

# Integrative Photovoltaic Awnings in the Natural Fusion Home: Solar Decathlon 2009

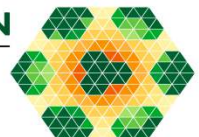


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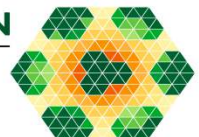
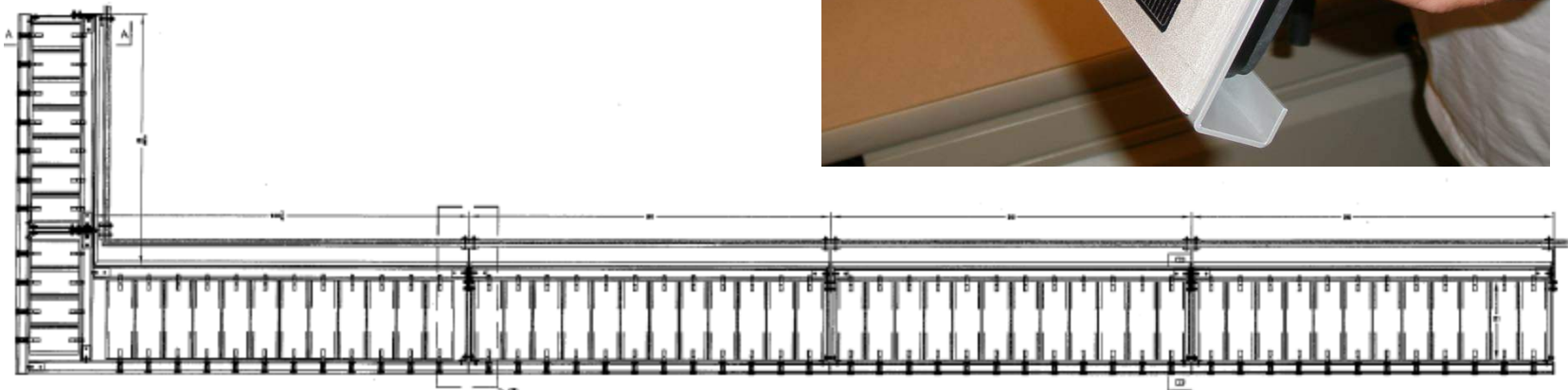
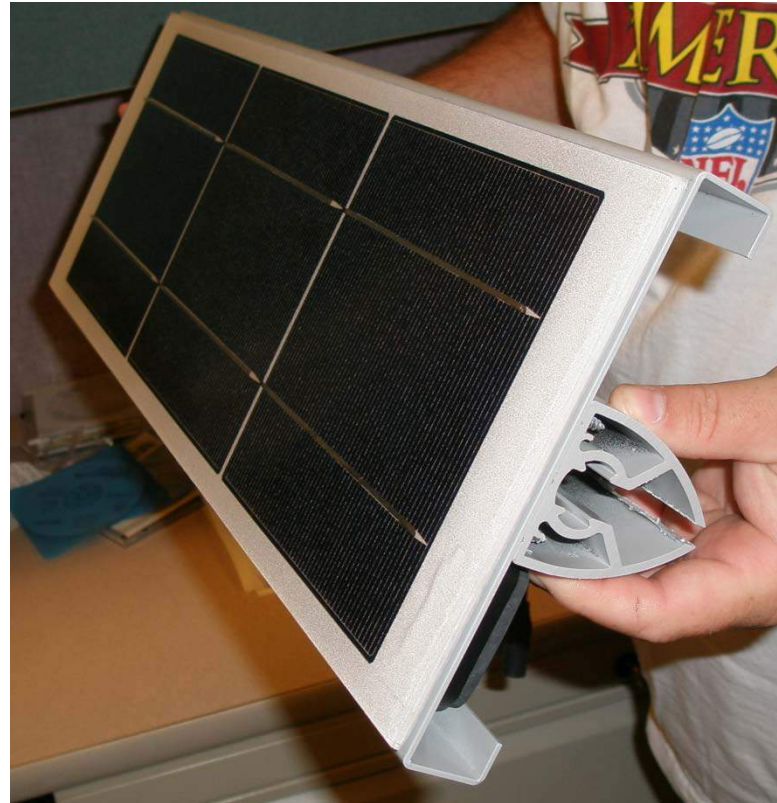
SOLAR DECATHLON 2009

NATURAL FUSION

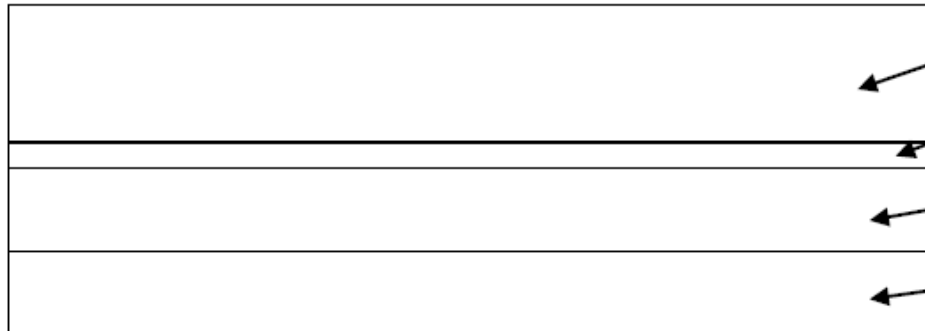


# Solar Awning Prototype

- Innovative PV module design
- 480 Peak Watts
- Active and passive solar benefits
- Adaptable to sizing constraints



# Cell Composition: Thermoplastic Polyurethane



Glass

TPU

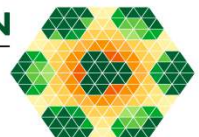
Poly-Si

Tedlar



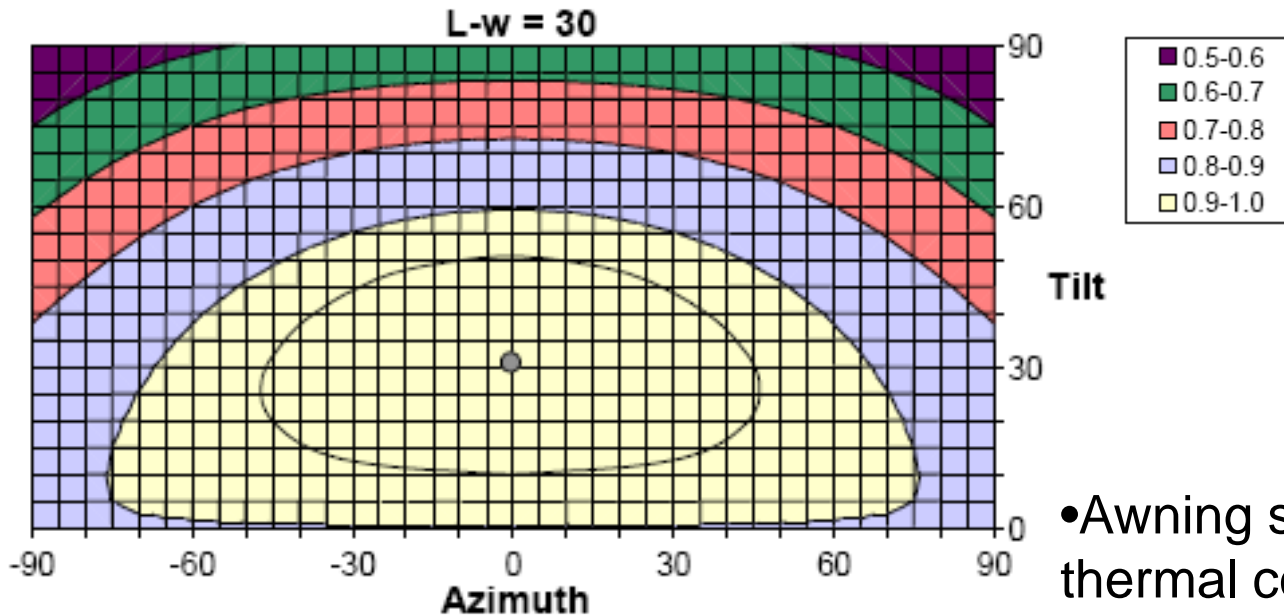
MODEL NUMBER: <b>SPI-L010-12</b>	
MAX POWER [P <sub>MAX</sub> ] <b>10 W</b>	OPEN CIRCUIT VOLTAGE <b>1.82 V</b>
CURRENT AT P <sub>MAX</sub> <b>6.81 A</b>	SHORT CIRCUIT CURRENT <b>7.46 A</b>
VOLTAGE AT P <sub>MAX</sub> <b>1.47 V</b>	MAX SYSTEM VOLTAGE <b>600 V</b>
SERIES FUSE <b>12 A</b>	

Test	ASTM	Notes	Developmental TPU	Commercial EVA 1	Commercial EVA 2
Dielectric Strength	D 149, Method A		57.3 kV/mm	56.0 kV/mm	60.2 kV/mm
Surface Resistivity	D 257	(>1x10 <sup>12</sup> insulating)	2.4x10 <sup>15</sup> Ohm/sq.	2.7x10 <sup>15</sup> Ohm/sq.	1.3x10 <sup>16</sup> Ohm/sq.
Volume Resistivity	D 257	(>1x10 <sup>11</sup> insulating)	5.8x10 <sup>13</sup> Ohm/cm	9.7x10 <sup>12</sup> Ohm/cm	3.2x10 <sup>13</sup> Ohm/cm

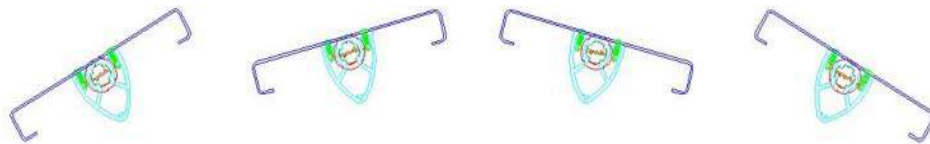




# Flat Photovoltaics in Pennsylvania? A Systems Integrative Approach to PV

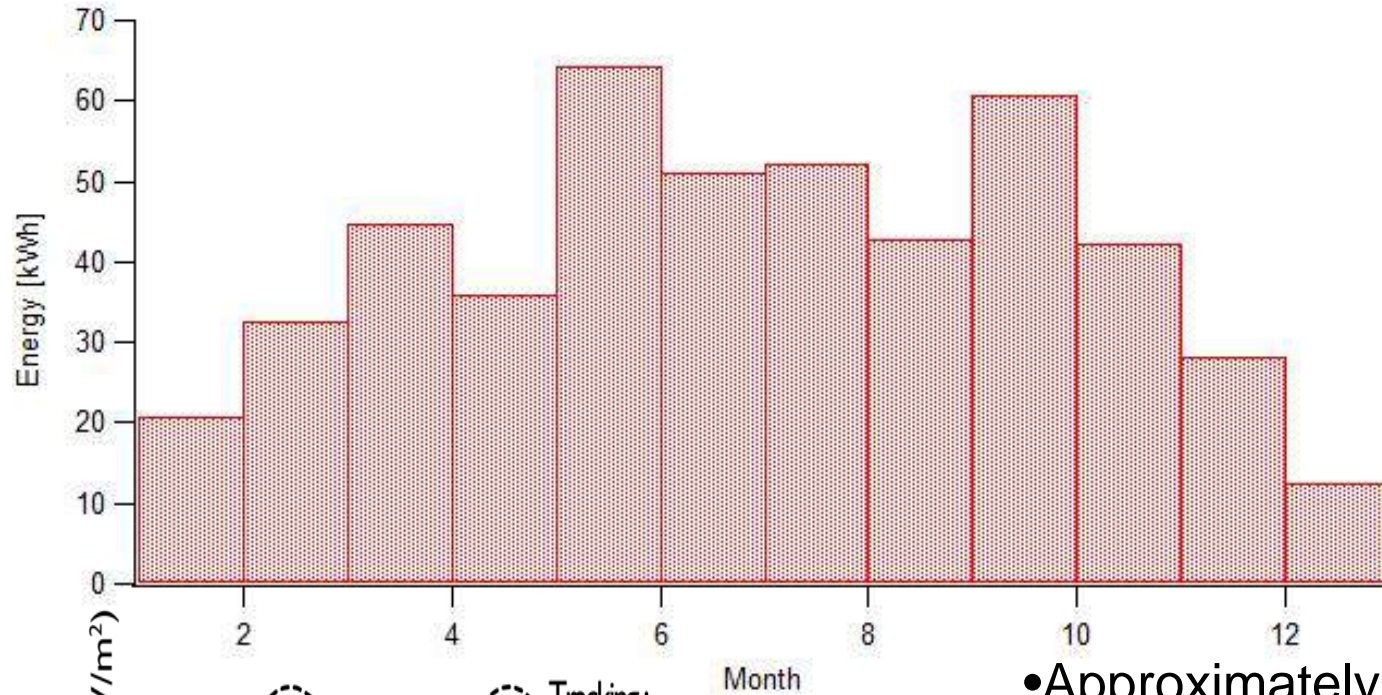


- Awning structure provides thermal coupling for modules

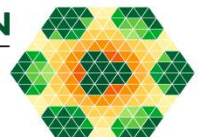
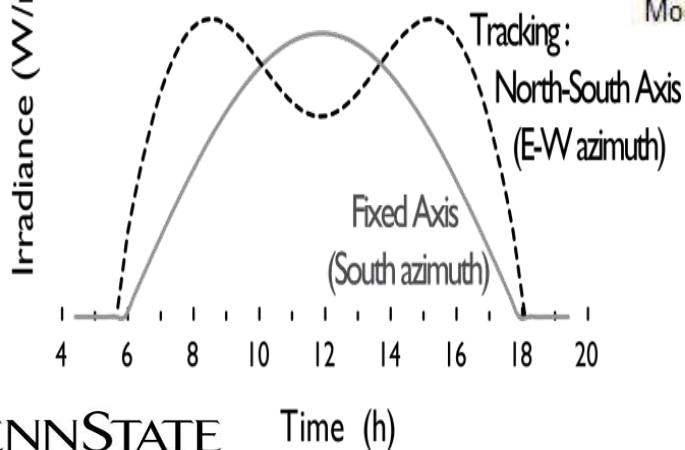


- Both active (solar tracking) and passive solar (thermal mass) gains

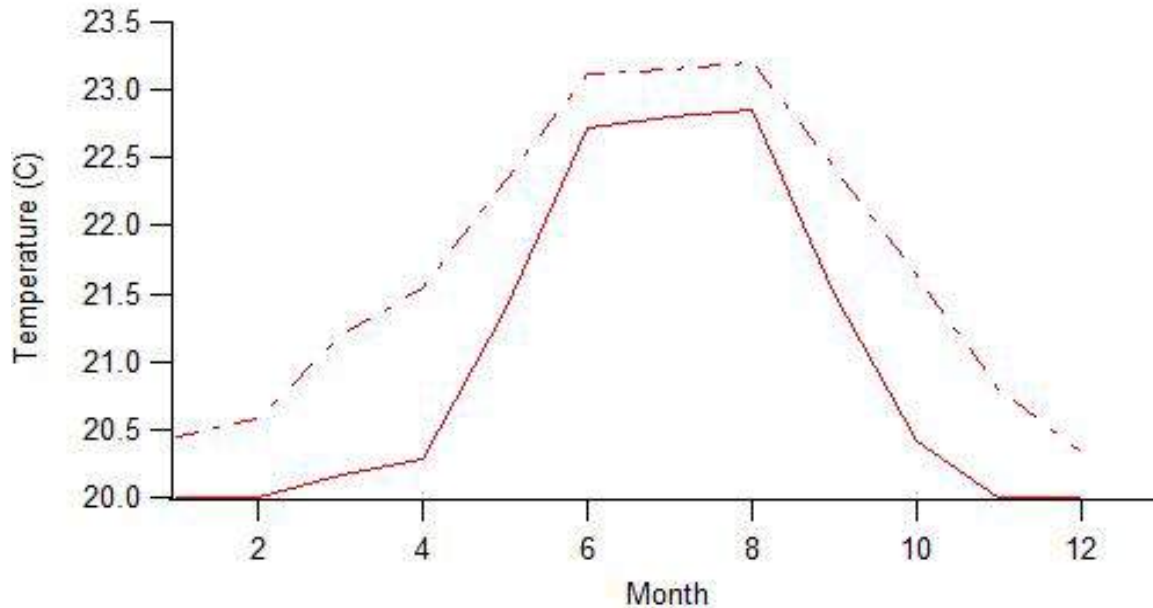
# Awning Performance: Active



• Approximately 500kWh per year  
(State College, PA)



# Awning Performance: Passive



- Passive solar benefits from reducing summer penetration
- Reduction in total heating/cooling loads
- 0.5 to 1°C in the winter to 0.2 to 0.5°C during the summer





# Context of the Solar Decathlon

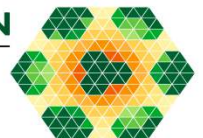


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