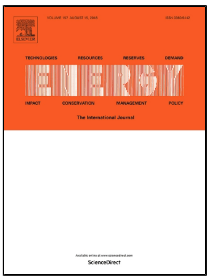
Accepted Manuscript



Impact of increased solar penetration on bill savings of net metered residential consumers in India

Thakur Jagruti, Chakraborty Basab

PII:	S0360-5442(18)31545-7
DOI:	10.1016/j.energy.2018.08.025
Reference:	EGY 13501
To appear in:	*Energy*
Received Date:	17 December 2017
Accepted Date:	03 August 2018

Please cite this article as: Thakur Jagruti, Chakraborty Basab, Impact of increased solar penetration on bill savings of net metered residential consumers in India, *Energy* (2018), doi: 10.1016/j.energy.2018.08.025

Impact of increased solar penetration on bill savings of net metered residential consumers in India

Thakur Jagruti[a], Chakraborty Basab[a1]

[a] Rajendra Mishra School of Engineering Entrepreneurship, Indian Institute of Technology, Kharagpur, 721302, India

Abstract

The modernization of the grid and increased renewable penetration had led to a requirement of alternative tariff mechanisms for consumers. The increasing PV deployment trend, as well as implementation of smart meters under smart grid pilot projects in India, opened up avenues for alternative retail rates and net metering policies. The rooftop PV deployment had led to an increase in the number of net metered consumers. The present work studies the impact of different retail rate mechanisms on bill savings of net metered consumers, with increasing solar penetration scenario. Seven different scenarios, based on increasing solar penetration in the energy mix, are designed. After simulating wholesale electricity prices through a unit commitment based energy system model, retail rates (two time-invariant and three time-variant) are designed using simulated electricity prices. To evaluate the impact of increasing PV penetration on consumer economics, the electricity bills of 97 net metered consumers are calculated using designed retail rates for all the scenarios. It is observed from the results, that the value of bill savings decreases with increasing PV penetration for all the retail rates. Also, decrease in the value of bill savings is more in time-variant rates as compared to time-invariant rates.

Keywords: Net metering, India, rooftop PV penetration, energy policy, residential consumers, energy system model

Abbreviations:

AMI- Automatic Metering Infrastructure

CPP- Critical Peak Pricing

[1] Corresponding Author. Tel: +0322281092
Email Address: basab@see.iitkgp.ernet.in (Prof. Basab Chakraborty)