



SVTC.

# Workforce Training (Community Colleges)

- **Program Partners**

- Workforce Institute
- San Jose City College
- Evergreen Valley College
- Work2future (WIB for San Jose and 7 other cities)



- **Program Focus:**

- Initial: Manufacturing Technician Training Course
- Other courses will be defined through direct feedback from the PV industry
- Support University-Level Curriculum Development
- Support Industry Curriculum Development
- Start with short-term Certificate courses; expand to full AA Degree program

Evergreen Valley College



- **Projected Timeframe**

- 1 year to complete a self-sustaining Manufacturing Technician Training program
- Follow-on funding to deploy curriculum provided through Work2future

**work<sup>2</sup> future**

opportunity • jobs • success

SVTC Solar enables an entirely new range of hands-on workforce training curriculum to be developed

# SVTC Solar – California's PV Manufacturing Development Facility





## The Commission Should Approve the Alternate PD

The Commission should approve the Alternate Decision which authorizes PG&E to recover net costs of \$9.9 million for a solar PV R&D project sponsored by the Silicon Valley Technology Center (California Solar PV Manufacturing Development Facility).

The net contribution by PG&E customers provides required matching funds for \$30 million in support from the US DOE, supplements \$45 million committed from other sources, including in-kind solar industry support, and does not duplicate existing R&D.

SVTC's PV MDF is a fee-for-service facility that will allow solar firms to research and test new product designs and manufacturing processes allowing for an R&D "bridge" for development of new solar PV technologies.

PG&E's customers will benefit if the costs of solar PV are reduced by the PV MDF facilitating the development of new technologies.

SVTC's Solar PV MDF has received support from various levels of government, the solar PV industry, and major research institutions.

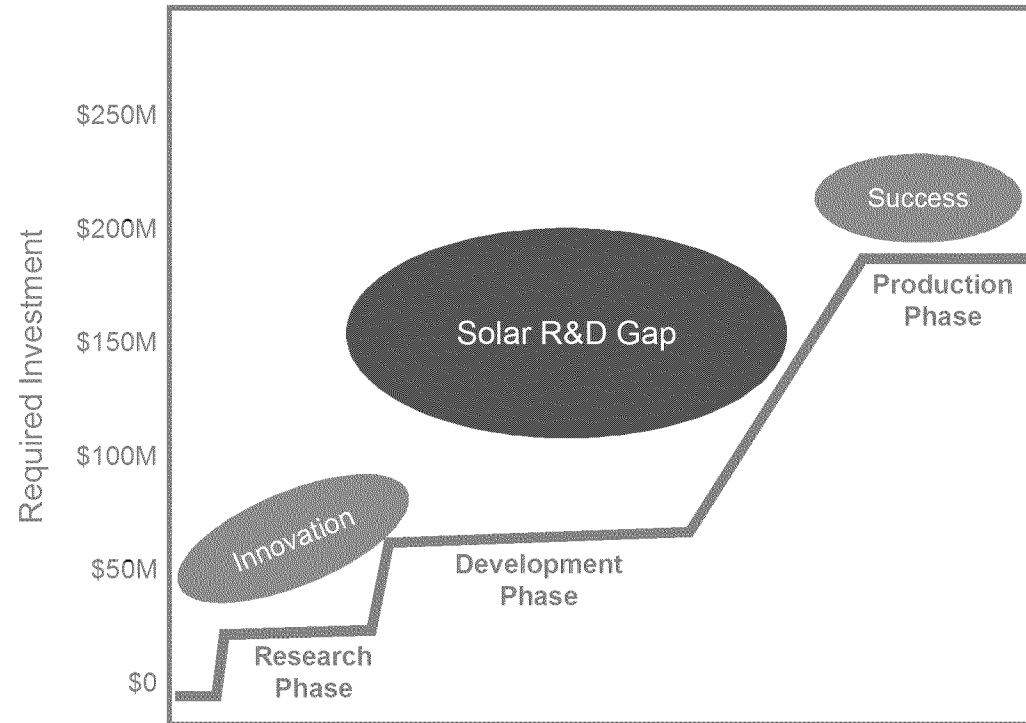




# SVTC's PV MDF Will Bridge the Solar R&D Gap

- ffi To prove viability, expensive, capital-intensive laboratory “test-bed” facilities must be available to solar start-ups
- ffi The PV MDF will enable US solar companies to bridge the solar R&D “gap” by “de-risking” technology through research and testing in an “open” laboratory

Typical Solar Investment Profile

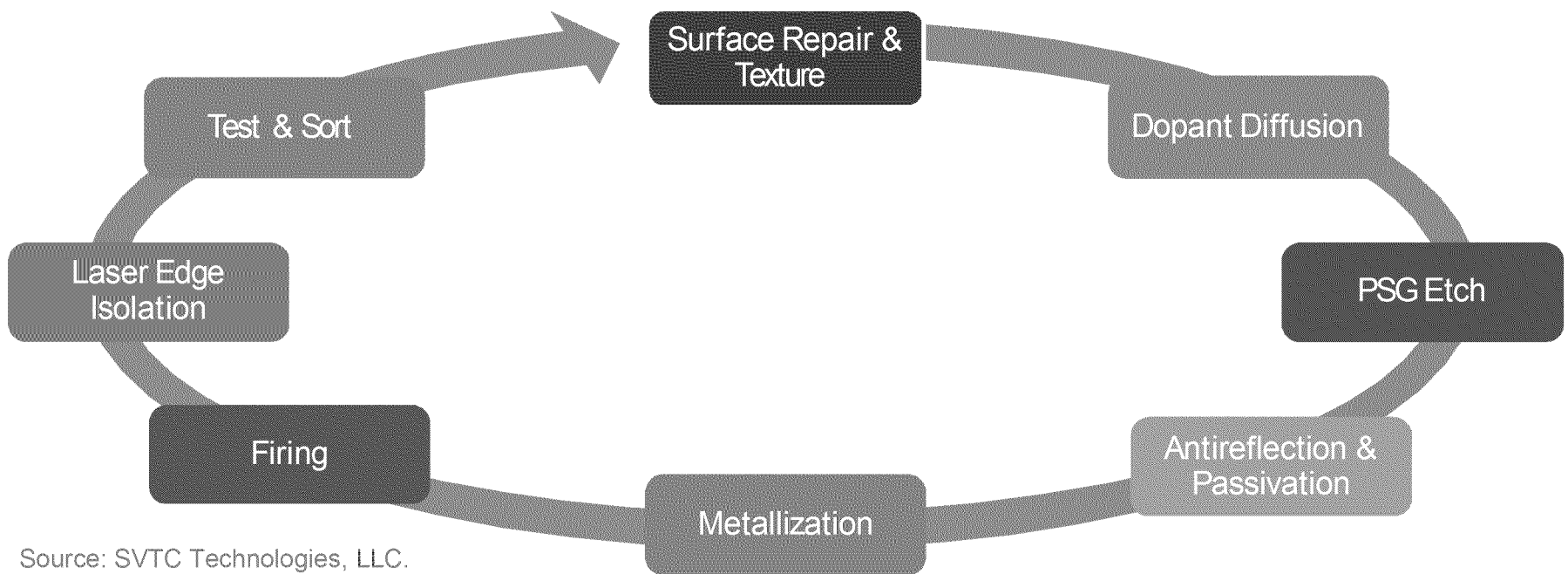


Source: SVTC Technologies, LLC.



# SVTC's PV MDF Promotes Innovation

| Specialized Tools Bays                     |                               |                                      |   |                          | Secure Customer Bays             |                                  |                                  |                                  |
|--|-------------------------------|--------------------------------------|---|--------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Module Fabrication                         | Texture                       | Dopant Diffusion                     | ARC & Passivation   | Contactless Printing     | Customer #1<br>Proprietary Tools | Customer #2<br>Proprietary Tools | Customer #3<br>Proprietary Tools | Customer #4<br>Proprietary Tools |
|  | Alkaline Dry Etch<br>PSG Etch | P-&B doping<br>Inkjet<br>LDS-Emitter | Direct plasma<br>Si-dep<br>ALD Al <sub>2</sub> O <sub>3</sub> | Ni/Cu Plating<br>Aerosol |                                  |                                  |                                  |                                  |
| Versatility + Flexibility + SPC Controlled |                               |                                      |   |                          |                                  |                                  |                                  |                                  |



Source: SVTC Technologies, LLC.



# SVTC's PV MDF Provides Valuable Service to Users

## Promotes Development

- Significantly lower development costs and shorter development times
- Users own all IP they develop
- Complete starting-point process library to accelerate development
- Support for new start-ups developing first products and for established manufacturers developing next-gen products

## Accessibility to Tools

- Complete analytical facilities (including failure analysis) and custom module assembly
- Cell and module test, certification and reliability
- Pilot production capacity
- Specialized engineering expertise (device design, process development, modeling, etc.)



# The Broad Benefits of a Successful PV MDF

## Benefits to PG&E customers

- As the solar PV industry is highly competitive, any manufacturing cost savings are likely to be passed through in retail prices

## Supports California's Clean Energy Future

- Brings \$30 million in federal funding to a California clean energy project with a need for a smaller percentage of additional funding than comparable projects
- Governor Brown and the U.S. Secretary of Energy agree that the project has merit
- Potential RD&D benefits of the project align with California and the Commission's policies in support of promoting and fostering clean and renewable energy

## Supports the domestic solar PV manufacturing industry

- Proposed project enjoys broad, diverse support from the RD&D and solar energy community in California and throughout the nation
- The PV MDF will provide competitive edge to domestic PV Manufacturers who focus on improving their manufacturing processes and decreasing other costs of production



# Appendix



# SVTC Receives Significant Support from Stakeholders

## Index of Letters of Commitment/Support:

### User Letters:

- SunPower
- Transform Solar
- Bloo Solar
- SiOnyx
- Silexos
- Equity Solar
- Sierra Solar Power
- Solar Implant Technologies
- CaliSolar
- Intermolecular
- PlasmaSi
- SAVe
- Lam Research (Silfex Division)
- Blue Sky Solar
- Varian Semiconductor Equipment
- Coherent
- MRL Industries
- MEMC
- ATMI
- Apogee Solar
- SemiCon Solar
- Crystal Solar
- PDF Solutions



### Cost-Share Letters:

- Roth & Rau USA (Silicon tools)
- Roth & Rau USA (Thin-film tools)
- Kurdex
- Coherent
- Mustang Solar
- MRL Industries
- Amerimade
- ASYS Group Americas
- TRUMPF
- SVTC Technologies
- RETC
- IMI USA
- DuPont
- Praxair
- ATMI
- Workforce Institute
- Work-2-Future
- Evergreen Community College
- City of San Jose (x2)
- Pacific Gas & Electric
- State of California



### University/College/National Lab Letters:

- NREL
- Lawrence Berkeley National Labs
- University of California, Berkeley
- Stanford University
- University of California, Merced
- San Jose City College
- Workforce Institute
- San Jose City College
- Evergreen Valley Community College
- Work-2-Future
- Solar Training Institute

### Industry-Collaborator Letters (tool makers, materials makers, and service providers):

- Roth & Rau USA
- Kurdex
- MRL Industries
- Mustang Solar
- Coherent
- Amerimade
- ASYS Group Americas
- TRUMPF
- DuPont
- MEMC
- JSH
- Praxair
- Air Products
- Lam Research (Silfex Division)
- Mallinckrodt-Baker
- ATMI
- RETC
- IMI USA
- CH2M Hill
- M&W Group
- Evans Analytical Group
- Crossing Automation
- SEMI PV Group



Source: SVTC Technologies, LLC.



## SVTC's Successful Track-Record

SVTC provides product and manufacturing development services to 10 separate industries (semiconductor, biochips, photovoltaic, MEMs, etc.)

10 years in business

200+ employees

250+ production grade process and metrology tools

2500+ recipes housed in a vast process library

2 year market study completed regarding PV industry and solar (PV)

100+ companies and PV investors were surveyed

17 potential users expressed interest or commitment

7 venture capitalists agreed to use the MDR to fund PV startups

11 vendors committed to provide baseline and alternative manufacturing equipment

5 PV clients currently working at SVTC as semiconductor facility

# PG&E<sup>®</sup> Competitive Funding Environment: Comparison of New York and California

## SVTC SOLAR



- **c-Si technology development center**
- \$30M of DOE SunShot funding supplemented by \$9.9M from PG&E customers and \$45M from other sources<sup>1</sup>

## PVMC



- **SEMATECH entity focused on CIGS**
- \$62.5M of DOE SunShot funding supplemented by over \$200M from the State of New York and over \$40M from other sources<sup>2</sup>

## SEMATECH



- **Semiconductor Research Consortium**
- \$460M of incentives offered by State of New York<sup>3</sup>
- Facilities relocated from Austin, Texas to Albany, New York

## GLOBALFOUNDRIES



- **Semiconductor Contract Manufacturer**
- \$1.4B of incentives offered by State of New York<sup>4</sup>
- Advanced manufacturing facility being built in Malta, New York

1 SVTC Solar  
2 DOE SunShot press release, April 7, 2011 and confidential sources  
3 Austin Statesman, May 22, 2010  
4 Albany Times Union, November 11, 2011



# DOE SunShot Initiative Funds R&D in California (SunShot Awardees Listed Below)

