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Accelerating the Transition to Clean Energy Technologies

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POLICY BRIEF

Reimagining Grid Planning Processes for an Accelerated Energy Transition

Unleashing the Full Potential of Electrical Grids

The ongoing energy transition is driven by the urgent need for deep decarbonization. This requires fundamentally reshaping the generation, transmission, and distribution of electricity, and demands substantial investments in grid capacities.

The planning processes for grid development present complex challenges. First, modern grids form highly complex systems. Second, required capacities of future grids depend on inherently uncertain factors. Third, the required collaboration of multiple stakeholders in the planning process begets complexity.

Overcoming these different complexities and uncertainties necessitates planning processes that are efficient, transparent, legitimate, and guided by sound principles and effective steering mechanisms. Moreover, it is critical that grid planning aligns with and acts as an enabler for the UN Sustainable Development Goals (SDGs).

Successfully addressing the challenges and needs of grid planning is pivotal in unlocking the full potential of electrical grids to facilitate the energy transition. This policy brief highlights key issues that require the attention of policy makers and sector stakeholders.

Key Messages

1 Develop cohesive scenarios for the electricity sector that show the necessary electrification measures required to achieve net zero emissions

Comprehensive scenarios of electricity generation and demand to reach net zero emissions across the entire energy system are critical in determining future grid development needs. Nationally and, where possible, regionally coordinated scenarios, developed in a transparent and inclusive manner with key sector stakeholders, are crucial to facilitate effective planning and decision-making.

2 Ensure that grid development plans enable deep decarbonization in line with the developed scenarios

Grid development plans enabling the entire energy system transformation in line with the developed set of scenarios require coordinated involvement of all impacted stakeholders. Balancing conflicting goals between local and national levels as well as between economic, social, and environmental considerations will require political guidance

3 Update existing cost-benefit analyses to properly capture the values of sufficient grid capacity and account for social, environmental, and resilience metrics

Planning is fraught with uncertainty and complexity, magnified by the long lead times of grid development projects. It is imperative to establish a clear, standardised, and transparent grid planning assessment framework that is embraced by all relevant stakeholders and is capable of assessing and weighing multiple metrics. Key factors to consider include economic, social, and environmental dimensions of grid development while also addressing risk and resilience factors. It is also vital to incorporate all of the benefits of increasing grid capacity to properly value grid development projects and also capture the consequences of inadequate grid development in the context of deep decarbonization of the economy.

4 Ensure that regulatory frameworks foster both conventional and smart grid solutions contributing to the clean energy transition

Regulatory frameworks could be more responsive to meet the needs of the rapidly evolving electricity sector, including accommodating the emergence of new actors, increased use of generation and demand flexibility, and new technologies like battery storage. It is however important to consider the need for long-term regulatory stability for sector stakeholders. It is also crucial to weigh the socioeconomic benefits of rapid grid development against potential implications for security of supply and quality of service. Tools such as regulatory sandboxes could be extensively used to support the deployment of innovative solutions and to help the sector to meet net zero emission targets.

5 Develop strategies to recruit and train a skilled workforce to satisfy short- and long-term competence needs

To effectively address the challenges of an uncertain and complex grid planning environment, substantial investments and collaboration among education, government, research, and industry stakeholders are imperative for attracting and nurturing a skilled workforce. Experts from diverse backgrounds and with distinct competencies are required throughout the planning process. These backgrounds and competencies include policy and regulation, engineering, environmental impact assessment, and urban and rural planning as well as expertise in behavioral sciences.

6 Promote stakeholder interaction at all levels of the grid planning process

Enhanced collaboration between government, industry, research and other societal actors should be promoted to efficiently share knowledge and co-create solutions for effective grid development. In specific grid planning projects, dedicated platforms for public engagement and stakeholder interaction, in particular with local communities, should be established to ensure productive collaboration, permitting, and decision-making.

7 Increase awareness and understanding of the role of the electrical grid for meeting the Sustainable Development Goals

Highlighting the central and transformative role of electricity systems in achieving the UN Sustainable Development Goals (SDGs) can help gain acceptance for necessary grid investments. More specifically, grid planning outcomes that may directly impact SDG 7: Clean and Affordable Energy, should be more clearly linked to potential benefits to other SDGs regarding climate action, poverty reduction, and innovation, among others.

BACKGROUND

This policy brief was developed within the ISGAN Knowledge Sharing Project on Network Planning Under Uncertainty, conducted from September 2022 to July 2023. The project engaged experts from 12 countries across three continents, including Transmission System Operators (TSOs), Distribution System Operators (DSOs), researchers, and policymakers, who actively contributed their expertise, perspectives and lessons learned. Additionally, valuable insights were provided by the International Renewable Energy Agency (IRENA).

This collaborative project represents the ninth initiative of the ISGAN Knowledge Sharing Platform, effectively engaging several ISGAN working groups and tasks to produce actionable policy advice to policy makers and energy sector stakeholders.

CONTACT

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