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Designing sustainable energy plans for the Greater Mekong Subregion

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Fossil fuels and hydropower dams have long been at the backbone of power supply systems in the Greater Mekong Subregion (GMS), an energy policy catalyzed by the direct availability of these resources, the backing of foreign investments, and the limited coordination among the many decision-makers. Such policy has resulted in large externalities: gas and coal-fired plants contribute to the carbon footprint of all GMS countries, particularly Thailand; dams have affected the riverine ecosystems, impacting entire economic sectors. According to the official energy plans, coal will be soon sidelined, but dams will keep playing an important role. That is despite the availability of solar and other renewable resources. Is it possible to design more sustainable energy plans for the GMS? Can we limit the number of dams that will be built in the near future? What are the main technologies and policies that should be prioritized? To answer these questions, we developed a spatially-distributed numerical model that co-optimizes capacity expansion as well as hourly dispatch of generation, transmission, and storage. The model is applied to Thailand, Laos, and Cambodia, over a planning period spanning from 2016 to 2037. Optimization results show that the generation capacity planned by these countries could be met in a more sustainable manner by relying on solar PV, which could supply about one third of the projected electricity demand. Investments in renewable energy should be supported by cross-border grid interconnections, which would connect load centers to more production sites, easing the supply-demand balancing. To put the analysis in a broader water-energy context, we also assess the impact of current and proposed energy plans on river connectivity and flows. Overall, our analysis demonstrates that there are untapped opportunities for untying the fate of the Mekong River basin from that of power supply and economic development.