinking, therefore, the sudden pollution made the residents quite nervous and led them to independently research the reasons for the pollution. The first question raised by the local people was, “Red tide occurred normally in deep water, but why did the red tide happened only in Biwako which was actually a freshwater lake?” (A Fujii, 2016)

They slowly discovered many reasons for the pollution. It turned out to be a containment problem caused by phosphorus contained in the detergent, which was a kind of chemical element. The main reason was sewage from factories, which had discharged a huge sum of industrial emissions over a long period of time. Domestic wastewater from synthetic detergent and used oil was also a main cause. Beforehand, residents living near Biwako had noticed a problem with soap during cleaning: soap is in a solid state and therefore is very hard to rinse out, and the clothes turned a bit yellow after being washed by the soap. This inconvenience brought about their switch to the frequent use of synthetic detergent, however, the phosphorus contained in the synthetic detergent was one of causes for the red tide. (Yamada, 2014) Using ‘Tempura oil’ also caused the pollution of Biwako. According to the local people, older generations of Japanese did not fry a lot for their dishes, however, their eating habits changed and ‘tempura’ (fried foods) prevailed and became favorable in households.

Residents of the Aito town (of Higashi-Ohmi City) were the first group in Japan to collect this used tempura oil in order to prevent its pollution of the lake. After collecting the oil, residents (mostly housewives) tried to remake it into a kind of pollution-free detergent powder. The next year, a rule was passed to forbid factories and households from releasing their sewage with poisonous detergent into the lake.

Photo 5.1 and 5.2

Photo 5.1-5.4: Procedure: From Used Oil to Detergent

First, tempura oil was collected with these boxes from schools and households. After that, used oil was clotted into solid pieces with medicine, which would then be dried under the sun and then made into detergent powder. Local workers allocated this powder into recycled pet bottles. The product was then called natural soap and could be applied to dishwasher, laundry or floor cleaning. As shown, workers here were women and they all worked with masks because of the powder's pungent smell.

Photo 5.3 and 5.4

5.1.2 Creating a Recycling System

Used oil recycling was one of a part of the recycling system. The core of the whole system was actually the farmland which grew rapeseed. Fuji Ayako, who was also the initiator of the Nanohana Eco project (rapes oil project), was the one who extended this movement to the national level in Japan. She called this movement a model case for a regional recycling society.(A Fujii, 2016) The first step was to produce rapeseed oil. The price of the rapeseed oil was a bit higher than those from supermarkets, so during our stay we found that households seldom used this oil but that many restaurants cooperated with this project and used it. This oil is also sold nationally in Japan. In 2001, over than 500 people from all over Japan gathered at the Nanohana summit to initiate the Nanohana Eco project and then build up the network of 36 prefectures (constituting about 80 regions)(Network-of-Nanohana-Eco-Project, 2017) (see Fig. 5.1).

The recycling system built at the Nanohana Eco project was also affected by their investigation of Germany during 1992-1996 about their use of rapeseed oil into Bio diesel fuel (BDF) which would then be applied to vehicles, such as small-size buses, trucks or electricity generators etc. In the past, rapeseed oil was imported from foreign countries and was used only for cooking oil, however, for the purpose of producing BDF, they needed to enlarge the production of rapeseed in the form of plantations and achieve independence from imports.(A Fujii, 2016; Yamada, 2014)

After that, they started to use the fallow period of rice to enlarge their production of rapeseed and also to develop the lands surrounding the mountains near Biwako. Farmers gave one package of rice hulls to Nanohana NPO and Nanohan NPO reformed the rice hulls into charcoal. Charcoal is an organic fertilizer, and about 20-25% of rice hulls will be turned into charcoal. Nanohan NPO gave one package of charcoal back to farmers, making it a simple exchange relationship(Masuda, 2014).

Japan is a country lacking in natural resources, and as a result, they not only use every inch of resources available but also recycle the used energy during their production process. For example, when they turned rice hulls into charcoal, there was heat energy left behind. They kept this heat and stored it in a reheating turbine, and this heat would then be utilized for heating rooms in factories as well as for the heat needed to produce rapeseed oil.

The project has now spread into 47 prefectures in Japan. Higashi-Ohmi was the first one, therefore, other places which wanted to launch this project would visit Higashi-Ohmi to learn. After the earthquake of 311 in 2011, Fuji Ayako initiated a new plan to use the roots of the rapeseed to absorb the nuclear radiation, which has been very successful in northeast Japan.

5.1.3 The Welfare Mall: Integration of "Food, Energy, Care"

1) Restaurant

The welfare mall included the restaurant, the daycare center, and the café. The reason why they used the term "Mall" was because they hoped for people to get what they need in the same way that they buy clothes and shoes at a shopping mall. Of course, this was no shopping mall at all, but the hope was that after people entered the Welfare Mall, all of their problems got solved and their needs were satisfied.

As one of the managers, Mr. Nomura, said, this region was full of people who were either old or mentally disabled, unable to interact with others and therefore unaccepted by society, or people who had been bullied at school. So, the welfare mall played the supporting role of either arranging a position or hiring them directly(Nomura, 2014).

The restaurant rented farmland from the landlords who were too old to work, and the farm was just next to the restaurant. It hired two to three people who were not able to integrate into society to work on the farm. Vegetables grow here would be provided as ingredients for the kitchen. The restaurant also held vegetable exchange events so that local farmers who had produced extra vegetables and products could exchange or sell them here, and extra vegetables could be sold to the restaurant too. One of the unique aspects of the restaurant was its recipes. The cooks of the restaurant spent years collecting the classic but vanishing cuisines from the locals and learning the traditional ways of preparing food. They also hired socially disabled adults to drive cars and sent their Bentou (lunch boxes) to those who were not able to cook(Nomura, 2014; Ohta, 2016).

Therefore, family members had to send their families to the day care center in the morning around 8-9 and pick them up after work. There were nurses who took care of them and taught

them drawing and singing at the day care center. Long-term care was also provided, but with few offers.

2) Day Care Center

Aged Society

In 1970, Japan's population of over-65-year-olds was 7.33 million people, constituting 7% of the total population and making it become a so-called aging society, while Germany already reached 7% from 1930. From 1994, the aged population in Japan accounted for more than 14% of the total population, thus making it a real aged society. In Germany, it was in 1975 when the proportion reached 14%. While in Germany it took 45 years for the proportion to rise from 7% to 14%, Japan experienced a much faster speed of aging in which it took only 25 years (Chen, 2005).

This rapid aging tendency of the population pushed the Japanese government to pass the Nursing Care Insurance in April 2000, which allowed general enterprises to enter the care insurance market (Chen, 2005). The Nursing Care Insurance is state-based insurance, which serves mainly those who are disabled from accidents, such as fire accidents or traffic accidents, or disabled elders (Ohta, 2016). However, as the manager of the Day Care Center of the Welfare Mall Ohta Seizo said, the Nursing Care Insurance cannot satisfy local needs, especially in counties where young manpower is missing(Ohta, 2016).

Initiative for Day Care Center

The manager mentioned how they started to initiate the Day Care Center,

> "In your daily life in Higashi-Ohmi City, you found that many problems were triggered by the fact that many generations live together in a house. This gave rise to the problems in which young people are not able to adjust to society. Plus, there are many people who live with difficulties, for example they cannot take out the trash or cook" (Ohta, 2016).

In Japan, garbage disposal already becomes a serious social problem due to its complicated system. It is common for a house of the elderly or a disabled person to be stacked with garbage

(Hara, 2017). However, such things which individuals are unable to do are not covered by the above-mentioned Nursing Care Insurance. Only private volunteers or neighborhoods can help at times. The Day Care Center plays a role in supplementing the gap between the public and the private care system (Ohta, 2016)(see Fig.5.2).

> "Between public and private, there is still some space that we can do. This help makes life stable and sustainable, however, if it is based on the moods then this will not continue. And who can help to solve these problems? It is this region. Therefore, we establish the Day Care Center. (Ohta, 2016)"

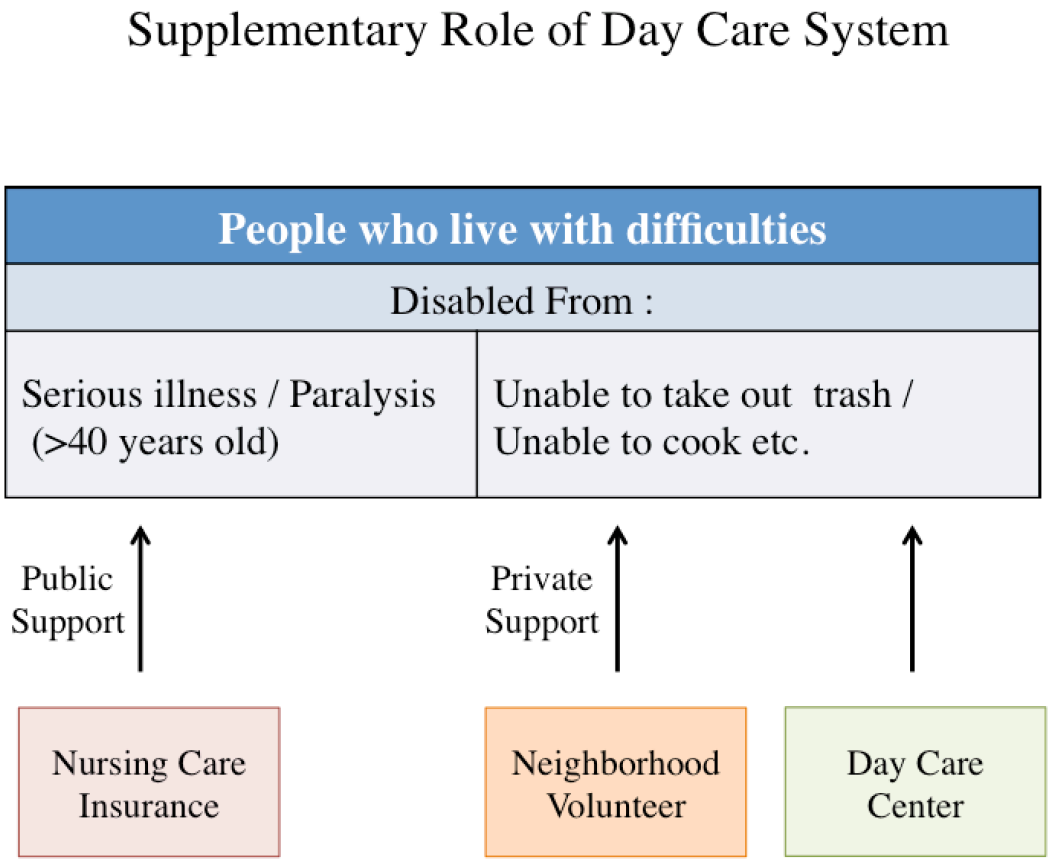

Fig. 5.2: Day Care Center of Welfare Mall was established in order to supplement the insufficiency of public and private supports.

Financing of Day Care Center

The finance for the care for the disabled should be raised privately. For example, if 20% of the fund comes from the residents, the remaining 80% would still be missing, which is also the part

that the Day Care Center should cover. The government covers the Nursing Care Insurance, the operation of the daily service including electricity and staffs and so on, and the base rate of price for the nursed. The Day Care Center will give its surplus as capital for the care of the aforementioned disabled (e.g. those who cannot throw out their garbage). However, their surplus is determined by the numbers of nursed people because they receive the base rate of price for the nursed. The higher the number of nursed people, the higher price the Day Care Center will receive from the government. The Day Care Center should also reduce the fee for electricity or staffs so that they can create surplus for these services. The worst situation would be that the Day Care Center does not have any surplus, then the other units of the Welfare Mall will support for this financial loop, such as the surplus from the Citizens' Cooperative Power Plants, the Nonaka Restaurant and the Komugi Café. In contrast to 100% dependence on the free donation from the residents, this method of financing makes the operation of the service more stable and also more institutionalized (Ohta, 2016) (see Fig. 5.3).

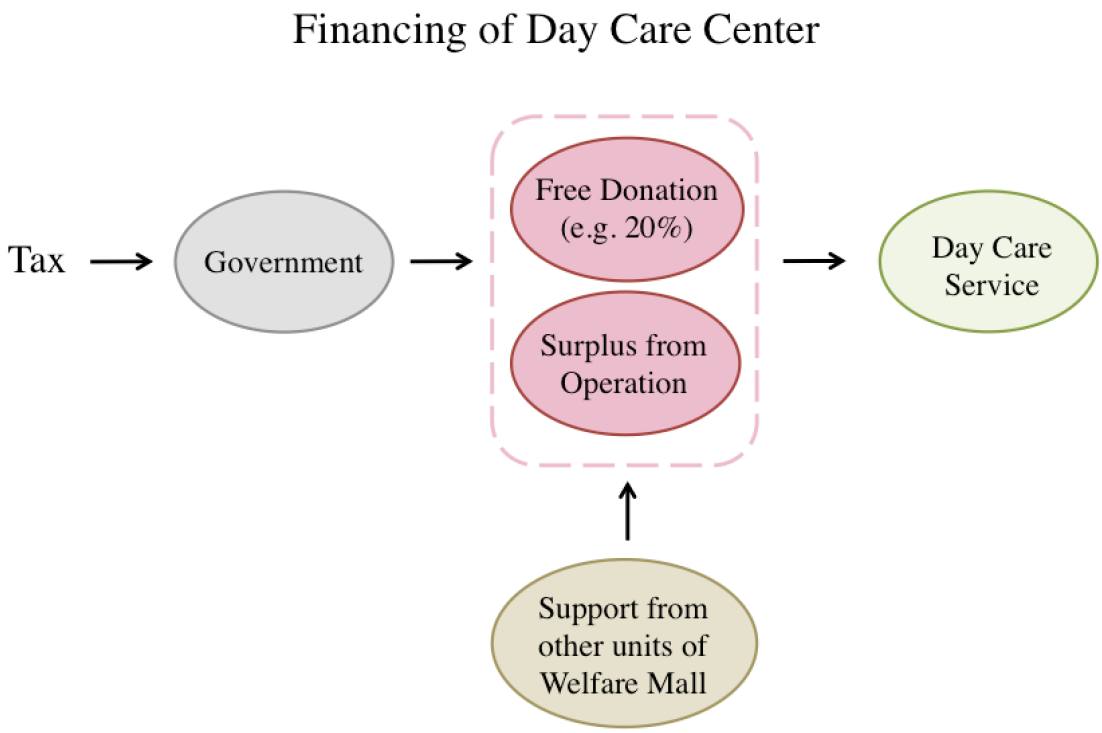

Fig. 5.3: Capital of Day Care Center constitutes only a small part of free donation; most parts comes from the surplus of its operation, which covers the fee for care of the disabled.

“People who Wish to Die at Home”

“Where would be the best place to stay when you die?” Seizo Ohta said this is the most important question that they face in the region. Most people choose to die at home in Japan, therefore under this circumstance, Home-Visit Nursing Care is necessary. However, the National Nursing Care Insurance only covers those who are seriously ill, for those who need care but do not reach the national standard should be the responsibility of the Day Care Center (Ohta, 2016).

Foreign Nursing Care is now slowly being liberated, provided that their Japanese passed a language test, could understand medical terms, and had a work visa. Although the Day Care Center does not hire foreign nurses, they can work legally if they work through the contract of a care organization instead of signing a private contract directly with the cared people. Unlike the situation in Taiwan, the visiting nurses cannot stay overnight with the cared people and instead visit them shortly in the daytime. For example, the Day Care Center has now (as of March 2016) 50 cared people and seven visiting nurses. The cared people can call for nursing care 24 hours a day for 30 minutes at a time (Ohta, 2016).

There are also some beds set upstairs of the Day Care Center for emergency and overnight care. However, due to the lack of finance and staff, it is still not operational (Ohta, 2016).

Employment: Manpower’s Circulation of the Region

The elderly who are still healthy and able to work, or unemployed young people, are the ones that the Day Care Center hopes to employ because of the ideal circulation of manpower. As Seizo Ohta said,

> “If you are in the fifties or sixties and stay healthy, you can come over and help; or if you suffer from frustration from work, you can work here until you feel confident again to go back to the general workplace, and you can come back here again once you don’t feel right. This is the ‘circulation’(Ohta, March 2016).”

This ideal of circulation goes back to the origin of the establishment of Welfare Mall: that people feel relieved to live in region. In this sense, the circulation of environment, of people and of work are the same thing.

5.1.5 Discussion

Economic Growth/ Economic Scale

The endeavor of Higashi-Ohmi explains that happiness cannot be judged only by economic growth, especially after Japan's long-term bubble economy, when long working hours have been a serious burden for the whole society despite resulting in refined skills. The Welfare Mall is probably a microcosm of this endeavor. Although the degree of hard work here is not less than that in cities, it tries to incorporate the forgotten aspects missed in economic development through its careful methods of goal setting, staff hiring and openness. Under the conditions of low salaries and intensive working, the staff of the Welfare Mall present high impetus for work and even after work they are willing to help with other institutes or activities.

As the local government employer Yamaguchi, said, what people are now attempting to do is less economically beneficial than ideological (Yamaguchi, 2016). For example, the Kikito company reused the rest of its wood into business cards based on the idea of the recycling of wood. This only generates a very low ratio of overall economic profit. These small-scale local enterprises cooperate easily with other organizations and municipalities, while larger scale local companies such as Kyo Se Ra solar panel company, printing plants, electrical equipment plants or glass factories are very difficult to persuade to join in these local activities without greater incentives (Yamaguchi, 2016).

Autonomy

One ideal of their operation was that people from the region were very aware that all of the ideas and practices should be independent from bureaucracy, because they believed that to change requires thinking outside of the box (Nomura, 2014). If any of the officials wanted to join these practices, they were supposed to join individually and not on behalf of their working places.

To briefly conclude the whole idea of the movement in this region, the main concern was to get greater self-sufficiency, to make use of regional resources, and to connect the needs of people with their work. The integration of natural and human resources can be hardly replicated from other regions in Japan or from abroad, because it requires an understanding of the particular environment as well as trustworthy key persons who can really promote it.

5.2 Alternative Consumption Practices

5.2.1 Local Farming and Direct Sales in Higashi-Ohmi

‘Marguerite Station’

Marguerite Station is a local store of agricultural direct sales in the Aito area in Higashi-Ohmi. It began with 200 million yen for its establishment, and the current annual income has already reached 500 million yen. 85% of this income is comprised of farmer's income and the other 15% by the Marguerite station. The owner of the farm house Ueda said that melon alone can create 100 million yen income annually, with secondary income from processed goods (Ueda, 2016) . This created a huge income for the locals from tourists. Ueda and his wife Tami are also members of the Marguerite Station. They sell mainly three kinds of products: brittle mochi cookies, blueberry jams, and green tea.

At present, Japan's food self-sufficiency rate is only 39-40%. About 50 years ago, agricultural policy changed greatly, which led to a recession of agriculture, great reduction of farmer income and the moving out of farmers from rural areas, which therefore also affected rice plantations. A part of paddy fields have now been transferred to wheat and soybeans. Because rice yields one term in a year and wheat and soybean rotate within a year, these three crops transfer on the field in a year. To take Aito township in Higashi-Ohmi for example, there are a total of 21 farms in Aito, one of which is managed by a professional farmer with ten acres of farmland, mainly growing rice, vegetables and grapes; the other 20 farming households are combination agricultural cooperatives, with 25 acres of farmland altogether. They share agricultural machines, commissioned for 800 Yen / hour. Ueda has 1.6 acres of rice fields and also grows green tea in the mountain. There were eight households in total who grew green tea, but there are only three households left and they also built up a cooperative (Ueda, 2016).

Photo 5.5: Manager of Farm House Ueda was drying Kaki-Mochi, special traditional cookies made from rice.

Photo 5.6: Farmers bring the self-made products to the Marguerite Station in the very early morning.

The ‘Don’t Waste’ exchange event is held by the Welfare Mall every two months. The event takes place on the square surrounded by the three buildings of the Welfare Mall. “We just create a meeting place. In here you can communicate with other people; you feel happy and encouraged when people need your stuff. This is really the things we want to do” (Nomura, 2014)

> “People who come to the ‘Don’t Waste’ exchange event may not be qualified to sell their products to the Marguerite Station, but they themselves have also produced many things. This place adds another choice for the residents” (Nomura, Nov. 2014).

There is also a cabinet set outside of the Nonaka restaurant with the writing “No one sells” on it. The idea came from the secretary of the restaurant, which is supposed to be an exchange space for extra food from the locals and the restaurant. The idea is very similar to the ‘food distribution’ cabinet located at the Gartenstrasse in Freiburg.

5.2.2 Alternative Consumption Ways in Freiburg

‘Urban Character’ of Freiburg

In terms of systematic connections, the emerging autonomous systems of energy, agriculture and welfare seem to develop independently and relative separately in Freiburg. However, when getting more involved with the related individuals and organizations, it is apparent that these players overlap among each other and sometimes exhibit strong connections. The awareness behind these movements and the people involved was very similar: autonomous, participatory, democratic and solidary.

However, if we compare the cases of Higashi-Ohmi and Freiburg, the urban character of Freiburg appears to be more significant than that of Higashi-Ohmi. During my participation in these two cities, I felt that people in Higashi-Ohmi trusted more, connected to each other more deeply and cooperated through institutions more easily. It is human nature to both trust and distrust others, and this happened everywhere. However, the distrust in Freiburg was relatively more pronounced. One reason could be that in Freiburg, the education level of those involved in these projects is higher than that of those in Higashi-Ohmi, and sometimes such higher education can instill greater distrust in people. The other reason could be that people in Freiburg

express themselves more straightforwardly, and when I was contacting different involvers from different sectors, they did not hide their judgments or negative impressions from one another. It was not very easy to hear these kinds of judgment in Higashi-Ohmi, but this does not mean that disagreements among each other did not exist.

Except for subjective factors like the culture and character of people between these two cities, the urban characteristics can be described by relatively objective factors such as geographical sizes of the cities as well as economic and educational structures. Therefore, potentials for cooperation and institutional patterns appear differently in each context.

The belief in autonomy, participation, democracy and solidarity led to a certain kind of ideology as an urban characteristic which draws similar people to gather in the same city. This ideology implies a reverse from classical capitalism towards a more simple and healthy lifestyle which to some extent interweaves with a nostalgic longing for a pre-capitalistic society. Under the endeavor of this movement, some contradictory features emerge and lead to a new pattern of life, such as new simplistic shops defined by old business strategies.

As an observer or a participant who came from Asia and is female, no matter how I was labeled or perhaps not labeled at all, it is very hard to jump to conclusions regarding where this urban character came from or if it exists, because the observation itself was a result and a mixture of the observer and the observed. Although it is necessary to analyze my observed cases comparatively and objectively, it is also worthwhile to express my intuitive observation.

Photo 5.7: Local market at Vauban every Wednesday.

Examples of Weltladen and FoodCoop

FoodCoop (food cooperatives) sell locally produced ingredients, such as a variety of grains, wine, syrup, dry fruit, soap and so on. The way they sell is not so much selling as it is sharing or exchanging. Money is still the medium of the transaction, but unlike in a typical store, when you walk into the "shop", no one is actually doing the selling. There is simply a book on the table: consumers take food, use the scale to weigh their food, put money into a money box, and then write down the amount of their consumption on the list. The requirement is that consumers must first join the FoodCoop, and so far the quota is full and cannot absorb more members. Freiburg has many similar cooperatives and each cooperative has its own set of rules. Memberships into a FoodCoop is usually through friends and will be accepted after the members acknowledge them. The installation style inside the FoodCoop is minimal, for instance, a variety of cereals are separated by large bins, and the members themselves bring a bag or box to take food. (FoodCoop, 2016) The price is very fair, lower than the average price of the supermarket, but the food is still fresh.

Cooperatives' members enjoy better product quality and cheaper prices, but also must adjust to the simple equipment and the products having less variety than in a supermarket (of course, members can still also go to the supermarket to buy what they need). More importantly, the members bear mutual trust in one another and honestly reimburse themselves (FoodCoop, 2016).

Photo 5.8

Photo 5.8-5.9: A member of FoodCoop was taking out grain from a large bin and paid according to the price on the list.

Weltladen (the world's shop) is based on the same concept. Instead having many layers standing between producers and consumers, through fair trade, consumers will know who the sellers are as well as the production chain involved. Weltladen imports products from around the world in accordance with the principle of fair trade, such as decorations, utensils, clothes, bags, and of course tea with coffee. There are a total of five stores in Freiburg.

In particular, the fundamental ideal of the five stores is to break the capitalist mode of operation, so that the operator's income is not in accordance with an operating profit but a fixed income. A store may have two full-time operators, and two or three part-time members with fixed salaries. Five stores have to follow the certification list of products from FLO-Cert (fair trade certification organization), and therefore the imported products are unified (Eine-Welt-Forum, 2016; Weltladen, 2016).

One operator of Weltladen was asked how they decide the proportion of foreign wares to goods from the locals. In my opinion, although the import is based on the principle of fair trade, it still needs to be transported long distances and therefore is not fair to the local goods. It is worth noting that Weltladen, as the name suggests, sells mainly goods from other countries with only some items sourced domestically (Weltladen, 2016).

Nevertheless, the priority of the three concepts of land, organic, and fair trade were gradually discussed in Freiburg. The operator cited some organic stores as examples of places in which you could buy many imported organic goods, but they did not meet the principle of fair trade. She worried that this will increase the nutritional problems of exporting countries. The paradoxical side is that for the consumers, the purchase of organic products is mainly for the purpose of health, but the exporters of organic products sell products at low prices which leads to a low income of the producers who can only consume cheap products. This relation results in a relative deprivation between consumers and producers, both economically and nutritionally.

Therefore, she thinks the most ideal solution is to combine organic and local products, which keeps the freshness of the products, lowers harm to the environment and offers fairness to the

economy. Therefore, local and organic products should be given priority attention, and the lowest priority should be the import of goods (Weltladen, 2016).[1]

5.3 Regional Currency: Connecting Renewable Energy

5.3.1 Theoretical Concept of Solar Dollar (SD) and Multi-Layer Currency's System

Solar Dollar (SD)

The priority of Solar Dollar is to achieve a reduction of CO2 emission; further, it tries to combine environmental consciousness and diverse payment methods of locals, while the electric utility company benefits from low-cost financing (Greco, 2016).

The circulation of SD contains three main actors including the issuer, which is also a local electric power company. The second party would be the one who accepts SD from the issuer, and normally it contains employees, suppliers or contractors who provide labor and services to the issuer. Contractors or suppliers can utilize the services of the electric power company. The third party is individuals or shops from the region which receive electricity from the issuer and sell goods or provide services to the second party. They then receive SD from the second party and redeem it back to the issuer. The value of SD given by the society is in accordance with the

[1] Based on the group discussion on 1st August 2016 at the Eine Welt Forum of Freiburg. Members included: a manager of Weltladen of Freiburg; Ms. Dagmar Große of Eine Welt Forum; Manfred Westermayer,the director of Esperanto; Namsook Lee, an operator of a fair trade store in the city hall of Seoul in South Korea; and me.

society's demand for the electricity service of the power company, and also depends on people's acceptance of SD as an exchange medium (Bendell, 2013; Greco, 2016).

Theoretically, the Solar Dollar is self-correcting because only the issuer is compelled to accept SD. If employees, suppliers or contractors are reluctant to accept SD, the issuer will need to reduce the rate of issue until demand and supply reach a balance (Greco, 2016).

Essentially, this idea should work because electricity is needed for everyone. As long as shopkeepers and employees of supply chains and so on are willing to accept SD as a part of their payments, the regional economy will be able to circulate SD to a certain degree (Greco, 2016).

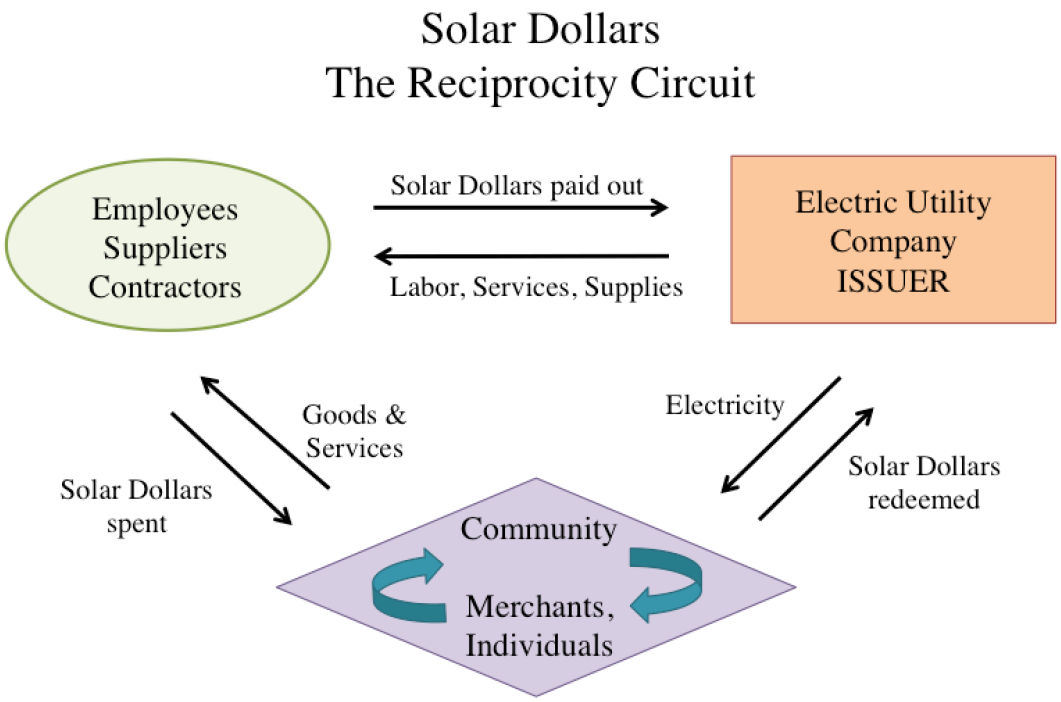

Fig. 5.4: A local electric power company issues Solar Dollar and produces electricity, which promotes an economic cycling of a region. Source from: Greco(2016).

Multi-Layer Currency's System

The idea of the multi-layer currency's system aims to restructure the current economic architecture. The current currency system is basically as we know it, the Dollar, the Euro, the Japanese Yen, British Pounds etc. Local currencies are used mainly for local economic activities based on the local economic networks, continental currencies for the exchange goods and services between different regions of continents and global currencies for global trade. Consequently, these levels should be complemented by yet another level. A redundantly constructed multi-layer currency's system ought to be more stable than the present mono-culture of currencies (MONNETA, 2014)(see Fig. 5.5).

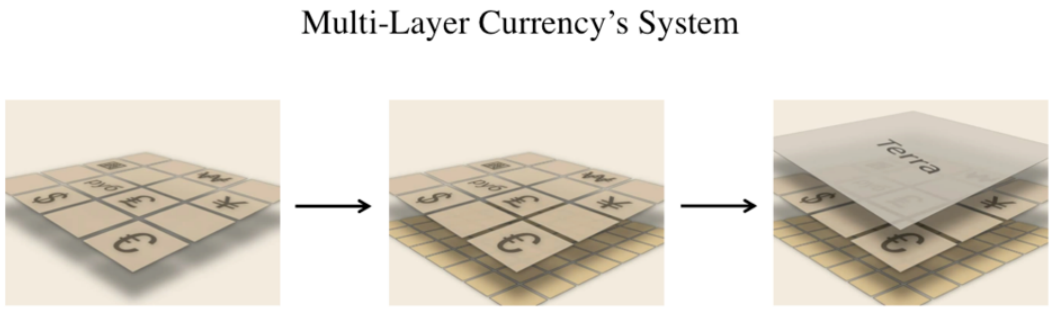

Fig. 5.5: Local currencies, current currency system and global currencies complement each other, constituting a multi-layer currency's system. Source: modified from MONNETA (2014).

5.3.2 Sanpo-Yoshi Coupon in Higashi-Ohmi: An 'Adhesive' to Connect Regional Economy and Renewable Energy

Coupon substitutes for money as a reward for the revenues of the Citizens' Co-Owned Renewable Power Plants. In fact, instead of only being an invention for the Co-Owned Renewable Power Plants, coupon has been created and used mainly for the purpose of the economic boom in this region. Although the Chamber of Commerce and Industry of Yokaichi city developed the idea of coupon and started to issue it in the year 2010, they still hoped to

extend the range and the rates of the usage by cooperating coupon with other fields or extending the usage of coupon to tourists (Yoshida, 2014).

Photo 5.10: Sanpo-Yoshi Coupon

The idea of coupon originally came from the Aomori city of northern Japan. While Higashi-Ohmi city only has less than 120,000 people, less than half of the population of Aomori city, the Chamber of Commerce and Industry expected to reach half of the circulation (around 3-5 billion Japanese Yen annually) compared to that of Aomori city (around 6-10 Japanese Yen) (Yoshida, 2014). However, the coupons are issued in different Cities of the Shiga-Prefecture, respectively, and they can only circulate within each city.

Coupon plays an adhesive role in creating reciprocal relationships between environment and economics. When we read any literature on Co-Owned Renewable Power Plants of this region, they describe renewable energy as an additional value from the 'grace of the sun', whereby the coupon returns the grace back to circulate on the regional economy and the people of the region (Prefecture-Shiga, 2016).

1) Reasons for Initiation: Regional Merchant Culture and the Global Financial Crisis

The regional merchant culture explains a part of why coupon replaced money as a reward for electricity production and sale. Regarding the coupon, the term 'Sanpo-Yoshi' (meaning 'benefits for all three sides') has been always added ahead of the coupon as 'Sanpo-Yoshi Coupon', which refers to a business philosophy reminding local merchants ('Omi merchants') to not only keep their own benefits and that of their customers but also those of the whole society. From this logic, if the merchants do business well, then the society will also benefit from it.

Historically, this term could be traced back to the Edo Period (1603-1867 A.D.) when the area of Omi was especially economically prosperous. Even in the primary and secondary education, students learn the Sanpo-Yoshi principle as 'the benefits for self, for the other side, for society as a whole', which has been regarded as a spirit or a starting point that should be passed on from generation to generation (Prefecture-Shiga, 2016; Yoshida, 2014)

Under the concept of Sanpo-Yoshi, to keep richness circulating inside the region would be of upmost importance. Compared to money, coupon as a new currency has aimed to prevent the outflow of money to other regions and therefore will support local businesses. Through getting along with the local people during my stay in Higashi-Ohmi, it was not hard to find that Sanpo-Yoshi was not only an official slogan but a prevalent belief rooted in this region, which also explained why local residents still support the coupon even if they faced difficulties in utilizing it.

The sudden occurrence of the global financial crisis stimulated the Chamber of Commerce and Industry of the Yokaichi city to adopt the idea of coupon.

> Why should we turn our emphasis suddenly on the issue of the environment? Our duty is to ensure economic stability, however, when facing the Lehman Brothers collapse and the coming global financial crisis, we started to ponder an environmental plan in which residents will combine together to establish an ecological city where people produce for their own needs and sell through their own market channels, especially to make use of resources of this region, so that we can expect a long-term prosperous regional economy and make sure this region will be in a stable status (Yoshida, 2014).

2) Application and Performance of the Coupon

The shops inside Higashi-Ohmi city have to first register at the Chamber of Commerce and Industry so that they can become the shops at which customers can use coupons. The data in 2015 showed that in the year 2013, the utilization rate of the coupon was 29%, more than the 21% estimated based on consumption tendency by the Prefecture. By the end of 2014, the registered number of the shops reached 429 (537 shops as of March 2016) and the number of coupons which were issued annually amounted to 1,398 (units: individual/household/enterprise) with total amount of 17,825,000 Japanese Yen, from which the reward for facilitating solar panel constituted 115 units/ 5,381,000 Japanese Yen. The other two parts where the coupons have issued include 'purchasing and utilization capital', referring to coupons bought by individuals, households, and enterprises to give as grants or favors; and the other part is the 'subsidy for private or social housing reform'. The former annual issue amount accounted for 1,236 units/ 6,366,000 Japanese Yen, the latter 47 units/ 6,088,000 Japanese Yen (Chamber of Commerce and Industry of the Yokaichi city, 2014).

The other way of application of the coupon was called 'Bonus for Facilitating Solar PV system', referring to the bonus commission in which the households, shops, and offices who facilitate PV on the rooftops under 10 kW will receive the Sanpo-Yoshi Coupon as extra bonus. 'Bonus for Facilitating Solar PV system' especially benefits those who use PV produced by the enterprises inside Higashi-Ohmi city: 1kW for 15,000 Japanese Yen (upper limit 75,000 Japanese Yen); while those who sign a contract with the enterprises outside of Higashi-Ohmi city receive only 10,000 Japanese Yen for 1 kW (upper limit 50,000 Japanese Yen). This design apparently showed its preference for the local PV installers (Prefecture-Shiga, 2016)

3) Bottlenecks in promoting coupons

Through the interviews with the members of the Co-Owned Renewable Power Plants, the usage of the coupon appeared to be to some extent inconvenient (Sige, 2016). When talking about the convenience of money and the coupon, Tami Sige, a member of the Co-Owned Renewable Power Plant of Welfare Mall, agreed that money is undoubtedly more convenient than coupon, as

> "You can use money in other prefectures, such as the near Hikone Prefecture, while the coupon is only confined in Shiga Prefecture. As to the deadline of the coupon, it is also a

pity that it cannot be extended but sometimes you are not aware of the deadline." (Sige, 2016)

Nevertheless, she believed that for the purpose of regional development, the usage of coupon still has its own good. Another member of the Co-Owned Renewable Power Plant of Welfare Mall felt that the range of usages of the shops were limited. However, just like Tami Sige's belief, she thought the core concept of the coupon was self-sufficiency and for the good of this region.

The Chamber of Commerce and Industry did not adopt the direct interviews or questionnaires with their users of the coupons, however, they could still hear some responses from their surroundings.

> "We heard from the citizens that the duration of a half year was too short, however, the duration was regulated by the law. The other response was that the denomination of the coupon was too small…. This relates to the relationship of government, economics and society, so in the following path the feelings of the local people will subtly affect." (Yoshida, 2016)

The inconvenience of the coupon could be apparently sensed during the interviews, however, it seemed not to be a big problem for the members of the Citizens' Co-Owned Renewable Power Plants. Neither the members nor the Chamber of Commerce and Industry ever planned to cancel the design of coupon. On the contrary, the Chamber of Commerce and Industry still tried to find ways to expand the circulation of coupon in this region.

4) Query on Sanpo-Yoshi Coupon's Effect on Regional Economics

Sanpo-Yoshi Coupon has been designed to boom up regional economic circulation, however, the effect of the coupon has not been very significant yet. The reason for this can be surmised by the discrepancy between residents' daily consuming habits and the limit of the coupons. First, it might create a feeling of inequality regarding the return on investment if a member invests in Citizens' Co-Owned Renewable Power Plants with money and receives their return with coupons. Although more than 400 shops in the local area cooperated the usage of coupons, a part of the sellers' market was still outside of this circulation. And as mentioned above, users could not consume freely due to the limit of the denomination of the coupon. Therefore, the degree of convenience between using money and coupon in consumption is very different.

Second, how can one define the geographical range of a regional economy? Officially, it is necessary to delineate the geographical range based on the administrative border in order to issue the coupon, however, consumers' demand or residents' concepts of 'region' are not certainly determined by the administrative borders. Third, the coupon has never replaced money but was also not a part of the regional currency and accounted for a certain fraction of residents' currency usage in consumption. Therefore, more observation should be conducted on the actual effect of the Sanpo-Yoshi Coupon on the booming of Higashi-Ohmi's economy.

5.3.3 'Freitaler': Regional Currency in Freiburg

Chiemgauer: First Regional Currency in Germany

> "When goods and services flow in one direction, money flows in the other direction: the basic principle of our economic system is no longer valid in many places. Money does not return to where it was spent. Regional currencies might help change that." (Rebmann, 2017)

In Germany, there are more than 46 regions which circulate their own regional currencies. The very first regional currency was Chiemgauer in the area of Bayern between Rosenheim and Traunstein, which circulates through over 600 shops in the region with 3,000 customers using the parallel regional currencies. The economist Gelleri founded the association of Chiemgauer in 2003 with a start-up capital of 10,000 Chiemgauer, which has now reached 700,000. It has been evaluated that the speed of circulation of Chiemgauer was three times higher than that of the Euro which therefore pushed up its own value (Sackmann, 2016).

The principles and spirits of Chiemgauer extended to other regional currencies with only some adjustment of rules according to the regional differences. In order to strengthen local retailers, Chiemgauer must be paid out in six months. After that, it can only be extended with an extra charge of 3% of its value (Sackmann, 2016). Based on this rule, the Chiemgauer will steadily lose its value only when it is quickly spent by the owners, which makes sure to stimulate the economy.

Freitaler and Tauschring in Freiburg

Freitaler is a regional currency in Freiburg and its surroundings. As the ideal of its design states,

> The Freitaler places hurdles for the outflow of capital, abroad or into the financial markets. This leaves more purchasing power in the region and helps to close regional economic cycles, to activate previously unused regional resources and secure jobs.(FREITALER, 2017b)

Freitaler differentiates itself from the current monetary system by positioning itself as a part of a social environment, instead of controlling money through distant central banks.

The cooperative shops with Freitaler have now reached more than 70 stores. These member stores are charged a fee when they exchange Freitaler to Euro in return, and this amount of money will be used to promote social projects in the region. In 2015, a total of around 1500 euros was paid to more than 20 initiatives supported by the Freitaler (FREITALER, 2017b) (see Fig. 5.6).

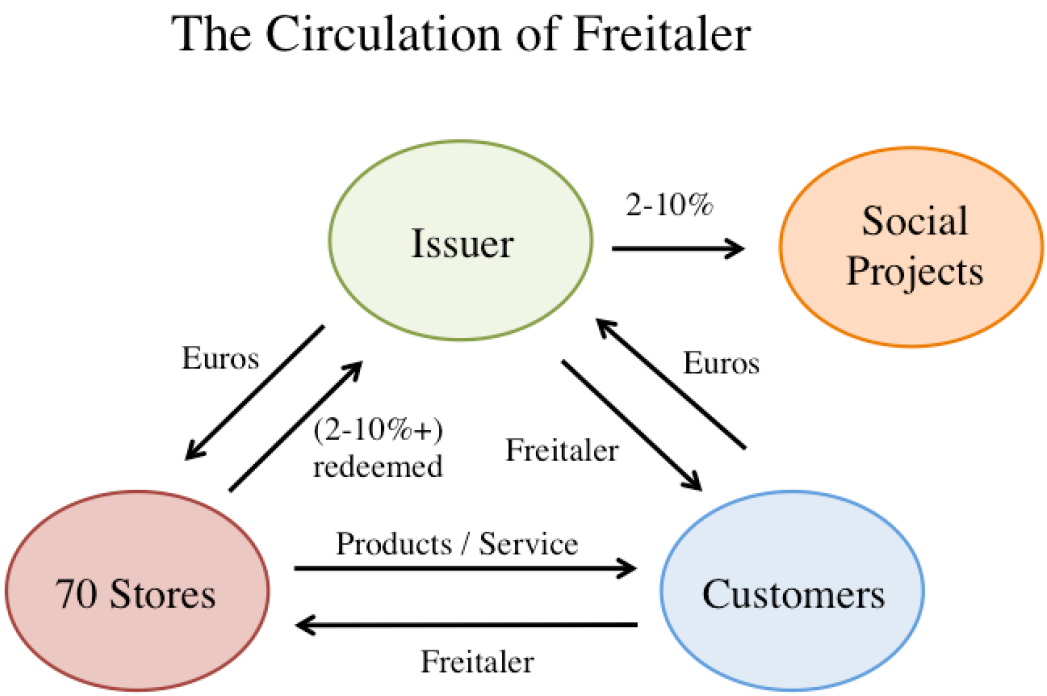

Fig. 5.6: Cooperatives shops are charged a fee by the issuer for promoting social projects in Freiburg.

Similar to Sanpo-Yoshi Coupon's in Higashi-Ohmi, the Freitaler has also been launched in response to the financial crisis. Its operation began one year after the financial crisis, in 2009, with its revenue peak in 2012 and 2013. In 2012, the reason why the circulation reached to 25,000 Freitaler was mainly because two permanent positions were set up. There are now five positions which arrange Freitaler. The next year in 2013, the exchange rose to over 50,000 Freitaler, which was contributed to the participation of supermarket EDEKA's in Freitaler (FREITALER, 2017a). As to Freitaler's contribution to the environment, the transportation routes of goods are shortened so that CO2 emission can be reduced. Further, the users of Freitaler consume more natural products from the region and also create healthy relationships with the regional shops.

Similar regional currencies in Freiburg include Tauschring (TR) and Zeitbank+. The concept behind Tauschring is to limit the tendency to accumulate wealth: Money should only be a means of exchange and not itself become a commodity(Talent-Experiment, 2017)

As the chairman Reinhard Biermann said,

> "I think an hour medical practitioner or computer expert should be worth as much as an hour window cleaning or pediatrician. This was also the original idealistic approach of the movement(Talent-Experiment, 2017)."

Under the Tauschring system, 'Talent' serves as the second currency rather than money.

5.3.4 Case of ALLMENDA cooperative in Bregenz, Austria

The Cooperative of ALLMENDA was legally registered as a social business and served as an issuer for three kinds of regional currencies, VTaler, Langenegger Talente and NEUKI, in Vorarlberg, Langenegg and Neukirchen an der Vöckla, respectively. The VTaler circulated since the mid-1990s and has been regarded as a benchmark for exchange systems (ALLMENDA, 2017a). Based on their experiences, other methods of payment have been developed according to the conditions of villages, valleys and social connections .

ALLMENDA set up six offices for issuing at the region. Until November 2015, there have been around 110,000 VTalers circulating in Vorarlberg, which was faster than the flow of Euro. VTalers circulated about four times before they were exchanged into Euros. Through this circulation, the trainee positions and employment opportunities increased. Customers receive 3% discount by subscribing the VTaler monthly, and until the middle of August 2017, the subscription amount reached 4,000 VTalers in one year.

College students did the survey of the regional feedback on VTaler in 2013, determining a satisfaction rate of around 30%. The result showed that the participatory motivations of the shops were to support the idea of regional currency and to win new customers. The shops which joined VTaler identified themselves strongly with the economy in the region. However, many shops thought there should still be space for the improvement of their revenues. Some advice on the expansion of VTaler was given by the shops, such as issuers being set up all over the country, more intensive advertising of the subscribers, and networks like a regulars' table for the registered shops. And although registered shops could make a short advertisement on the website of the VTaler issuer, a large number of shops asked for more intensive advertisements by the VTaler. Further, more than 70% of shops accepted the necessary organizational steps and fees for the expansion.(ALLMENDA, 2017a)

The idea of 'common good' backed up for the establishment and the expansion of ALLMENDA. ALLMENDA not only arranged the regional currencies but also solar PV facilities, communal gardens (*Gemeinschaftsgarten*), spring markets and planned for the setup of a bank for common weal (*Gemeinwohlbank*).

> "The economy of common wealth appeals to an economic order which orientates towards the core value of human relationship: human dignity, solidarity, ecological sustainability, social justice, democracy and transparency." (ALLMENDA, 2017a)

Combination of Regional Currency and Citizens' Renewable Energy

VTaler originally aimed to boom up the added value of the region, but the participants combined the idea of regional currency and energy autonomy with awareness. They believed that VTaler contributed to CO2 reduction in two ways. One was through its connection with the renewable power plants and the other was through enabling shorter distances when shopping (ALLMENDA, 2017b).

The vice-mayor initiated this idea and the municipality of Bregenz implemented it, therefore, this also made it possible to have cost-free roof rentals. The solar plant was financed by a total 40 participants of the cooperative and the municipality of Bregenz also provided support of 200 Euro for each kWp. In the end, the total construction fee reached 100,000 Euro. In the nine months from August 2011 to May 2012, the solar PV was realized with 39 kWp (kilowatt peak). In terms of revenue distribution, investors were supposed to receive 1% return, but 30% of them refused it. And the revenue was paid 88% in Euro and another 12% was paid in Vtaler (ALLMENDA, 2017c).

Table 5.1 Comparison of Regional Currencies: Sanpo-Yoshi Coupon, Freitaler and Vtaler

Regional currency	**Combination with Citizens' Energy**	**Redeem for energy production**	**Cooperated shops**	**Customers/shops with the issuer**
'Sanpo-Yoshi Coupon'	yes	100% in Coupon	>500 shops Registered at the issuer	1 Yen to 1 Coupon
Freitaler	no		> 70 shops Registered at municipality	1 Euro to 1 Freitaler Shops pay 2-10% to the issuer when exchanging Freitaler to Euro
Vtaler	yes	88% in Euro 12% in Vtaler	>200 shops Registered at the issuer	1 Euro to 1 Vtaler Customers get 3% discounts by subscribing VTaler monthly

5.3.5 Summary: 'Sanpo-Yoshi Coupon' , Freitaler and VTaler[2]

Comparing the issuers of these three local currencies, the issuer of 'Sanpo-Yoshi Coupon' is the Chamber of Commerce and Industry of the Yokaichi city, a governmental unit, while the other two issuers were initiated locally by non-governmental organizations. Did the legal identities of the issuers affect the motives of members for using regional currencies? Most members of Sanpo-Yoshi Coupon supported this idea because they believed a regional currency was beneficial to the local shops and their overall economy of the region, whereas members of

[2] See Table 5.1.

Freitaler and VTaler were more aware that regional currency played the role of an alternative to replace the Euro and to reverse the instability of global capitalism.

In terms of redemption for energy production, VTaler was combined with the Euro and accounts for only a small part of redemption while the Sanpo-Yoshi Coupon is the only currency media as return. The advantage of the combination of VTaler and Euro lies in its flexibility in terms of its design. Considering the inconvenience of using regional currency during the interview in Higashi-Ohmi, the VTaler method could be a suggestion for adjustment, for example, from '100% return of Sanpo-Yoshi Coupon' as return to '50% in Sanpo-Yoshi Coupon and 50% in Yen'. However, from my interview, the reduction of the proportion of Sanpo-Yoshi Coupon has not been an option for improvement so far. It is possible that this retreat would be regarded as a failure or as unnecessary from the perspective of the issuer.

The combination of regional currency and energy production serves as a key instrument to reduce the paradox of ecology and economy.

Chapter 6

Conclusion

6.1 Research Findings

1) From Decentralized Energy to Seeing the Starting Point of Resistance, and Grassroots Movement of Continuity

I will now return to the initially raised research questions, which focused on: the grassroots forces, the relationship with the object of resistance, the role of different contexts, and the effects of the struggle on the region's internal, gender, division and unity conditions.

What are the grassroots conditions needed for decentralized energy? Resistance is a kind of beginning, such as resistance to large-scale renewable energy, nuclear disarmament, or pollution problem-solving. By building up a force of local residents, grassroots power is an opportunity and a starting point. Within the field of decentralized energy, whether this power can continue depends to a large extent on what their system and regulations are able to establish.

Rebellion sometimes refers to transient events, but the atmosphere and the power created by the resistance is continuous, such as community building the establishment of a variety of local groups.

From the cases studies, the reflections on the wind turbines of residents from YuanLi of Taiwan and Shinji Lake of Japan and their resistance have received official responses, which resulted in a change of position or the removal of wind turbines. How much of this resistance can push the policy structure is questionable, as seen in the failure of the movement in Taiwan to amend the same distances of construction.

Japan's renewable energy regulations are the most flexible among these three countries, including the adjustment of wind turbines, solar roof leasing regulations, and the establishment of cleaner regulations in line with the pollution of Lake Biwa. Japan's residents protested together, for issues from small degrees of conflict to great regulatory adjustments. Japanese residents have a high degree of policy coordination, for example, residents allow manufacturers to use roads and work at night and so on.

After the struggle, a split is a common phenomenon. In the tight situation, the homogeneity created by the target is particularly evident, but after it slows down, the internal groups of interest differences may be significant. After the social movement, we can see that the same group is divided into different local groups: they have a similar ideas, but working closely together becomes less likely. This split might be also a reflection of the local community's diversity.

Another notable observation is the role conversion of men and women from YuanLi. One reason why women's roles increase during autonomous movements might be that women possess the features that the movements need. For example, the outside coordinator of the Self-Help Group whom I first contacted with was a housewife from YuanLi. President Chen's daughter was very strong in the face of the determination to resist the irrational procedure from the company and government, while her husband was far less engaged in the process. Movements need the features of sharing and links, however, these characteristics are very hard to find in males especially in a patriotic society. But after the movement, men from YuanLi were also more connected to public activities and showed increased participation in agricultural cooperative production or community development.

2) Political and Economic Considerations of Electricity Liberalization

I will now address the research questions on the liberalization of the electricity system as a requirement for decentralized energy and the specificity of energy domain.

The liberalization of the electricity system is an important condition for residents to participate in energy, but on the one hand there are many other conditions as influence, and sometimes the process of electric power liberalization is not necessarily fair to the citizens' participation in energy.

Multiple aspects should be taken into account in the process of electric power liberalization. The liberalization of electric producers is easier to achieve than the liberalization of entire power transmission grids. Technically, the cost and time required for the dispersed small grids to replace the conventional high voltage grid is high. Moreover, the capital owned by the electricity transport industry is also difficult to replace, and the Berlin power grid liberalization

movement shows that the degree of the funds raising from the residents was still very low in comparison to the traditional power grid owners, and also its credit is not necessarily high: many still believe in the capability of city government. Besides, compared to spontaneous local movements, when inhabitants' networks expand to encompass a certain project, it must take endure questioning than before.

The whole trend in the EU is to create a comprehensive liberalization of the internal energy market, as well as to replace FIT with a tender system under the concept of a liberalization. This trend is actually a competing force with the citizens' energy. A comprehensive liberalization trend attempts to put citizens' energy and larger renewable energy companies into the same basket of competition, which makes it difficult for small-scale capitalized energy organizations to compete, but if they can increase cooperation to form larger capitalized and scaled energy cooperatives, there is still a chance to compete. It can be said that the German energy cooperatives act in the resistance on the one hand, and adjust themselves at the same time. Now, the biggest achievement of citizen's energy in Germany is that energy cooperatives are winning the new tendering system, but this did not mean the system design is conducive to small-scale energy organizations, but rather means that they master the way to create lower costs.

So far, the German electricity system has encountered several criticisms, such as its restrictions on the total amount of renewable energy being seen as biased in favor of conventional pollution sources. Further, based on the Renewable Energy Act, the loss of renewable energy, such as the temporary power-off of wind turbines, is a cost passed on to the general public.

From the perspective of administrative power on the impact of electricity liberalization of Taiwan, the Energy Bureau, Taipower Company and China Petroleum Corporation are in cooperation on the staff, and therefore have great control over the distribution and provision of power.

Japan's power system liberalization is repeatedly moving forwards and backwards. In particular, the restart of nuclear power plants indicated that the court's ruling on the shutdown is, on the one hand, not absolutely valid, and on the other hand, also shows that Japan's centralization power plants' in-depth power interests are quite big. For example, the Kansai power plant affected enterprises, which in turn affected the liberalization of the power system. And the habit

of thinking is also an impact, especially when there is a lack of electricity again or the prices of renewable energy remains very high. In such cases, policies together with citizens prefer to go back to the old systems.

Decentralized energy is likely to bear a reflection of science and technology. Not only the increase of democratic participation but also residents' reflecting on renewable energy technology and its relation with their residential surroundings can lead to creating their own energy system. When will the residents take technology into account? What are the different roles in considering science and technology? What are the meanings of the sizes of science and technology in the process of bidding systems among different stakeholders? These are the remaining questions which need more analysis.

As to the differences of imported technology and locally produced technology, it is more possible that locally produced technology is more generally accepted by the locals. One preliminary speculation is related to its creation of local employment or simply residents favorability for the local enterprises, but it still needs further study, especially with regards to the relationship between residents and local enterprises. In the case of Higashi-Ohmi in Japan, residents have no resentment against the local solar power plant Kyo Se Ra, even if the company enjoys the priority given to the tender process by the municipal service but makes no contribution to the development of the investment, for example, in fundraising for renewable energy. On the contrary, the wind turbine in YuanLi is a German manufacturer, although they are partly managed by Taiwanese, and it is easy to form a local conflict with outsiders once the procedure of facilitating becomes a problem.

3) A Dynamic Forming of Participation

In the chapter on Participatory Forms, I theoretically established delineations for the different ongoing cooperative methods for decentralized energy, particularly based on the engagement of energy cooperatives combined with their relations to other players.

The transfer from the Traditional Buy-Sale Relations to an Operator Model addresses a trend where citizens' participation in decentralized energy can be simplified by the services of an intermediary company. This transfer can be a good example for the societies which are still on the preliminary stage of decentralizing energy system, for example in Taiwan.

In Germany, a Cooperation Model is a mainstream decentralized energy system which incorporates energy users into suppliers under the framework of local organizations such as energy cooperatives. However, when energy cooperatives expand their scopes of management, they also face more challenges which energy enterprises might also have, such as having sufficient manpower or capital. Expansion of their organizations is an issue which refers to a question: is it better to expand under the logic of capital accumulation or with an alternative way outside capitalism by diverse cooperation? For these organizations, addressing this question not only involves choosing from ideals but represents a practical challenge because finance, credibility and capability are the important issues dealt among different involvers who also reach out for cooperation. During the more and more complicated involvement from different players, the energy cooperatives need to find a balance between the flexibility which is required by high degrees of participation and the institutionalization required by qualified management.

The case of Freiburg shows that energy cooperatives have a big differentiation from the local renewable energy companies according to their managing ideals. There were examples in which they reached out for cooperation with each other, however, studies show that they were not successful. As to the autonomous communal energy, the connections between communities and energy cooperatives are stronger than with renewable energy enterprises. This can be especially shown on the case of district heating system in Kappel.

The participatory forms in Higashi-Ohmi are relatively simpler than those in Germany. Citizens' Co-Owned Renewable Power Plants were built based mainly on the trust among the investors, and their management only engages with PV installers, the issuer of the Coupon and the Kansai Power Plant. It can be expected that involvement will be getting more complicated after the comprehensive Liberalization of Electricity after April 1st, 2016. However, their combination of regional currency and renewable energy production, the premise behind the 'Wind-Sun Future Fund', can hold good implications for the future Freiburg.

4) How has Decentralized Energy Been 'Embedded' in Regional Economies?

Decentralized energy strongly rooted in locals, differentiating it from policy-oriented renewable energy. If decentralized energy is only an ideal or a political concept, it will not be strong enough.

It is also questionable whether an outside fund or project can lead to a tightly connected community. As mentioned, the causes of creating the bond among locals are the core elements needed in the forming of decentralized energy. The case of Higashi-Ohmi shows that citizens' energy cooperative is a 'result' of its community development. However, this development should also be traced back to the origin of the lake pollution and residents' endeavors in recycling. It can be said that the environmental consciousness 'recycles' itself in the region and plays a significant role in its history.

In the countryside, a better life cannot simply be achieved by a utopian imagination for a community life, but a capability to deal with complex problems based on the local needs, such as care for the elderly, care for the physically and mentally disabled, care for the unemployed and food security, which further needs to be solved in an institutionalized system. After the nuclear disaster of 311 in 2011, this reflection has been more strongly developed than ever before.

The case studies show that regional economies indicate different ways to define economics. Many labor works or services cannot be reflections on the economic growth of output value. In Higashi-Ohmi, for example, it is common to see the mutual help between farm house and Welfare Mall in an advertisement promoting farm house activities or simply in helping to wash dishes and so on. Regional currencies such as Tauschring in Freiburg also provide a way to reassess the value of people.

6.2 Research restrictions

1) Ambiguity of the Small Players' Future

In the tendering system, this study has not touched on how the local government's financial situation affects the preferences of the tender. In the old tendering system, the small participant has difficulty bearing the risk of bidding, and now the situation has changed because of the Special Law in Germany's new tendering system. However, there is still need for further

research on its effect on small-scale renewable energy participants. When larger renewable energy companies tend to avoid risks and build up a fake energy cooperatives, will this damage the general reputation of energy cooperatives and other smaller organizations in the future perception, which then lead to the loss of independence? I think one key point is that how these small energy organizations choose from the expansion of cooperation and the maintenance of autonomous characteristics.

2) Boundaries Among Stakeholders and Position of Myself in the Study

Stakeholders are a convenient tool based on their description, but after having made actual contact I found that this perception brings more restrictions to understanding. How are these researchers defining each other? This remains an unsolved question. In the case of Higashi-Ohmi, it is observed that people who tend to be more closely dedicated are also more distant from those who tend to have fame, power, or money. The other factor which affects relations is the intention to stay in this place. If people just pass through this place, residents tend to regard them as tourists, but if they are willing to stay no matter what abilities they have, then locals will try to help them live in the region.

During my participation in these places, I noticed the people whom I contacted observe my relations with others as well, especially with those who have interests or conflicts with them. Of course there were only few people who outwardly expressed their conflicts with others, however, it is often to some extent perceivable. However, my own position within the research objectives also influences my research result. Sometimes, I chose only to contact those whom I trusted. This situation has no difference in Germany, Japan or Taiwan.

3) Route of Dynamical Development of Decentralized Energy

In this study, I fail to outline the interplay between the actors of decentralized energy and the trend of the energy transition, because the cooperative forms of decentralized energy develop dynamically according to many details, and correcting this is useful to analyze each case in a more project-led orientation.

References

Agency-for-Natural-Resources-and-Energy. (2013). Bericht über die Zukunft der erneuerbaren Energien Japans und Windkraft. Retrieved from http://www.japan.ahk.de/fileadmin/ahk_japan/Dokumente/02_Murakami_METI_.pdf,

Agency-for-Natural-Resources-and-Energy. (2017a). 登録小売電気事業者一覧 (Registered retail electricity company list). Retrieved from http://www.enecho.meti.go.jp/category/electricity_and_gas/electric/summary/retailers_list/

Agency-for-Natural-Resources-and-Energy. (2017b). 電力会社の切り替えるには(Switch Electric Power Companies). Retrieved from http://www.enecho.meti.go.jp/category/electricity_and_gas/electric/electricity_liberalization/step/

Agency-for-Natural-Resources-and-Energy. (2017c). 電気料金及び電気事業制度について (Electricity Price and Electricity Business System). Retrieved from http://www.enecho.meti.go.jp/category/electricity_and_gas/electric/

ALLMENDA. (2017a). Der VTaler ist die Regionalwährung in Vorarlberg. Retrieved from http://www.allmenda.com/content/vtaler

ALLMENDA. (2017b). Gemeinsam sinnvoll investieren! Retrieved from http://www.allmenda.com/crowd

ALLMENDA. (2017c). Regionale Energie Anlage Bregenz Bauhof-Die Stadt Bregenz auf dem Weg zur Energieautonomie. Retrieved from http://www.allmenda.com/content/energieanlage-bregenz

Appelrath, H.-J. r., Kagermann, H., & Mayer, H. (2012). Future Energy Grid Migrationspfade ins Internet der Energie. *acatech STUDIE Februar 2012*, 158-206.

Badenova. (2015). Für Stadtwerke und Private Anlagenbetreiber: Badenova Vermarktet Strom aus Blockheizkraftwerk [Press release]

BATTAGLIA, S. (2012). ELECTRICITY GENERATION, TRANSMISSION, & DISTRIBUTION TO THE END USER. Retrieved from http://www.yourenergyblog.com/electricity-generation-transmission-distribution-to-the-end-user/

Bendell, J. G., Thomas H. . (2013). Currencies of transition-Transforming money to unleash sustainability. *The Necessary Transition: The Journey towards the Sustainable Enterprise Economy*, 221-242.

Bernhardt, J. (2013). *Windenergienutzung in Deutschland Historische Entwicklung, politische Rahmenbedingungen, ausgewählte Akteure und Konflikte* (Vol. 8): Universität Hamburg.

BMWi. (2014). Eckpunkte für ein Ausschreibungsdesign für Photovoltaik-Freiflächenanlagen. 1-7.

Broers, J. r. (2017). *Konsequenzen-das erste Onshore Windenergie- Ausschreibungsverfahren*. Paper presented at the BRANCHENTAG-WINDENERGIE.

Brösamle, H. (2017). „Wie bewerten Sie die Ergebnisse der ersten Ausschreibung für Onshore-Windkraftanlagen?“. *neue energie, June 2017,* 63-64.

Bureau-of-Energy-under-Ministry-of-Economic-Affairs. (2013). Annual Report 2013. Retrieved from http://web3.moeaboe.gov.tw/ECW/populace/content/ContentLink.aspx?menu_

Burger, C., & Weinmann, J. (2013). *The Decentralized Energy Revolution*.

Business-&-Human-Rights-Resource-Centre. (2013). Company responses/non-responses re impacts of planned InfraVest wind turbines in Yuanli, Taiwan. Retrieved from https://business-humanrights.org/en/documents/company-responsesnon-responses-re-impacts-of-planned-infravest-wind-turbines-in-yuanli-taiwan

Business-Wissen. (2017). Beispiele und Vorteile von Betreibermodellen. Retrieved from https://www.business-wissen.de/artikel/betreibermodell-beispiele-und-vorteile-von-betreibermodellen/

Central-Federation-of-Societies-of-Commerce-and-industry. Difference of ‘Chamber of Commerce and Industry’ and ‘Society of Commerce and Industry’. *2017.* Retrieved from https://www.shokokai.or.jp/somu/main_kaigisho_hikaku.htm

Chambers, R. (1994). Participatory rural appraisal (PRA): Challenges, potentials and paradigm. *World Development, 22*(10), 1437-1454. doi:https://doi.org/10.1016/0305-750X(94)90030-2

Chen, H.-M. (March 2016) */Interviewer: H.-T. Huang*.

Chen, Q. (March 2016) */Interviewer: HuiTzu*.

Chen, Y. (2005). Introduction of Japanese Nursing Care Insurance System. *Community Development Journal Quarterly, 110*, 351-358.

Clashausen, C. (2017, 29 June 2017) */Interviewer: H. Huang*.

Colthorpe, A. (2017). Japan to lower tariffs, cancel projects after paying ¥2.3tr last year for FiTs. Retrieved from https://www.pv-tech.org/news/japan-to-lower-tariffs-cancel-projects-after-paying-2.3tr-last-year-for-fit

Cruz, C., Martins, A., & Marques, R. (2011). *Public-private partnerships for wind power generation: The Portuguese case* (Vol. 39).

Devine-Wright, P. (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind energy, 8*(2), 125-139.

Dirlik, A. (2007). Global modernity : modernity in the age of global capitalism. *Boulder, CO : Paradigm Publishers*.

Dooley, J. J. (1998). Unintended consequences: energy R&D in a deregulated energy market. *Energy Policy, 26*(7), 547-555. doi:https://doi.org/10.1016/S0301-4215(97)00166-3

Dresel, T. (2015) */Interviewer: H. Huang & Y. Li*.

Dudenredaktion. (Ed.) (6. Auflage ed.). Dudenverlag, Mannheim.

E.ON-UK. (2017). What is decentralised energy?

Eine-Welt-Forum. (2016) */Interviewer: H.-T. Huang*.

ENGELS, J. I. (2002). Gender roles and German anti-nuclear protest The women of Wyhl. *Clermont-Ferrand : Presses univ. Blaise Pascal*, 407- 424.

EUR-LEX. (9.July 2016). Commission Notice on the notion of State aid as referred to in Article 107(1) of the Treaty on the Functioning of the European Union

. http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2016.262.01.0001.01.ENG

European-Commission. (2014). State aid: Commission adopts new guidelines for state aid to airports and airlines [Press release]. Retrieved from http://europa.eu/rapid/press-release_IP-14-172_en.htm

EWE. (2016). Offshore-Windpark RIFFGAT GmbH & Co. KG.

EWEA. (2015). Design options for wind

energy tenders. *The European Wind Energy Association*, 1-21.

Fan, S., & Olofinbiyi, T. (2013). Role of emerging countries in climate-smart agriculture. *Climate Action: United Nations Environment Programme (UNEP)*, 121-124.

Farrell, J. (2011). The Challenge of Reconciling a Centralized v. Decentralized Electricity System. Retrieved from https://ilsr.org/challenge-reconciling-centralized-v-decentralized-electricity-system/

fesa. (2012). Netzwerktreffen Energieinitiativen Sübaden. *SolarRegion, 3*.

fesa. (2013). Gemeinsam Wind ernten – Energiegenossenschaften erschließen das Geschäftsfeld. *SolarRegion, 4*.

Fezer, J., & Schmitz, M. (2012). Why Is Landscape Beautiful? (1979). In J. Fezer & M. Schmitz (Eds.), *Lucius Burckhardt Writings. Rethinking Man-made Environments: Politics, Landscape & Design* (pp. 133-141). Vienna: Springer Vienna.

Fisch, M. N., Braunschweig,Nusser, T.,Mahler,B. (2013). EnergiePlus-Erste Mehrfamilienhaus-Projekte. Retrieved from http://www.dbz.de/artikel/dbz_EnergiePlus_Erste_Mehrfamilienhaus-Projekte_1721385.html

Flieger. (2014). 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.

Flieger, B. (2011). *Energiegenossenschaften. Eine klimaverantwortliche, bürgernahe Energiewirtschaft ist möglich*.

Flieger, B. (2014, July 16) */Interviewer: H. H. Shuping Liu*.

Flieger, B. (2015). Einführung in (genossenschaftliches) Energie-Contracting mit Fallbeispielen. *Bürgerenergiegenossen-(BEG)-Stammtisch*.

FoodCoop. (2016) */Interviewer: H.-T. Huang*.

Fraunhofer. (2013). *Windenergie Report Deutschland 2013*. Kassel: Fraunhoferverlag-IWES.

Fredriksson, S., Hyvärinen, O., Mattila, M., & Wass, H. (2010). The Politics of Competitive Tendering: Political Orientation and Attitudes towards Contracting Out among Finnish Local Politicians. *Local Government Studies, 36*(5), 637-654. doi:10.1080/03003930.2010.506977

FREITALER. (2017a). Eintausch. Retrieved from http://www.freitaler.com/freitaler/funktionsweise/geschichte-und-fakten/

FREITALER. (2017b). FUNKTIONSWEISE. Retrieved from http://www.freitaler.com/freitaler/funktionsweise/funktionsweise/

Fri.philo (Producer). (8 Aug 2015). When 'Crazy' Turbines started to turn Retrieved from https://www.youtube.com/watch?v=fnK8xDwNqKk

Fujii, A. (2004). *Eco Revolution of Rapeseed Blossom. (Na-no-Hana-Eco-Kakumei)(菜の花エコ革命)*. Tokyo: Sōshinsha.

Fujii, A. (2016) */Interviewer: H. Huang*.

Furukawa, K., & Huang, H.-T. (2014). *Naturschutz und Energiewende: Windräder als Konfliktthema im Naturschutz*. Proposal of Seminar 'Naturschutz und Gesellschaft', University of Freiburg.

Futterlieb, M. (2016, 15 Feb.).

Genus, A., & Coles, A.-M. (2008). Rethinking the multi-level perspective of technological transitions. *Research Policy, 37*(9), 1436-1445. doi:https://doi.org/10.1016/j.respol.2008.05.006

Gibbs, D., & Leach, B. (1994). TELEMATICS IN LOCAL ECONOMIC DEVELOPMENT: THE CASE OF MANCHESTER. *Tijdschrift voor economische en sociale geografie, 85*(3), 209-223. doi:10.1111/j.1467-9663.1994.tb00690.x

Göppel, J. (2015). Situation der Bürgerenergie in Deutschland. Retrieved from http://www.goeppel.de/neuigkeiten/nachricht/article//situation-de.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-an

Greco, T. H. (2016). Solar Dollars – a way to promote renewable energy, while supporting the local economy and providing interest-free financing for utility companies. Retrieved from beyondmoney.net/2016/08/26/solar-dollars-a-private-currency-with-multiple-benefits/

Green, R. J., & Newbery, D. M. (1992). Competition in the British Electricity Spot Market. *Journal of Political Economy, 100*(5), 929-953. doi:10.1086/261846

Green-Energy-and-Environment-Research-Laboratories. (2012). 千架海陸風機風力資訊整合平台 (Tausende Windturbinen-Information-Integration-Plattform). Retrieved from http://wind.itri.org.tw/Thousand/ThIndex.aspx

Guha, R. (1998). Dominance without Hegemony. *Oxford University Press*.

Hagmann, J. r., Chuma, E., Murwira, K., & Connolly, M. (1998). Learning Together through Participartory Extension: A Guide to an Approach Developed in Zimbabwe.

Hand. (2015). Taiwan Idependent Power Plant. Retrieved from http://www.hand.org.tw

Hara, C. (2017) */Interviewer: H. Huang*.

Hashimoto, K., Nakagawa, S., Seiwa, O., & Nishimura, T. (2009). Citizens' Co-Owned Power Plant of Higahiomi Model. *Society of Environmental Conservation Engineering*.

Hassan, M., & Majumder-Russell, D. (2014). Electricity regulation in the UK: overview. Retrieved from https://uk.practicallaw.thomsonreuters.com/1-523-9996?transitionType=Default&contextData=(sc.Default)&firstPage=true&bhcp=1

Hauser, E., Hildebrand, J., Dröschel, B., Klann, U., Heib, S., & Grashof, K. (2015). Nutzeneffekte von Bürgerenergie. *Studie im Auftrag von Greenpeace Energy eG in Zusammenarbeit mit dem Bündnis Bürgerenergie e.V.*, 19-32.

Hauser, E., Weber,A., Zipp. A, Leprich, P, Hofmüller,S. & Kochems, J. (2014). Bewertung von Ausschreibungsverfahren als Finanzierungsmodell für Anlagen erneuerbarer Energienutzung. *IZES*, 20-29.

Held, F. (2017, Mittwoch, 20. September 2017). Schluchseewerk AG hält am PSW Atdorf fest. *Badische Zeitung*. Retrieved from http://www.badische-zeitung.de/bad-saeckingen/schluchseewerk-ag-haelt-am-psw-atdorf-fest--135418119.html

Industrial-Development-Bureau-under-Ministry-of-Economic-Affairs. (2013). Retrieved from http://www.moeaidb.gov.tw/external/ctlr?PRO=news.NewsV

InfraVest. (2006a). 50 億風力發電機組商機 (Windkraft: 5 Milliarden NT dollars

Geschäftschance).

InfraVest. (2006b). 風力發電前途光明(Windkraft: Blühende Zukunft).

International-Energy-Agency. (2017). 2017 Amendment of the Renewable Energy Sources Act (EEG 2017). https://www.iea.org/policiesandmeasures/pams/germany/name-158567-en.php

ISSUU. (2012). 苑裡反風車抗爭懶人包 (Information der YuanLi

Anti-Windkraft-Bewegung).

Jacobs, M., & Stott, M. (1992). Sustainable development and the local economy. *Local Economy, 7*(3), 261-272. doi:10.1080/02690949208726152

Japan-Power-Academy. (2013). 電気の施設訪問レポート vol.11 新出雲ウインドファームを訪問しました Bericht über den Besuch der elektrischen Anlage, Nr.11, Besuch vom „Shin Izumo Windkraftwerk. Retrieved from https://www.power-academy.jp/electronics/report/rep01300.html

JWPA. (2011). 風力発電施設の故障・事故の現状-主に NEDO 利用率向上調査結果のまとめ- Der gegenwärtige Zustand der Beschädigung und des Unfalls der Windkraftwerke. Retrieved from http://jwpa.jp/2011_pdf/88-06tokusyu.pdf

Kepco. (2017). 企業や一般家庭向けの電力小売りを全面自由化(Full Liberalization of Electricity Retailing for Companies and General Households). Retrieved from http://www.kepco.co.jp/corporate/liberalization/freeing.html

Kitchen, L., & Marsden, T. (2009). Creating Sustainable Rural Development through Stimulating the Eco-economy: Beyond the Eco-economic Paradox? *Sociologia Ruralis, 49*(3), 273-294. doi:10.1111/j.1467-9523.2009.00489.x

Kremer, B. (2017, 15. Feb 2017) */Interviewer: H. Huang*.

Lanzavecchia, E., & Leona, A. (2007). Domestic Electricity Market Liberalization and its Impact on Pricing. *Alumni Association Italy, Milan Energy Forum (INSEAD Report VPRI-071024-AILeon-PO)*, 1-20.

Legal-Dictionary. Donation inter vivos. http://legal-dictionary.thefreedictionary.com/Donation+inter+vivos

Ludden, D. (2002). Reading Subaltern Studies. Critical History, Con- tested Meaning and the Globalization of South Asia. *London: Anthem Press*, 442.

MaRS-Library. (2013). The leasing revenue model and leasing arrangements. Retrieved from https://www.marsdd.com/mars-library/the-leasing-revenue-model-and-leasing-arrangements/

Masuda, T. (2014) */Interviewer: H. Huang*.

Mautz, R. d., & Byzio, A. (2004). Der Einstieg in die Offshore-Windkraftnutzung als Prüfstein der Energiewende-Konfliktthemen und Konfliktdynamiken. *SOFI-Mitteilungen, 32*, 111-127.

Mertens-Stickel, K. (2014). Energiewende in der Hebelstraße Strom und Wärme aus dem Keller. *Solar-Bürger-Genossenschaft*.

Mickwitz, P., Melanen, M., Rosenström, U., & Seppälä, J. (2006). Regional eco-efficiency indicators – a participatory approach. *Journal of Cleaner Production, 14*(18), 1603-1611. doi:10.1016/j.jclepro.2005.05.025

Ministry-of-Environment. (2010). Bericht über das Shin Izumo Windkraftwerk und die Gebietslandschaft. http://www.env.go.jp/policy/assess/5-2windpower/wind_h22_2/mat_2_5.pdf,%20S.21

Mizuguchi, S., Ohta, K., Beers, P. J., Yamaguchi, M., & Nishimura, T. (2016). Interactions Among Multiple Niche-Innovations and Multi-regimes: The Case of the "Welfare Mall" in Higashiomi. In D. Loorbach, J. M. Wittmayer, H. Shiroyama, J. Fujino, & S. Mizuguchi (Eds.), *Governance of Urban Sustainability Transitions: European and Asian Experiences* (pp. 69-89). Tokyo: Springer Japan.

MONNETA (Producer). (2014). What are regional currencies? Retrieved from http://monneta.org/en/media/regional-currencies/

NABU. (2015). Offshore-Windkraft in Deutschland: Chance fürs Klima - Risiko für die Meere. Retrieved from https://webcache.googleusercontent.com/search?q=cache:5NxhXhs17AsJ:https://www.nabu.d

e/natur-und-landschaft/meere/offshore-windparks/index.html+&cd=1&hl=zh-TW&ct=clnk&gl=de&client=safari

Nakashima, E. (2009). Exploring New Business Models with Companies on the Theme of Environment. *CSR-Magazine.* Retrieved from http://www.csr-magazine.com/archives/analysts/rep06_02.html

Nanohana-Project-Network. (2006). An Overview of the Nanohana Project. Retrieved from http://greenaccess.law.osaka-u.ac.jp/wp-content/uploads/2013/04/06en_fujii.pdf

NEDO. (2008). 日本型風力発電カ□イト□ライン(Richtlinie der Stromerzeugung durch Windkraft Japans). Retrieved from http://www.nedo.go.jp/content/100107250.pdf

NEDO. (2014). 日本における風力発電の状況(Diagramm des Wandels der Einführungsmenge der Stromerzeugung durch Windkraft in Japan.). Retrieved from http://www.nedo.go.jp/library/fuuryoku/state/1-01.html

Nestle, U. (2015). Ausschreibungen für Erneuerbare Energien: ÜBERWINDBARE HEMMNISSE FÜR BÜRGERENERGIE? *Eine wissenschaftliche Expertise von EnKliP*, 2-24.

Network-of-Nanohana-Eco-Project. (2017). National Summit of Nanohana Eco Project. Retrieved from http://www.nanohana.gr.jp

Neue-Energie. (2017). Wie bewerten Sie die Ergebnisse der ersten Ausschreibung für Onshore-Windkraftanlagen? *neue energie, June 2017*, 63-65.

Nishimura, T., Nomura, S. (2013). Boom Up Local Energy and Local Community-Organization of Citizens' Co-Power Plants of the Welfare Mall. *Japan Environmental Technology Association.*

Nomura, S. (2013). Michibushin. *Lovely-Town-Eco-Club-Aito*.

Nomura, S. (2014) */Interviewer: H. Huang*.

NRW-Attendees. (2017, 28-29 Jun) *9.-Branchentag-Windenergie-NRW-2017/Interviewer: H. Huang*.

Ohta, S. (2016) */Interviewer: H. Huang*.

Paramashivan Kaundinya, D., Balachandra, P., & Ravindranath, N. H. (2009). *Grid-connected versus stand-alone energy systems for decentralized power—A review of literature* (Vol. 13).

Prefecture-Okinawa. (2011). Situation der Entstehung der Umweltfragen mit den Windkraftwerken. http://www.pref.okinawa.lg.jp/site/kankyo/seisaku/kikaku/shingikai/documents/2kai_sankou2.pdf

Prefecture-Shiga. (2016). *General Outline of Renewable Energy in Higashiomi; Shiga Prefecture*.

Prefecture-Shiga. (2017). Citizens' Co Power Plant ahead of the Whole Country. 29-39.

Prell, C., Hubacek, K., Reed, M., Quinn, C., Jin, N., Holden, J., . . . Sendzimir, J. (2007). If you have a hammer everything looks like a nail: traditional versus participatory model building. *Interdisciplinary Science Reviews, 32*(3), 263-282. doi:10.1179/030801807X211720

Radtke, J. (2013). *Bürgerenergie in Deutschland - Ein Modell für Partizipation?*

Radtke, J. (2016). *Bürgerenergie in Deutschland. Partizipation zwischen Gemeinwohl und Rendite*.

Rebmann, M. (2017). WARUM REGIONALWÄHRUNGEN EINE GUTE SACHE SIND? Die Erfolgsgeschichte des Chiemgauers. Retrieved from https://diefarbedesgeldes.de/regionalwaehrungen/?utm_source=Newsletter&utm_m

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., . . . Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *J Environ Manage, 90*(5), 1933-1949. doi:10.1016/j.jenvman.2009.01.001

Regionetz-Südbaden, f. e. v., LUBW (2015). Solarstrom an Mieter liefern-Neue Geschäftsmodelle für die Energiewende. *Regionaler Qualifizierungsworkshop*.

Rifkin, J. (2011). *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World*: Palgrave MacMillan.

Roberts, D. (2013). The next big thing in energy: Decentralization. Retrieved from http://grist.org/climate-energy/the-next-big-thing-in-energy-decentralization/

Rödel&Partner. (2016). Warum Verpächter, Pacht und Pachtzins? Retrieved from http://www.roedl.de/themen/tschechien/2014-06/verpaechter-pacht-pachtzins

Rohracher, H., & Späth, P. (2013). The Interplay of Urban Energy Policy and Socio-technical Transitions: The Eco-cities of Graz and Freiburg in Retrospect. *Urban Studies, 51*(7), 1415-1431. doi:10.1177/0042098013500360

Rüskamp, W. (2016, 30. Mai 2016). Tourismus vs. Wirtschaft: Wie geht es weiter mit dem Schluchsee? *Badische Zeitung*. Retrieved from http://www.badische-zeitung.de/suedwest-1/tourismus-vs-wirtschaft-wie-geht-es-weiter-mit-dem-schluchsee--122533352.html

Sackmann, C. (2016). Euro, nein danke! 46 deutsche Regionen setzen auf ihre eigene Währung. Retrieved from http://www.focus.de/finanzen/clever-einkaufen/chiemgauer-elbtaler-carlo-wer-braucht-schon-den-euro-warum-46-deutsche-regionen-auf-ihre-eigene-waehrung-setzen_id_6377437.html

Sanke-News. (2017). 関電「原発ゼロ」脱する　経営好転、２度の値下げ視野 (Kansai Electric Power Company's "zero nuclear power plant" -Management Improvement, the Second Stage of Price Cut) Retrieved from http://www.sankei.com/west/news/170517/wst1705170086-n1.html

Schaede, M., Großklos, M. (2014). Mehrfamilienhäuser als Passivhäuser mit Energiegewinn. *INSTITUT WOHNEN UND UMWELT GMBH*, 81-105.

Schot, J., & Geels, F. W. (2008). Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy. *Technology Analysis & Strategic Management, 20*(5), 537-554. doi:10.1080/09537320802292651

Schott, D. (1996). *Energie und Stadt in Europa : von der vorindustriellen „Holznot" bis zur Ölkrise der 1970er Jahre = Energy and the city in Europe*. Paper presented at the Internationale Stadtgeschichts-Konferenz.

SGS. (2017). BEWERTUNG UND PRÜFUNG ÜBER DEN WEITERBETRIEB VON WINDENERGIEANLAGEN (BPW)ANALYSE, PRÜFUNG UND BEWERTUNG. *INDUSTRIAL SERVICES DER SGS*, 1-6.

Sheehan, J., & Bachman, E. (2014). Seabrook—Wyhl—Marckolsheim: transnational links in a chain of campaigns. Retrieved from https://www.nonviolence.wri-irg.org/es/node/40530?language=en

Shimada, K., Tanaka, Y., Gomi, K., & Matsuoka, Y. (2007). Developing a long-term local society design methodology towards a low-carbon economy: An application to Shiga Prefecture in Japan. *Energy Policy, 35*(9), 4688-4703. doi:10.1016/j.enpol.2007.03.025

SIEMENS. (2017). Distributed Energy Systems. Retrieved from http://w3.siemens.com/topics/global/en/sustainable-energy/pages/distributed-energy-systems.aspx

Sige, T. (2016) */Interviewer: H.-T. Huang*.

Smith, A., Voß, J.-P., & Grin, J. (2010). Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Research Policy, 39*(4), 435-448. doi:10.1016/j.respol.2010.01.023

Solar-Bürger-Genossenschaft. (2013). Satzung Solar-Bürger-Genossenschaft.

SolarPowerEurope. (2016). Tenders for solar projects. 4-14.

SOONWALD-NAHE, N. (2014). Naturpark Soonwald-Nahe erhält Kernzonen. Retrieved from http://www.soonwald-nahe.de/aktuelles/Kernzonen.asp?jahr=2014

Späth, P. (2015, 13 July) */Interviewer: H. Huang*.

Spivak, G. C. (1985). Subaltern Studies: Deconstructing Historiography. *METHUEN: NEW YORK AND LONDON*, 197-221.

Storz, N., Oelsner, G.,Müller, T., Milkowski, N., Jenssen, T.,Hentschel, T. (2012). Bürger machen Energie, Rechtsformen und Tipps für Bürgerenergieanlage. *Karlsruhe/Stuttgart: Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg.*, 12-39.

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.

SWR (Producer). (2013). Windkraft contra Naturschutz. Retrieved from https://www.swr.de/odysso/windkraft-contra-naturschutz/-/id=1046894/nid=1046894/did=10981616/13ic9sy/index.html

Taiwan-Cogeneration-Corporation. (2013). Retrieved from http://www.cogen.com.tw

Taiwan-Environmental-Information-Center. (2013). 風車，瘋車，苑裡為何而反？

(Windturbine, Verrückte Windkraft, Warum bekämpft YuanLi?). Retrieved from http://e-info.org.tw/node/87147

Taiwan-Institute-of-Economic-Research. (2013a). Retrieved from http://www.tier.org.tw/comment/tiermon201305.asp

Taiwan-Institute-of-Economic-Research. (2013b).

Taiwan-NGO-Social-Enterprises. (2017). Retrieved from http://www.seietw.org/cooperation

Talent-Experiment. (2017). Warum gibt es Tauschringe? Retrieved from http://www.talent-experiment.de/index.php?option=com_content&view=article&id=19&Itemid=34

Teikoku-Shoin. (2013). Bevölkerungsdichte Japans.

The-Asahi-Shimbun. (11 March 2016).

Toyoda, Y. (2016). TRENDS AND DEVELOPMENTS OF Citizens' Co-owned Renewable Energy Power Plants. *Institute for Sustainability Research, Hosei University, Japan*, 87-99.

Toyoda, Y. (2017). Citizens' and Communal Power Plant National Survey Report 2016. *KIKNetwork*.

Ueda, S. (2016).

United-Daily-News-Group. (2009). 德商風電廠:感覺被台灣政府騙了(InfraVest:Getrogen von der taiwanesischen Regierung). Retrieved from http://blog.cnyes.com/my/invest-ycchu/article111707

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), 37-65.

Walk, H., & Schröder, C. (2014). Solidarität und Nachhaltigkeit in Städten: Die Rolle der Genossenschaften. *Berlin: Heinrich Böll Stiftung, 18*, 90-93.

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*(2), 64-82. doi:10.1162/glep.2007.7.2.64

Walter, G., Munz, I.,Halank, A. (2012). Das neue Marktprämienmodell in Deutschland-Bestrebungen für Bedarfsgerechtere Einspeisungen. *Branche ErnEuErbarE EnErgiEn.* Retrieved from http://www.advisoryhouse.com/UserData/Publication_1360865006.pdf

Welfare-Mall. (2016). Power Usage of Welfare Mall (January-December 2015).

Weltladen. (2016) */Interviewer: H.-T. Huang*.

Westermayer, M. (2017, 20 February) */Interviewer: H. Huang*.

Wiedemann, F. (2016). Nahwärmekonzept Schule Freiburg-Kappel. *econzept Energieplanung GmbH, Freiburg*.

WIKIPEDIA. (2015). Offshore-Windpark. Retrieved from https://de.wikipedia.org/wiki/Offshore-Windpark

Windpark-Prechtaler-Schanze. (22.Oct 2016) */Interviewer: H. H. Ecotrinova*.

Wolsink, M. (2000). Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support. *Renewable Energy, 21*, 49-64.

World-People-News. (2014). Anti-Windkraft zum Ende kommt.

Yamada, M. (2014) */Interviewer: H. Huang*.

Yamaguchi, M. (2014a) */Interviewer: H. Huang*.

Yamaguchi, M. (2014b). Urban Plan of Higashiomi City: Challenges *Department of Environment in City Higashi-Ohmi*.

Yamaguchi, M. (2016) */Interviewer: H.-T. Huang*.

Yegbemey, R. N., Yabi, J. A., Dossa, C. S. G., & Bauer, S. (2014). Novel participatory indicators of sustainability reveal weaknesses of maize cropping in Benin. *Agronomy for Sustainable Development, 34*(4), 909-920. doi:10.1007/s13593-014-0214-9

Yokaichi-Chamber-of-Commerce-and-Industry. (2016). Sun-San Project of Higashiomi. 1-22.

Yomiuri. (11 Mar 2016). *The Yomiuri Shimbun*.

Yoshida, S. (2014) */Interviewer: H.-T. Huang*.

Yoshida, S. (2016) */Interviewer: H.-T. Huang*.

Yoshihara. (2016). 高浜３、４号機仮処分決定（大津地裁）Q＆A (Takahama 3, 4 machine temporary disposition decision (Otsu district court) Q & A). Retrieved from http://www.yoshihara-law.jp/nonukes_faq.html

Your-Erope. (2017). Tendering rules and procedures. from Your-Erope http://europa.eu/youreurope/business/public-tenders/rules-procedures/index_en.htm

Yu, Z. (2014). The Latest Reform and Enlightenment of Japanese NPO Legal Person System. Retrieved from http://kyhz.nsa.gov.cn/xzxy_kygl/pf/xzxywz/yksInfoDetail.htm?infoid=1956

YuanLi, S.-H.-G. (September 2013) */Interviewer: H. Huang*.

Appendix

Date	Interviewee	Place	Content	Interviewer
3. Sep. 2013	Bureau of Energy / YuanLi Self-Help-Group	Taipei	Safe distance of wind turbine	Fight on site
9-10,Sep. 2013	Self-Help-Group	YuanLi	Problems of wind turbine projects	Group interview/Investigation on the site
26. Apr. 2014	Christian Wangart	Kirchzarten	Electricity generation with vegetable oil	Investigation of ECOtrinova
10. May. 2014	Bürgerenergie eG	Achkarren / Vogtsburg	Large PV system	Investigation of ECOtrinova
24. May. 2014	Solarbürgergenossenschaft eG	Gundelfingen	Mini-CHP for self-sufficient power	Investigation of ECOtrinova
26. May. 2014 ~now	Solarbürgergenossenschaft eG, ‚Arbeitsgruppe'	Freiburg	Projects of solargeno	Group discussion
31. May. 2014	Harald Rinklin (Rinklin-Naturkost GmbH)	Eichstetten/ Kaiserstuhl	Natural food wholesaler in the region	Investigation of ECOtrinova
15 Jul 2014	Dr. Georg Loeser (ECOtrinova)	Freiburg	Electricity system	Interview conducted with Prof. Liu
16. Jul. 2014	Dr. Burghard Flieger	Freiburg	Energy prosumer	Interview conducted with Prof. Liu

12-13. Nov. 2014	Dr. Kyoko Ohta, University of Tokyo; Dr. Niki Frantzeskaki , Transitions DRIFT; Satoru Mizuguchi, Journalist.	Tokyo	Preparation meeting for the investigation in HigashiOmi	Conducted with translator: Liu, Pei-Yu
17. Nov.2014	Workshop	Higashiomi.	Local Economics-Disabled Welfare, Agriculture and Self-Produced Energy	Conducted with translator: Liu, Pei-Yu
18&26. Nov. 2014 (second time: 10. Mar. 2016)	Nomura Masatsugu, Manager of Welfare Mall	Higashiomi	Operation of Welfare Mall	Personal interview translator: Liu, Pei-Yu Liao, Wei-Ni
19. Nov. 2014	Ueda Shigetaro, Director General, NPO-AI-ECO,	Higashiomi.	Regional agriculture	Personal interview
21. Nov. 2014 (second time: 20. Mar. 2016)	Yamada Minoru, Congress Man of Democratic Party	Higashiomi	NANOHANA Eco Project	Personal interview translator: Liu, Pei-Yu
21. Nov. 2014 (second time: 15. Mar. 2016)	Masuda Takashi, Director of NPO 'NANOHANA Eco Project'	Higashiomi	NANOHANA Eco Project	Personal interview translator: Liu, Pei-Yu Liao, Wei-Ni
26. Nov. 2014 (second time: 12. Mar. 2016)	Michiko Yamaguchi, Director of the project 'Green Empowerment'	Higashiomi	Green Empowerment	Personal interview translator: Liu, Pei-Yu Liao, Wei-Ni
26. Nov. 2014 (second time: 22. Mar. 2016)	Nishimura Toshiaki,'NouGaku 'Consulting of Agriculture and Energy	Higashiomi	Citizens' Power Plant	Personal interview translator: Liu, Pei-Yu
27. Nov. 2014 (second time: 10. Mar. 2016)	Yoshida Sadao, Head of secretariat,Chamber of Commerce and Industry	Higashiomi	Regional Currency and Citizens' Power Plant	Personal interview translator: Liu, Pei-Yu
9. May. 2015	Michael Wagner	Freiburg	Four hydroelectric power stations in Freiburg	Investigation of ECOtrinova

16. May. 2015	Regiozentrum and Lebensgarten Dreisamtal e.v.	Kirchzarten	Permaculture	Investigation of ECOtrinova
2. Jul. 2015	Bürgerenergiegenossen-(BEG)-Stammtisch (E-Werk Mittelbaden/fesa e.V./ BEG Biberach/ Ettenheimer Bürgerenergie eG)	Offenburg	Decentralized energy system	Join with solargeno
4. Jul. 2015	Workshop	Treffpunkt Schwabentorring 2, Freiburg	Transition gardens, Housing exchange, Energy.	Group Discussion
10. Jul. 2015	Dr. Carola Holweg	Vauban	Combination of agriculture and energy	Interview conducted with Yiching Li
12. Jul. 2015	Dr. Manfred Westermayer	Vauban	Environmental History in Freiburg	Interview conducted with Yiching Li
13. Jul. 2015	Dr. Philipp Späth, Institute for Environmental Social Sciences and Geography	Freiburg	Energy transition/Stakeholders	Interview conducted with Yiching Li
14. Jul. 2015	Thomas Forbriger(Educational Consultant, Eine Welt Forum Freiburg e.V.)	Freiburg	Local agriculturalsupply chain	Interview conducted with Yiching Li
23. Jul. 2015	Thomas Dresel (Environmental Council, City of Freiburg)	Freiburg	Energy transition, and a map of Freiburg	Interview conducted with Yiching Li
17. Oct. 2015	Passive house	Merzhausen, Freiburg	CHP & PV & Battery plus wood burning	Investigation of ECOtrinova
24. Oct. 2015	Ch. Meyer, Energy-Consulting Meyer	Heimschule St.Anton	PV-Autonomus community	Investigation of ECOtrinova

7. Nov. 2015	'Qualification Workshop': Regionetz Südbaden fesa e.v. LUBW etc.	Emmendingen	Solar power to tenants-new business models for energy transition	Join with solargeno eG
27. Nov. 2015	Gerhard Weber und Daniel Licht, Weber Heating Ventilation GmbH	Waldkirch	Mini-CHP and E-Mobility with CHP & Solar	Investigation of ECOtrinova
28. Nov. 2015	Bürgerenergiegenossen-(BEG)-Stammtisch	Titisee	Cogeneration of heat and power for citizens' cooperatives and municipalities	Interview conducted with Yiching Li
14. Dec. 2015	Bobsien Armin (fesa e.v.) Adriana Sri Adhiati	Riegel am Kaiserstuhl	Citizens' Initiatives in energy	Interview conducted with Yiching Li
15. Feb. 2016	Matthias Futterlieb (BürgerEnergie Berlin eG)	Berlin	Power supply grid in citizens' hand	Personal Interview
6. Mar. 2016	Hui-Ming Chen (Township Mayor) / Qing-Hai Chen (Leader of Self-Help Group)	YuanLi	Aftermath of the resistance/ Communal development	Personal Interview
Nov. 2014 Mar. 2016	Kobayashi	Higashiomi	Co-existence of fish and rice field	Personal Interview translator: Liao, Wei-Ni
11. Mar. 2016	Ohta Osamu (Day Care Center)	Higashiomi	Operation of Day Care Center	Personal Interview translator: Liao, Wei-Ni
13. Mar. 2016	Tami Ueda (Farm House)	Higashiomi	Investment in citizens' PV cooperatives	Personal Interview translator: Liao, Wei-Ni

15. Mar. 2016	Fujii, Ayako (Initiator of NANOHANA Eco Project)	Higashiomi	NANOHANA Eco Project	Personal Interview translator: Liao, Wei-Ni
18. Jun. 2016	Dr.Carola Holweg Manfred Voigt(ROM Kompost)	Emmendingen	Biochar compost	Personal Interview
1. Aug. 2016	Weltladen/ Dagmar Große,Eine Welt Forum/ Namsook Lee/Manfred Westermayer/	Freiburg	Fair trade/Organic food/Local agriculture	Group discussion
22. Oct. 2016	Windpark Prechtaler Schanze	Gutach, Mühlenbach	Wind park project with E-Werk Mittelbaden AG & Co. KG	Investigation of ECOtrinova
10. Jan. 2017	FoodCoop	Freiburg	Operation of FoodCoop	Personal visit
15. Feb. 2017	Brigitte Kremer	Freiburg	Investment in wind energy	Personal Interview
9. Mar. 2017	Thobias Hass	Tübingen	Decentralized electricity system	Personal Interview
29. Jun. 2017	Christine Clashausen, EnBW AG.	Düsseldorf	Eneterprises' reaction on the new tendering system	Personal Interview