



limited number of case study installations have operational clarity on roles and responsibilities during and after a climate-related event or have funding arrangements in place to deal with the aftermath of an event. Furthermore, the clarity that some possess stems from learning through experience and not from the project design. We expect that this report will trigger more thinking and planning for climate events in the design and operations of future projects.

Implications for Decentralized Solar Solutions in Climate Vulnerable Regions

Ensuring energy systems' resilience is vital for development agencies and is a growing area of concern for renewable energy practitioners. Building on the framework from a recent report by UN Foundation and Sustainable Energy for All (SEforAll) titled *Lasting Impact: Sustainable Off-Grid Solar Delivery Models to Power Health and Education* (UN Foundation and SEforAll 2019),

we identify the following additional considerations for decentralized solar energy installations in climate vulnerable regions:

- **Technical considerations** include understanding the current and future climate risks in the region, how they affect the demand for and supply of electricity, and what technology options, codes, and guidelines exist to ensure that the energy system continues to remain useful and functional. The implementing agencies and vendors should also consider whether project timelines include climate risks through the four stages of the project life cycle and whether the technical design considers the market availability of spare parts in case disruptions occur.
- **Organizational considerations** include whether the contractual and non-contractual responsibilities of all participants are laid out in the event of climate-related disruptions and whether they have adequate capacity to execute them. Users and implementing agencies should account for local capacity building, contingency communication, or response plans under contractual obligations that can be activated during climate-related events. Energy project planning should consider the local community's expectations, including the role played by energy in the community's current and future coping mechanisms to manage climate-related risks.
- **Economic considerations** include a realistic estimate of whether finance for the project incorporates climate resilience as a critical element of project planning. Funding agencies, implementing agencies, and users should collaborate on project planning that is flexible enough to integrate innovative financing options to hedge against short- and long-term uncertainty.

Policymakers, implementing agencies, vendors, and funding agencies can build resilient structures by integrating these considerations well before the design stage. System design and operation during the lifetime of the infrastructure, when based on climate and other risk assessments, can increase the installation's lifespan and reduce downtime and avoid failures. Policies, financial instruments, and design standards can reinforce the resilient design and management of infrastructure.

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