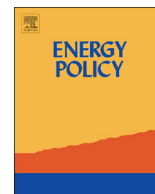




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Application of German energy transition in Taiwan: A critical review of unique electricity liberalisation as a core strategy to achieve renewable energy growth

Anton Ming-Zhi Gao^{a,*}, Chien-Te Fan^a, Chao-Ning Liao^b^a Institute of Law for Science and Technology, National Tsing Hua University, 101, Section 2, Kuang-Fu Road, Hsinchu 30013, Taiwan, ROC^b Department of Economics, National Tsing Hua University, 101, Section 2, Kuang-Fu Road, Hsinchu 30013, Taiwan, ROC

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ABSTRACT

Since the launch of the Energiewende (Energy Transition) in Germany in 2010, the concept influences on energy and climate policies around the globe. In May 2016, the Taiwan government began promoting renewable energy (RE) and phasing out nuclear power. However, it has not used the Renewable Energy Development Act, which is similar to the German Erneuerbare Energien Gesetz, as the main instrument. Instead, the new government has prioritised the revision of the Electricity Act and the introduction of liberalisation to allow RE producers to compete in the market and sell directly to end consumers.

The main purposes of this article are to provide a critical review of this unique way of promoting RE under an energy transition and to determine the significance of Germany's energy transition strategy as a framework to promote RE development.

The finding is that ambitious RE promotion schemes should remain at the core of energy transitions, while the liberalisation of electricity could play a supplementary role in an interconnected continental energy system to mitigate intermittency, which is one of the weaknesses of RE. Permitting expensive RE to be sold directly at the low market price of electricity would fail to give impetus to further RE development.

1. Introduction

Concerns regarding climate change and extreme weather have led to the recent coming together of all nations, with the common purpose of undertaking ambitious efforts to combat climate change and adapt to its effects under the Paris Agreement (UNFCCC, 2015). The Paris Agreement was entered into force on 4 November 2016, thirty days after at least 55 parties in the Convention, accounting for an estimated 55% of total global greenhouse gas emissions, deposited their instruments of ratification, acceptance, approval, or accession with the Depositary (UNFCCC, 2017). It is expected that this agreement will have a strong impact on the energy sector (Fragkos et al., 2017).

In recent years, the idea of Energy transition as a way to mitigate climate change has been becoming increasingly popular worldwide (Carlarne, 2010). The most successful example is Germany's Energiewende (energy transition), introduced in 2010 (BMW, 2010). The success of Germany's energy transition sends an important signal of the shift away from a fossil fuel economy (Pegels and Lütkenhorst, 2014), in spite of the recent carbon emission backlash resulting from the closing down of nuclear power plants in 2016 (Nelson, 2016). The

influence of this great lesson soon spread to France, which began promoting its own version of energy transition and green growth through the Energy Transition for Green Growth Act of 17 August 2015 (French government, 2016).

The move by these two key member states has had a bottom-up influence on the EU. On 30 November 2016, the EU announced its intention to develop and present a package of measures to remain competitive, as clean energy transition is changing global energy markets (DG Energy, 2016a). It is hoped that such an energy transition could contribute to the implementation of the Paris agreement (DG Energy, 2016a).

The wave of energy transition in Europe is affecting the rest of the world as well. For instance, in May 2016, Japan created a German–Japanese Energy Council aimed at promoting energy transition (GJETC, 2017a). Despite their differences in energy policies, Japan and Germany are confronted by a similar challenge: to restructure their energy systems in such a way that they are low-risk, reliable, resource-efficient, and climate-neutral in the long term (DBU, 2016). Matching the pace of Japan, since May 2016, when the new government of Taiwan came into power, the promotion of renewable energy (RE) has

* Corresponding author.

E-mail addresses: antongao@mx.nthu.edu.tw (A.M.-Z. Gao), ctfan@mx.nthu.edu.tw (C.-T. Fan), liaoan@mx.nthu.edu.tw (C.-N. Liao).

been on its policy agenda (DPA, 2016). On 23 December 2016, the Ministry of Economic Affairs' Bureau of Energy (MOEABOE) and the German Consulate in Taipei signed a declaration of intent to cooperate in energy transition (Joint Declaration of Intent on Cooperation in the Field of Energy Transition) to bolster efforts on related issues (Taipei Times, 2016a). Unofficially, the idea of Energiewende has also influenced experts in Asia, for example, in South Korea (Kim, 2015) and China (Wang and Watson, 2008), as to governmental energy and climate change policies.

The main goals of this article are to elaborate on energy transition strategies around the world and assess the energy transition strategy in Taiwan. Particular attention is given to the interaction and inter-relationship between RE development and electricity liberalisation with respect to energy transition. The electricity liberalisation in this article is defined as the introduction of a competition and market mechanism into the original highly regulated electricity market, thus exclude privatization.

Therefore, we first provide an overview of the concept of energy transition and investigate the policy mix for achieving multiple goals (e.g. emission reduction, RE development, sustainability). Despite the multi-policy directions, the preliminary finding is that, the development of RE usually stands at the core of energy transition measures (Morris and Jungjohann, 2016). However, there is some controversy as to whether electricity liberalisation facilitates or impedes RE development and energy transition. Subsequently, we highlight Taiwan's unique approach in adopting electricity liberalisation as the core of promoting RE development through the recently passed EA in January 2017 (Executive Yuan, 2017).

Furthermore, we provide an overview of RE promotion schemes before and after the establishment of the feed-in tariff (FIT), under the RE Development Act (REDA) of 2009, which follows Germany's FIT model. We also elaborate on the legal design of the three new RE privileges and roles under EA to promote RE development, and evaluate whether this unique way of using 'liberalisation as the main strategy' under EA could boost RE development in Taiwan.

2. Overview of energy transition strategy

2.1. Context of energy transition

The broadest meaning of energy transition treats it as a *neutral* concept, similar to the historical evolution of energy. For example, some studies define energy transition as a shift in the energy mix (Chabrol, 2016).

However, currently, this concept is more commonly explained the German way. Energiewende is the word used for Germany's energy policy—Energy concept—in 2010 (Agora Energiewende, 2015). It embraces the transformation of the traditional energy system (fossil-fuel-based) to a new, RE-based system (Electricity Journal, 2016). This context is more relevant to the current energy transition wave around the world. Therefore, in this article, we follow this definition and scope.

2.2. Energy transition strategy

With a view to achieving such a transition, the German government has adopted comprehensive policies and laws to deal with the supply side (RE promotion and nuclear phase-out, energy market reform) and demand side (e.g. energy efficiency and conservation, energy-efficient buildings), as well as overall climate mitigation concerns (Anon, 2010). The comprehensive policy and legal roadmap adopted by Germany is provided in Table 1.

Based on their energy situations and concerns, different countries may adopt different policies and legal measures for energy transition. One would assume that the different energy demand and supply situation, economic structure, energy resources, social development, and international status among different countries would prevent us from

Table 1

Policy and legal roadmap for German Energy Transition.

Source: The German Energiewende Book, <https://book.energytransition.org/>.

Policies for clean energy	
A. Nuclear phase-out	
B. RE Act with feed-in tariffs and auctions	
C. Emissions trading	
D. Environmental taxation	
E. Cogeneration Act	
F. RE Heating Act and Market Incentive Program (MAP)	
G. Act on Accelerating Grid Expansion	
H. Energy-Conservation Ordinance (EnEV) and financial support schemes	
I. Ecodesign/ErP Directive	
J. International Climate Initiative	
K. Coordination with the European Union	

Table 2

Common Elements of Energy Transition in Germany, France, EU, Japan, and Taiwan.

		Germany	France	EU	JP	TW
Overall Supply	GHG emission reduction	V	V	V	V	V
	Renewable electricity	V	V	V	V	V
	Reduction or phase out of nuclear power	V	V		V	V
Demand	Electricity Market reform	V	V	V	V	V
	Energy conservation and efficiency	V	V	V	V	V
	Energy buildings emphasis	V	V	V	V	V

Compiled from the following references:

- Germany: The German Energiewende Book, <https://book.energytransition.org/>.
- France: Energy transition | Gouvernement.fr, www.gouvernement.fr/en/energy-transition.
- Europe: Commission proposes new rules for consumer-centred clean energy transition, Wednesday, 30 November 2016 <http://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>.
- Japan: Junko Mochizuki, Stephanie E. Chang, Disasters as opportunity for change: Tsunami recovery and energy transition in Japan, International Journal of Disaster Risk Reduction, Volume 21, March 2017, Pages 331–339; Aleh Cherp, Vadim Vinichenko, Jessica Jewell, Masahiro Suzuki, Miklós Antal, Comparing electricity transitions: A historical analysis of nuclear, wind and solar power in Germany and Japan, Energy Policy, Volume 101, February 2017, Pages 612–628; Is policy on track for an energiewende in Japan? – Energy Transition, <https://energytransition.org/2016/07/is-policy-on-track-for-an-energiewende-in-japan/>; <https://www.hertie-school.org/the-governance-post/2015/11/japanese-energy-transition/>.
- Taiwan: Renewable Energy Promotion Policies in Taiwan, <http://docplayer.net/18221111-Renewable-energy-promotion-policies-in-taiwan-bureau-of-energy-ministry-of-economic-affairs.html>; EA of 2017, <http://law.moj.gov.tw/LawClass/LawAll.aspx?PCode=J0030011>.

finding a common analytical framework for the energy transition. For Taiwan in particular, where legal traditions have long been based on those in Germany, this similarity could be vital. However, common elements can likely be identified. From recent developments in energy transition in the EU, France, Japan, and Taiwan, we can identify common elements in policy and legal issues, as shown in Table 2. All of these countries appear to follow Germany's energy transition model.

2.3. Priorities and core measures of energy transition

From Table 2, we can see various measures for achieving multiple goals. However, the core elements of energy transition can still be identified. From the targets set by the EU for 2020 or 2030, we can narrow down the policy directions in Table 2 to three key elements:

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