



Rajasthan - Utah Energy Partnership Dialogue

U.S.-India State and Urban Initiative

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Jaipur, Rajasthan

Briefing Document

Background

India's lofty goals for building modern, reliable, affordable and cleaner electric power infrastructure and services require strong support from India's powerful state governments. A coherent U.S. strategy to engage India's states can play a strongly supportive role in helping India meet its own energy goals, catalyze strategic commercial and academic ties, and deepen the bilateral partnership.

U.S. and Indian states—governments as well as research universities and the private sector—are well positioned to reach out beyond their borders to engage with subnational entities around the world to achieve common goals, share best practices and insight, and in some cases, find new investment opportunities. The U.S.-India State and Urban Initiative facilitates cross-collaboration between and among state and city governments, companies, research institutions, and universities in U.S. and Indian states.

Rajasthan and Utah are natural partners due to their robust and diverse energy resources, influential research institutions, and uniquely similar arid landscapes. Rajasthan and Utah are both highly ranked among their peers in solar integration, energy storage, and autonomous electric vehicles. There are ample opportunities for entities in Rajasthan and Utah to collaborate on determining the future of energy in their states.

Utah's Energy Profile and Priorities

Utah's electricity mix is dominated by coal – as of June 2019, 65 percent of the state's electricity generation came from coal, while natural gas made up 22.1 percent, hydroelectric power made up 3.2 percent, solar power made up 5.5 percent, and petroleum-based sources made up 0.1 percent, Utah's Strategic Energy Plan outlines their belief that coal power will soon be replaced by natural gas, wind, and solar power, which are relatively abundant in the state. Among U.S. states, Utah ranked 10th in crude oil production, 11th in coal production, and 13th in natural gas production in 2016. Overall, Utah produces more energy than it consumes, so it is known for supplying energy to neighboring states.

Rajasthan's Energy Profile and Priorities

As of 2017, Rajasthan's installed power capacity was dominated by coal—51 percent coming from coal, 5 percent from gas, 3 percent from nuclear, 9 percent from solar, 22 percent from wind, and 9 percent



from hydroelectric power. Rajasthan has historically not been a power surplus state, but there is hope that this will change given recent discoveries of petroleum and natural gas reserves in the western part of the state as well as continued investment in solar power. There are numerous opportunities for potential engagement with Rajasthan on energy generation, given its stated priorities in advancing energy storage, expanding its renewable energy generation mix, improving the performance of its state-owned utilities, deploying smart power technologies, and improving the efficiency of its existing thermal power plants.

Utah's Potential Partnership Opportunities

Incubators, Research Institutions, and Companies

[University of Utah](#): The University of Utah has several centers that work on research in energy innovation and energy-related science, policy, and economics, including the Energy & Geoscience Institute, the Center for Technology and Venture Commercialization, and the Advanced Energy Innovations Lab. Indian states can learn best practices to further their research initiatives, for example, in energy storage and production, and foster opportunities for effective university-industry collaboration.

[Brigham Young University](#): Brigham Young University's Chemical Engineering program is focused on advanced technologies that utilize various fossil fuel natural resources to produce power in the most clean and efficient manner possible, including high exergy oxy-coal combustion leveraging maximum temperatures and elevated pressures, advanced instrumentation for combustion and gasification research, biomass / coal co-firing for CO₂ mitigation and investigations of novel mercury control technologies.

[Utah State University](#): Utah State University houses the Bingham Entrepreneurship and Energy Research Center, which performs research on meteorology and air quality, oil and gas emissions, energy policy, and statistical modeling. The university also previously ran the Renewable Energy for Rural Economic Development (RERED) initiative, which conducted research on commercialization of renewable energy and clean technology innovations. Such expertise can be of assistance to Indian states as they pursue evidence-based policy on similar issues in the energy space.

[Sustainable Electrified Transportation Center](#): A research institution run in conjunction by Utah State University and three out-of-state universities, the Sustainable Electrified Transportation Center (SELECT) brings together academic researchers, industry members, and students to study issues such as electric machines, energy storage, grid integration, and charging infrastructure. It also houses the Electric Vehicle & Roadway (EVR) Research Facility and Test Track, a state-of-the-art facility working on research, development, and testing of wirelessly charged electric vehicle and roadway technologies.

State Programs

[Utah Governor's Office of Energy Development](#): Created in 2011 as an independent, technical office, vital to navigating the rapidly changing energy landscape, the Governor's Office of Energy Development has grown to become a national standard for successfully delivering high value results to a state's economy and its residents through the provision of affordable, reliable and sustainable energy. The office signed an agreement in August 2018 with Baja California's Ministry of Economic Development, and can use that experience in agreements with Indian states.



Rajasthan's Potential Partnership Opportunities

Incubators, Research Institutions, and Companies

[Bask Research Foundation](#): Bask Research Foundation is a knowledge platform that uses data science and emerging technologies to promote clean energy and energy efficiency, particularly through establishing greater collaboration and experimentation in the power sector.

[Birla Institute of Technology & Science](#): Birla Institute of Technology & Science houses the Centre for Renewable Energy & Environment Development (CREED), a research institute which conceives and implements renewable energy and environmental protection projects; and collaborates with organizations in the renewable energy space on education, technological development, and workforce training.

[CUTS International \(Consumer Unity & Trust Society\)](#): CUTS International is a consumer-focused policy research and advocacy organization, headquartered in Jaipur, focused on consumer sovereignty, social justice, economic equality, and environmental protection. In the energy sector, it assesses policy effectiveness, increases consumer awareness, and assists on building stakeholder capacity.

[Indian Institute of Technology, Jodhpur \(IIT Jodhpur\)](#): IIT Jodhpur has numerous energy research laboratories, including the Renewable Energy Laboratory, which designs, tests, and disseminates renewable and efficient energy systems; the Center for Solar Energy, which works on development of new technologies for energy storage, technology indigenization, harvesting solar energy, and energy conversion; the Solar Radiation Laboratory, which studies solar radiation measurement, humidity, rain gauge and wind speed; and the Power Electronics Laboratory, which conducts research on power conversion systems and AC/DC microgrids.

[Malaviya National Institute of Technology](#): Malaviya National Institute of Technology contains the Centre for Energy and Environment, a research center and institute focused on finding sustainable solutions to energy insecurity and environmental degradation. In addition to its research on energy innovation and efficiency, it provides higher education and training programs in energy and environment, develops testing methods for energy equipment and devices, and engages in partnerships with actors in the public and private sectors.

[Startup Oasis](#): Startup Oasis is a social enterprise incubation center that provides entrepreneurs with business and technical advice, access to expert consultants, opportunities for mentorship, and seed and early-stage funding. Overall, it has incubated 202 companies—several of which have a focus on clean energy technology—which have cumulatively raised over 200 crore rupees (roughly \$29.1 million) in funding, and 76 of which are under physical incubation. It has also trained 3,610 students in entrepreneurial skills.

State Programs

[Rajasthan Electronics and Instruments Limited \(REIL\)](#): REIL is a joint venture of the Government of India and the Government of Rajasthan which focuses on manufacturing, materials management, quality assurance, research and development, planning, finance, marketing, and sales of products in the areas of agriculture and dairy, solar photovoltaics, and information technology. The company houses several facilities and equipment that make products such as SPV modules, solar lanterns, SPV water desalination plants, and home lighting systems.



[Rajasthan Rajya Vidyut Utpadan Nigam Limited](#): RVUNL is the state electricity generation company, which directs power development projects throughout the state and operates state-owned power stations.

[Rajasthan Renewable Energy Corporation Limited \(RRECL\)](#): RRECL promotes and develops nonconventional energy sources, coordinates program activities for various state energy programs, creates awareness about energy conservation and environmental protection, and issues and invites contracts from companies interesting in setting up renewable energy projects within the state.

[Startup Rajasthan \(iStart\)](#): Startup Rajasthan is a government initiative that provides office space, mentorship and networking opportunities, business idea development, and fundraising support to entrepreneurs—and does significant work with clean technology startup companies.

Other Opportunities

Rajasthan has begun cooperation internationally with the US state of Utah on mutual energy goals, and the two states have organized an energy partnership dialogue for late August 2019.

Recommended Reading:

[Rajasthan Greening the Grid Report \(NREL, 2017\)](#)

[Rajasthan Power for All \(2014\)](#)

[Utah's Energy Landscape 2016](#)

[Utah's Energy Action Plan to 2020](#)

[Utah's Strategic Energy Plan](#)

[State Electric Vehicle Master Plan](#)

[Advancing Utah Coal](#)