P01 / A Climate Policy Design Lab for Asia and the Southeast: Advancing Climate Solutions for Tomorrow

Topic : ENVIRONMENT, SDGs, ENERGY

Chair : Benjamin Cashore (National University of Singapore)

Second Chair : Maitreyee Mukherjee (LKY School of Public Policy, National University of Singapore)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

Two paradoxical global environmental trends have emerged since the 1992 Rio Earth Summit: the proliferation of well-intended policies designed to address climate change, and the acceleration of global heating, carrying with it a myriad of climate-related challenges including water scarcity, food insecurity, and poverty alleviation. Understanding, and overcoming, this paradox is important, since reversing current global trends is required to avoid catastrophic social, economic, and ecological outcomes.

The Institute for Environment and Sustainability (IES) at the National University of Singapore's (NUS) Lee Kuan Yew School of Public Policy (LKYSPP) is proposing a panel on papers devoted to generating, and applying,

"policy design capacity building" with which to generate insights for identifying policy mix innovations capable of produced durable and effective results. To do this, we are seeking papers that target "micro-level" policy levers capable of producing macro level policy change. The papers can be conceptual, theoretical, historical, as well as engaging in "anticipatory policy design" insights with which to foster multistakeholder policy learning processes.

The panel will integrate the papers around identifying and building a climate policy design lab for Asia and Southeast Asia, which stands at a critical juncture moment in the potential to accelerate a range of decarbonization pathways on which government, the private sector, and NGOs are currently embarked.

Details: One of the most important questions facing policy makers and sustainability scientists is how to build lasting and effective climate solutions. While there has been no shortage of climate related technological, market, and finance initiatives over the last 30 years, there is widespread frustration among governments, the private sector, and non-governmental organizations over the pace and scale of change. These questions are of particular importance in Asia and the Southeast, where governments, following the Paris Accord, have unleashed an array of initiatives designed to develop transition pathways towards a low-carbon economy and achieve their nationally determined contributions (NDCs). The purpose of this panel to shed light on the puzzle of the failure to accelerate climate outcomes alongside sustained policy attention on climate targets. This panel is devoted to deliberating over and uncovering- How to design durable, effective, 'fit-for-purpose' policies that can sustain political, governance and socio-economic challenges, to ensure effective decarbonisation pathways in Southeast Asia? By doing so, the panel aim to generate design insights for traveling climate related sustainability policy pathways.

CALL FOR PAPERS

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Based on the above discussed research theme, the panel invites both conceptual and empirical papers in

the context of Southeast Asia?, addressing the following questions (but not exhaustive)

1. What policy design approaches have proven effective historically in delivering climate outcomes?

2. What are policy design insights for creating policy lock-in, entrenchment, and expansion especially regarding green technology pathways? This is especially important given that while accelerating, these advancds are still far below what is required if they are to help countries meet their nationally determined contribution ?

3. What are the critical policy design capacities that would need to be nurtured to take advantage of these insights to diffuse, with, and across, practioner communities?

4. How might policy learning dialogues be structured to foster innovation and enhance political feasibility?

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Session 1

Thursday, July 3rd 08:00 to 10:00 (E1)

Why Existing Policy Efforts Have Failed to Unlock Indonesia's Vast Solar Potential and How Policy Design Can Make a Difference: A Case Study

Liuyang He (LKY School of Public Policy, National University of Singapore)

Benjamin Cashore (National University of Singapore)

Despite Indonesia's vast solar potential and various policy efforts to support renewable energy development, the country has experienced a sluggish pace in solar power growth over the decades. Meanwhile, coal continues to dominate the energy mix, driving a significant increase in carbon emissions and exacerbating climate change. To understand why the current policy approach has failed to produce effective and enduring outcomes, this study traces the historical development of Indonesia's high-carbon lock-in and the shortcomings of policies intended to incentivize and catalyze solar energy growth.

The case focuses on two key policy instruments: Feed-in-Tariff for utility-scale solar plants and the Net Metering scheme for rooftop solar installations, both exemplifying a policy creation-euphoria-implementation-depression cycle. By mapping out the stakeholders and their objectives and analysing the policy pathways of both policies, we found that the neglect of incorporating key design features—i.e., stickiness, entrenchment, and expansion of support, as identified by the diagnostic questions—and the resulting misalignment between key stakeholders' objectives and the policies have caused the ineffectiveness of past policies in the long term. These policies have neither succeeded in shifting the objectives of influential stakeholders opposed to solar energy nor in fostering a coalition of solar supporters to establish a virtuous coalition.

We argue, however, that the apparent failure of existing solar-supporting policies to drive solar development in Indonesia does not reflect an intrinsic deficiency or unsuitability of these policy tools. Instead, it is the omission of critical design features and the improper sequencing of policy tools that has caused the premature punctuation or downturn.

This offers an important lesson for investment and financing in clean technology in the region. When the underdevelopment of solar is attributed solely to a lack of financing, and efforts focus exclusively on securing financial support and expanding investment volumes, it neglects the critical dimension of the sequential order and interactive effects among policies, business dynamics, and investments, which risks rendering policy efforts in vain.

Although the majority of this case is descriptive and explanatory, we also propose several policy recommendations to initiate subsequent conversations through both internal IES deliberations and external stakeholder engagement. Using this case as a starting point, further reflection and brainstorming will take place in policy design dialogues, applying the anticipatory policy design approach to develop actionable policy levers that that accelerate renewable energy adoption and contribute to a durable low-carbon future.

(Virtual) Empowering Farmers and Women in Energy Transition: Policy and NGO Strategies for Solar-Powered Irrigation Enterprises

Meenakshi Singh (Aga Khan Rural Support Programme (India))

The green transition in agriculture relies not only on supply-side innovations like renewable energy infrastructure but also on demand-side factors influencing adoption, affordability, and behavioural change. In rural India, where irrigation is critical for agricultural productivity, shifting from fossil fuel-based pumps to solar-powered irrigation systems offers opportunities to reduce operational costs, enhance water-use

efficiency, and lower carbon emissions. However, adoption is hindered by financial constraints, lack of awareness, and socio-cultural barriers. Targeted policy interventions and NGO strategies are key to overcoming these demand-side challenges and ensuring inclusive participation in the clean energy transition.

This paper examines these policy and NGO-led interventions through the case of a solar-powered irrigation enterprise model implemented in Bihar by AKRSPI in collaboration with IWMI. Bihar's socio-ecological context—abundant groundwater and a longstanding tradition of informal water markets—makes it ideal for this model. It enables farmers to own solar-powered irrigation systems and sell water to neighbouring farmers at mutually agreed rates. A critical feature is the underground pipeline network (1,500–2,000 feet with 6–8 outlets), improving water distribution efficiency. Unlike similar models in other states, which run for 300–500 hours annually, Bihar's systems operate for 1,000–1,500 hours per year, generating INR 1,20,000–1,50,000 ($1,445–$1,805 USD) in annual revenue. For comparison, the average annual income of a farmer in Bihar is INR 90,504 ($1,090 USD), meaning solar enterprises can provide up to 66% more income than traditional farming alone. This additional income significantly enhances farmers' financial stability, enabling reinvestment in agriculture and improving household welfare.

Despite its economic and environmental benefits, solar irrigation adoption faces demand-side barriers, such as high upfront costs, limited access to credit, and socio-cultural norms limiting women's participation in irrigation markets. To address these, AKRSPI, in collaboration with Jeevika (BRLPS), has prioritised financial innovation, community mobilisation, and gender-inclusive strategies. Policy interventions like subsidised credit, concessional loans, and institutional support for decentralised renewable energy enterprises have made solar irrigation systems more accessible. A significant portion of farmers' contributions (about 50%) comes from loans, reducing financial barriers to entry.

NGOs play a critical role in behavioural change, capacity-building, and community engagement. AKRSPI has focused on promoting women-owned solar irrigation enterprises, challenging the male-dominated nature of Bihar's irrigation sector. These interventions not only increase agricultural productivity and income but also empower women and promote their leadership in the clean energy transition.

This case study highlights how a combination of financial innovation, social mobilisation, and localised policy interventions can drive demand-side adoption of clean energy in agriculture. By integrating subsidised financing, technical support, and gender-responsive approaches, governments and NGOs can scale up sustainable irrigation models, ensuring a just and inclusive green transition. This approach has broader implications for rural energy access, climate resilience, and economic development, demonstrating that demand-side factors are as critical as supply-side innovations in achieving sustainability goals.

Unearthing Injustice: Institutional Governance Challenges in Indonesia's and the US's EV Mining Supply Chains

Katherine Hasnain (LKY School of Public Policy, National University of Singapore)

Research Question:
How effective are formal and informal governance frameworks in Indonesia and the United States at mitigating environmental justice trade-offs associated with the expansion of EV battery mining and supply chains? What policy design insights can improve the integration of formal and informal governance systems to address institutional inertia and foster effective decarbonization pathways?

Abstract:
The global pivot to electric vehicles (EVs), beginning in 2010, has accelerated the demand for critical minerals such as nickel and lithium, essential for EV batteries (Matulka, 2014; IEA, 2022). This rapid adoption marks a significant step toward reducing fossil fuel dependency but has also cast a spotlight on the socio-economic and environmental trade-offs associated with resource extraction. Regions like South Sulawesi, Indonesia, and Nevada, United States, exemplify these challenges, where mining activities have heightened competition for resources such as water, exacerbated socio-economic inequalities, and exposed governance gaps in resource management (Campbell & Lee, 2024; St. John, 2024).

This study investigates the capacity of institutional governance systems in Indonesia and the United States—prominent players in the global EV supply chain—to address these impacts. It examines how formal governance frameworks, such as mining laws and environmental regulations, interact with informal mechanisms, including adat (customary laws) in Indonesia and tribal governance in the United States. The analysis focuses on how national and subnational policy design can address the socio-environmental burdens created by the EV boom and identifies critical gaps in resource allocation, governance fragmentation, and stakeholder inclusion (WALHI, 2023; Earthworks, 2022).

Using institutional mapping and policy analysis, the study identifies governance barriers, including institutional inertia, path dependency, and enforcement gaps, that limit the ability to mitigate harm. In Indonesia, policies such as the EV Roadmap have spurred industrial expansion, while in the United States,

recent initiatives like the Inflation Reduction Act are ramping up lithium mining in Nevada to meet growing domestic demand. These findings emphasize the need for hybrid governance approaches that integrate formal institutions, such as national mining regulations, with informal mechanisms like adat and tribal governance, to balance industrial growth with equity and sustainability.

Keywords: electric vehicles, climate governance, critical minerals, nickel mining, lithium extraction, environmental justice, water access, socio-economic impacts, resource governance, Indonesia, United States, IRA, Inflation Reduction Act, just energy transition, institutional frameworks, hybrid governance models, super wicked problems.