

6<sup>th</sup> International Conference on

# GREEN ENERGY AND EXPO

August 29-31, 2018 | Toronto, Canada

## Economic viability of solar microgrids under net metering

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As feed-in-tariffs are being phased out, net metering (NM) programs are being enhanced, thus presenting a new opportunity for behind-the-meter renewable electricity generation. This paper analyses the Internal Rate of Return (IRR) on investment in solar microgrids under various NM options. Residential microgrids, based on survey results for residential consumption profiles are shown to have an IRR of 2% - 5% depending on the year in which the project starts. Small business microgrids for office buildings with 3 or 6 floors have a corresponding IRR of 2% - 12%. In order to obtain higher IRRs, we analyze larger business customers that are subject to charges on their peak consumption each month in addition to the charges for electricity consumption which residential and small business customers pay. This paper shows how reducing these peak charges is essential to obtaining a high IRR from solar. If the peak consumption occurs at a time of low solar generation, a battery is necessary and power flow in/out of the battery optimized. The paper presents examples of optimal microgrid control for business customers whose consumption is concentrated during daytime and also for those whose consumption extends into the evening. The results are based on actual hourly data from business customers in Ontario. The paper then presents the IRR corresponding to different sizes of battery. It is shown that IRRs vary from 18% without a battery to 47% with a battery. The battery capacity (in kWh) that maximizes IRR for a given solar capacity (in kW) is determined for the different consumption profiles considered. The analysis takes into account the trends in the prices of solar systems, batteries, and electricity.

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