

Energy at Scale Center

The MIT Energy at Scale Center assesses the economic and environmental impacts of scaling up low-carbon technologies. The project is administered by the MIT Joint Program on the Science and Policy of Global Change and the MIT Energy Initiative.

Low-carbon energy sources require a very large deployment scale in order to make a substantial contribution to future global energy needs. (e.g., at a level of the current global contribution of natural gas of 100 or more exajoules per year). The potential barriers and impacts of deployment are all interrelated and can be considerable, even for sources like wind, biomass, and solar.

We explore these risks using our Integrated Global System Modeling framework that combines the Economic Projection and Policy Analysis model and the MIT Earth System Model, as well as a portfolio of impact-assessment models that focus on life-sustaining resources (e.g., managed water systems, crop production, ecosystem/forest services, wind/solar/hydropower, and air quality). These linked computer models allow us to analyze a wide range of development pathways in the global energy, agricultural, transportation, and other key sectors.

Our researchers have substantial experience identifying challenges, hazards, and potential barriers to low-carbon options deployed at continental to global scales, and can provide expert guidance on economically viable solutions. In doing so, this research will provide the foundation and frontiers of knowledge, strategies, and policies to identify the most viable deployment opportunities of low-carbon energy technologies. The unique opportunity is in galvanizing stronger connections across the threads of research shown in our list of current and potential initiatives (see box) that can result in more quantifiable feasibility studies and risk-based assessments.

As a sponsor of the MIT Energy at Scale Center, you can support advancement of our energy projection systems that will include never-before-seen levels of integration between various human and natural systems. This will allow us to provide you with a stronger basis for more informed investment decisions. Membership in the Energy at Scale Center is granted upon payment of the annual fee. We are seeking to collaborate on additional research projects based on areas of mutual interest.

More information on our website: energyatscale.mit.edu



Current and Potential Initiatives

- Prospects for scaling up electrification (transportation, industrial use, and residential sectors)
- Accelerating the energy transition
- Impacts of backup requirements on deployment of renewables
- Economic and environmental consequences of large-scale deployment of nuclear energy and carbon capture and storage (coal-, natural gas-, and biomass-based)
- Economics and geopolitics for natural gas in different regions of the world
- Predictability and synchronicity of intermittent renewable energy (wind and solar)
- Evaluation of costs of alternative technologies for electricity generation
- Carbon capture and storage in industrial applications (cement, iron and steel, refineries)
- Role of hydrogen and other energy carriers
- Ability for managed water systems to meet irrigation demands for biofuels
- Scenarios of a low-carbon future
- Energy and economic impacts of different policy instruments

Additional topics can be explored based on areas of mutual interest.

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