GPG FINDINGS

016

JANUARY 2015

PHOTOVOLTAIC-THERMAL HYBRID SOLAR SYSTEM

OPPORTUNITY

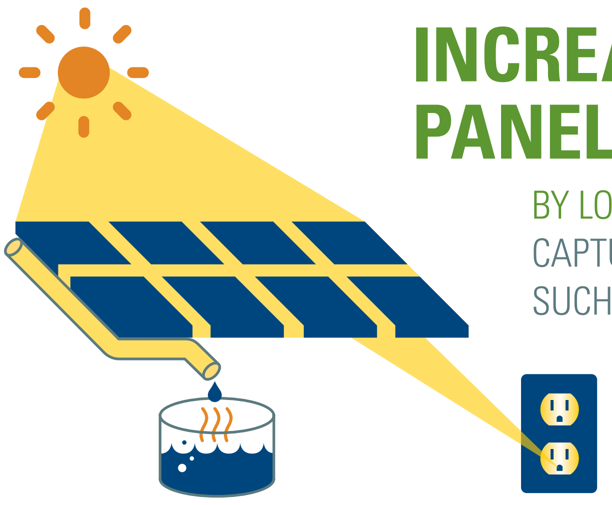
What are the renewable energy goals of federal mandates?

7.5%
OF ELECTRICITY
GENERATED BY RENEWABLES[1]

30%
OF HOT WATER
HEATED WITH SOLAR[2]

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 LEARNED[3]

LIMITED
COST-EFFECTIVE DEPLOYMENT POTENTIAL[4]

COMPETITIVE
WITH TRADITIONAL SOLAR WHEN 30-50% LESS EXPENSIVE[5]

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%

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