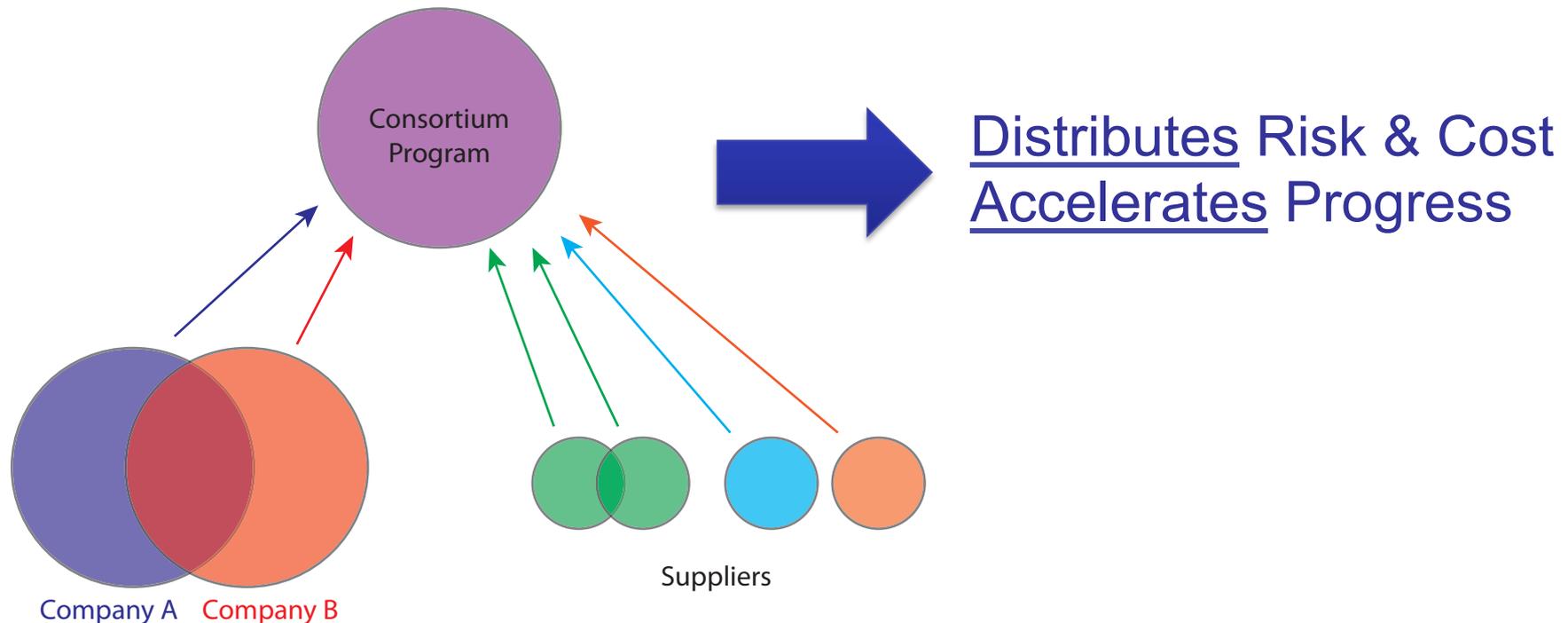


Key: Establishing Collaborative Consortia

- PV Industry is historically fragmented
- How do you get consortium members – even direct competitors – to work together?



Initial PVMC cSi Program Areas

1. In-line/Off-line Metrology

Primary Goals

- Identify critical industry needs in metrology and rank
- Develop projects to demonstrate new cSi metrology technologies
- Transition new metrology technologies into pilot and manufacturing lines

Current 5-Yr Program Area Goal (revision expected by WG)

- >1,100 wf/hr in-line tool, reducing yield loss such that cost of insertion is offset completely

2. New Feedstock/Wafering Methodologies

Primary Goals

- Identify necessary feedstock/wafering targets for \$/W
- Establish cSi feedstock/wafering programs to accelerate transition of new technologies into mainstream manufacturing
- Provide and foster process, test, and demonstration activities to validate new technologies and identify technical barriers

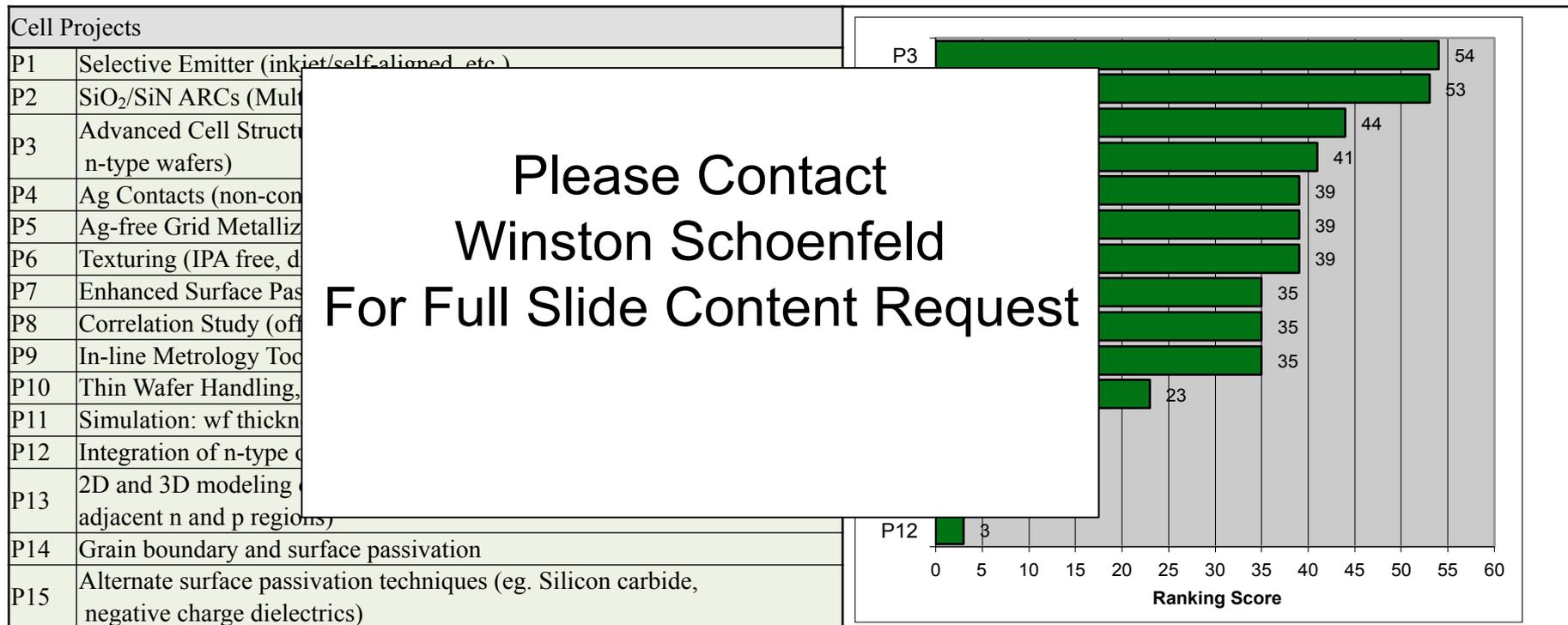
Current 5-Yr Program Area Goal (revision expected by WG)

- Demonstrate silicon usage efficiency < 3g/W and cSi wafer cost reduction of >50% to below \$0.25/W.

These two program areas are currently supported in FL through \$14.5M of DOE and industry/partner matching funding

Programs driven by identified areas of need

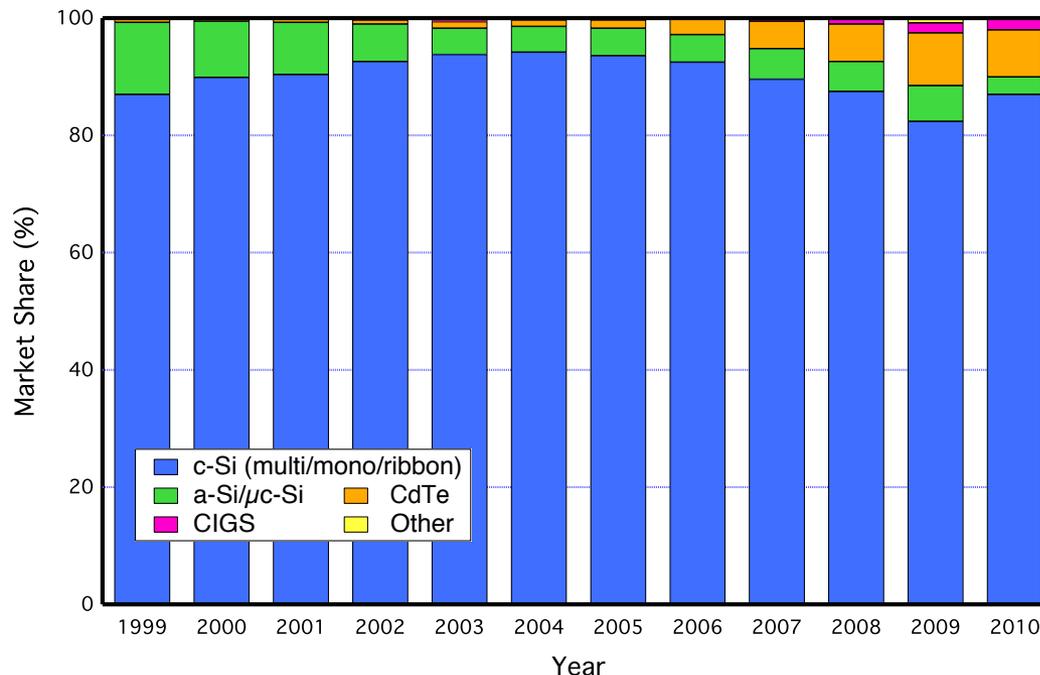
- Consortium members identify program area projects (working groups)



- Identical paretos for feedstock/wafering, modules, and manufacturing productivity.
- Program area ranking allows prioritization of projects and selection of asset allocation

So....What is the Unique Opportunity for Florida ???

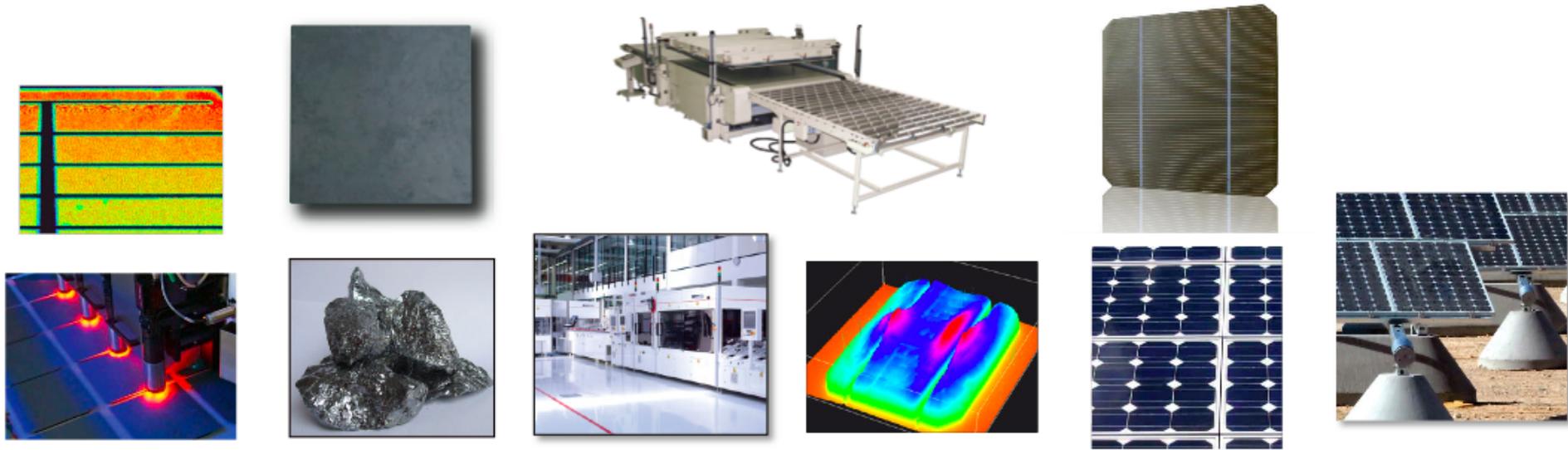
- Currently, Florida is one of only 2 states running the first U.S. PV manufacturing consortium
- Florida houses the cSi arm of the PVMC – a conversion technology that has maintained 80% market share for over a decade.



- We have the potential to grow into something much larger....

Supply Chain Strength in the U.S.

PVMC-FL can build from *existing* U.S. leadership in several areas of the cSi PV supply chain – smaller barrier for growth and job creation



| R&D Partners | Material Suppliers | Equipment Suppliers | Metrology Suppliers | Module Producers and Integrators | End-Users |
|--|---|--|---|---|---|
| <ul style="list-style-type: none"> - IBM - NREL - ORNL - SRC - NIST - ASU - SUNY - UCF - SRI - Sandia - Sandia - SEMI - ISMI - MIT - UCLA - FSEC | <ul style="list-style-type: none"> - MEMC - ATMI - 1366 - Crystal Solar - JT Baker - Saint Gobain - Solsil - Dow - Orion - 3M | <ul style="list-style-type: none"> - Schmid - Spire - TEL - Roth & Rau - Varian - Ulvac - Consarc | <ul style="list-style-type: none"> - Semilab - Boeing/Spectrolab - FEI - Keithley - Agilent - Newport - Ultrasonic Tech - KLA | <ul style="list-style-type: none"> - Suniva - Ampulse - Intersil - SemiSouth - Solar Power Ind. - Calisolar | <ul style="list-style-type: none"> - FP&L / NextEra - Lockheed Martin - Progress Energy - Austin Energy - TSEC |

What the U.S. cSi Industry Needs

The challenge

- Industry alignment
- Lack of infrastructure
- Lack of place to work
- Metrology, test and reliability
- Manufacturing cost – CIGS and cSi
- Balance of system, technology commercialization, workforce development
- Cost of PV energy to consumer

The PVMC solution

- Roadmap and standards
- Collaborate to fund and create it
- Advanced manufacturing development facility
- Develop, model, and share capabilities
- Improved methods = reduced cost
- Support to the industry
- Consortium = shared knowledge and resources and reduced cost of manufacturing = reduced cost to consumer



PVMC cSi Manufacturing Development Facility is Essential

Expansion Planned for PVMC FL – Phase II

- **Establish Next-gen RD&C Manufacturing Facility**
 - Next-gen cSi wafer-to-module *manufacturing*-scale lines for Consortium Projects
 - Critical value-added element of PVMC for industry, houses consortium and member company projects.
 - 100,000 ft² site already available in Palm Bay, FL



- **Establish PV Commercialization Support Structure**
 - Support transfers into manufacturing, provide incubation and start-up support
- **Develop Training Workforce Development Programs**
 - College, university, MDF, and member company programs
- **National cSi Roadmap and Standards**
 - Identify industry drivers, establish Executive Steering Committee/Working Groups

Benefits to Florida

- Established Florida as cSi Manufacturing Hub of the U.S.
- Brings manufacturing technical challenges to the doorstep of University researchers
- Establishes a magnet for industry, bringing companies to the Florida doorstep

“The SEMATECH Effect”

Value of Long Term Advanced Technology Partnerships

SEMATECH and New York

- Home to International SEMATECH HQ, the manufacturing arm of SEMATECH
- Attracted more than \$3.2 billion dollars in capital investment for AMD microchip plant
- Created nearly 500 high-tech, high-wage immediately
- Supporting more than 500 companies across the state as key anchor of Albany Nanotech Initiative

U.S. scaled estimates – more that 3.1 million permanent jobs

Economic Impact Study

SEMATECH and Texas

- Played a critical role in national security initiative
- Key driver of the launch of Texas as a leading high-economy
- Attracted more than \$12 billion dollars in capital investment
- Created more than 80,000 high-tech, high-wage jobs Texas
- Leader in government technology & economic development policy and investment

Semiconductor R&D has a multiplier effect of five (highest of all industries) resulting in an additional 400,000 ancillary jobs

U.S. Scaled Estimates

Based on U.S. capturing same share of global market as Texas captured in U.S. market, annual economic impacts of:

- \$482.8 billion in expenditures
- \$235.4 billion in gross domestic product
- \$141.8 billion in personal income
- \$50.3 billion in supported retail sales
- More than 3.1 million permanent jobs



“[SEMATECH North is] the most exciting development since the construction of the Erie Canal.”

***New York Governor
George Pataki
SEMATECH North
ribbon cutting, 2003***



[SEMATECH and the AMRC] will advance the technologies that will help drive our state's economy for the next 50 years.

***Texas Governor
Rick Perry
AMRC Launch***

Thank you for your attention !!!