

Climate Change Governance in Taiwan: Transitional Gridlock in a High Carbon Regime*

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Abstract

The examination of climate governance in Taiwan requires a long term perspective of social transformation to dissect the triple helix interaction of energy and carbon emissions, industry, and air pollution control. From the challenges faced during the structural transformation of these three facets, we can see the government's long-term efforts in climate policy and the gridlock it has faced, as well as corresponding criticisms from civil society and its power to reverse policy decisions.

This article attempts to explain the structural impediments that have prevented the transformation of governance. From the Asian perspective of cosmopolitan climate governance, it is necessary to analyze which path dependency has resulted in the quandary of national governance and even of social transformation. The influence of the developmental state, the politics of authoritarian regimes, the economy's high carbon makeup, the brown energy framework, and the ideology of carbon capitalism are examined as contributing factors.

Keywords: High Carbon Regime, Lock in, Brown Economic and Energy, COP21

I. Introduction

Modern society faces large scale transformative societal change, especially since the engine of modernity of contemporary social operations are powered by fossil resources or coal-fire power which have dominantly molded the centralized system, resulting in the structure of political decision-making tending towards centralized, linear thinking, which has led to the control, distribution and management of society's development (Loorbach *and* Rotmans, 2006; Frantzeskaki, Loorbach *and* Meadowcroft, 2012). However, this set of operating mechanisms has created the lock-in of negative externalities, and the long term resistance to innovation and change has resulted in a high degree of systemic vulnerability (Beck, 1986, 1992), which is the criticism from reflexive modernization of the self-development of industrial society which has led to the massive risk society, and even of the world risk society. Or, based on what Geels believe, is such that a socio-technical system based on fossil energy would result in contested modernization (Geels, 2006; Rotmans *and* Loorbach, 2009).

Urry (2011) criticized such development from a path dependency perspective, saying that the various social systems that we see today, including the energy systems, fuel inefficient automobile transportation, long-distance commuting, and energy inefficient technology, etc., has constructed today's modern capitalistic system, which has basically established a system of high carbon operations. And also, the large-scale socio-technical system and operating mechanism, through the accumulation of different dispossessions have further developed into the high carbon capitalistic ideology today. Among them, to Urry (2011), the most critical of which is how the high carbon regime has achieved the legitimacy and ability to sustain its operations.

With such a sense of the problem, this paper will mainly discuss the

issue of Taiwan's climate governance, and provide an initial analysis of Taiwan in the context of Asia's political and economic development, and the structural dilemmas and challenges to governance.

II. Theoretical framework

A. Transitional management

From the theoretical elements of reflexive modernization (Beck, 1986, 1992), the proponents of transition management had attempted to propose reversing the industrial risk society model, to move towards a green and sustainable new social development model. Transition management is considered a long-term transition process of governance which takes on a sustainable, forward-thinking, adaptive, and multi-actor approach. It influences and promotes social change, and using reflexivity and self-criticism, together with mutual innovation and competition from within society, social experiments and via conducting small social experiments, to constantly self-improve and to evolve and transit from an old system to a new system. Among them, it is most important to construct a Leitbild (guiding vision) to lead the change, that is, it requires a clear and refreshed discussion to bring about the transformation (Voß *et al.*, 2006; Grin, 2006; Kemp *and* Loorbach, 2006). Therefore, this form of sustainability foresight analysis requires self-critical and self-corrective reflexive governance (Voß *et al.*, 2006; Stirling, 2007). Such a process is non-linear, and after an initial period of gradual change, structural change brought forth by breakthroughs would produce social, economic, cultural, ecological and systemic co-evolution (Rip, 2006) and rapid change (Kemp *and* Loorbach, 2006).

The research approach to reflexive governance is more suitable for developed countries which followed industrialization than Asian countries which are driven by high-carbon economies, especially since these countries also currently face the demands and challenges of a low-carbon economy

and social transformation. Wang, J. H. (2012) pointed out that the reflexive governance approach proposed by Beck (2006) could be used as a new method to reflect on the “development” of individual countries. In particular, developmental states emphasize economically-driven social change, and the quick imitation and catch up of advanced industrialized countries whose foundations were laid using fossil fuels, but which left behind numerous environmental and labor exploitations. Faced with major transformation today, it is necessary to conduct a more comprehensive and extensive study of the “developmental” implications of the country.

The analytical path of reflexive governance needs to start from a self-critical and reflective evaluation of the country’s decision-making and regulatory structure, which should include analysis at two levels of the institutions and agents (Grin, 2006; Voß *et al.*, 2009), of which the former could focus on the government’s decision-making, policies, systems and regulation, while the latter could be directed at the diverse actors, such as government personnel, industrial groups, civil society, and other stakeholders. This paper will largely focus on the former, and will explore the historical path of the transitional difficulties caused by the long-term impact of Taiwan’s high-carbon industry and high-carbon energy structure, and how the persistent supporting policies, and the component subsidies and low electricity prices, have led to the neglect by industries in the investment of innovation, and research and development, which has thereby resulted in the delay in transition.

B. Path dependency

Transition management which possesses a reflexive governance importance will focus on examining the path dependencies that cause social ecological transformation, including for the *cognitive, institutional, technical, and economic patterns*, and considers whether as society moves towards transformation whether these facets will impose strict restrictions and obstacles and lock-in social innovation and change onto a certain

track (Voß *et al.*, 2006; Rip, 2006). Further, a persistent problem is that complexities are deeply-rooted in the social structure, which has formed a structural path dependency that has locked-in social change and innovation to certain technological biases, dominant networks and administrative obstacles, etc. Therefore, to overcome these systemic failures requires the restructuring of the social system, and the reconfiguration of society's development and its values, in order to transform (Rotmans *and* Loorbach, 2009, 2010). In other words, transformation will be undertaken via the systems change and institutional innovation of the fundamental structure of society, using a long-term and systems thinking, and the participation of diverse fields and multiple stakeholders, to develop the economy, culture, technology and ecology at the various institutional scales (Rotmans *and* Loorbach, 2006).

Marshall *and* Alexandra (2016) highlighted the obstruction to policy innovation caused by institutional path dependency. They analyzed Australia's Murray-Darling Basin's study of the retardation and predicaments of the transformation of water resources policy as an example, and pointed out that researchers should use context-specific institutional analysis in their observations. Barnett *et al.* (2015) also analyzed that institutional path dependency can also result in the obstruction of change, and affect the speed of change. It pointed out that path dependent institutions are resistant to change. When such resistance causes climate adaptation to become slow, they will then become obstacles and limitations. In general, the barriers that are commonly agreed upon include a lack of or inconsistent leadership, insufficient knowledge of risks and responses, inadequate funding, difficulties in negotiating between competing values and goals, a lack of institutional support, and poor coordination across various levels of government. Buuren *et al.* (2016) emphasized that in the Netherlands, the dominant policy coalition created obstacles, which delayed the envisioning of a new paradigm for the Dutch's flood risk management. Pierson (2000) pointed out very early on that four characteristics of politics had resulted in the

main cause of path dependence: the conservative nature of institutions, the high density of institutions resulting in barriers to entry, power asymmetries which become self-reinforcing, and the complexity of policy environments that gets in the way of learning (Buuren *et al.*, 2016). Obviously, the research on path dependency needs to highlight the decision-making system, knowledge, social cognition and values, with a view of the limitations of the framework used by decision makers in decision-making.

C. Developmental state

In analyzing the climate and energy governance of the Asian countries, in addition to referencing the transition management theory, and using the transformation of institutional obstacles, market structures, technological systems, ideologies, policy discussions and values, etc., as pathways to the problem, it is most important to use an analytical perspective of reflexive governance as an entry point to understand the government's decision-making and the social contexts in the Asian countries.

Taking Taiwan as an example, in the late 1980s, for latecomer countries like South Korea which had to play catch-up with the industrialized countries, other than learning from and imitating the type of development of these industrialized countries, the fast-paced, accelerated and compressed process of industrialization resulted in the serious neglect of society's labor, environment, gender, etc. and their rights and related issues, which spawned long-term problems of exploitation.

In terms of the reflexive criticism of political and social development, Chou (2000, 2002) explained that since the fast-paced, accelerated and compressed process of industrialization from the early 1980s, there was also the configuration of authoritarian politics and its transformation into democracy, but although there was considerable resistance on labor, environment, and political issues at that time, civil

society still lacked the systematic and endogenous ability to construct risk knowledge, and were unable to respond quickly which had implications on their ability to have strong control. On the other hand, the structural dominance and continuation of authoritarian expert politics and the developmental state logic of prioritizing economic development, have led to various environmental and technological risks becoming hidden and neglected. In the long run, the result has been to create a delayed high-tech risk society with institutionalized hidden risks. South Korean scholar Chang (2010) had thus used the concept of compressed modernization to explain the development of his country.

But the delayed risk society poses massive challenges for a country which is rapidly undergoing the transformation of its climate and energy governance, and if it is unable to suitably construct transparent and participatory technology policies, it might evolve even deeper systemic risks, as underlined by the OECD (2003).

And we can see that although the newly-elected ruling DPP has established social justice as the cornerstone in the Guidelines on Energy Development (under social risk communication and public participation) that it has recently launched, and is proactively involving citizen participation in the Energy Transition White Paper that it has formulated, but the nature of authoritarian expert politics in decision-making has not been completely eradicated, which has resulted in high vulnerabilities and systemic risks lurking in the development of Taiwan's recent climate and energy governance. As such, there needs to be greater transparency in transformation, and learning from and participating in the socio-technical system is therefore not something worth encouraging.

In fact, it can be initially said that the politics, economy, technology and governance, etc. for the whole of Asia has been dominated by authoritarian expert politics as part of its historical formation, with economic development as the driving force, although such a governance

model is being gradually challenged by society. And it is therefore even more necessary that in the context of authoritarian expert politics and delayed risk society in Asia, that the concept of accumulation by dispossession as emphasized by Harvey (2003) should be revised.

III. Methodology

As a developmental state dominated by authoritarian expert politics, Taiwan's government is similar to other Asian countries, in prioritizing economic development as a driver for social transformation, but as a result has neglected environmental and labor risks over the long-term; and therefore presents with the difficulties faced today in climate and low-carbon transformation. As the viewpoints for path dependency analysis is wide-ranging, this paper will use the perspective of reflexive government as an entry point to analyze the question of social transformation, first, by limiting the analysis to the industrial and energy structures (economic models), electricity and water prices, and fossil fuel subsidies (regulations), to demonstrate the formation of the high-carbon, brown economic package.¹ Second, a brief social analysis will also be conducted on the struggle for environmental movements, and the perceptions and attitudes of the public towards climate and energy issues, to examine the indications that society has already undergone a paradigm shift. Third, by analyzing

¹ This paper defines the brown economic package as a society whereby the exploitation of the environment and labor forms the core of economic activity and capital accumulation, in particular among the high-carbon industries, and the resultant problems they bring about in terms of high energy consumption, high pollution levels and high water consumption. It can also be referred to as an exploitation system based on the externalization of environmental costs while at the same time depressing the value of labor (see Chou *and* Walther, 2016). In addition, the brown economic package does not only refer to brown industries, but also to brown energy such as nuclear power, coal-fired power generation and other low-cost electricity production and electric power systems, etc., which have delayed industrial innovation, as well as research and development, and slowed down transition.

from the aspect of governance, we explore the declarations of the carbon reduction policies, the lack of a clear roadmap, and the discussion of climate and energy issues, to understand how we are tied down by the challenges of the discussions over the high-carbon and brown economy, which has resulted in a social transformation quandary.

For the data collection and chart depiction, the authors have largely used reports and statistical data from government sources to conduct the analysis, and as for data on carbon emissions from the industrial and energy sector, and on energy subsidies, these come from the Environmental Protection Agency and the Bureau of Energy; data for the industries' contribution to GDP comes from the Directorate General of Budget, Accounting and Statistics, and data on subsidies come from the International Energy Agency (IEA); and for information on the government's major energy and industry conferences, policies and announcements, these mainly come from the Executive Yuan, the Bureau of Energy and the Environmental Protection Agency. The analysis of environmental movements and initiatives come from the cumulative research outcomes of one of the authors. At the same time, from the brief analysis of the results from the surveys that the author conducted on climate change risk perception in 2012 and 2015, we point out that Taiwan's society is currently undergoing a paradigm shift. By connecting and amassing these sources of information, we developed a framework to understand Taiwan's high-carbon economy and high-carbon energy structure.

IV. The transition lag of a high-carbon society

A. Path dependency - of a high-carbon industrial structure

Observing the trend curve of the growth of carbon dioxide emissions in Taiwan over the years would enable us to see the problem of the emissions composition clearly. As Taiwan's development is highly dependent on the foreign trade economic-orientation of the manufacturing

industry, and in a situation where the development of indigenous and renewable energy has not been fully developed, and imported energy largely comprises fossil fuels, the sustained development of an energy-consuming manufacturing industry will directly lead to an increase in greenhouse gas emissions. We can observe in Figure 1 the cumulative trend of the emissions from the various sectors from 1990 to 2016. In 1990, the total carbon dioxide emissions released in Taiwan were about 109.46 million metric tons. The total carbon dioxide emissions increased to 209.26 million metric tons in 2000, reaching 98.52 million metric tons in the industrial sector, or 47.08%. By 2016, the emissions had increased to 262.66 million metric tons, with 130.52 million metric tons in the industrial sector making up about 49.69% (Bureau of Energy (BOE), 2018).

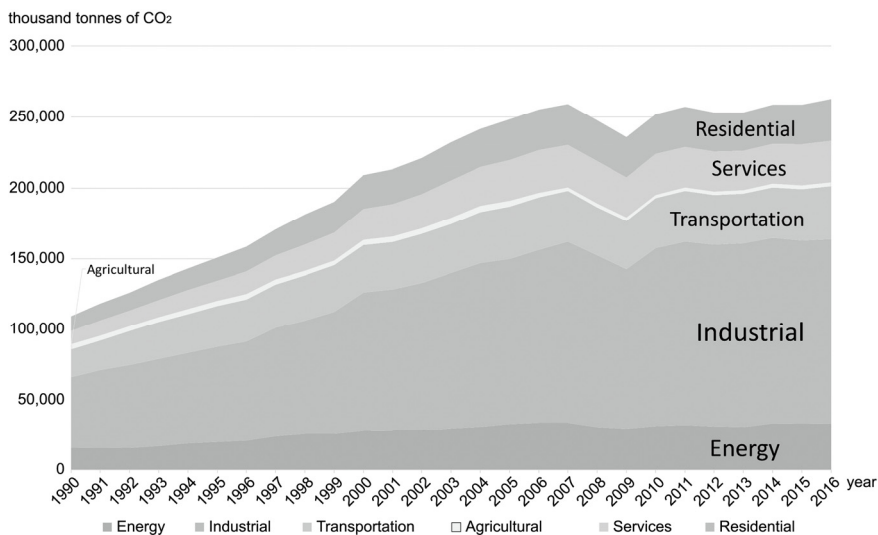


Figure 1: Carbon dioxide emissions from fuel combustion by sector, from 1990 to 2016 (includes emissions from electricity consumption)

Source: BOE, 2018.

If we further analyze the emissions situation from among the main industries within the industrial sector, it can be seen that the emissions from the entire industrial sector has been consistently increasing with

economic growth. However, along with industrial transformation, the proportion of emissions from the paper and textile industry have gradually decreased, while growth in the cement industry has remained flat, with steady growth in the steel and petrochemical industry. In 2011, the carbon emissions reached a peak in the petrochemical, cement and steel industries, at 4,6511,000 metric tons, 1,1325,000 metric tons and 2,288,500 metric tons, respectively, and they have since led the carbon emissions in the industrial sector until 2016. The emissions in the electronics industry reached 20,524,000 metric tons in 2000 and has continued to grow, reaching 25,655,000 metric tons in 2016 (BOE, 2018). It is evident from Figure 2 that the electronics, steel and petrochemical industries are the main sources of emissions among Taiwan's industries over the years. From the statistical analysis done by the Bureau of Energy (2018), it can be seen that in both the petrochemical industry and the steel industry, the CO₂ emissions accounted for more than half of the emissions from the industrial sector for nearly a decade until 2016, which showed that they are in fact the main sources of the high carbon emissions.

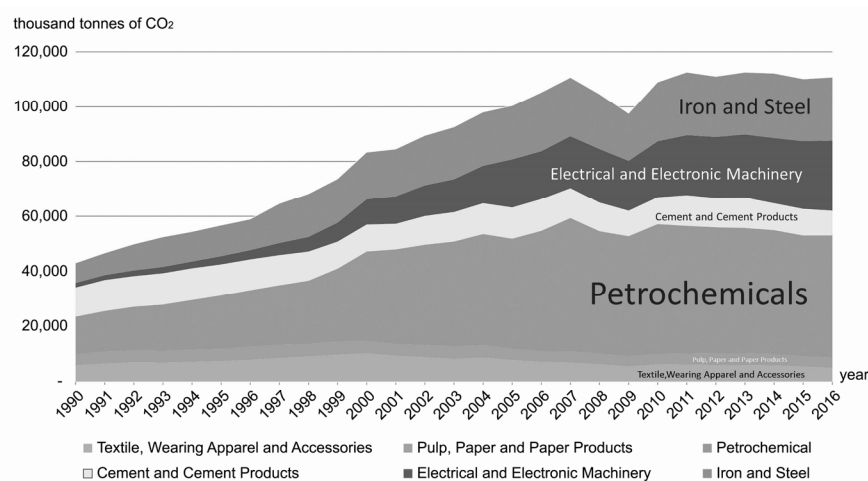


Figure 2: Cumulative trend of CO₂ emissions from the industrial sector allocated to major industries in Taiwan, from 1990 to 2016

Source: BOE, 2018.

According to the Bureau of Energy's annual statistical report (BOE, 2018), the total emissions of carbon dioxide from energy fuel combustion in 2016 was about 262.66 million tons, and the industrial sector which made up 33.8% of the national GDP accounted for 50% of the CO₂ emissions. Further, when sorting by industrial sector, the petrochemical industry accounted for 34% of the carbon dioxide emissions from the industrial sector, but its output value only accounted for 11.37% of the industrial sector; the steel industry accounted for 18% of the carbon dioxide emissions from the industrial sector, while its output value accounted for 11.78% among the major industrial sectors. In contrast, although the electronics industry accounted for 20% of the country's emissions, the output value reached 50% of the industry (Figures 3, 4, and 5).

These findings show that the major energy-consuming industries in Taiwan are highly tilted to the steel and petrochemical industries, resulting in these two industries making up more than half of the CO₂ emissions in the industrial sector; however, their national output is relatively low and imbalanced.

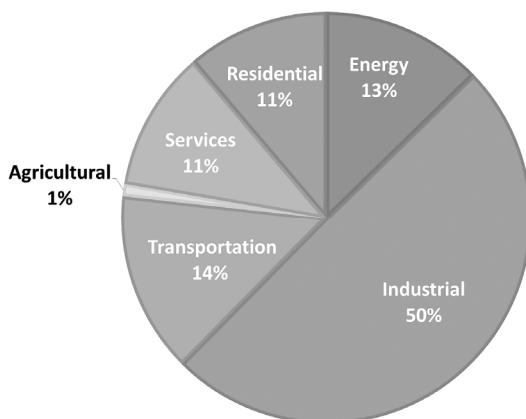


Figure 3: Share of CO₂ emissions from fuel combustion by sector in Taiwan, 2016 (includes emissions from electricity consumption)

Source: BOE, 2018, author's chart illustration.

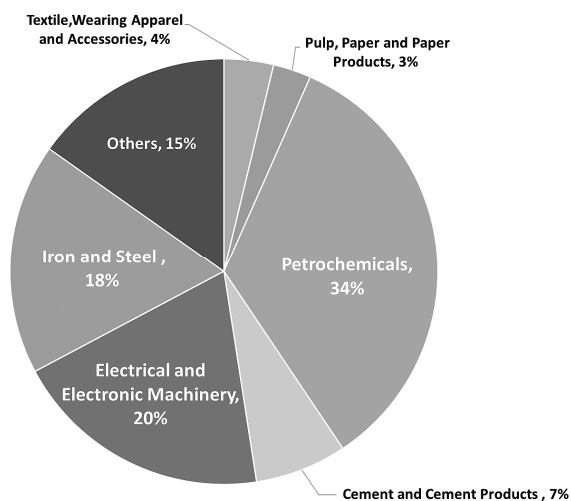


Figure 4: Share of CO₂ emissions from industrial sector allocated to major industries in Taiwan, 2016

Source: BOE, 2018.

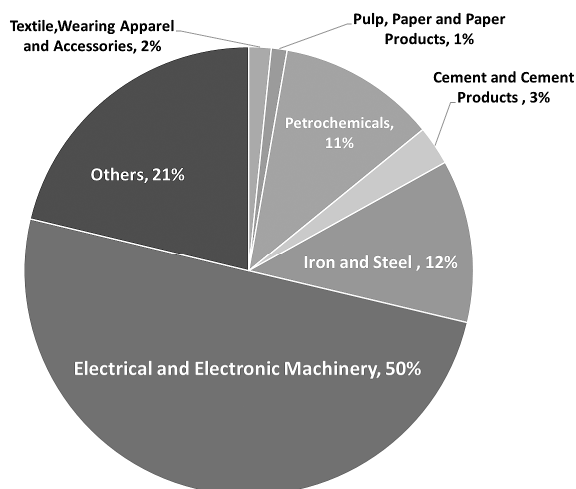


Figure 5: Share of real GDP from industrial sector allocated to major industries in Taiwan (as % of GDP in the industrial sector), 2016

Source: BOE, 2018, author's chart illustration.

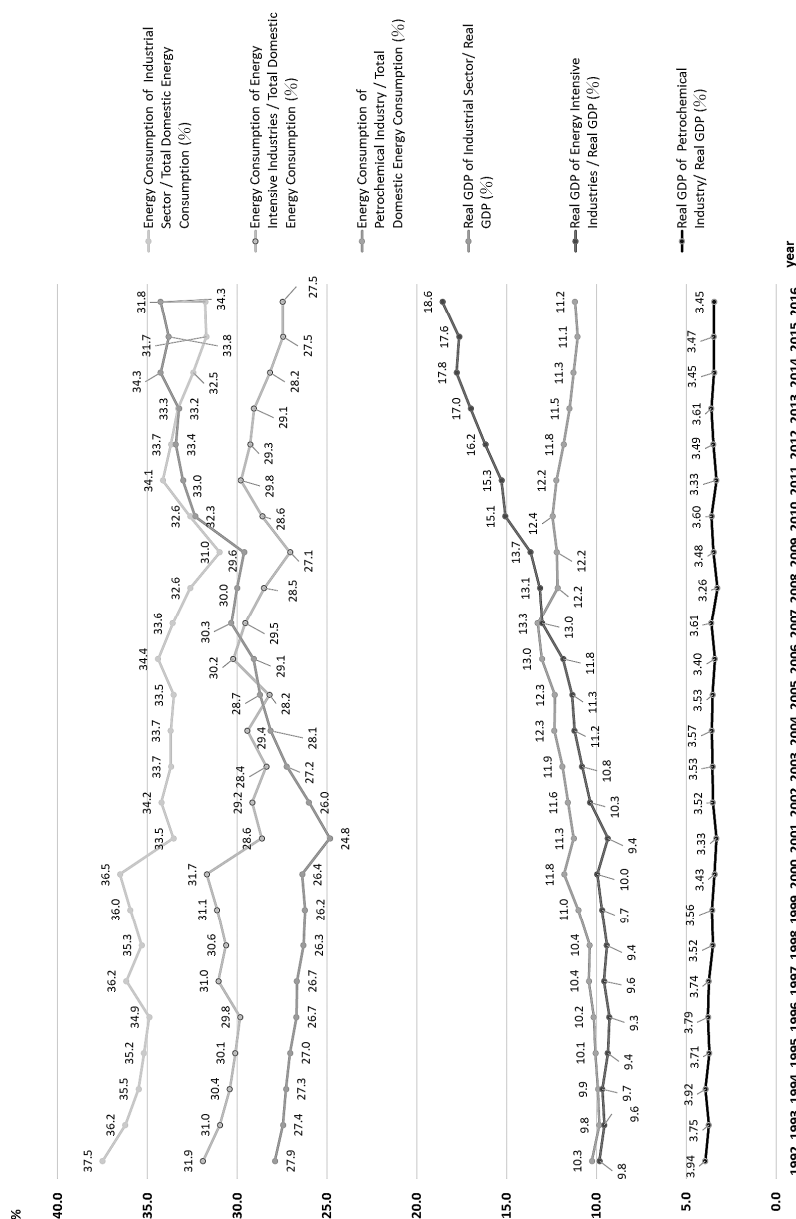


Figure 6: Comparison of energy consumption and GDP contribution, at national-level and of energy-intensive and petrochemical industries in Taiwan, from 1992 to 2016

Source: BOE, 2018; Directorate General of Budget, Accounting and Statistics, 2017; author's chart illustration.

Figure 6 shows that in the past 24 years (from 1992 to 2016), Taiwan's overall industrial energy consumption has only slightly decreased from 37.49% to 31.78%, but its GDP contribution has increased from 27.89% to 34.26%. In 2013, the industrial sector's contribution to the proportion of GDP even exceeded its proportion of energy consumption. Of course, the contribution of energy-intensive industries is also increasing (9.83% to 18.57%), but their energy consumption is still significantly higher than their GDP contributions (31.9% to 27.46%). Among them, the petrochemical industry has increased its energy consumption but its contribution to GDP has shown a slight decline, with its energy consumption increasing slightly from 10.25% to 11.20%, but its GDP contribution decreasing from 3.94 to 3.45%.

B. Path dependency - of a high-carbon energy structure

If we look at Taiwan's power supply and compare the composition of Taiwan's power generation in the past decade, thermal power generation has always played a more dominant role in the higher emissions of carbon dioxide. Figure 7 shows that thermal power generation accounted for 76.65% of Taiwan's power supply in 2003, and by 2008 and even by 2013, its share increased by nearly 78%, and surged past 80% in 2016 to reach 85.95% in 2017.

Further detailed analysis and comparisons showed that in terms of electricity generation, for thermal power generation which released higher carbon dioxide emissions, coal-burning accounted for 48.06% of the electricity generated, and gas accounted for 27.55%; comparatively nuclear energy accounted for 16.5%. On the surface, carbon-free renewable energy accounted for 4.28%, but after deducting for conventional hydropower, it only accounted for 2.13% of the national electricity generation. In the past two years, due to the strong promotion of energy transformation by the new government, in 2016 coal-burning accounted for 45.44% of electricity generation, gas accounted for 32.41%;

comparatively nuclear energy accounted for 11.99%, and renewable energy generation is still low, shares of renewables in electricity is about 3.5% in Taiwan in 2016 (Bureau of Energy, 2016). Quite obviously, the proportion of thermal power generation is still too high in the composition of Taiwan's power generation, and there is a need to adjust the proportion of coal which releases higher carbon emissions and gas which releases lower carbon emissions, and to reduce carbon emissions in general. And there is a need to vigorously promote carbon-free renewable energy to replace thermal power generation.

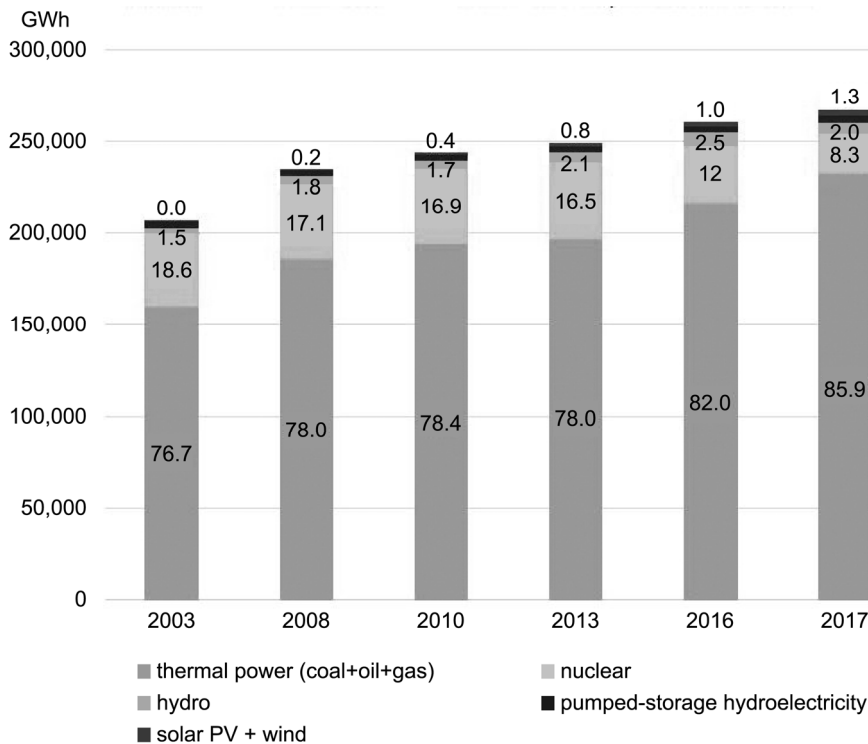


Figure 7: Electricity generation composition in Taiwan, from 2003 to 2017

Source: BOE, 2018.

Power sector's trends in carbon emissions

When analyzing by sector, the energy sector is the main source of greenhouse gas emissions in our country, among them the emissions from the power sector alone exceeded half of the total emissions in Taiwan. According to the Environmental Protection Administration (2017), in the Annual National Inventory Report, in 1990, the emissions of the fuel input for the power generation industry (thermal power and cogeneration plants) is 39,628 thousand metric tons of CO₂. At that time, the total carbon discharge for the whole of Taiwan was 109,491 thousand metric tons of CO₂, and the carbon emissions from the power generation industry accounted for only 36.19% of the total carbon emissions in the country. By 2000, the emissions from the power generation industry were 108,944 metric tons of CO₂. Then, the total carbon discharge in Taiwan was 209,364 metric tons of CO₂, and the carbon emissions of the power generation industry accounted for more than half of the total carbon discharge in Taiwan, to reach 52.04%, 59% in 2012 and 2013, and then fell to 52.67% in 2015.

Furthermore, Figure 8 compares the power generation and national carbon dioxide emission trends over the years. It can be clearly seen that the emissions from the power generation sector have gradually increased since 1990, with the increase intensifying since 1998, and reaching its peak in 2008, and the ebb and flow of the trend curve evidently driving the curve of total national emissions, resulting in the total national emissions also increasing since 1998, and reaching its highest point in 2007. Thereafter, by 2015, the carbon emissions from the power generation sector had exceeded more than half of the total carbon emissions in Taiwan. In other words, the power sector is the main driver of carbon emissions in Taiwan, therefore the question of how carbon reduction measures should be promoted in the power sector will be the crux as to whether Taiwan would be able to achieve the targets as set in the overall carbon reduction policy by 2025.²

² On November 2011, the government announced its vision for energy development, with the policy goal set at installing renewable energy capacity to reach 9,952 MW by 2025,

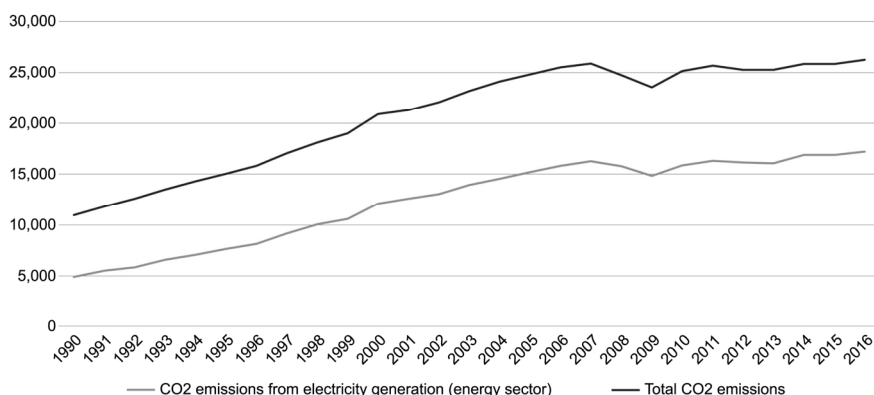


Figure 8: CO₂ emissions from electricity generation in the energy sector and the total CO₂ emissions in Taiwan, from 1990 to 2016

Source: BOE, 2018.

C. Path dependency – low energy prices and fossil fuel subsidies

In addition to the above-mentioned high-carbon industrial and high-carbon energy structure, Taiwan's electricity and water prices are on the low-side which have shaped the development of the high-carbon society.

According to the latest 2017 statistics from the International Energy Agency (IEA), Taiwan's industrial electricity price was NT\$2.4491 per kWh, which was seventh lowest in the world. When comparing with neighboring Asian countries, it was NT\$2.9911 per kWh in South Korea which was the 14th lowest in the world, and it was NT\$5.1027 per kWh in Japan, which was the world's second highest. In terms of household

to account for about 14.8% of the total installed power generation capacity. Jerry J. R. Ou (2011) Creating a Green Energy Low-Carbon Environment — To Move Towards a Nuclear-Free Home, Energy Report, December 2011. Energy Report, Taipower Company's Response and Strategy to the New Energy Policy, January 2012. Yahoo News (2011), President Ma's announcement of the energy policy: first, second and third nuclear plants will not be closed, fourth nuclear plant to be halted, November 3, 2011.

electricity consumption, Taiwan's residential electricity consumption was NT\$2.5679 per kWh, which was the second lowest in the world.

According to a 2014 survey by the International Water Association of the water price per 100 units in 160 cities, Taiwan's average annual water bill was US\$39.53, or about NT\$1,186, comprising 0.10% of GDP with the cost of the water burden ranking 28th. According to the statistics, the price of water in Europe, America and Asia is higher than that in Taiwan, while the average price of water in European countries is almost three times that of Taiwan (Taipei Water Department, 2017).

According to the latest 2014 to 2016 statistics from the OECD and IEA (2017), the fossil fuel subsidies in Taiwan were US\$159 million in 2014, US\$20 million in 2015 and US\$108.8 million in 2016 (see Table 1).

Table 1: Fossil fuel subsidies in Taiwan, 2014 to 2016

Unit: Real 2016 million USD

Country	Product	2014	2015	2016
Chinese Taipei	Oil	159.0	20.0	108.8
Chinese Taipei	Electricity	-	-	-
Chinese Taipei	Gas	-	-	-
Chinese Taipei	Coal	-	-	-
Chinese Taipei	Total	159.0	20.0	108.8

Source: IEA (2017). IEA fossil-fuel subsidies database.

<http://www.iea.org/weo2017> Retrieval Date: 2018/10/3.

In addition, the 2016 statistics of various fossil fuel indicators from the IEA (2017) showed that in recent years, Taiwan has been affected by the oil and gas price fluctuations. The per capita subsidy is US\$4.6 (USD/person), which ranks as the fifth lowest among 41 countries, higher only than Sri Lanka (3.1 USD/person), South Korea (3 USD/person), Ghana (1.1 USD/person) and Vietnam (1.1 USD/person). Also, according to the statistics from the International Monetary Fund (IMF) (2015),

Taiwan's total fossil fuel subsidies in 2013 were \$310 million, not including for external costs. However, when factoring for air pollution, greenhouse pollution and external costs such as traffic jams, then the subsidies would go up to US\$26.6 billion, and it was estimated that this would grow to US\$31.6 billion (or approximately NT\$1.1 trillion) in 2015 (Figure 3), which would account for 5.43% of GDP (Chao, 2017).

D. Brown economic package

In other words, the structural problems that Taiwan faces in its social transformation are its high-carbon industries, high-carbon energy, low electricity and water prices, and long-term fossil fuel subsidies. Worse still, relative to the environmental costs of a high-carbon society, the cost of labor in Taiwan is also low relative to the world's major industrialized countries. With the low electricity and water prices propping up the low-wage working conditions, coupled with the government's long-term subsidies for high-carbon industries and energy, this has resulted in companies indulging in rent-seeking behaviors and lacking the motivation to develop R&D innovation, thus resulting in them gradually losing their international competitiveness. This had led to the perception internationally that Taiwan has fallen into the middle-income trap (Liberty Times Net, 2017).

In fact, such structural development has resulted in a brown economic package, leading to very tricky, long-term and structural path dependency in the transformation of climate governance in Taiwan, which has even locked-in the developmental path of Taiwan's transformation.

V. Social resistance to path dependency

A. Contextual environmental movement

Other than the lag in the government's governance which requires our further analysis, there are also two areas of social developments which are worth mentioning, although they are not the current focus of this

paper's analysis. First, since the mid-1980s, there have been various anti-chemical or petrochemical movements in the Taiwanese society, and these environmental movements have been directly and indirectly related to climate governance, whether in form or substance.

Chou (2017) divides these into anti-pollution movements and climate change risk movements, the former of which are protests led by residents due to concerns over their own health, and were mostly regional movements with a few which took on a national focus, and were essentially focused mainly on the category of air pollution. The latter can be exemplified by the anti-Pinnan industrial petrochemical protests in 1995, the steel incident, and the anti-Kuo Kuang petrochemical plant protests in 2010, with the demands of these protests alleviated to the level of opposition against high energy consumption, high carbon emissions, high water consumption and high pollution levels, and these were also organized based on fairly systematic known-how. Such social movements have created a sustained change in the public's awareness on sustainability and environmental protection issues, and continued to exert pressure on the state and industries.

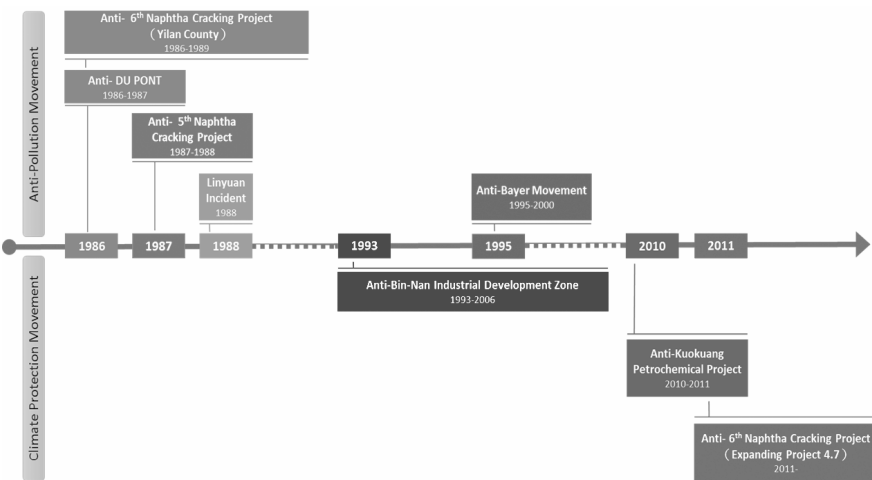


Figure 9: Evolution of anti-chemical movements over the years

Source: the authors

B. Public climate risk perception and paradigm shift

Second, the public's climate risk perception has become an important element in driving society towards a low carbon transformation orientation. From Chou's (2017) analysis of the two climate changes risk perception surveys conducted in 2012 and 2015, the Taiwanese have the ability to support the general direction of energy and industrial transformation. No doubt, on the price that people are willing to pay for transformation, this needs to be meticulously looked into, but the basic disposition of the public is supportive of the government's developmental orientation towards a low carbon society.

First, the Taiwanese already recognize the risks of climate change, and the need to change. Therefore, having accepted the possible price that has to be paid for transformation, the public already understands that implementing an environmental protection agenda will not hinder Taiwan's economic growth, which also means that Taiwan could develop environmentally-friendly industries, as the public would be supportive of such industrial development. A comparison of Figures 10 and 11, of the attitudinal surveys in both 2012 and 2015, shows that there is a slight increase in the attitude of the public in their willingness to pay higher taxes for electricity, and there is also an increase among the members of the public who believe that environmental protection is not in conflict with economic development. In Figure 11, the left column shows that 85.1% of the public are willing (very willing and willing) for electricity prices to be increased as a response to renewable energy transformation. According to a 2018 Greenpeace Foundation survey, when provided with adequate information and when clearly informed of the price increase and purpose, the proportion of people who were willing for electricity prices to be raised increased from 52.5% to 71.2%. If electricity prices were to be increased for the acceleration of renewable energy development, 25.2% of the respondents would be willing to pay 10% more on electricity prices, or NT\$3.1 per kWh, 17.6% would be willing to pay 30% more, or NT\$3.5

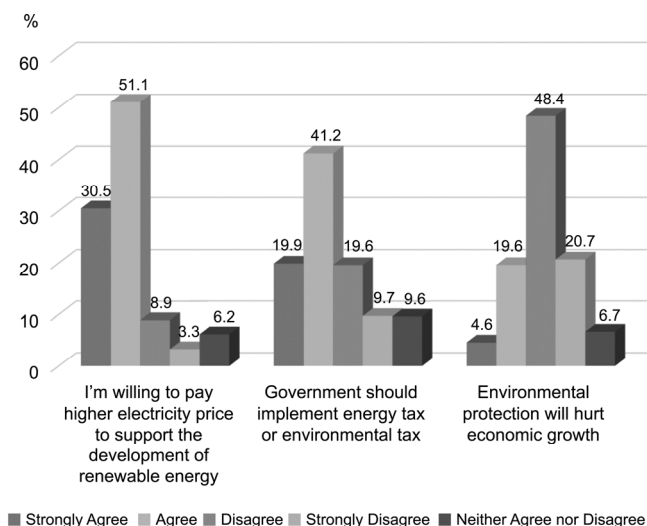


Figure 10: The willingness to pay the price for transformation, and the intention associated with environmental protection and economic growth, 2012

Source: the author.

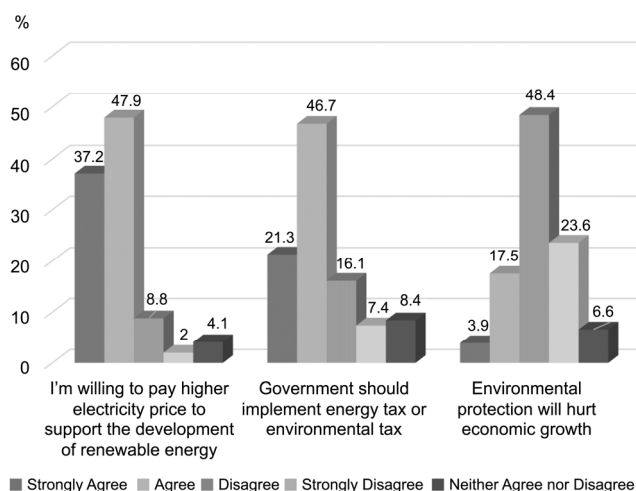


Figure 11: The willingness to pay the price for transformation, and the intention associated with environmental protection and economic growth, 2015

Source: the author.

per kWh, 14% would be willing to pay 50% more, or NT\$4.2 per kWh, and 14.4% would be willing to pay more than 50% more. This demonstrates the validity of the surveys from 2015 to 2018, and also reflects the willingness to pay. As for carbon or related tax which can directly contribute to energy and industrial transformation, Figures 10 and 11 shows that 68% of respondents would be willing to pay higher taxes to protect the environment. At the same time, the public has caught up with international trends, and understands that it is not a given that environmental protection will contradict with economic development, and the public has also recognized that a balance can be struck between economic development and environmental sustainability. As you can see in Figures 10 and 11, the right column shows that 72% of the public does not think that environmental protection will hinder Taiwan's economic growth.

Based on the above-mentioned public surveys on climate change and related policies, the Taiwanese are aware and supportive of the government's active adjustment of the industrial and energy structure, to deal with climate change risks. Also, when it comes to the need to levy an energy tax or adjust electricity prices during the process of transformation, the public's acceptance level is also high. Attention needs to be paid on the question of risk communication, and the purpose of transformation and roadmap also needs to be clearly planned. The decision-making process and outcomes should also be made public, so that it can help the public understand and accept these policies.

Whether it is the contextual environment movement or the paradigm shift to a low-carbon society, both these aspects have brought about very important social transformations and symbols, and directly challenge the high-carbon society and brown economy. Society's low-carbon transformation drive has come to a face-to-face confrontation with the high-carbon economic system, with the two pulling at each other, resulting in a rather tense relationship. But even as these two drivers of society orientate towards sustainable development, the transformation of the government's governance and industrial transformation is still lagging.

VI. The state's lagging transition

A. Important governmental conferences and policies, but without a clear roadmap

In response to global climate change conventions, carbon reduction and sustainable development trends, we can trace Taiwan's government industrial policy transformation plans, which has been spread out across the important national energy conferences, sustainable economic development conferences, policy platforms and guidance, over the years. In response to the signing of the Kyoto Protocol, Taiwan's government held the first-ever National Energy Conference in 1998, followed by important conferences, policy guidelines or white papers (see figure 12): the 2005 2nd National Energy Conference, the 2006 National Conference on Sustainable Development, the 2006 National Conference on Sustainable Economic Development, the 2008 Guidelines on Sustainable Energy Policy, the 2009 3rd National Energy Conference, the 2010 National Master Plan on Energy Conservation and Carbon Reduction, the 2010 National Industrial Development Conference, the 2012 Energy Development Guidelines, the 2015 4th National Energy Conference, the 2015 Greenhouse Gas Reduction and Management Act, and the 2015 Intended Nationally Determined Contribution (NDC), etc.

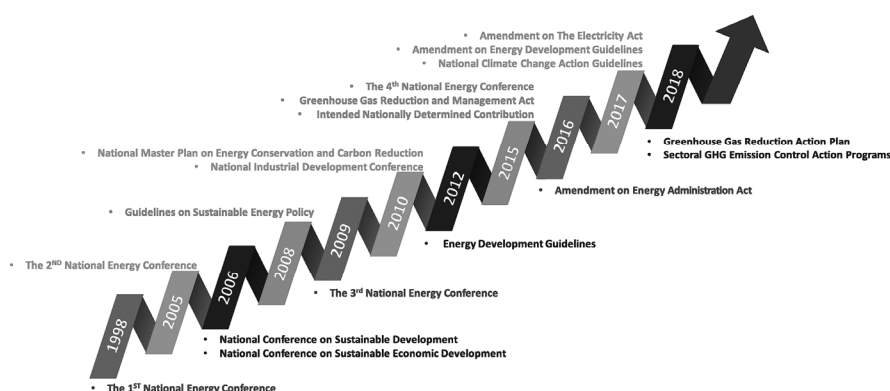


Figure 12: Key climate policies and conferences over the years

Source: authors.

In all these various national-level energy and economic conferences, and policy guidelines, there were two important directions which showed that in the transformation of energy, industries and carbon emissions – which is being threatened by climate change – the first is to simulate carbon dioxide emission scenarios and set quality standards in response to the climate change convention, and the second is to develop a plan for industrial policy transformation. However, as Chou (2017) criticized, the outcomes of these important meetings, policy announcements and plans have not been genuinely fulfilled, which is akin to selling a pig in a poke, thus revealing that in its policy implementation in the face of global climate change, Taiwan's previous government had hit a roadblock in its promotion of industrial transformation. And corresponding to the high-carbon industrial and high-carbon energy structures in the earlier analysis, it can be said that the government was faced with a conundrum in its transformation of climate governance, which delayed its undertaking of social and economic transformation.

If we observe the different stages of policy announcements (see figure 12), it can be said that Taiwan's government has been setting targets over the last two decades to respond to the requirements from international climate and carbon reduction conventions, and has attempted to carry out corresponding industrial, economic and social transformations. It can be said that the 1998 National Energy Conference set for the first time carbon dioxide emissions reduction targets, which aimed to reduce carbon dioxide emissions in 2020 to the 2000 benchmark level (1998 proposal); the 2008 Guidelines on Sustainable Energy Policy further set the carbon dioxide emissions reduction targets (2008 proposal), and for the 2009 3rd National Energy Conference and the 2010 Legislative Yuan's National Master Plan on Energy Conservation and Carbon Reduction (2010 proposal), which set the carbon dioxide emissions reduction targets from 2016 to 2020 to return to the level of 2008's emissions, to 2005's levels by 2020, and to 2000's levels by 2025, using 214 million tons as a benchmark. In September 2015, Taiwan's government announced to the world its Intended Nationally Determined Contributions (INDC) (2015

proposal), to reduce greenhouse gases by 50% below BAU by 2030 (214 million metric tons of carbon dioxide equivalent). That is, that by 2030, greenhouse gas emissions will return to the 2005 baseline level, with another 20% reduction.

At the same time, before the COP21 in 2015, the symbolic promulgation of the Greenhouse Gas Reduction and Management Act also stipulated that by 2050, Taiwan's carbon emissions will be reduced to half (134 million metric tons) the 2005 benchmark levels (269 million metric tons) (see figure).

Carbon dioxide emissions baseline targets in different years (refer to Chou *and* Liou, 2012 amended version; Chou, 2017).

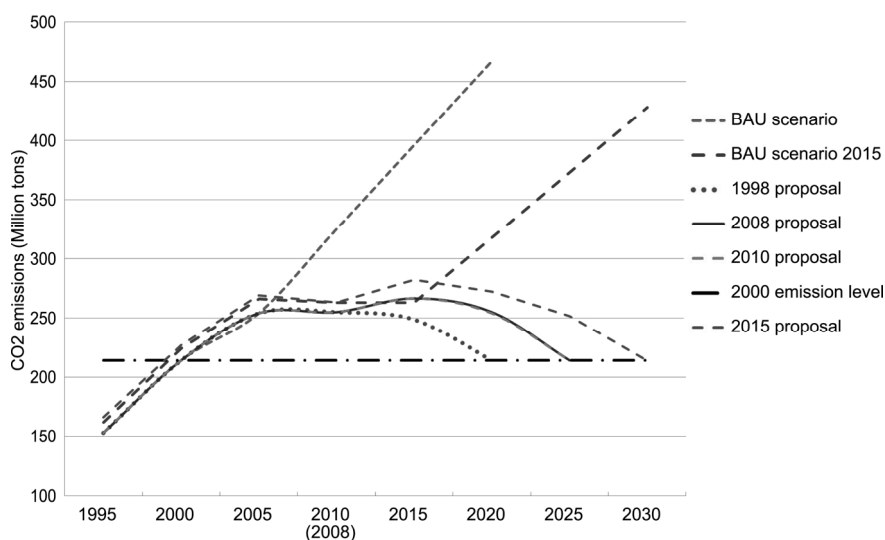


Figure 13: CO2 emissions in BAU scenarios and CO2 reduction targets in Taiwan over the years

Source: Chou *and* Liou, 2012.

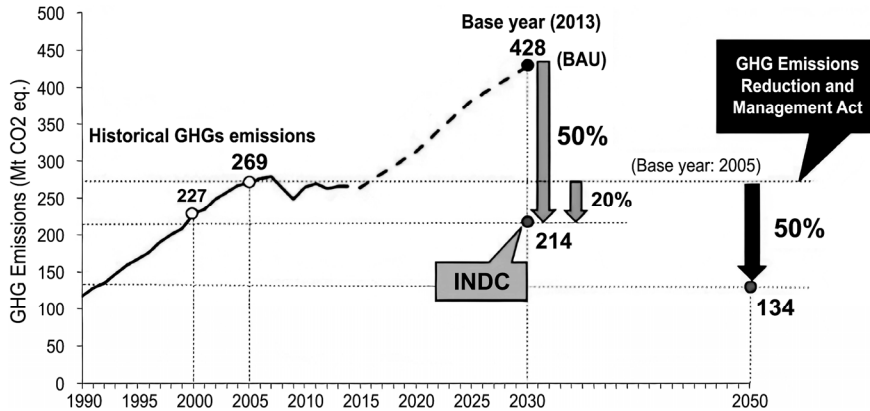


Figure 14: Greenhouse gas emissions trajectory

Source: Bureau of Energy, 2016.

The path dependency produced by a high-carbon social structure has hindered the transformation of climate governance, and this has become clearer in recent years. Even as the new government which came into power in August 2016 set up the Office of Energy and Carbon Reduction under the Executive Yuan, to spearhead energy transition and carbon reduction initiatives, but up until now, it has still not achieved much success. The new government has launched the 2016 Amendment on Energy Administration Act, the 2017, Amendment on the Electricity Act, the 2017 Energy Development Guidelines, the 2017 National Climate Change Action Guidelines, the 2018 Greenhouse Gas Reduction Action Plan, the 2018 Sectoral GHG Emission Control Action programs, and the 2018 energy transition white paper, but all these efforts have been met with formidable obstacles.

B. Transitional discursive struggle by brown economic regime

In the government's hold-up to carry out the transformation of climate governance, in addition to the obstacles to reform that have been brought

about by the hardened high carbon and brown economic structures, externally we also witness the robustness of civil society, that is, the strong and sustained environmental movements and thriving green energy initiatives, which has acted to continue to monitor and drive the government to carry out transformation. However, the delay in transformation is not only due to a lack of a clear roadmap within government, or regulatory policies and tools, but most importantly, Taiwan's government still lacks the discussion on the clear path for transformation corresponding to these aspects.

In contrast, the old high-carbon regime has incessantly exerted its influence on academia, the media, and industries, and has been unceasing in its influence on discourses and intervention in policies under the guise of the brown economy package. The most prominent example is the 'five shortages' as proposed in the white paper of the Chinese National Federation of Industries (CNFI) (2015): the lack of water, electricity, manpower, land and skilled workers, which very clearly defended the brown industry and economy. On this concept of 'five shortages', other than the last shortage of skilled talent which has less relation to climate and environmental governance, each of the other shortages are repeatedly aimed to consolidate the open rent-seeking ambitions of these industries over water price, electricity price and labor costs, even to the extent of externalizing environmental costs which triggered environmental protests and thereby resulted in a lack of public trust, and by misconstruing cause with effect, and claiming the lack of land as a source of problem, these industries hope that the government would modify its program on environmental impact assessment, eliminate public protests and provide land for factories.

However, the CNFI's five shortages were heavily criticized by research think tanks, academics and citizen groups. Researcher Sun M. T. from the Chung-Hua Institution for Economic Research said: Taiwan currently has the "seven lows" of low water prices, electricity prices, oil

prices, prices of goods, interest rates, exchange rates and wages – the prices of all factors of production are very low (Chiu, 2016). “Already, people would want to come to Taiwan to set up their computer facilities, precisely because electricity prices are so cheap”, and also because the exchange rates and interest rates are also not high. But such cheap factors of production have not been able to enhance industrial competitiveness, primarily because of the low efficiency of businesses. In the 2017 survey of the Carbon Disclosure Project (CDP) conducted by The Risk Society and Policy Research Center (2018), it was pointed out that the major energy-consuming industries include Formosa Petrochemical Corporation, Formosa Chemicals & Fibre Corporation and Formosa Plastics Corporation, etc., which were all rated with a C grade, which showed that their energy consumption was overly high. The Taiwan Environmental Protection Union (2018) pointed out that the five shortages raised by CNFI are fake issues, and that it is necessary for the government to come out with a proper forward-looking plan, build proper basic infrastructure, as well as be fully open and transparent with information, and have good management and maintenance, so as to prevent the monopolization and abuse of resources (such as land and water), and to prevent improper profiting.

Even as it was roundly criticized from all sides, the concept of five shortages which represented the brown economy continued to be pervasive, and via mobilization and discussion in the media, this has caused the government to restrain its transformation and reform, and turn in towards conservativeness. Even after the DPP returned to power in 2016, it was still worried about the interests of these industries. When the new premier first officially addressed the media (Executive Yuan News, 2017), he said that priority would be given to dealing with the five shortages in the industrial sector. That is, the discourse over development that is mixed with the power of a high-carbon economic structure, which aimed to sustain and replicate the rent-seeking model of the past under the CNFI – the representative of the interests of conservative businesses – by attempting to lock-in social and economic development to the existing high-carbon,

brown and low-value industrial energy and labor structure. Such a development discourse also amplifies the brown economy package, and attempts to strengthen the legitimacy of the high-carbon industry economic structure. From another perspective, by combining the existing power of the brown economic structure and discourse, which produces a conservative and regressive vision, this pulls back and constrains the transformation of low-carbon governance in the Taiwanese society; and this is also one of the dilemmas being faced by the new government in its promotion of a low-carbon social transformation.

What's more, such a struggle over the discourse has also correspondingly resulted in the government's deficiency to develop a clear roadmap, policy tools and regulations. Even more so, the new government is lacking in strong knowledge and policy discourse, to be able to lead the whole of society in having a clear guiding vision in its transformation, and to construct a social learning curve to advance the whole of Taiwan towards momentous climate and energy transition (Chou, 2017).

VII. Discussion and Conclusion

This paper analyzes the dilemmas and challenges that Taiwan faces in its transformation of climate governance from three perspectives, first, from quite a broad perspective to present the formation of the high-carbon and brown economy in Taiwan, including the analysis of the industrial and energy structure (economic model), and electricity prices, water prices and fossil fuel subsidies (regulations). Second, a brief analysis was also conducted of the environmental movements from the late 1980s, as they evolved from the anti-pollution protests to the climate risk movements against high-carbon emissions, high energy consumption and high water consumption. At the same time, this paper also analyzed the significance of the paradigm shift that has occurred in the Taiwanese society corresponding to the public's attitudes towards their climate and energy perceptions. Third, a brief

secondary analysis was also conducted of the government's pledges to reduce carbon emissions, but which lacked a clear roadmap of climate governance and transformation discourse, thus when challenged by existing interest groups advocating for a high-carbon and brown economy, the transformation capability becomes poor and weak.

Such a transformation structure is very similar to the analysis done by Pierson (2000), to construct the concept of the conservative nature of institutions and the high density of institutions that create barriers to entry, including that of interest groups which drive the high-carbon industrial and energy structure that constantly seek to maintain the existing brown economic package, and attempt to strengthen policy rent-seeking via policy discourse – and the CNFI is exactly one of these such representatives. And although the analysis of the social aspect is not covered at length in this paper, the momentum of the environmental movements and the public's climate perceptions symbolize the strong support from the public for low-carbon social transformation. From 1998 to 2018, the government's pledge for a low-carbon policy has been ostensibly portrayed as the government's response to the international and domestic requirements, but on the whole Taiwan is still a high-carbon society and brown economic body, and the new government's climate governance was therefore met with difficulties internally and externally.

From this transformation structure, we have categorized these issues into the different types in Table 2 to analyze the transformational dilemmas and challenges faced by the developmental state under authoritarian expert politics, mainly from the angle of the industry, civil society and the state, and divided them into five types: discursive package, discursive strength, structure, agents and instruments. Of course, in relation to the object of analysis of transition management, the media and academia, and these two aforementioned together with the industry and the interest complex of the government should be included, but these are not focus of this paper.

From the analysis in the table, we can see that the agents of industry and CNFI have combined the KMT's past high-carbon regime, to continue to shape the legitimacy and importance of energy-intensive industries, using the annual white paper as an important tool, under which the media is mobilized to promote the five shortages, which forms quite a strong development discourse. The discourse of the lack of water, electricity, manpower, land, and skilled labor continues to strengthen and justify the conditions that are required by the existing high-carbon industrial and energy structure; and such an attempt will lock-in economic and social development to the brown economic package, while ignoring the external pressures of global climate and carbon-reduction governance, which paradoxically becomes quite a strong policy pressure.

However, such a position to delink with global carbon reduction governance has also been catered for by some government agencies. Even though DPP regained power in May 2016, but regime change cannot be taken to represent the smooth transition of Taiwan's overall transformation. On the one hand, the linear, high-carbon economic model which authoritarian expert politics leaned towards in the past, seemed to be due to the inertia in thought and behavior of the government agencies; on the other hand, even if there was a lack of large-scale innovation among the high-energy consumption, high pollution and high-carbon emission industries for more than 20 years, and the contribution to GDP continued to be flat and limited, but when including for the tremendous political and economic forces, has resulted in the new government having misgivings in its transformation and reform, which would therefore only adopt a fairly conservative development pathway. Moreover, in terms of the government agents, because each agent has a different perspective on development, this has resulted in conflicting goals within the government on low-carbon transformation. The hidden internal struggle between the conflict of the old and new, reflects the lack of a clear roadmap across the whole government. Therefore, it can be seen that the new government's policy discourse of climate carbon reduction governance is weak and has

descended into chaos. The more there is a lack of a clear discursive package and low-carbon transformation path, the easier it is to be locked into the existing grey economic track.

In fact, such a development is no different from the transformation of Taiwan's climate governance over the past 20 years. As we analyzed in this paper, the government has over the years convened and promulgated important energy and industrial conferences and carbon reduction policies, but the strong lock-in effect of the high carbon and grey economic structure often pulls back the implementation of reform, and everything comes to naught, with even the government itself still promoting major industrial projects which result in high energy consumption, high carbon emissions and high pollution, such as the 2010 Kuo Kuang petrochemical plant project (Chou, 2013, 2016, 2017). And such development outcomes have resulted in the formation of systemic risks under delayed transformation, and the resultant constant vicious cycle which has severely slowed down the speed of Taiwan's low-carbon transformation.

As for Taiwan's civil society, even though it began to mature around 2010, it has shown social robustness in some major environmental and risk movements, and have been able to systematically organize as well as construct risk knowledge and shaped the discourse, to supervise and confront the government (Chou, 2013). At the same time, as shown earlier, the public already possesses the cultural appetite for the transformation to a low-carbon society, and are supportive of the government's energy, industrial, economic and social reforms. But on the whole, civil society represents different agents in society and is concerned over multiple issues, and although civil society is proficient in using the media as a tool for mobilization, but its focus is quite diverse; on the other hand, for relevant citizen groups which are committed to participating in the energy transition efforts promoted by the government, their focus of attention is on denuclearization and energy rationing, and the discourse in strengthening the development of climate change and carbon reduction initiatives is lacking.

Even if issues of energy transition are highly relevant to carbon reduction, but generally speaking under the energy transition structure led by the government, there does not exist a clear carbon reduction policy and decarbonization pathway to supporting energy transition. Civil society has correspondingly raised criticisms, but there has been no systematic development, mobilization and construction of a discourse on low-carbon knowledge. And the agents in society who champion green energy, such as the Taiwan Independent Power Plants and the Taiwan Environmental Protection Union, etc., are mostly focused on promoting green energy and are less systematic when it comes to or have direct relevance to carbon reduction issues. Compared with the symbiotic anti-coal and anti-warming initiatives among citizen groups in Thailand and Philippines (Francisco, 2017; Jakkrit, 2017), the anti-coal initiatives in Taiwan are more linked to the issue of anti-air pollution. Basically, in addition to the discourse and thought in relation to the anti-carbon emission and anti-high energy consumption initiatives which arose from the anti-Kuo Kuang protests around 2010 (Wu, 2010), the carbon reduction awareness in the whole of society is weak, and there is not a clear low-carbon discursive package.³

³ In the past, Taiwan's environmental groups have been mainly focused on protesting over environmental pollution, and the energy issues pertaining to carbon reduction were mainly the domain of the anti-nuclear movement. There were only two major environmental movements – the anti-Pinnan Industrial Park Movement in 1995 and the Anti-Kuokuang Petrochemical Project Movement in 2010 – which were concerned with global warming and carbon reduction issues (relating to high energy consuming and high carbon emitting industries). Chou (2017) pointed out that this change in direction showed that the model of Taiwan's environmental movements has shifted from anti-pollution movements to climate change risk movements, in particular with the systematic discussion over carbon reduction and anti-global warming in the Anti-Kuokuang Petrochemical Project Movement, which exemplified how civil society possessed the robust risk knowledge to overturn government decisions. However, the topic of carbon reduction has not continued to grow. The important civil groups in Taiwan, like the Green Citizens' Action Alliance and the Citizen of the Earth, Taiwan, have put a considerable focus on anti-nuclear movements, and even though established groups like the Taiwan Environmental Protection Union and the Consumers Foundation

The seriousness of this divergence lies in the fact that the characteristics and model of Taiwan's environmental movements need to change, even though Chou (2017) had pointed out that Taiwan's environmental movements have been gradually evolving from being that of stakeholders playing an opposing role and fighting over concerns of their own health, to that of being role models in the climate change risk movement, which are becoming aware of the threat of the high energy consuming and high carbon emitting industries to Taiwan, though in reality, the latter still requires the involvement of more people. There are two aspects here: first, on whether systematic discussion among civil society would be able to grasp the complexity of climate and energy issues, and second, whether these ideas can be effectively mass transmitted to the public. The fact is, Taiwan's NGOs were previously mainly concerned with protests over local pollution issues, so there is still some way to go for them to transit to having the concept and relevant knowledge production on low-carbon and sustainable industries. Although the Anti-Kuokuang Petrochemical Project Movement brought about increased anti-carbon knowledge production, but this intensity has gradually weakened with the end of the movement, unless there are sustained large-scale environmental movements to connect and reproduce the knowledge and discussions. At the same time, as the main axis of the issue is not clear, even though many NGO groups have turned their attention to energy transition movements to advocate for green energy and oppose nuclear energy, etc, however these lack the effectiveness of mobilizing discussion around the topic, which have therefore been unable to clearly and powerfully transmit the message of reducing carbon dioxide emissions to the general public.

Chinese Taipei, have continued to provide criticism on carbon discharge at the United Nations Climate Change Conference (COP) held in December every year, it has been unsystematic. In recent years, the topics have revolved around anti-pollution as an extension of the Anti-Kuokuang Petrochemical Project Movement, with the inclusion of low carbon energy and carbon reduction issues.

Table 2: structural predicament of climate governance

	Industry	Civil society	State
Discursive package	Brown economic package	Focused on green energy transition. A lack of clear and strong climate governance discourse	Internal struggle between high carbon and low carbon economic packages
Discursive strength	Strong	Weak	Weak and chaotic
Structure	High carbon industry and energy	Multiple social movement objectives	Lack of a clear roadmap
Agents	Industry agents and an outmoded high carbon regime	Multiple civil society actors	Multiple agents lacking strong coordination
Instruments	Publication of white papers and media mobilization	Social mobilization and environmental movements	Requires innovative policies regulations, incentives

Source: created by Authors.

On the other hand, by using the perspectives of economic models (high carbon industry and high carbon energy), social cognition (public perception and the issue of five shortages), systems (water and electricity prices and fossil fuel subsidies), government policies and regulations (carbon reduction policy, NDC, relevant energy and carbon reduction regulations), administrative agencies (regime change and transition), social actors (citizen groups), and others, the author has conducted a preliminary contextual and reflexive analysis of the path dependency of Taiwan's transformation towards a low carbon society. It can be seen that due to the linear, high-carbon economic industry-driven model dominated by authoritarian expert politics, this has profound and lasting influences which have configured Taiwan's development pathway. Even as Taiwan has undergone the third wave of democratization, and is at the stage of democratic consolidation, but the culture of control that has been shaped by authoritarian expert politics (of overvalued economic growth and undervalued risks), and the supporting linear economic development model

has established the temporary success of Taiwan over the past 20 years. The success of this development model was built on the grey economic package, which used low electricity prices, water prices, labor costs, on top of a land supply which ignored environmental risks, and thereby enabling the Taiwan economic development miracle of the past.

However, such a development model has resulted in the rent-seeking behavior of industrial interest groups and the expansion of the brown economic discourse, and at the same time also shaped the various environmental movements by citizen groups for over the past 20 years, to resist chemical industries and petrochemicals, and the high-carbon and energy consuming industries. What's more, state bureaucracy can superficially propagate its response to international expectations on carbon reduction and industrial policies, and that the high-carbon economic model is a thing of the past. In general, the whole of Taiwan's society is caught between the debate and the push-pull of the grey economic package, and the delayed and hidden industrial, government and social transformations (Chou, 2013). From the process of social transformation research, we can observe that the whole of society has been using an outmoded thinking, industrial method and governance framework to operate and resist, no matter whether it is on social innovation or change of any extent, this has been locked into a fixed path.

Such a development pattern has not only resulted in a delay to transformation, but also constitutes systematic gaps and risks. And Taiwan's society therefore needs to undergo a complete reversal and paradigm shift. Social transformation will require the restructuring of the social system and the reconfiguration of society's development and values, in order to counteract the systemic failures (Rotmans *and* Loorbach, 2009). It is therefore imperative for Taiwan to come out with a renewed definition of sustainable industrial, social, energy, environmental and labor development, to construct of a new vision, and develop a systematic inventory of the barriers that can hinder the change from a high-carbon to a low-carbon

society. In particular, the state, industry, civil society, media, and even academia would need to navigate along a new social learning curve. But this is probably a problem common to many of the emerging industrial countries in Asia that are advancing and catching up.

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氣候變遷治理在臺灣

高碳政權之轉型困境

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摘 要

對台灣氣候治理的考察，需要放在長程的社會轉型角度——能源與排碳、產業與治理轉型的三個螺旋鍊運動，進行剖析。從這三個結構性的轉型挑戰，我們可以看到，政府在氣候政策上長期以來的努力與困境，以及公民社會相應的批判與翻轉決策的量能。

我們要問的是，是什麼結構性的障礙阻止了治理的轉型，亦即，從亞洲的觀點來看 cosmopolitan climate governance，需要分析哪些路徑依賴造成了國家治理、甚至社會轉型的困境，包括發展型國家、威權專家政治、經濟上的高碳結構、褐色能源結構、以及其背後的高碳資本主義論述。本文將指出從最早台灣政府回應 1997 年京都議定書隔年立即召開的第一次全國能源會議，到 2015 年 9 月於 COP21 之前對全球宣示的 INDC，甚至到 2016 年 5 月民進黨執政後之能源政策改革保守性，都顯示前述各種路徑依賴之長期、系統性的鎖定效應 (locked-in effect) 威力。而除了高碳政權對氣候治理轉型的困境之外，在社會端，我們雖看到公眾朝向低碳社會的典範轉移以及各種活躍的反排碳、反空汙、推動綠色能源與公民電廠的活動，但生活在深入鑲嵌的高碳經濟與褐色能源結構下，社會的轉型仍然遲滯，舉步躊躇。

關鍵詞：高碳政權、鎖定、褐色經濟與能源、COP21

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