An exploratory analysis of energy connectivity interlinkages with SDGs

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1. Introduction

Energy connectivity in the Asia-Pacific region is currently experiencing a revival of its relevance to the regional energy agenda. Although this is not a new topic in the region, the present interest and scope of the initiatives being proposed and studied are a significant push forward. Indeed, many countries have already been engaged in cross-border power trade for decades, with a relative predominance of hydropower projects, including export contracts, mainly through bilateral agreements and under broader regional cooperation frameworks. The projects and initiatives proposed currently consider a broader list of technologies, including solar and wind, and even some future potential for hydrogen, as well as the actors involved, with new international organizations and investors participating.

Existing studies have highlighted how energy connectivity initiatives have a positive impact on realizing the transition to sustainable energy systems and mitigating and/or adapting to the impacts of climate change. Countries involved can benefit from the synergistic sharing of energy resources, facilitating the integration of renewable energy in power mixes, and increasing the resilience of their supply against disruptions. This is being validated by techno-economic studies and modelling exercises conducted across the continent and similarly in other parts of the world.

However, it is important to consider that energy connectivity initiatives have broader impacts that play an important role in ensuring their sustainability (social, economic, and environmental). While some studies have looked at this for domestic or national (within a country) projects, this has not been adequately investigated for cross border projects. Therefore, this study aims to support a better design of energy connectivity projects and initiatives by establishing a set of metrics. These are expected to have several positive impacts on the process, such as (i) allowing early easy comparability across projects and proposals, (ii) supporting multi-stakeholders' engagement in the process, and (iii) facilitating identification of possible areas for project improvement. As such, the metrics should be useful in supporting technical, economic, financial, and other detailed studies.

2. Energy and Energy connectivity projects and the Sustainable Development Goals

Access to modern and sustainable energy (SDG-7) plays a vital role in economic prosperity and social wellbeing. Evidence has shown that countries with higher GDP do also have higher energy consumption, and, in fact, there are still "no low energy, rich countries." This has also been found when considering the Human Development Index, which is more comprehensive than the GDP. The SDG-7 has also been linked to several other SDGs. For a reference, it is interesting to navigate the SDG interlinkages and Data visualization tool developed by the Institute for Global Environmental Studies in Japan (IGES, 2017). The

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International Council for Science also conducted a study to investigate interlinkages between SDGs, finding that SDG-7 has key interactions at the goal level with SDGs 1, 2, 6, 8, and 13, and 58 target-level interactions (46 of them positive, 10 neutral, and 2 negative) (International Science Council, 2017). This has led to studies aiming to analyze energy projects from their impacts across multiple SDGs, such as the Sustainable Development Goals Impact Assessment Framework for Energy Projects (SDGs-IAE), which helps to identify synergies and trade-offs of specific energy projects (Castor et al., 2020). In this sense, the SDGs are also contributing to new methodologies for multi-criteria assessment of energy projects incorporating broader societal impacts (see Castro-Diaz et al., 2024 and Mayer et al., 2024 for recent studies suggesting different methodologies based on energy justice and the quantification of social-political barriers and drivers of net-zero energy, respectively).

However, as observed in domestic projects, energy connectivity is considered to have a significant impact on several SDGs. Many of these are spillover effects from increasing access to sustainable energy and lowering the costs of electricity. Indeed, most previous studies have focused on these as well as on the reduction of greenhouse gases emissions. But also, for a long time, energy connectivity has usually been considered a type of functional cooperation that could lead to improvement of relations between countries and lead to cooperation in other areas as well. Indeed, energy connectivity has been, in some cases, been pursued for its peace implications (Kammen, 2015).

In addition, practice has shown that energy connectivity has impacts beyond these, which should be considered in their evaluation. Moreover, even more importantly, by incorporating these considerations into their design, it is possible to increase their alignment with the sustainable development of countries and increase their social and political support. An example of this is the CASA-1000 Community Support Program in Central Asia, which has channeled investments to and through local communities across the transmission line across all countries (even though if they were not directly benefiting from the electricity traded).

3. Results (tentative)

This study investigates the interlinkages between energy connectivity projects (focusing on electricity sector) through a review of available literature, analysis of existing cases in Asia Pacific, and inputs from experts and practitioners. The findings will include: (1) comparative analysis between domestic and cross border energy projects, which should lead to input new dimensions into planning process, (2) differences between exporting, transit, and importing countries, and (3) assessment of the suitability of current metrics for SDGs targets for assessment of energy connectivity projects.

4. Conclusion

This ongoing research proposes a multi-criteria quick assessment of energy connectivity projects based on sustainable development goals. While the impact on SDG-7 and 13 has already been incorporated into techno-economic modelling, the linkage with other SDGs is still less well known and, in many cases, not adequately considered at early stages when developing scenarios for analysis. Developing a set of metrics to evaluate the alignment of projects with several SDGs is important for supporting policy decision-making and consensus building. Further results will be presented and discussed with stakeholders and experts.