The Electricity system has broad and significant impacts on Earth’s natural processes.

Research Questions:

(1) Where and to what degree are there gaps in electricity reliability and electrification, globally, and how have these gaps changed over the past decade?

(1) What is the latent unmet electricity demand in areas without electrification or with intermittent electricity access?

(1) How will electricity demand for low and no access areas evolve, given different socioeconomic and climate futures? How will the electricity supply required to meet the growing demand shape emissions and impact climate commitments?

• Links between electricity infrastructure development and use and the priorities of the U.S. Decadal Survey for Earth Science and Applications from Space (ESAS). We expect the insights and datasets developed with this work to inform eight of the ESAS Decadal Survey questions (H-2a, H-2c, W-5a, W-6a, E-1a, E-1c, C-3b, S-2a).
Key Deliverables:

1. Global gridded dataset describing month of electrification; 2012-2022; 1km² grid.
2. Global gridded dataset of power access frequency and consistency; 2012-2022; 1km² grid, reported quarterly.
3. Satellite-derived estimates of annual System Average Interruption Frequency Index (SAIFI); at administrative levels 1, 2, & 3.
4. Gridded estimates of building electricity consumption and unmet demand; 2012-2022; 1km² grid, coverage over low-access areas, reported annually.
5. Annual forecasts (2020-2050) of building electricity demand and emissions for 18 socioeconomic, climate change, and behavior scenarios; 1km² grid, coverage over low-access areas.
6. Quality control and assessment flags for the previous measures (1-4).