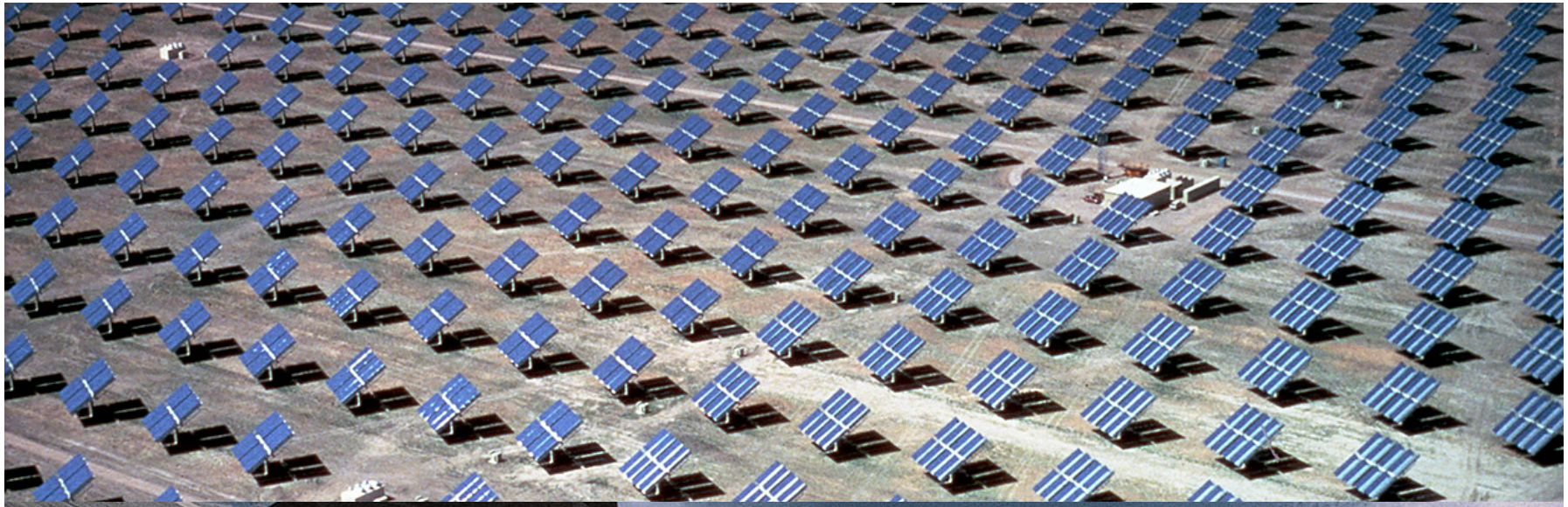
Scuola universitaria professionale della Svizzera italiana
Dipartimento ambiente costruzioni e design
Istituto sostenibilità applicata all'ambiente costruito

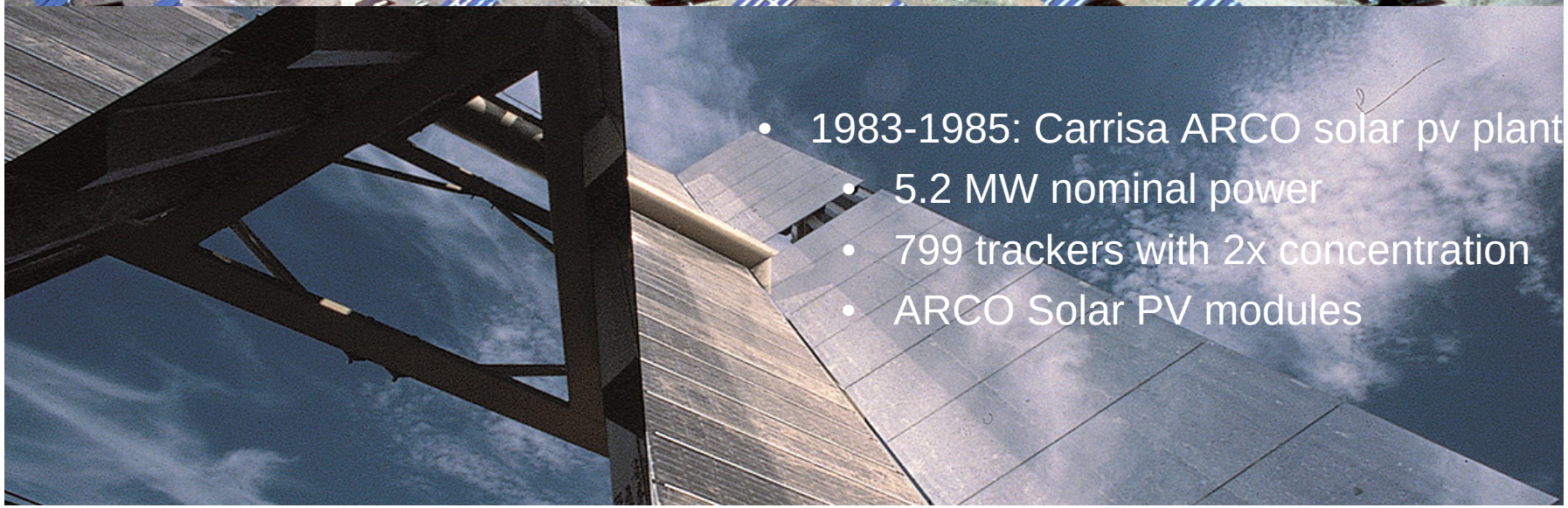
SUPSI

SUPSI PVLab: Quality, Research and Testing

SUPSI Industry Day 2017 - PV Testing for quality
Campus Trevano 6th October 2017

Mauro Caccivio
Head of PV Systems Quality Team

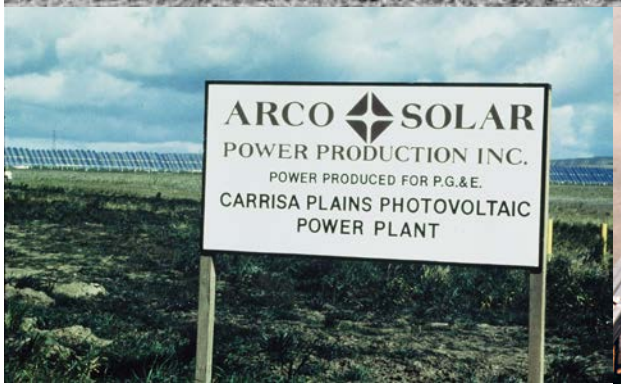


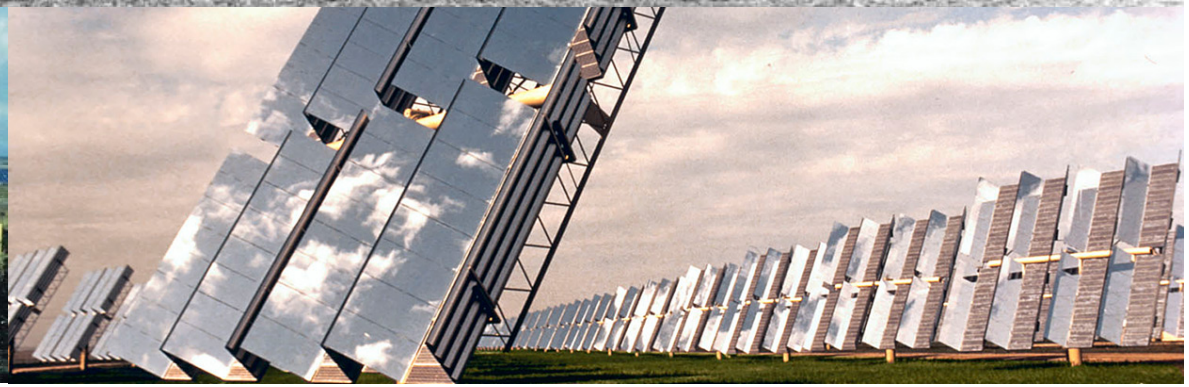


- 1983-1985: Carrisa ARCO solar pv plant
  - 5.2 MW nominal power
  - 799 trackers with 2x concentration
  - ARCO Solar PV modules

- World largest PV plant for 20 years

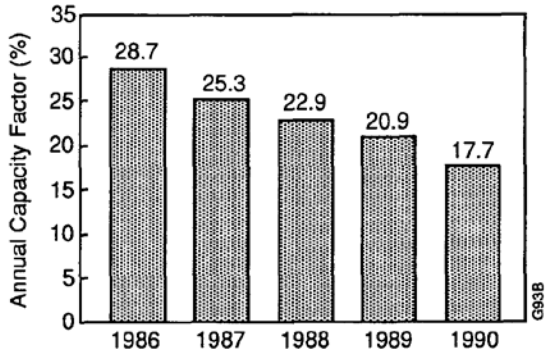
Year	Name	Country	Capacity
1982	Lugo	USA	1MW
1985	Carrisa Plain	USA	5.6MW
2005	Bavaria Solarpark	D	6.3MW





- 1982:TISO (Ticino Solare) 10 kW PV plant
- ARCO Solar modules, with PVB (old formula) and EVA (new formula) as encapsulant

- 1986-1990:
  - -40% power in 5 years
  - Browning of EVA encapsulant (new formula)
  - Problems with diodes and hot spots

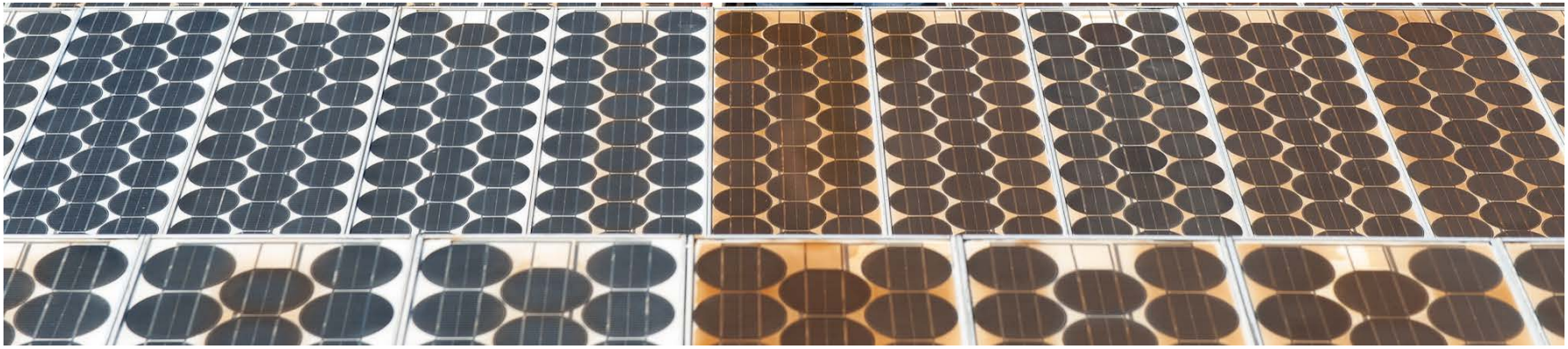


- 1990: ARCO Solar, now Siemens, sells the plant to an investor

Arco Sells Last 3 Solar Plants for $2 Million : Energy: The sale to New Mexico investors demonstrates the firm's strategy of focusing on its core oil and gas business.

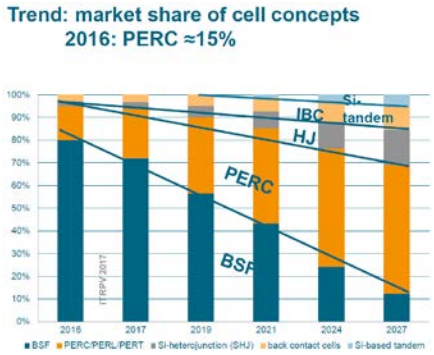
January 12, 1990 | PATRICK LEE | TIMES STAFF WRITER

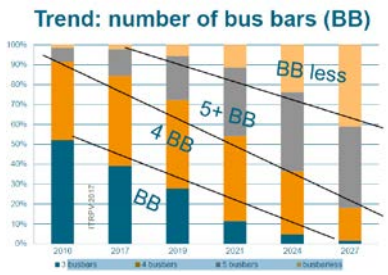
- 1994-95: the plant is dismantled

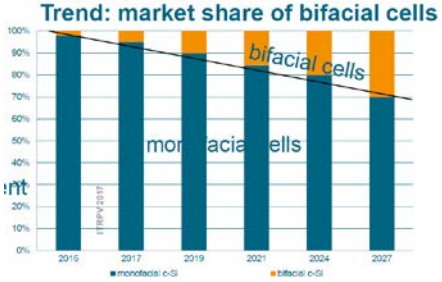


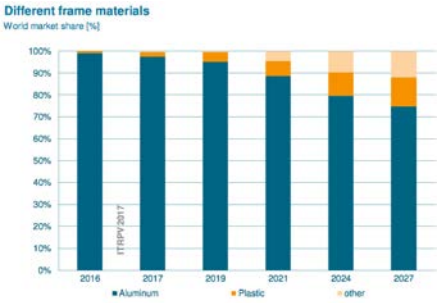
- WHAT CAN WE LEARN FROM THIS STORY?
  - Quality issues can have important impact on investments
  - Investors often take decisions without sufficient **risk analysis**
  - Pressure on prices: new materials need **accelerated testing** and **new standards** to reduce risk of quality issues

International Technology Roadmap for Photovoltaic (ITRPV)

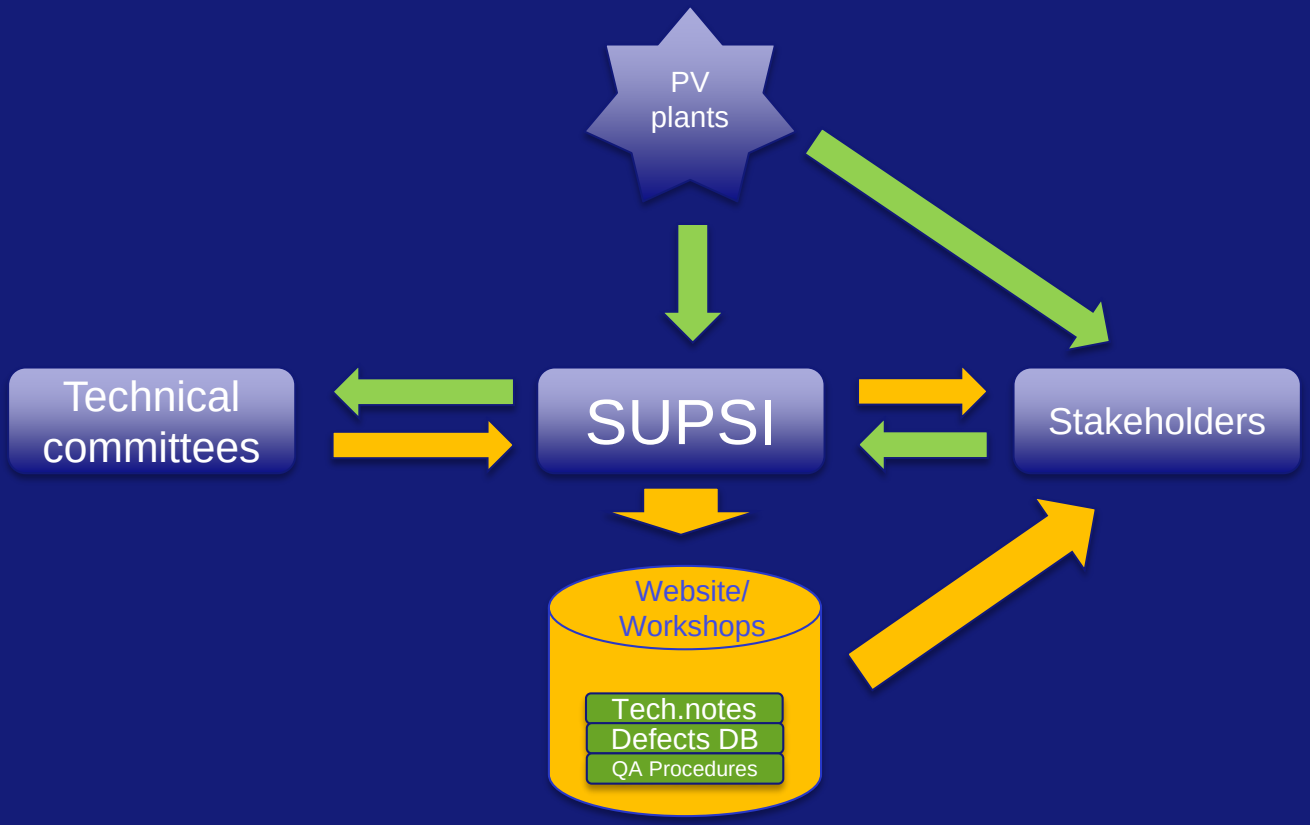








SUPSI:
SUPPORT to SOLAR INDUSTRY



Mission statement of Energy System Sector

Our mission is to **accelerate the transition to reliable and environmentally sustainable energy systems.**

We develop **innovative approaches** to intelligent energy management and to photovoltaic systems quality.

We **facilitate their implementation** in the built environment.

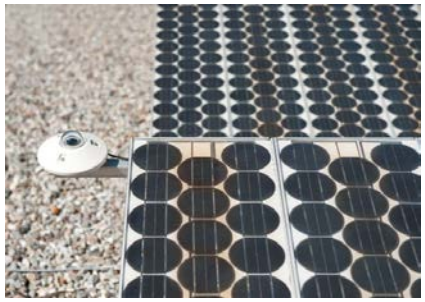
We promote the **knowledge transfer** to industry, professionals and younger generation.

Photovoltaic Systems Quality Team

- Massive rise of PV installation, solar module will become a commodity
- Need in Switzerland to ensure the quality of PV system and the related financial investment
- The focus on systems aspects and quality ensure a clear positioning of the team in respect to other Swiss research groups historically oriented at PV cell level
- A team of researcher with a long term experience on photovoltaics, prepared to answer the new needs of the market actors, local and international: industry, installers, insurances and electrical utilities.

Photovoltaic Systems Quality Team Activities

- ISO 17025 accredited PV Lab
- Module characterization: electrical, thermal, optical and mechanical
- Field performance: outdoor yield evaluation
- Failure Mode and Effects Analysis: definition and classification of module problems
- New tools for problems prediction: mechanism and occurrence of problems
- Development of novel test procedure: new types of modules (ex. Bifacial), accelerated and ultra accelerated testing
- Basic and continuing education. Training in developing countries



SUPSI PVLab

- ISO 17025 accredited testing
  - Prototype pre-testing
  - Retesting activities
  - Module characterisation:
    - Lot acceptance verification
    - Reference module characterisation

- Energy Yield measurement: technologies comparison
- Field testing on PV systems
- Quality Auditing
- Accelerated testing procedures for industry:
  - New products qualification
  - Optimisation of R&D processes

Thanks for your attention!

Questions