

OPPORTUNITY

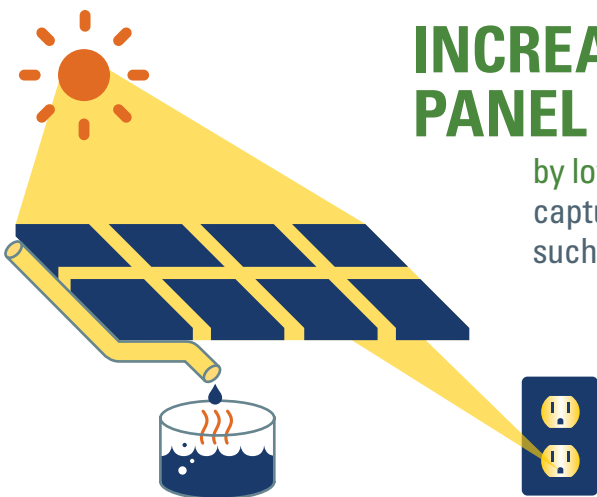
What are the renewable energy goals of federal mandates?

7.5%
OF ELECTRICITY
generated by renewables¹

30%
OF HOT WATER
heated with solar²

TECHNOLOGY

What is the advantage of PV-T?



INCREASES PV
PANEL EFFICIENCY
by lowering pv temperature
captures heat for other uses
such as domestic hot water

M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY measured performance of a PV-T system provided by SunDrum Solar and installed at the O’Neill Federal Building in Boston, Massachusetts

RESULTS

How did PV-T perform in M&V?

1st
large-scale installation;
numerous lessons learned³

LIMITED
cost-effective deployment potential⁴

COMPETITIVE
with traditional solar when 30–50% less expensive⁵

Energy Savings and Economics for PV-T

Cost-effective when electricity rates are high

City	Electricity Rate (\$/kWh)	City Cost Adjustment Multiplier	Solar Energy Production (kWh/yr)	Annual Cost Savings (\$)	Installed Cost (\$)	Simple Payback (yrs)	Payback with 30% Tax Credit (yrs)
Portland, OR	0.09	0.992	6,698	\$581	\$56,765	98	68
Boston, MA	0.15	1.172	6,331	\$934	\$67,065	72	50
Denver, CO	0.11	0.943	11,063	\$1,198	\$53,961	45	32
Honolulu, HI	0.34	1.173	10,097	\$3,488	\$67,123	19	13
Daggett, CA	0.18	0.996	11,824	\$2,144	\$56,994	27	19
Phoenix, AZ	0.10	0.887	11,783	\$1,237	\$50,757	41	29

DEPLOYMENT

Where does M&V recommend deploying PV-T?

HIGH ELECTRIC RATES
Small facilities, with electric rates > \$.30 k/Wh, in hot climates with large domestic hot water (DHW) loads and limited roof space.
Incentives can lower system costs by as much as 75%

¹Photovoltaic-Thermal New Technology Demonstration. Jesse Dean, Peter McNutt, Lars Lisell, Jay Burch, Dennis Jones, David Heinicke (NREL), January 2015 p.1 ²Ibid, p.1 ³Ibid, p.58 ⁴Ibid, p.8 ⁵Ibid, p.47