



New approaches for transitions to low fossil carbon societies: promoting opportunities for effective development, diffusion and implementation of technologies, policies and strategies



Masachika Suzuki ^{a,*}, Norichika Kanie ^b, Masahiko Iguchi ^c

^a Graduate School of Global Environmental Studies, Sophia University, Tokyo, Japan

^b Graduate School of Media and Governance, Keio University, Japan

^c Department of International Relations, Kyoto Sangyo University, Japan

ARTICLE INFO

Article history:

Received 5 April 2016

Received in revised form

19 April 2016

Accepted 19 April 2016

Available online 27 April 2016

Keywords:

Low fossil carbon societies

Clean energy

Technology diffusion

Technology development

ABSTRACT

The Paris Agreement signed on December 15 2015 is a landmark consensus in the global efforts to cope with climate change that emphasizes the importance to hold the increase in the global average temperature to below 2 °C and even to 1.5 °C above pre-industrial levels. In order to achieve this target, it is urgently needed to introduce new approaches for transitions to low fossil carbon societies by promoting opportunities for effective development, diffusion and implementation of new technologies, policies and strategies. This Special Volume focuses upon both domestic and international institutions designed to facilitate improved low fossil carbon technology governance. The articles contained in this Special Volume demonstrate the barriers and opportunities to making the urgently needed changes, develop and test new concepts, structures, policies, and strategies for low fossil carbon technology governance. They indicate that there are various innovative technologies, policies and strategies available to make the drastic changes to low fossil carbon society and it is not too late to put those technologies, policies and strategies in practice to meet the 2 °C and 1.5 °C targets under the Paris Agreement.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

The Paris Agreement signed on December 15 2015 is a landmark consensus in the global efforts to cope with climate change. The agreement emphasizes the importance to hold the increase in the global average temperature to below 2 °C and even to 1.5 °C above pre-industrial levels. In order to control the temperature increase under the levels, however, it is urgently needed to introduce new approaches for transitions to low fossil carbon societies by promoting opportunities for effective development, diffusion and implementation of new technologies, policies and strategies.

This Special Volume (SV) focuses upon both domestic and international institutions designed to facilitate improved low fossil carbon technology governance. The main objective of this SV is to address new approaches designed to facilitate the rapid and effective transition to post-fossil carbon societies. The authors of

this introductory article, together with the members in the editorial board requested authors to demonstrate the barriers and opportunities to making the urgently needed changes, develop and test new concepts, structures, policies, and strategies for low fossil carbon technology governance.

The new approaches for transitions to low fossil carbon societies have been a subject of utmost interest among scholars in different fields of study. For example, the study of transition management examines different levels of changes at multi-levels and highlight necessary conditions for transformational changes for low fossil carbon societies (Verbong and Geels, 2010; Geels, 2014; Vasseur and Kemp, 2014). Transitions for low fossil carbon societies have been a subject of interest among scholars looking into National Innovation System (NIS) as well (Foxon et al., 2005; Alkemade and Suurs, 2012; Negro et al., 2012). With respect to the barriers for the diffusion of low carbon technologies, many scholars have conducted case studies on a specific clean energy technology in different countries to identify the barriers and address the roles of institutions and stakeholders to overcome them in each specific case (Painuly, 2001; Reddy and Painuly, 2004; Ockwell et al., 2007, 2009).

* Corresponding author. 7-1 Kioi-cho, Chiyoda-ku, Tokyo, 102-8554, Japan.

E-mail addresses: suzuki@genv.sophia.ac.jp (M. Suzuki), kanie@sfc.keio.ac.jp (N. Kanie), iguchi@cc.kyoto-su.ac.jp (M. Iguchi).

The ideas of developing this SV came from a workshop titled as “Governance Architecture towards Low Carbon Society: Technology and Actor Configuration.” The workshop was organized at the Institute for the Advanced Study of Sustainability at United Nations University in October 2013. The editorial and advisory board for this SV was then established at the workshop with Donald Huisingh (University of Tennessee), Tobias Schmidt (ETH Zurich), Joern Huenteler (World Bank), and Heleen de Coninck (Radboud University). The call for papers was announced after the workshop. As a result, it was successful to gather and select eighteen high-quality articles that made special efforts in addressing new approaches at the various levels of low fossil carbon technology governance.

2. Setting the special volume into perspective

The eighteen articles demonstrate respectively new concepts, structures, policies, and strategies for low fossil carbon technology governance at various levels including the meta-level (social system level), the meso level (regime and institutional level), the macro level (policies and business strategy level) and the micro level (products, services, and value-chain level). It is to emphasize that the ideas and efforts at those levels are necessary to meet the 2 °C and the 1.5 °C increase targets under the Paris Agreement.

This SV is built in line with thoughts and findings among prior special volumes of Journal of Cleaner Production including “Towards Post Fossil Carbon Societies: Regenerative and Preventative Eco-Industrial Development” (Volume 114, 2016), “Carbon Emissions Reduction: Policies, Technologies, Monitoring, Assessment and Modeling” (Volume 103, 2015), “Climate Co-Benefits in Urban Asia” (Volume 58, 2013), and “Minimizing Emissions and Energy Wastage by Improved Industrial Processes and Integration of Renewable Energy” (Volume 18, 2010). Volume 114 demonstrates holistic approaches for innovative eco-industrial development. Volume 103 indicates that there are a variety of effective policies and technologies available for us to move to low fossil carbon societies. The concept of “co-benefits” is the focus of Volume 58 in which the authors in this special volume illustrate that the implementations of low carbon policies and technologies, if properly designed, bring about social, economic, environmental benefits as well. Volume 18 indicates that there are numerous opportunities in the industrial process to reduce pollution and waste and integrate renewable energy sources into the process. This SV attempts to advance the thoughts and research findings for the transitions to low fossil carbon societies. The following section illustrates research topics and key findings of each article contained in this SV and summarize the overarching lines which are woven through them.

2.1. An overview of the papers in this special volume

Table 1 presents overview of papers in this SV. This section presents some highlights on the new approaches for transitions to low fossil carbon societies. One key aspect is challenges and barriers prevent or slow-down the development and effective implementation of post-fossil carbon societal technologies, and what institutional frameworks and governance tools are needed to overcome current challenges to make the transition. This is well reflected in the papers of this SV, which are categorized in terms of contents on (1) illustrating transitional changes for low fossil carbon societies, (2) proposing new policy and/or business strategies for low carbon technology development, and (3) drawing implications for international technology and financial institutions.

The Table 1 summarizes the research themes and focuses of respective authors. Various aspects of transition to low fossil

carbon societies are covered, with rich case studies from both developing and developed countries. The scope of level of analysis focused by authors of the papers is illustrated by the four categories (meta, meso, macro and micro levels) presented in the table.

2.1.1. Illustrating transitional changes for low fossil carbon societies

Addressing challenges and opportunities for effectively making transitions to low fossil carbon societies requires the new concepts and approaches. In this regard, Robertson (2016) discussed the necessity to address not only the social aspects but also the technological aspects for transition scenarios attempting to examine pathways towards low carbon futures. The author proposed a ‘systems’ approach that integrates quantitative and qualitative analysis of low fossil carbon transition pathways. This new approach, as the author argues, allows us to study the transition by improving the resolution of transition policy recommendations. Marquardt et al. (2016) highlighted the role of international donors to facilitate the transition in developing countries. By providing extensive empirical insights from the status of energy transition in the Philippines and Morocco, the authors argue that donors can be a driving force for testing alternative ways for electricity supply that are closely connected to the country’s primary energy objectives.

McLellan et al. (2016) analyzed the progress of decentralized energy systems in Japan in the period after the Fukushima accident of 2011. Authors identified several barriers to the transition although there have been the desire of stakeholders to change the energy system, and hence reveals the ‘lock-in’ of the Japanese electrical regime. Fuchs and Hinderer (2016) analyzed the German electricity transition. The authors sketched such transition originally arose from the civil society, initially as the movement directed against nuclear energy, and later on as a movement favoring decentralized forms of energy production and distribution. Once these movements are officially recognized with regulatory supports, regions, cities and villages started to experiment new ideas and strategies that caused socio-technical innovations in this area.

Identifying barriers for technology diffusion in the developing countries, especially a widespread diffusion of renewable energy technologies is critical to transition to low fossil carbon societies, as argued by Mignon and Bergek (2016). Authors studied a qualitative multiple case study of 28 adopters in France and in Sweden, and identified these adopters faced with system-level challenges, such as market-structure obstacles and lack of institutional routines, as well as actor-level challenges, such as lack of resources or behavioral characteristics. In conclusion, they argued that policy makers need to consider not only system-level diffusion challenges, but also to understand actor-level contexts, including the behaviors of adopters who contribute to the transition.

Policies to assure combatting climate change and realizing energy security indeed requires a rapid growth in global installed capacity of renewable energy generation, as Lacerda and Bergh (2016) argued. Authors focus on wind power capacity in China, the United States, Germany and Spain, and found the mismatch between installed capacity and power generation for the case of wind power. They argued that several policies, especially electricity market regulation and policies promoting system flexibility play a key role to contribute to a better balance between power generation capacity and capacity utilization of wind power.

Kirchhoff et al. (2016) identified success factors for the implementation of microgrids supplied with renewable energies. Authors found that energy access microgrids in the Global South and bottom-up cooperatives in Germany share a high number of success factors due to specific lessons learnt that could be applied from one context to the other.

Download English Version:

<https://daneshyari.com/en/article/1744126>

Download Persian Version:

<https://daneshyari.com/article/1744126>

[Daneshyari.com](https://daneshyari.com)