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**Citizens' Power Plants in Taiwan: Driving Forces
from Bottom-up and Top-Down**

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Dr. Hui-Tzu Huang

1. Introduction

Energy transition as a term symbolizing the transition from pollutant electricity system to clean energy system, has not only played a role in the mainstream of the renewable energy policy of the Taiwanese government, but also has been initiated by the Taiwanese locals.

With the 'half-monopolistic' electricity system, the citizens' power plants initiated by the locals in Taiwan oppose to some extent to the existing energy system. To them, energy transition also means the transition of the existing electricity system. Thus, it is meaningful to analyze the differences between the two driving forces of the top-down and the bottom-up.

There is also interplay between these two driving forces. From the perspectives of the bottom-up, energy policy has a tremendous impact on the action from the locals. Besides, local organizations also rely largely on the associated rules from the officials. On the other hand, the official organizations try to lead the trend of citizens' power plants instead of empowering it to the locals. This means that the energy policy has been also influenced by the local actions.

Energy autonomy is not just a policy goal, but instead, it stems from diverse voices and different motives. To put it simply, we hope to draw a clearer picture of the current state of energy autonomous movement in Taiwan through this study.

2. Problem Statement and Research Objectives

2.1

Different organizations in Taiwan are advocating energy transition, energy autonomy and citizens' power plants. However, there are obvious differences between the reasons for their initiations and the contents. Although the concepts of citizens' power plants were originally initiated by the locals, we can find that the official organizations also claimed to have the dominant power on this issue.

The renewable energy policy of the Taiwanese government were carried out in a large-scale and a rapid manner, but this is in contrast to the concept of citizens'

power plants, which emphasizes public participation. Citizens in Taiwan advocated that citizens, including communities, schools, households or individuals, in participate in the production of renewable energy in the way of mass cooperation, thus proposing the concept of a citizens' power plant.

However, the government also proposed that the government should be the crucial actor to promote citizens' power plants. Therefore, based on conceptual differences, this study focuses on different driving forces in citizens' power plants. More specifically, the following research questions need to be addressed:

- a) What are the motives which lead citizens to develop their startup idea of building up citizens' power plants at the local level?
- b) In what aspects do the above mentioned bottom-up and top-down forces interplay, conflict or coincide with each other? More importantly, what are the influencing factors behind the political and economic relations?

2.2

The purpose of this research is to analyze the dynamic process of citizens' power plants in Taiwan from bottom-up and top-down forces. As to the research objectives, the top-down force include the central units represented by the Bureau of Energy, the Environmental Protection Administration and the Taiwan Power Company; the bottom-up force is initiated by the local groups such as energy-related social enterprises, communities and environmental groups.

The dynamic interplay of these two driving forces will be proved by the analysis of 1) the causes of their initiatives and their opposing parties 2) the patterns of their interests distribution.

3. Research Method and Theoretical Approach

3.1

The primary research method for this study is interview and literature review. 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 (H.-T. Huang, 2017; Prell et al., 2007). The entire process of interview conduction lasted about eight months, starting from a solar Farm from YunLin County in July 2018, and then followed by several other renewable energy social enterprises such as Sunny Founder and DOMI Earth, as well as environmental protection organizations.

3.2

This study argues that the development of citizens' power plants should be regarded as the transition process of society and technology. The theory of Multi-Level Perspective (MLP) put forward by Geels is a complex dynamic process for understanding sociotechnical change, which not only analyzes from the macro-, meso- and micro- levels, but also introduces power and politics into the topics related to green innovation (F. W. Geels, 2002; Frank W. Geels, 2014).

The macro- level refers to a socio-technical landscape , including a set of deep structural trends. For the interaction of actors, this means the external structure and context such as oil prices, economic growth, wars, emigration, political coalitions, cultural and normative values, and environmental problems. Geels believes that the trajectory of socio-technical change is located in this landscape map.

Geels defines the meso- level as sociotechnical regimes which represents a stable technology development. He differentiates it into seven dimensions, including technology, user practices and application domains (markets), symbolic meaning of technology, infrastructure, industry structure, policy and techno-scientific knowledge. These dimensions are stable because they are interconnected and these links are maintained and re-formed by their coalitions and coordination.

At the micro- level, the niches, Geels and Schot (1994) believe that niches are blocked by general market, so they play the role of incubation space for radical innovation. Radical innovation technology needs such space for protection, because the selection criteria in the niches are different from the general ones. The niche is also a field that provides a learning process- learning by doing, learning in use, and learning in interaction. Besides, niches also provide space for social network to support innovations such as supply chain or consumers' relationships. Therefore, the niche is the seed of change.

These three levels of analytical perspective help us analyze the dynamic development of citizens' power plants. Although the citizens' power plants are stimulated and

triggered by the niche level, they are also affected by the existing regime and sociotechnical landscape. As Geels said, regime is embedded in landscape, and niche is embedded in regime. Changes in the landscape level will put pressure on the level of regime and promote the emergence of new technologies. We can position the bottom-up driving force as the niche level, and the top-down driving force as the regime level, and then observe the interactions of these two levels under the scope of landscape level.(F. W. Geels, 2002; Frank W. Geels, 2011)

According to the MLP theory, when tensions emerge in the regime level, the configuration and connection will be loosened, which creates opportunities for radical innovation to escape from the niche level or integrate into regime (F. W. Geels, 2002). We can find that citizens' power plants can rise from the locals in part because the existing energy systems have been challenged. Under this condition, citizens' power plants have not only become emerging concepts, but have also gradually entered the stable sociotechnical structure of regime level.

4. Liberalisation 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.

Electricity Transmission of IPP

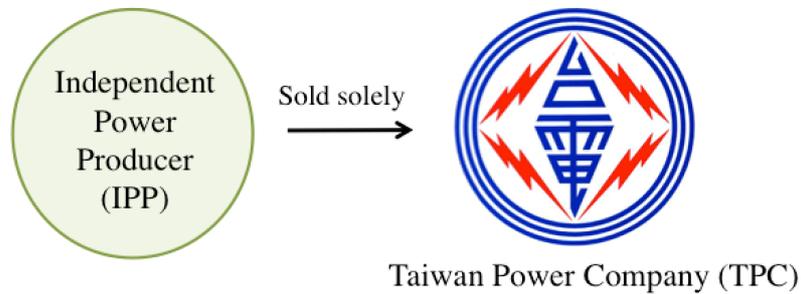


Fig. 3.2: Electricity produced by Independent Power Producers (IPP) is required to be sold solely to the Taiwan Power Company.

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).

Composition of the Staff of the Energy Authority

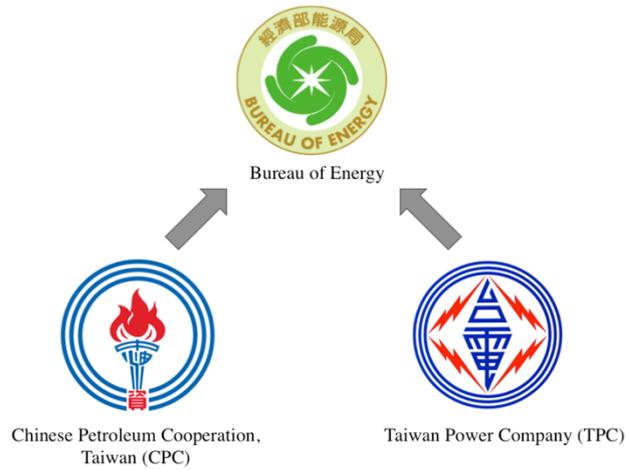


Fig. 3.3: After the reorganization of personnel, the Chinese Petroleum Cooperation and Taiwan Power Company were centrally governed by the Bureau of Energy.

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).

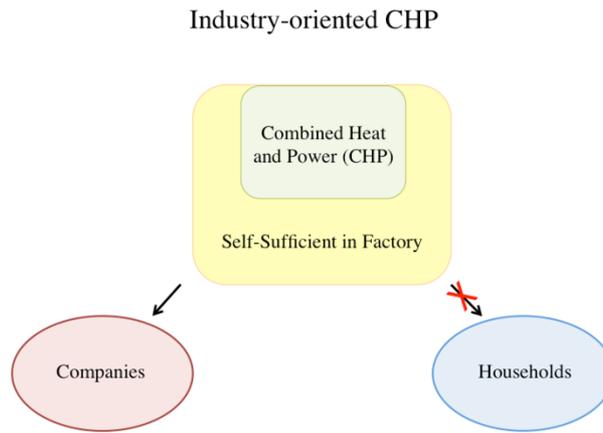


Fig. 3.4: Cogeneration of heat and power system is industry-oriented in Taiwan, and not liberalized to the households.

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.¹

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