P09 / Regional cooperation for the energy transition: steps towards renewable-based regional energy planning

Topic : ENVIRONMENT, SDGs, ENERGY

Chair : Daniel del Barrio Alvarez (The University of Tokyo)

Second Chair : Dinita Setyawati (Ember Energy)

Third Chair : Muyi Yang (University of Technology Sydney)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

Cross-border electricity trade has become a key enabler to facilitate the integration of renewables in large shares, and therefore, a milestone to achieve the energy transition. Countries across the globe are looking at connecting their electricity grids and establishing power trade agreements to support achieving their goals of moving towards sustainable energy systems. Indeed, cross border electricity trade and the benefits of interconnections between large electrical systems are generally found across all regions and continents, including also some global initiatives. Some examples are Northern Europe, United States, Western and Southern Africa, and South Asia (Agostini et al., 2019).

Nonetheless, many regions are encountering difficulties in moving beyond limited exchanges based on dedicated contracts. This represents an important bottleneck towards the goal of sustainable energy planning, as this limits the trade of electricity to large scale (in case mega-) projects that can justify the extraordinary investments by themselves. However, these projects are usually associated with higher environmental and social costs. This can include large scale dams flooding extensive inhabited areas or hydrogen generation projects in areas with limited water resources, among many others. This has led to big controversies around cross border electricity projects that, eventually, could cause strong public opposition to these projects leading to a delay on the sustainable energy transition.

Regional (supra or international) energy planning approaches are considered a suitable alternative to facilitate better coordination, harmonization, and integration of national electricity systems. As such, initiatives such as regional coordination committees, regional regulatory forums, regional capacity building programs are being proposed and experiences in many countries.

However, these experiences and the knowledge derived from them remains scattered, with little capacity for generalization. This panel aims to set a step towards the development of theories and frameworks for the analysis of renewable based regional energy planning.

· Institutional options to facilitate regional planning, operation, and/or regulation

· Financial mechanisms for supranational projects (generation and transmission)

· Innovative technological options for regionally oriented renewables (e.g. offshore energy islands)

· Empirical analyses on cooperation

· Sociotechnical imaginaries

· Geopolitical and energy security drivers for cooperation

· Energy justice and just transition implications of regional energy initiatives (both positive and negative)

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Session 1

Thursday, July 3rd 08:00 to 10:00 (SME-G4)

Building Regional Capacities for a Green Hydrogen Economy: Insights from the UNLOCK Project and Frameworks for Renewable-Based Energy Planning

Beata Kviatek (Hanze University of Applied Sciences Groningen)

Regional capacity building is a critical enabler in advancing the green hydrogen economy, particularly in fostering renewable-based regional energy planning. This paper examines initial evidence from the Interreg Europe project "Unlocking Green Hydrogen Economy for SMEs in European Regions" (UNLOCK), which focuses on empowering regions to integrate green hydrogen into their energy systems. Through interregional learning and collaboration, the UNLOCK project serves as a model for how capacity-building initiatives can accelerate the transition toward sustainable, hydrogen-based energy solutions.

Green hydrogen has emerged as a cornerstone of efforts to decarbonize energy-intensive industries and achieve climate neutrality. However, fragmented regional energy policies and the absence of harmonized regulatory and financial frameworks present significant barriers to its widespread adoption. UNLOCK addresses these challenges by facilitating knowledge exchange, developing strategic action plans, and piloting context-specific solutions. These measures aim to bolster regional competencies and foster a supportive environment in which SMEs can thrive in the emerging hydrogen economy.

This paper underscores the critical role of regional capacity-building programs in bridging gaps in technical expertise, regulatory harmonization, and financial mechanisms. By examining empirical evidence, the study identifies best practices for crafting institutional frameworks that integrate green hydrogen into broader renewable energy strategies. It further highlights the potential of regional synergies to enhance energy system flexibility and optimize resource allocation for hydrogen production, storage, and distribution.

The findings from UNLOCK also highlight the need to develop robust theories and frameworks that underpin renewable-based regional energy planning. Socio-technical systems theory, for example, provides valuable perspectives on the interaction between technological innovation, policy evolution, and stakeholder engagement. Incorporating energy justice and just transition principles is essential to ensure equitable and inclusive outcomes, addressing disparities in resource distribution and societal benefits. Furthermore, geopolitical and energy security considerations must be factored into regional strategies to strengthen interregional and cross-border cooperation and promote long-term resilience.

In conclusion, regional capacity building for the green hydrogen economy represents a vital step in the global energy transition. Insights from the UNLOCK project demonstrate how targeted interventions can help regions overcome structural barriers and effectively harness renewable energy resources effectively. By synthesizing these lessons, this paper contributes to the development of comprehensive analytical frameworks for renewable-based regional energy planning, offering actionable pathways to scalable, sustainable energy solutions that align with climate neutrality goals while fostering competitive and resilient sustainable regions.

Just transition perspectives for cross-border energy planning in Southeast Asia

Daniel del Barrio Alvarez (The University of Tokyo)

Mirza Huda (ISEAS - Yusof Ishak Institute)

The development of regional power connectivity has been a long-standing explicit policy goal of Southeast Asian countries, as evidenced by the implementation of several initiatives, including the ASEAN Power Grid

and the Greater Mekong Subregion. Historically, most of the projects have been bilateral interconnections, with the most electricity traded between Lao PDR and Thailand. However, there are signals of a change in the future role of regional power trade and the current regional plannings, as indicated by the numerous bilateral and multilateral power trade agreements announced. This shift has given rise to a new set of research questions concerning the potential future developments of regional power trade in Southeast Asia and their implications. This paper aims to shed light to these possible future pathways and how these may impact a just transition in the region. For that, we conduct interviews with experts in the region identifying the different existing perspectives. The results are expected to support future research and studies on cross-border energy planning in Southeast Asia.

(Virtual) The Political Economy of Cross-Border Electricity Trading: A Case Study of the LTMS Power Integration Project

Hannah Lord (Australian National University)

Cross-border electricity trading in Southeast Asia could play a significant role in supporting a renewable energy transition, and the ASEAN Power Grid has emerged as a focus of regional energy policy discussions. However, despite this attention, efforts to advance the ASEAN Power Grid have been piecemeal and fragmented, with political barriers identified as a factor. The political economy of cross-border electricity trading in Southeast Asia has been identified as a research gap. This research seeks to identify the political economic factors shaping successful cross-border electricity trading arrangements. It uses a case study method to examine negotiations on the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP), the first multilateral cross-border electricity trading agreement under ASEAN regional policy frameworks. Billed as a pathfinder agreement, the LTMS-PIP has achieved partial success, although its full realisation has been hampered by an interplay of factors between the international, regional and national scales. Preliminary findings from this research identify the changing demand profile for decarbonised energy from international business, the role of political leadership within the structure of ASEAN regional negotiations, and domestic industry preferences as key factors. These findings can contribute to a better understanding of the political economy of cross-border electricity trading in the context of a renewable energy transition.

The role of non-state actors in facilitating a regional power market for energy transition in South Asia: insights from a narrative analysis

Anindya Upadhyay (LKY School of Public Policy, National University of Singapore)

Cross border trade of electricity can play a crucial role in energy transitions as it can facilitate access to different clean power sources within a region. While studies across North America and European Union have demonstrated the value that regional electricity trade brings to positive climate action, Asia and South Asia in particular lags behind, despite high potential. A plethora of factors including (but not limited to), regional politics, inadequate infrastructure and disharmonized policies in the region have contributed to the slow growth of cross border power trade in South Asia. Until recently, cross border power trade took place only through bilateral contracts between neighbouring countries and the idea of `regional energy trade' remained almost non-existent. After countries in the South Asian Association for Regional Cooperation (SAARC) recognized the need for electricity cooperation in 2014, guidelines for the same evolved rapidly in India over the next few years, catalysed by efforts of non-state actors. Following these guidelines, for the first time ever, cross border power trade took place between India-Nepal in 2021 and then India-Bhutan in 2022 through India-based privately owned platform – the Indian Energy Exchange (IEX). This helped India have access to additional cheap hydropower from Nepal and Bhutan, who in turn can procure cheap solar power from India. As mentioned earlier, non-state actors (development agencies and multilateral institutions) have played a major role over the last decade in capacity, knowledge and consensus building among these South Asian nations required for exchange-based power trade. Their active role towards this goal predates SAARC's 2014 framework. While the recently commenced trades on IEX is a win in the direction of having a market in the region for cross border power trade, this is still an experimental phase towards achieving a 'commonly governed' regional power market -- that helps in energy transition -- avoiding dominance of a single country.

This piques curiosity about the preponderant role of non-state actors -- as opposed to countries or groupings (like SAARC, BBIN or BIMSTEC) -- in consensus-building for operationalizing market-based cross border power trade in its current form. Through a narrative analysis of the cross-border power trade policy terrain over the years, this paper seeks to study the role of non-state actors in enabling market-based power trade in the quest for a regional institution in South Asia.

This paper hopes to contribute to literature on governance, policy experimentation and policy learning for energy transition.