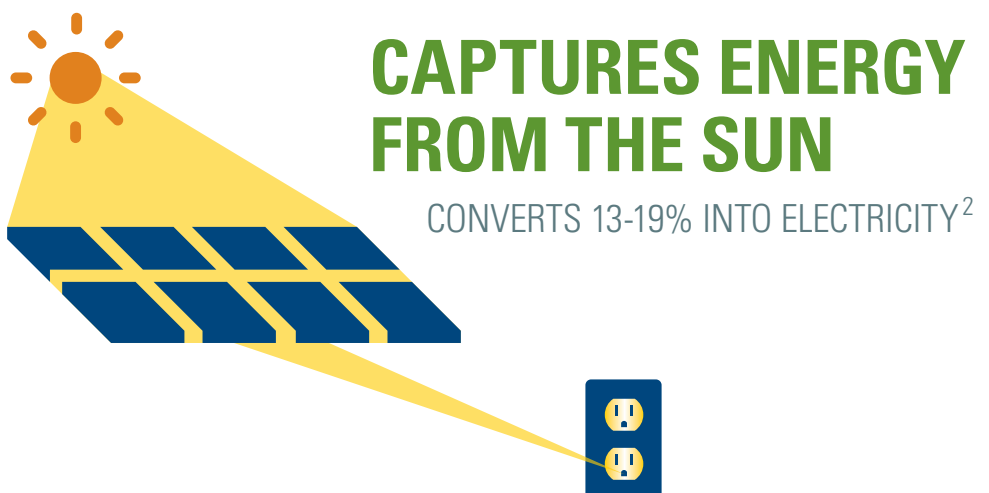# 005

PHOTOVOLTAIC SYSTEM PERFORMANCE

OPPORTUNITY

How much energy is generated by photovoltaics in GSA buildings?

1% **OF GSA'S ENERGY** COMES FROM SOLAR[1]

TECHNOLOGY

How does PV work?

CAPTURES ENERGY FROM THE SUN

CONVERTS 13-19% INTO ELECTRICITY[2]

M&V

Where did Measurement and Verification occur?

SANDIA NATIONAL LABORATORIES and **NEW MEXICO STATE UNIVERSITY'S COLLEGE OF ENGINEERING** assessed performance of 5 PV installations provided by Sunpower, Evergreen Solar, Solyndra, United Solar Ovonic, and Abound Solar at the Major General Emmett J. Bean Federal Center in Indianapolis, Indiana

RESULTS

How did photovoltaics perform in M&V?

8%
OF SITE LOAD ENERGY GENERATED FROM PV[3]

PARITY
AMONG SYSTEMS UNDER CLOUDY SKIES[4]

19 YEAR
PAYBACK[5]

Steady decline in PV cost will further improve payback[6]

Laboratory Systems Perform Similarly Under Cloudy Skies

PV System Yield on Cloudy Day, March 3, 2012

Legend: Med Eff, Chrystaline, Thin Film, Cylindrical

Y-axis: PV System Yield, Yf (kWh/kW)
X-axis: Time
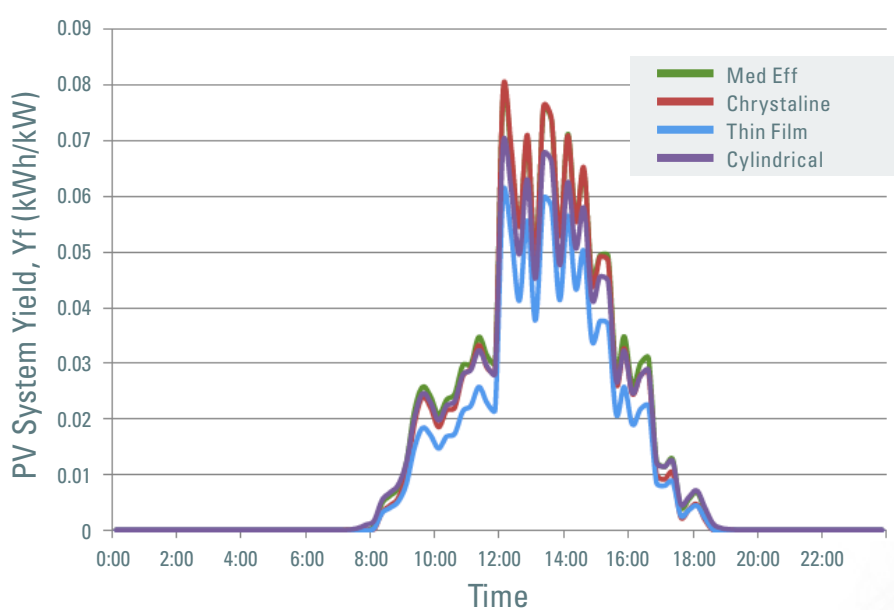
DEPLOYMENT

Where does M&V recommend deploying photovoltaics?

PV EFFECTIVE EVEN IN DIFFUSE, 4-SEASON CLIMATES

PRICE SHOULD DRIVE PV SELECTION

Modeling tools produce accurate simulations for both sunny and cloudy climates

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[1] GSA Energy Usage Analysis System, 2013   [2] Photovoltaic System Performance. Andrew L. Rosenthal (USDOE, NMSU, SNL) December 2012, p.5   [3] Ibid, p.12   [4] Ibid, p.1   [5] Ibid, p.12   [6] Ibid, p.3