TABLE 2

CASE STUDY RESULTS: 1.23 DC/AC RATIO

Variable	No PV	PV Only	PV plus DC battery	PV plus AC battery
Year 1 Utility Bill	$3,973	$1,926	$1,985	$1,984
Year 1 Energy Clipped	0 kWh	5.66 kWh	0 kWh	5.66 kWh
Year 1 Battery Energy Charged	0 kWh	0 kWh	2,256 kWh	2,179 kWh
Year 1 Battery Energy Discharged	0 kWh	0 kWh	2,027 kWh	1,969 kWh
Net Present Value	$0	$19,948	$12,186	$12,402

TABLE 3

CASE STUDY RESULTS: 1.85 DC/AC RATIO

Variable	No PV	PV Only	PV plus DC battery	PV plus AC battery
Year 1 Utility Bill	$3,973	$1,240	$1,045	$1,345
Year 1 Energy Clipped	0 kWh	1220 kWh	4.21 kWh	1220 kWh
Year 1 Battery Energy Charged	0 kWh	0 kWh	5,435 kWh	4,152 kWh
Year 1 Battery Energy Discharged	0 kWh	0 kWh	4,886 kWh	3,756 kWh
Net Present Value	$0	$24,315	$16,247	$14,384

different battery configurations produced net-present values within 1% of each other, indicating that system topology was not important. For a case with a PV DC/AC ratio of 1.85, the DC-connected battery system produced a net-present value 13% higher than the AC-connected battery system due to increased opportunity to capture PV power which would have been clipped.

Future work will consider system topology, value streams, and control for large front-of-the-meter PV plus battery systems who have an incentive to install high DC to AC ratios. It would also be of interest to implement the model in a mixed-integer linear program and determine the optimal operation for a tightly coupled system. Finally, the converters which are currently modeled as single-point efficiencies may be expanded to non-linear response models.

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