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Potential for solar-powered base-load capacity BRADY STOLL, MARK DEINERT, The University of Texas at Austin — In 2010 nuclear power accounted for 27% of electricity production in Japan. The March 2011 disaster at the Fukushima Daiichi power station resulted in the closure of all of Japans nuclear power plants and it remains an open question as to how many will reopen. Even before the loss of nuclear capacity there were efforts in Japan to foster the use of renewable energy, including large-scale solar power. Nuclear power plants in Japan operated beyond base load with excess energy being stored in large scale pumped hydroelectric storage systems. Here we show how coupling these storage systems to rooftop solar systems in Tokyo could compensate for the loss of nuclear power. Data from a study of rooftop space, and a 34-year data set of average daily irradiance in the Tokyo metropolitan area were used. If current generation PV systems were placed on the available rooftop space in greater Tokyo, this coupled system could provide for 20% of Toyo's nuclear capacity with a capacity factor of 0.99. Using pumped hydroelectric storage with six times this rooftop area could completely provide for TEPCO's nuclear capacity with a capacity factor of 0.98.

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