P04 / Hidden Challenges Arose from Dynamic Interactions along the Way to Sustainable Energy Transitions

Topic : GLOBAL WARMING, SDG, ENVIRONMENT, ENERGY AND POLICY

Chair : Paul Jo (HAIC at Arizona State University)

Second Chair : Ju-Ying Yang (Valdosta State University)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

Recently, with more frequent climate calamities caused by climate change, the need for a sustainable energy transition is greater than ever. However, sustainable energy transitions cannot be a simple and short-term shift to renewable energy sources, but require “long-term and complex reconfigurations of technology, policy, infrastructure, scientific knowledge and social and cultural practices to sustainable ends” (Baker et al., 2014, p. 4). As many actors, such as governments and civic organizations, get involved in this move, it becomes harder to align their goals and agree on the best way to achieve energy transitions. Furthermore, “carbon lock-in” hinders pivotal changes even when reaching an agreement among various actors (Unruh, 2000).

Given this nature of energy transitions, it is evident that dynamic interactions and conflicts among various actors and factors are involved in the transition process, making it more complex to realize. For example, technocrats in governments (actors) have usually sought to find an efficient way to transition based on a top-down approach while civil actors prefer a democratic way based on a bottom-up approach. In doing so, certain factors, such as democratic procedures, not only enhance social acceptance of renewable energy policies but also reveal conflicting interests among various groups (Baldwin et al., 2018; Knudsen et al., 2015). In addition, certain regulations generated in the past for the incumbent could impede energy transitions by amplifying conflicts during the process. Another example shows that governments could deal with challenges through interaction, such as policy learning from others (Etheredge, 1981; Etheredge & Short, 1983).

Therefore, it is imperative to explore interactions and conflicts among various actors and factors during energy transitions in order for the transition processes to be not only effective but also democratic. However, the literature on energy transitions has focused more on causational and static assessments rather than dynamic interplay among actors and factors and their repercussions. (Kern & Markard, 2016; Kern & Smith, 2008; Pidgeon et al., 2014; Rasch & Köhne, 2016; Verbong & Geels, 2007). This **onsite** panel thus aims to answer this research question: *How do various agents deal with challenges and tensions caused by dynamic interactions between actors and factors during energy transitions?* Dealing with this overarching question can contribute to understanding the complexities of energy transitions and facilitate a more just and effective energy transition, which is one of the most urgent tasks for humanity.

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CALL FOR PAPERS

We welcome research papers focusing on various challenges caused by dynamic interactions of actors and factors in energy transitions, which should be addressed to move toward a sustainable energy system. Not surprisingly, renewable energy projects have provoked severe social conflicts even when the public generally support these projects (Knudsen et al., 2015). In this sense, it is imperative to explain how various actors deal with these conflicts while diverse interactions accelerate or delay the achievement of sustainable communities. This panel thus calls for papers that include, but not limited to answer the question: how could critical junctures open a window of opportunity to address tensions resulting from the “carbon lock-in” (Pierson, 2000; Unruh, 2000) or how could deliberation or negotiation frame interactions among various actors, thus opening a pathway to a renewable energy transition (Metze & Dodge, 2016).

In sum, in order to have a better understanding of diverse challenges caused by dynamic interactions between actors and factors in energy transition processes, we aim to provide the platform for discussion through this panel addressing: 1) Theoretically, how do various theories, for example, civic engagement or path dependence, conceptualize dynamic interactions during energy transitions? 2) How do various factors contribute to (or delay) achieving sustainable goals by addressing (or amplifying) conflicts caused by energy transitions? 3) What challenges do various actors have along the way of energy transitions and how do they deal with it? 4) Can they achieve a just energy transition? And if so, how?

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Session 1

Wednesday, June 28th 08:00 to 10:00 (KHS251)

(Virtual) Dynamics of South Korean environmental governance

DaEun Son (Korea University)

Extreme weathers are commonly found around the world today which is closely related with climate changes. The World Disaster Report 2000-2019 by UNDRR observed that there have been 7,348 natural disasters and 4 billion victims caused by climate change over the past 20 years. Experts and climate-related organizations have long identified "greenhouse gas emissions" as the main cause of climate change. The IPCC(Intergovernmental Panel on Climate Change) revealed through its Fifth Report that main cause of climate change is human activity based on fossil energy systems. Therefore, the 2018 IPCC announced that it aims to achieve zero CO2 emissions by 2050 and net zero all greenhouse gases by 2063 in order to limit global temperature rise to within 1.5°C. Various efforts have been witnessed in many countries to move away from relying on fossil, while substantial greenhouse gas reduction has not been achieved.

Against this backdrop, this paper examines how the environmental governance has been shaped and reshaped in recent years under different political structure in South Korea. South Korea is ranked 11th in cumulative greenhouse gas emissions from 1951 to 2017, and fifth among OECD countries in 2017. While South Korea has made efforts to reduce greenhouse gas emissions, greenhouse gas reduction roadmap targets established in 2009 and 2015 have not been met. While there have been plenty of discussions on climate change crisis and political circles have emphasized actions, the results are far from satisfactory. Concrete policies to reduce greenhouse gas involves industrial restructuring which often leads to financial cost of economic actors. The government sometimes is in dilemmatic position in between business firms and environmental NGOs. This has made agreements among the state/government, business organizations, and civil society difficult. The carbon emission trading system, a typical international means for reducing greenhouse gas emissions, has also been under constant discussion in South Korea, but it has not produced any significant results. Yet, the processes of discussion and debates have been very dynamic. We employ environmental governance framework to analyze the dynamic processes of interaction among different actors around the policies related with greenhouse gas reduction including carbon emission trading system in South Korea.

Timing and institutional voids as critical implementation barriers for sustainable energy transition: the case of blue energy at the Afsluitdijk, the Netherlands

Ferry Van Kann (University of Groningen)

Stefan Verweij (University of Groningen)

As widely recognized, climate calamities caused by climate change emphasize the need for sustainable energy. This requires a shift away from fossil fuels towards renewable energy. Currently, in many Western countries no more than 20% of the primary energy comes from renewable sources. While the need to accelerate the sustainable energy transition is thus increasingly apparent, in practice, many initiatives to produce renewable energy face important barriers that hinder successful development and implementation; examples include network barriers, the high costs and maturity of new technologies, limited commercial viability and financing, and the large potential environmental and/or socio-economic impacts. In addition, while the influence of institutional barriers is also receiving more research attention, deeper insights into how sector-specific frameworks hinder cross-sectoral initiatives such as sustainable energy are called for.

This paper responds to the call for more fundamental institutional research into sustainable energy transition

and focuses in particular on influence of institutional voids. We aim to explain the role of institutional voids in the implementation and realization of sustainable energy initiatives. To this end, we study the case of the case of the Afsluitdijk, a 32 km long and more than 90 years old dike that protects a significant part of The Netherlands against flooding. Moreover, it created a man-made barrier between fresh water (Lake IJssel) and the salt water of the North Sea. Recently, as a result of climate change and especially sea level rise, the major dam needed reinforcements to remain a successful protection against flooding, which provided unique opportunities to exploit Blue Energy or Osmotic Power. Consequently, the organization responsible for this dam (Rijkswaterstaat, or the Directorate-General of the Ministry of Infrastructure and Water Management of the Netherlands) invited market parties to come up with innovative solutions to keep the dam safe, be able to deal with sea level rise, and include various sustainable energy initiatives. However, except for a relatively small test site, the (almost) finished reconstruction of the Afsluitdijk clearly shows that barriers have hindered the implementation of innovative and sustainable energy technologies.

On the basis of a longitudinal analysis, we identified both institutional voids and timing issues as critical explanations to understanding the complexities of energy transition. We find that even when (key) actors have the ambition to innovate and stimulate energy transition, existing sector-specific institutional frameworks for procurement and time pressure resulting from laws on water safety and flood protection hinder the implementation of blue energy. This paper can therefore contribute to the body of knowledge that links policy learning, innovation and transition management (including the notion of critical junctures) to increase institutional capacity of actors in public policy to accommodate unique opportunities for sustainable energy transition.

Analyzing energy transitions beyond the incumbent-challenger divide. The case of Chile (2016-2023).

Antoine Maillet (Universidad de Chile)

Chile has been internationally recognized for its place in the global energy transition, particularly for its significant lithium reserves, and its favorable conditions for the development of green hydrogen projects. The latter is the product of the so-called "renewable boom", which occurred after important reforms in the electricity sector in 2016 (Madariaga, 2018; Maillet & Rozas Bugueño, 2019). This has led to consider Chile as a leader in climate mitigation efforts (CICC, 2023). However, these advances in the transition also face challenges that are not highly salient, but equally capable of limiting or slowing down the energy transition. What are these challenges, and what conflicts have they caused between different actors? In this paper, we analyze these challenges, emphasizing the complex interactions between incumbent companies, renewable energy challengers, and public authorities.

As a middle-income country, with great potential for renewable energy, but at the same time highly exposed to the effects of climate change, Chile is a relevant case to analyze. The reform to the electricity sector in 2016 favored the massive entry of non-conventional renewable energies, without resorting to subsidies. However, a few years later and until now, obstacles for the development of renewable energies have arisen. Emulating studies that have addressed the challenges of the energy transition for countries in the North (Downie, 2017), the paper will report on different "policy contests", such as a plan to close coal-fired power plants, or the development of energy transmission to avoid curtailment. However, we intend to develop an analytical look that goes beyond single contests, in order to show how actors with different interests have emerged, and which strategies and actions they have adopted to make their interests prevail in policy.

As it stands out in the literature, the energy transition often confronts incumbent companies – whose productive processes are based on fossil energies - and challengers promoting renewable alternatives, mostly wind and solar (Breetz et al, 2018; Stokes 2020). Our case study of Chile leads us to question the analytical payoff of this traditional divide. As a matter of fact, the simplified opposition between incumbents and challengers shows some shortcomings, as incumbents intend to diversify their energy source beyond fossil energies, while at the same time renewable challengers quickly become large utilities, willing to establish their own entry barriers to new challengers.

Our original analytical proposal is grounded on a systematization of secondary sources and the press, and on 20 interviews conducted with actors in the sector. We build on this material to develop new insights on how incumbent business players position themselves to maintain dominance in the energy market, showing how they combine industrial and political strategies, as on the one hand, they invest in new technologies; and on the other, they use their instrumental and structural power to slow down the transition.

The Equifinality of Transitioning to Renewable Energy: A Comparative Case Study of Four Texas Municipalities

Ju-Ying Yang (Valdosta State University)

Energy transitions are well-known as a fixed formula, from motivations to adopting renewable energy targets or achieving renewable targets, from the perspective of energy transitions literature. However, less attention has been paid to why municipalities transitioned to renewable energy so differently and what made that different. Therefore, this paper incorporates the path dependency and policy learning literature to unpack different energy transition pathways. This article presents findings from a comparative case study to build an overarching framework of local energy transitions. It identifies several differences among four Texas municipalities – Georgetown, Denton, Austin, and Houston – that drive them toward the same goal, transitioning to renewable energy, via different pathways. Four key themes are motivations, political pressure, carbon lock-in (path dependence), and policy learning. The results suggest three pathways. The first pathway is relatively straightforward. Municipalities can easily escape from carbon lock-in because of critical junctures, but the ignorance of management would make them fail. The second describes policy learning to help municipalities avoid making the same mistakes in energy transitions. Still, they cannot give up fossil fuels for some reason that makes their achievement controversial. The third pathway depicts municipalities in the deregulated market that do not have local control of citizens' energy usage. They only can purchase renewable energy for their public operations through retail electric providers rather than involve in a city-wide transition. This paper concludes with practical implications for municipalities in policy learning from failures and escaping from carbon lock-in during energy transitions.

Literature Review on Three Types of Public Engagement in Energy Transitions

Paul Jo (HAIC at Arizona State University)

As climate change continues to intensify, more vulnerable communities have been disproportionately affected by the environmental decline. Governments are thus faced with the challenge to respond to growing demands for the transition toward a renewable energy system while also sharing the benefits and costs of this transition equitably. Since energy transitions are not only about technical issues, but rather related to a variety of agents and contexts (Baker et al., 2014; Haas, 2019; Kern & Markard, 2016; Kern & Smith, 2008), more public engagement and participation, instead of the transition driven by experts, thus become critical for achieving seamless energy transitions. Given this trend, more researchers focus on public engagement in energy transitions (Chhetri et al., 2020; Chilvers & Longhurst, 2016; Evans & Phelan, 2016; Knudsen et al., 2015; MacArthur, 2015; Pidgeon et al., 2014; Rasch & Köhne, 2016). However, as diverse actors argue their versions of energy justice for their ideals and interests, a just transition becomes harder to achieve. Furthermore, the existing literature on public engagement in energy transitions does not pay sufficient attention to the dynamic interactions of various actors and factors in relation to energy justice, which is a critical component for achieving a just transition (Evensen et al., 2018; Forman, 2017; Ottinger et al., 2014; Yenneti & Day, 2015).

Therefore, this paper aims to provide a critical review of the energy transition literature to reveal its limitations and contribute to a synthesis of the energy justice and public engagement literature. To this end, this review examines three types of public engagement in energy transitions: 1) Public engagement by societal acceptance, 2) Public engagement by direct participation, and 3) Public engagement by deliberative process and specific institutions. Then, based on these studies, I will demonstrate that the literature on public engagement in energy transitions needs to focus more on dynamic interactions caused by ongoing changes in social norms, context, power and interest relations, and various energy justice concepts in order to achieve a just transition in multifaceted real-life contexts.