

## EXECUTIVE SUMMARY

The power and heating sectors are responsible for around 30% of global CO<sub>2</sub> emissions, and this share is likely to grow as countries move towards electrification of the transportation and building sectors. Therefore, enabling forward-thinking, long-term strategies in the power sector is a crucial area for international collaboration and support. The rapid transition of power systems toward modern, low-carbon pathways and technologies will be necessary to meet climate goals, while also enabling other critical objectives such as economic development, energy access, and energy system resiliency, among others. Many developed and developing countries are well-poised to champion power sector transformation (PST); however, additional support can help identify pathways and implement critical near and long-term actions. To provide this support, the Low Emission Development Strategies Global Partnership (LEDS GP) together with an expert team including Agora Energiewende, Energy Innovation, European Climate Foundation, Fraunhofer Institute for Systems and Innovation Research, Prayas Energy Group and LEDS Latin America and Caribbean Platform, developed a framework identifying four potential pathways that can be integrated and combined to support low-carbon PST. These four pathways are: (1) Distributed Energy Resource Revolution; (2) Bulk Power Transformation; (3) Transmission and Distribution Interactivity; and (4) Distributed Transactional Future.

To support exploration of pathways, this study examines country-specific PST objectives and factors that stakeholders may consider as they investigate various pathways to support PST. A framework and complementary tool for considering relative pathway emphasis in a hands-on manner is also presented. The report provides case studies on application of the approach to bring life to the topic. The case studies include Haiti, Kenya, Mexico, Southeast Asia, and the European Union, among others. The report also presents actions to be considered in the near-, medium- and long-term to support the realization of pathways and long-term transformation of the power sector. The report, together with a complementary spreadsheet tool developed under the effort, can be used to enable stakeholder engagement and visioning for the power sector over the long-term, taking into account country-specific factors and potential innovations. It can also be used to understand and inform relevant analysis tools and models based on which pathways are emphasized, and to identify supportive actions in the near- and medium-term to avoid lock-in of carbon-intensive technologies.