



Renewables



Patricia Kwon, Air Quality Specialist

South Coast Air Quality Management District

Early Solar PV Projects

AQMD has long history of promoting solar technology as alternative means of electricity generation

In 1993, 20 kW crystalline silicon solar PV installation over carport to charge EVs in AQMD demo fleet



Early Solar PV Projects

In 2005, 80 kW crystalline silicon solar PV installation to provide electricity for H₂ station electrolyzer for H₂ vehicles (130,000 kWh of electricity with cost savings of \$24,000/year)



Solar PV Tech Comparison

In 2009, demonstration of two 40 kW crystalline silicon PV and BIPV (amorphous Si) to compare performance

- System output
- Cost effectiveness
- 5 year study



ST-42 Inverter Tree
Used by Both Systems



BIPV by Solar Integrated



Crystalline silicon PV by PermaCity

Solar PV Research

- Major solar PV technologies include crystalline silicon, thin film, concentrated solar
- Thin film advantages: better performance in low light, easier installation, lightweight, lower manufacturing cost, less PV material
- Crystalline silicon advantages: higher conversion efficiency, less surface area, more durable



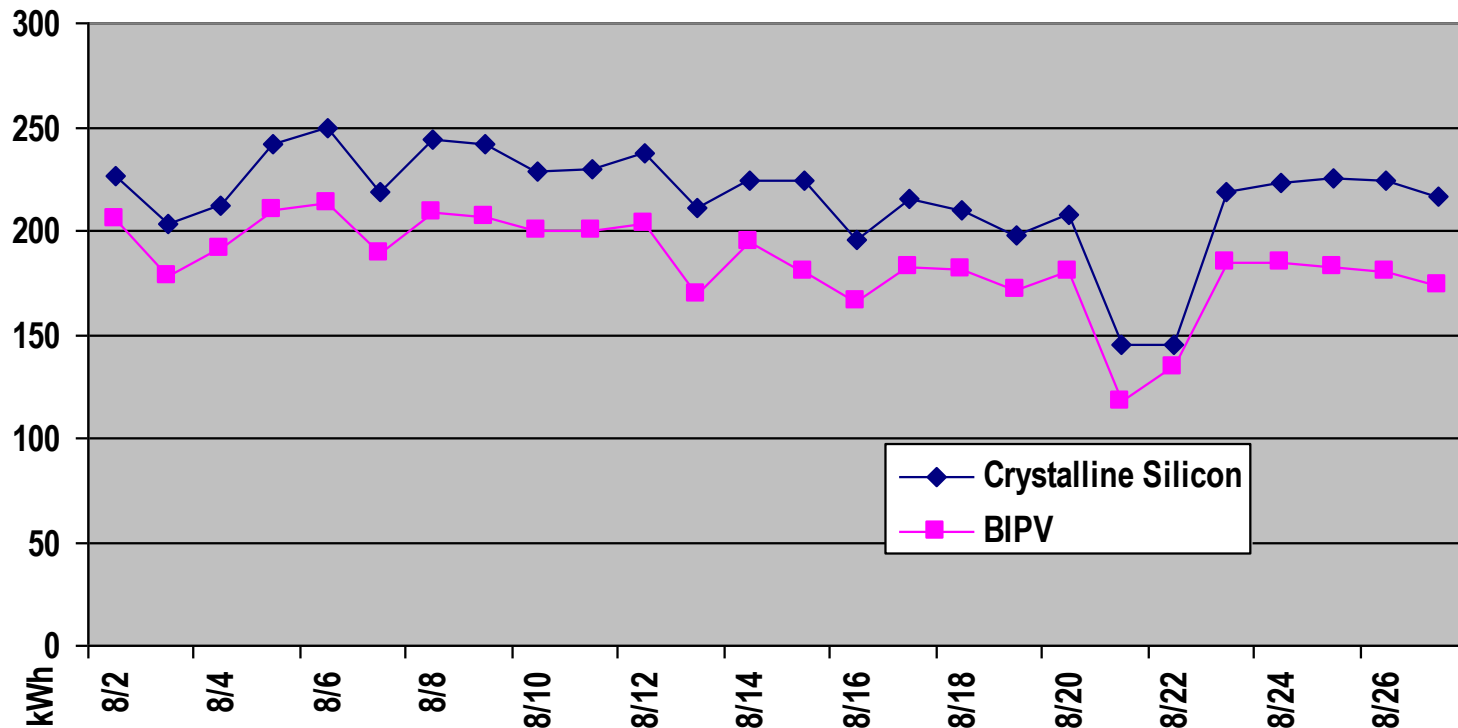
Kiosk in AQMD lobby monitoring AQMD solar PV installations

Comparison of Solar Technologies

Characteristic	Crystalline Silicon	BIPV
Installed Cost (residential 1-3 kW)	\$8.50/watt	\$9.40/watt
Equipment Life	25-30 yrs	20-25 yrs
Conversion Efficiency	13.20%	7%
Payback	1.7	1

Overall Performance

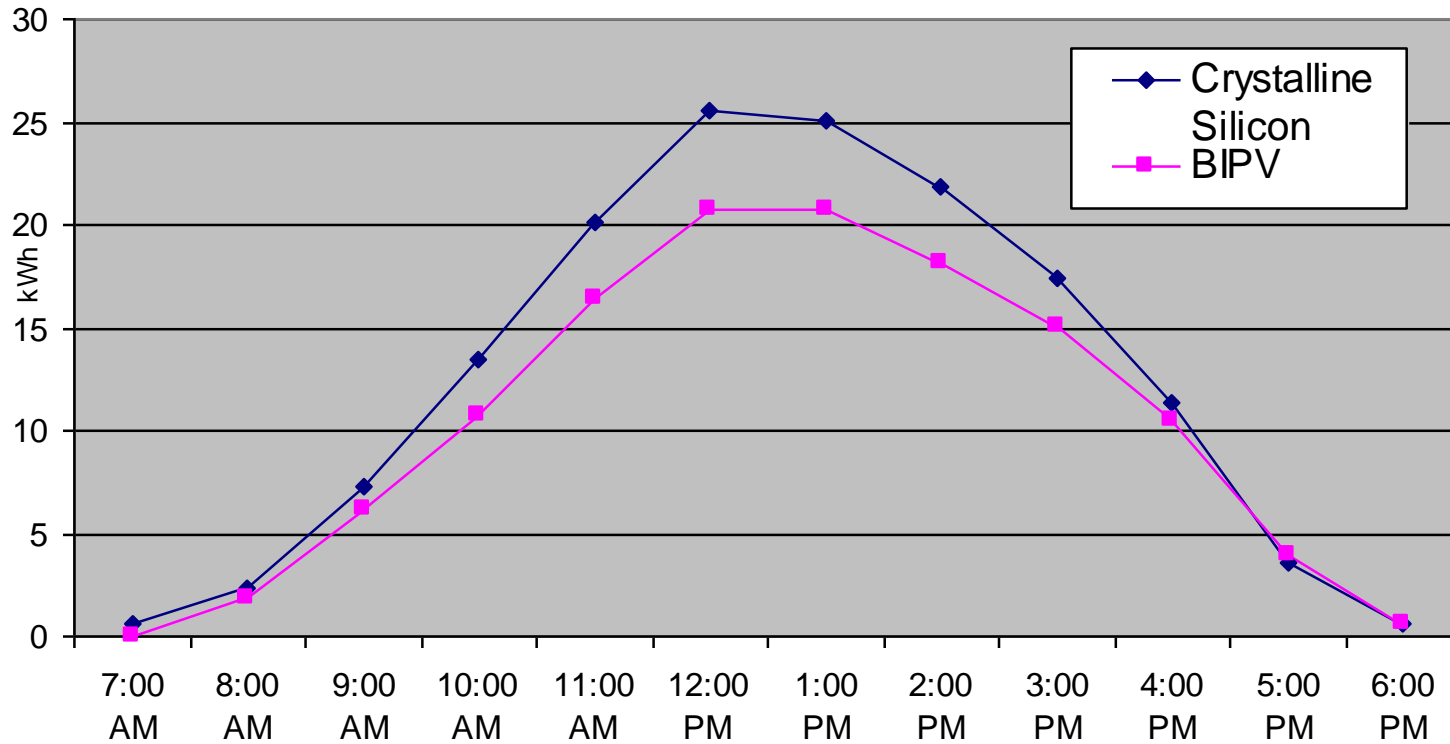
Performance of AQMD Solar PV



Overall, crystalline silicon PV modules perform 12% better on average than BIPV for summer operation

Time of Day Performance

Performance of AQMD Solar PV



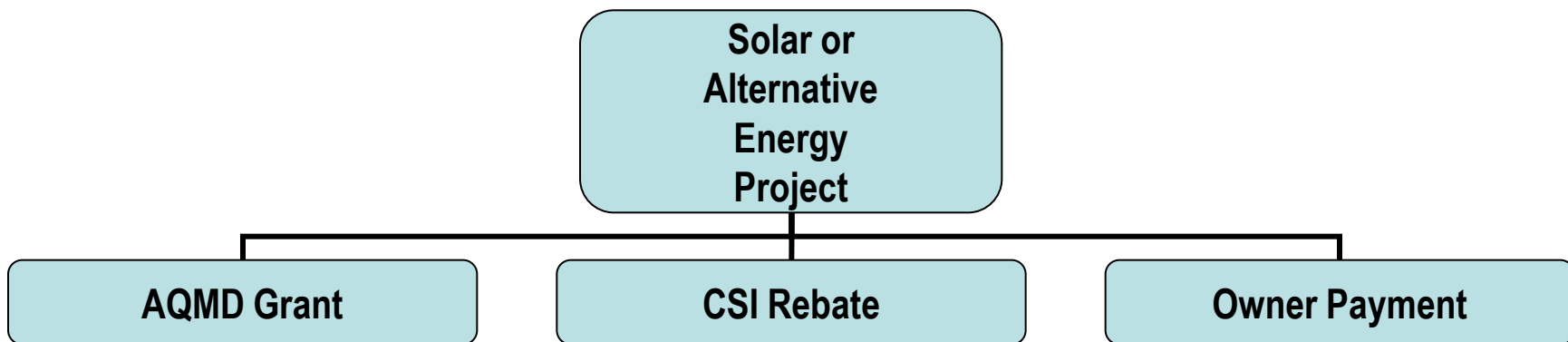
Crystalline silicon has better performance during peak hours but perform similarly with BIPV at beginning and end of the day (9/1/09)

Conclusions

- Initial results indicate that crystalline silicon (15 degree tilt) perform better overall and at peak hours than BIPV (0 degree tilt) during the summer
- Performance is comparable in early morning and late afternoon hours during the summer
- BIPV may display better performance during low light conditions in winter
- Further study to determine seasonal differences over 5 year period

Rule 1309.1 Renewable Energy Grant Program

- Rule 1309.1 awarded \$5.2M for renewable energy projects
- 83 projects with 21 contractors near EGFs and EJ areas
 - AQMD grant **50%** cost share
 - Utility rebate **40%** cost share
 - Property owner **10%** cost share
- Original projects almost completed, on backup list



Rule 1309.1 Renewable Energy Grants

Status	# Projects	Cost (\$)
Projects Completed by 12/31/09	59	\$3,598,139
Projects Dropping Out	24	\$1,573,275
Backup List	38	\$1,406,308
Backup Projects Eliminated	50	\$869,830
Remaining Funds		\$258,037

