VIJAY MODI

Columbia University
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Professional preparation:
Indian Institute of Technology, Bombay Major: Mechanical Engineering, B.Tech., 1978
Cornell University, Major: Mechanical Engineering, Ph.D., 1984

Appointments:
Department of Mechanical Engineering, Columbia University
2001- Professor
2002-2005 Chair
1993-2000: Associate Professor
1986-1992: Assistant Professor

Gas Turbine Laboratory, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology
1985-1986: Postdoctoral Associate

Cornell University, Sibley School of Mechanical and Aerospace Engineering,
1984: Visiting Assistant Professor

Selected Publications:
1. Ayse Selin Kocaman and **Vijay Modi**. Value of pumped hydro storage in a hybrid energy generation and allocation system. Applied Energy, 205(1): 1202-1215, November 2017

2. Shengxi Yuan, Ayse Selin Kocaman and **Vijay Modi**. Benefits of forecasting and energy storage in isolated grids with large wind penetration – The case of Sao Vicente. Renewable Energy, 105(1), 167-174, May 2017

3. Michael Waite, Elliott Cohen, Henri Torbey, M. Piccirilli, Y. Tian and **Vijay Modi**. Global trends in urban electricity demands for cooling and heating. Energy, 127 (1), 1-17, May 2017

4. Michael Waite, Ankita Deshmukh and **Vijay Modi**. Experimental and analytical investigation of hydronic system retrofits in an urban high-rise mixed use building. Energy and Buildings, 136 (1), 173-188, February 2017

5. Bianca Howard, Michael Waite and **Vijay Modi**. Current and near-term GHG emissions factors from electricity production for New York State and New York City. Applied Energy, 187 (1), 255-271, February 2017

Prof. **Vijay Modi**'s current areas of research interest fall broadly under two themes. Firstly: decarbonization of the energy system, electrification of heat/transport), digitization, interaction of the grid or a local micro-grid with buildings/storage/vehicles/HVAC. Much of this effort is built through modeling tools that aim to replicate the key features of the supply, demand, transmission, regulatory and market systems. Secondly: energy access, energy resource and infrastructure planning for access and renewable integration, demand estimation and role of novel payment systems in breaking barriers to upfront costs. Much of this effort is aimed at analysis and field experiments that aid cost-effective access. His laboratory, the Quadracci Sustainable Engineering Lab (QSEL) [Quadracci Sustainable Engineering Lab @ Columbia University], has been responsible for innovations such as a low-cost lead-acid charge/discharge circuit for solar lanterns (2005), fully digital pay-as-you-go minigrids (Sharedsolar) that have been continuously operating as pilots since 2011, battery-less PAYG smallholder irrigation systems (2013-15) and widely used tools such as "Network Planner" for making technology choices under demographic, demand and geographic variations. Finally his laboratory has been responsible for a free open-source app called FormHub, used over a million times for assessing field data. Most recently, he has worked on larger scale electricity and natural gas networks, their long-term cost/benefits and impact on access to energy, fertilizer and industrial growth.

While his early work was on heat transfer, cooling towers, gas turbines, computational fluid dynamics and micro-electro-mechanical systems, his recent work has been on energy infrastructure design & planning; solar energy; energy efficiency in agriculture, and data analytics spanning from urban settings to remote rural settings. He is currently working closely with city and national agencies/utilities to understand how energy services can be more accessible, more efficient and cleaner. His recent project on minigrids is providing a unique understanding of consumer behavior, demand for energy, and business models for deploying energy solutions and energy efficiency.