



120 Kilowatt IHCPV Field In Arizona



Introduction to AMONIX

Vahan Garboushian

Amonix Inc.

AMONIX



- ***Global leader in high performance solar electric systems***
- ***High-concentration = lowest cost in volume production***

➤ **Established in 1989**

- **Designed and developed Integrated High Concentration PV**
- **Commercial deployment in 2000**

➤ **Headquartered in Torrance**

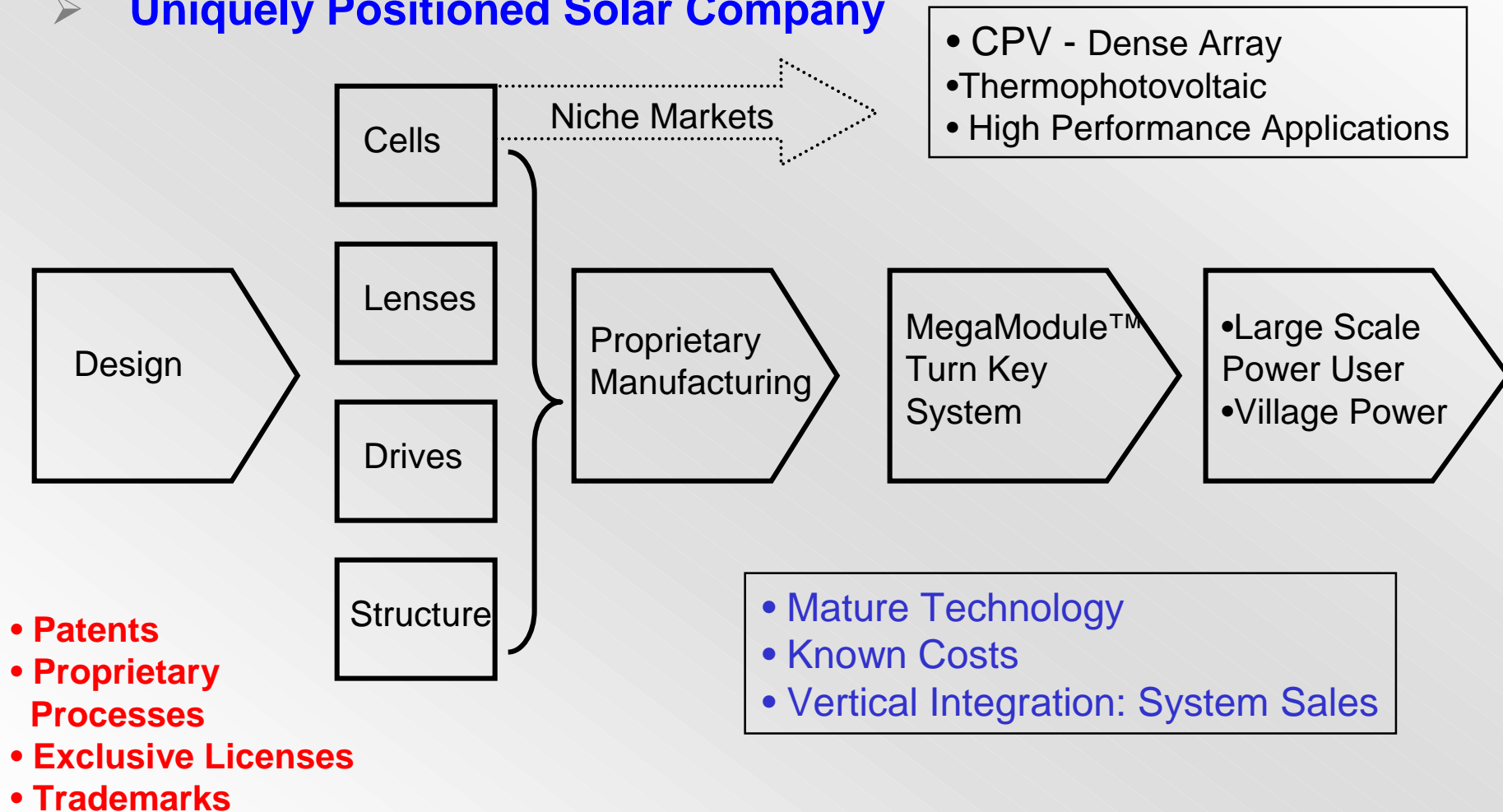
➤ **6,000 ft² Administrative & Engineering - 18,000 ft² Manufacturing**



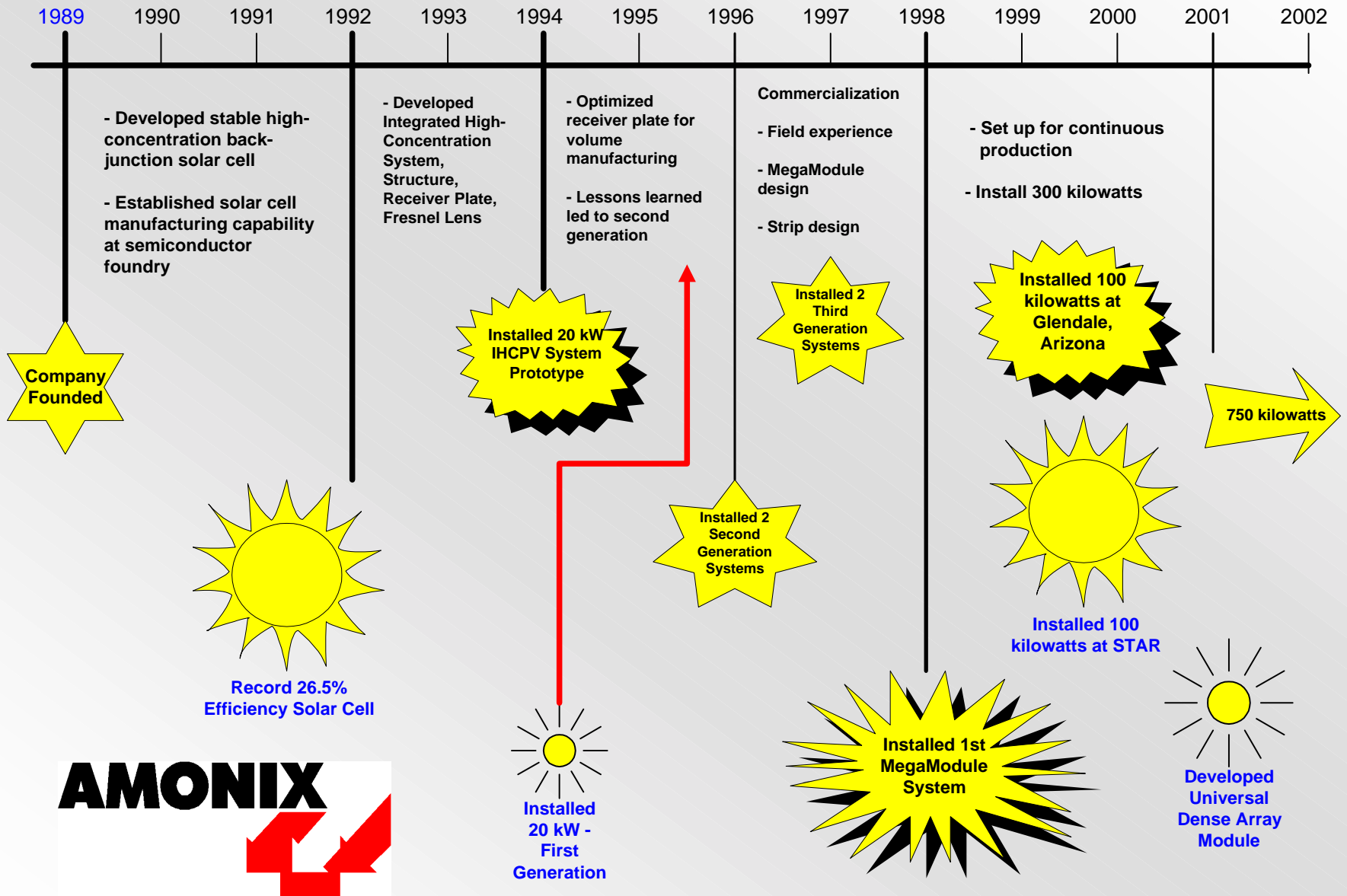
Amonix

The Leader in High Performance Photovoltaics

➤ Uniquely Positioned Solar Company



Key Milestones



Challenge for PV

The PROBLEM – **COST !**

- PV energy generation is expensive because of high cost of solar cell (“cost culprit”)
 - ◆ 50% to 60% of system cost

The SOLUTION -

- Reduce cost by reducing cell material
 - ◆ Thin Film Cells
 - ◆ Small area cell under high-concentration (AMONIX)

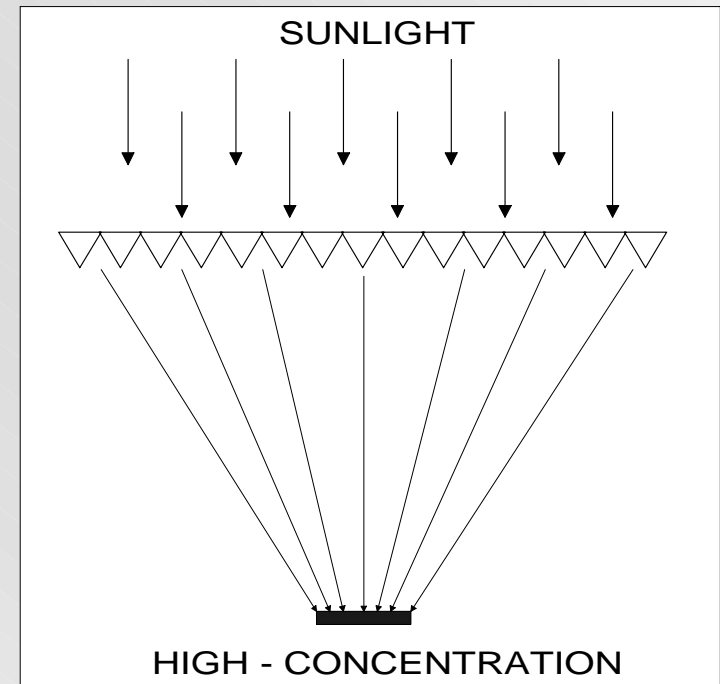
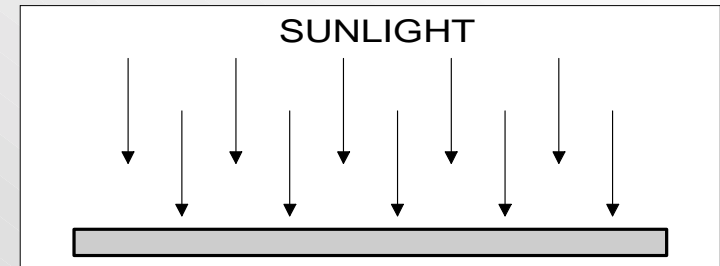
High Concentration

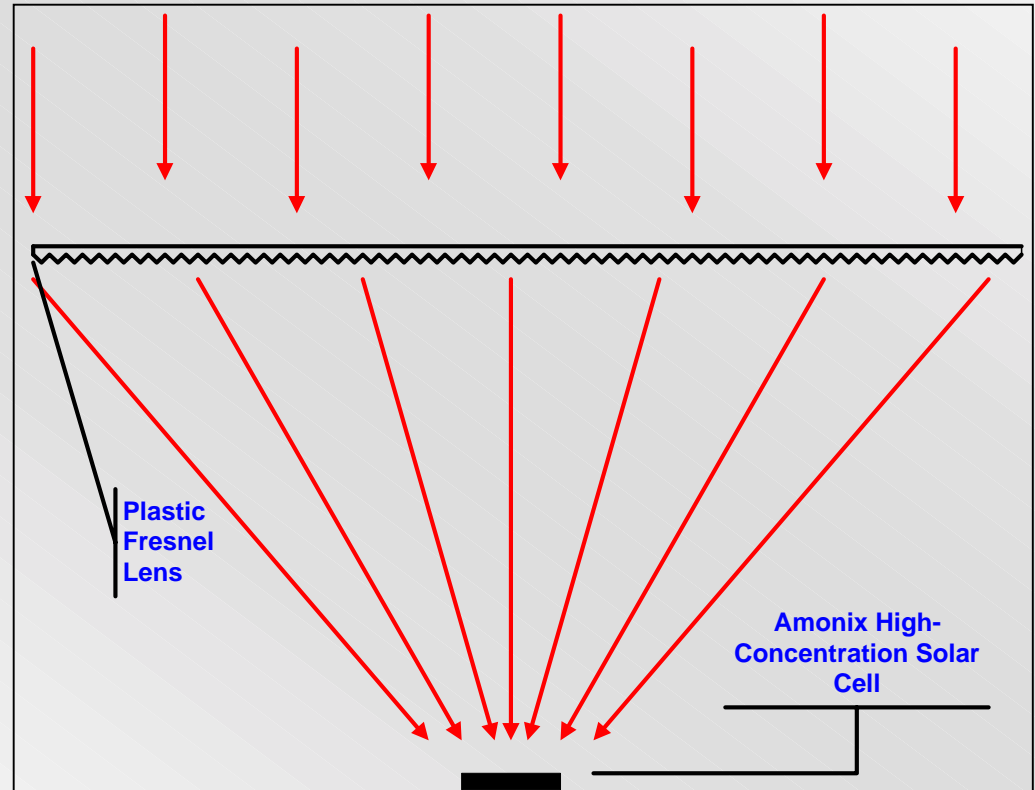
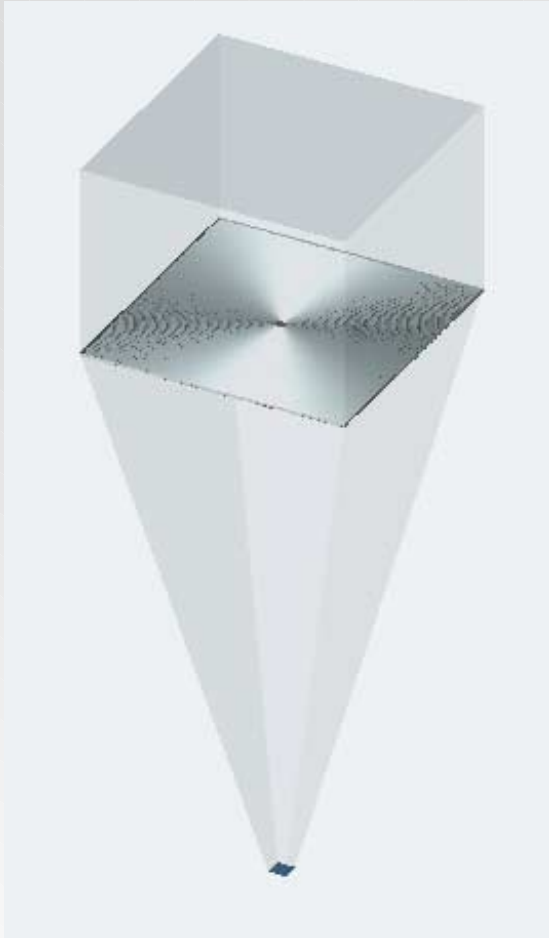
"How it works"

AMONIX



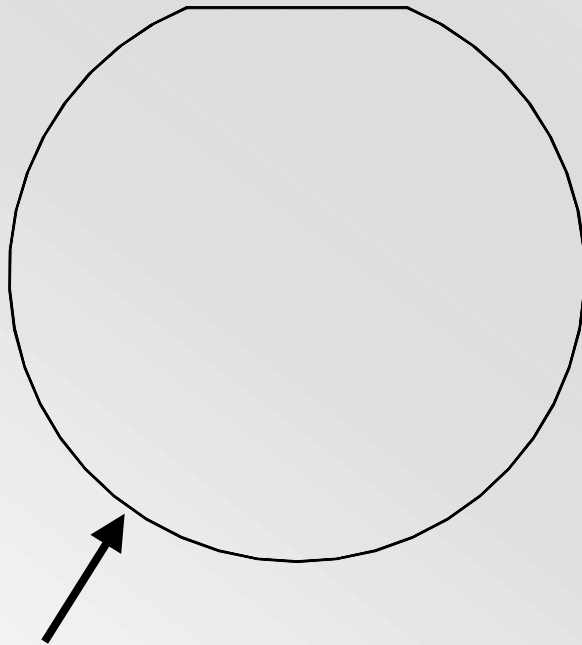
- Sunlight is concentrated using low cost Fresnel lens
- Cell area (cost) reduced by concentration ratio (250X – 500X)
- High system conversion efficiency > 18%
- Solar tracking = high capacity factor



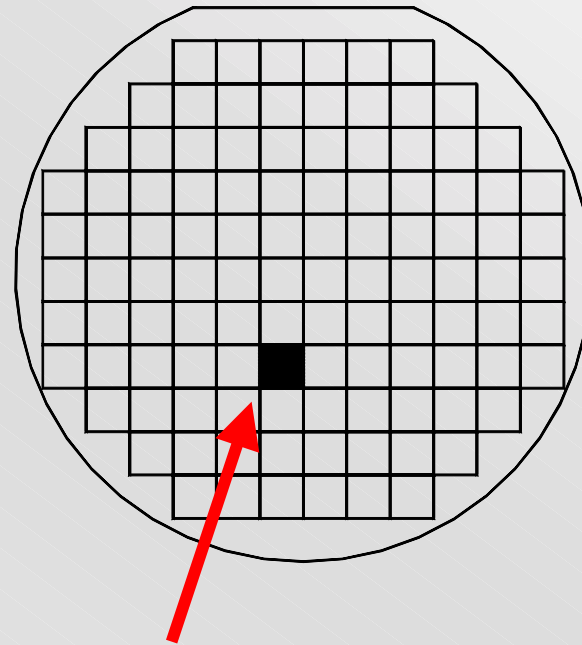


Amonix's Integrated High-Concentration PV system uses 1/250 of the cell area used by conventional systems = LOWER COST

High Concentration Economics

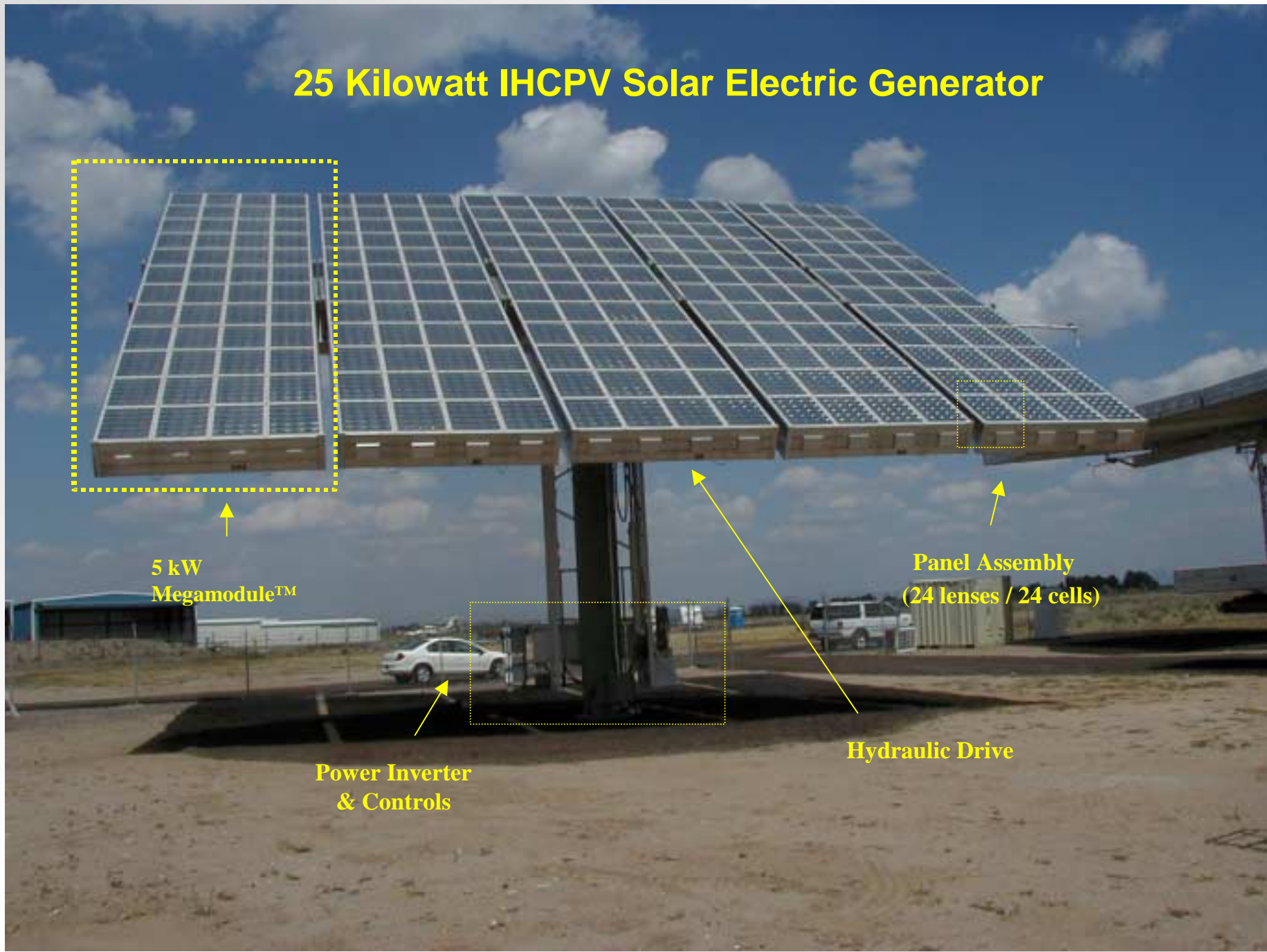


A single 6" wafer produces **2 - 2½ watts** under one-sun (no concentration)



- A **single** 1cm² Amonix cell produces **10 watts** at 500X concentration
- A 6" wafer contains enough cells to generate over **1000 WATTS!!**

25 Kilowatt IHCPV Solar Electric Generator



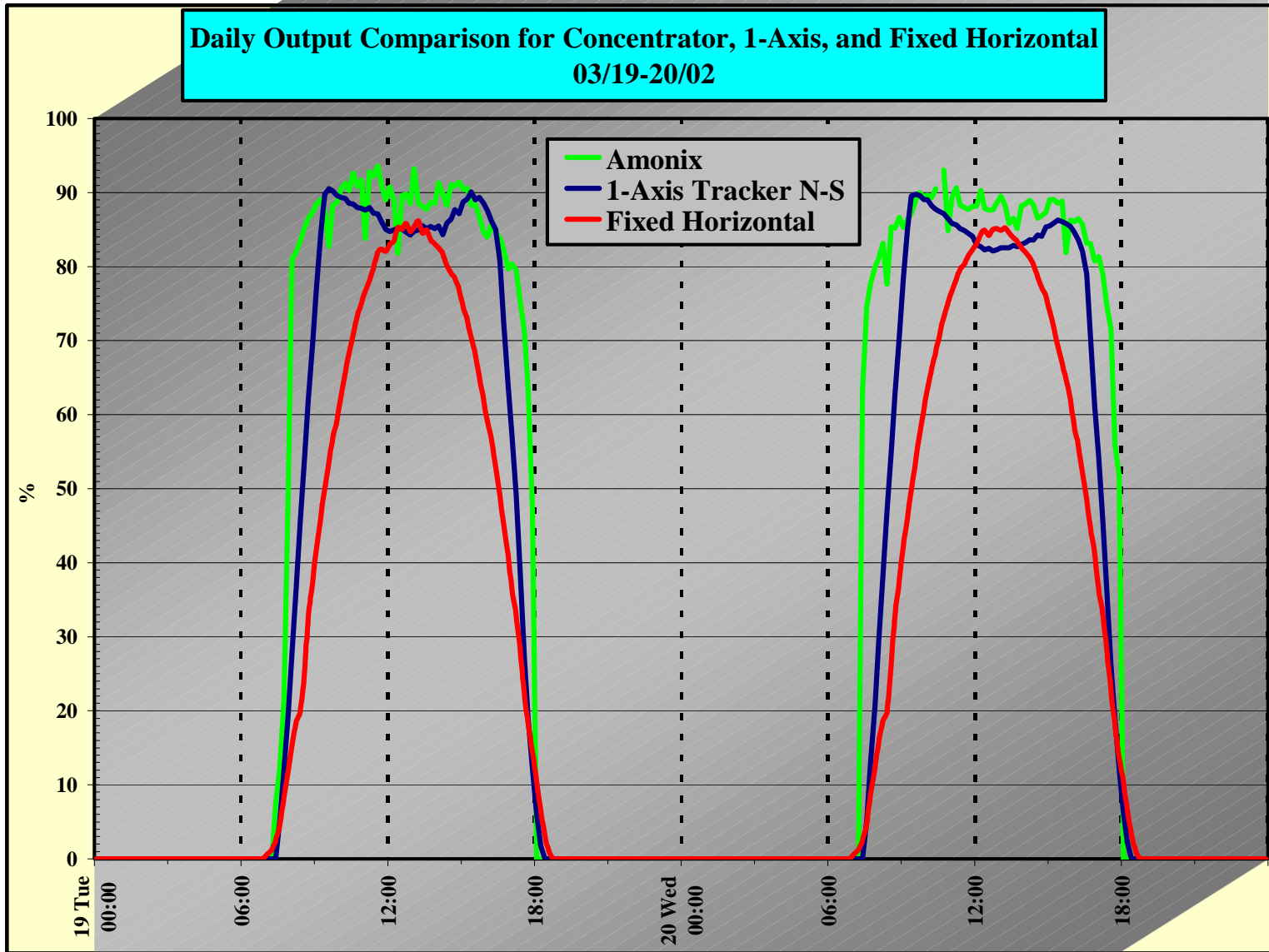
5 kW
Megamodule™

Panel Assembly
(24 lenses / 24 cells)

Power Inverter
& Controls

Hydraulic Drive

- Lowest cost PV in as little as 5 megawatts per year production
- Up to 30% more energy production in very good solar areas
- Highest efficiency of any installed PV system (up to 50% more)



Designed for Volume Assembly

AMONIX



Factory assembled under controlled conditions

New Hydraulic Drive



Field Assembly in One Day

AMONIX



Easily deployed

Patented Hydraulic Drive

- Amonix developed a revolutionary new hydraulic 2-axis drive and controller to replace old-style gear driven models
 - Powerful to handle very large arrays
 - Tracking to $<0.1^\circ$
 - Cost effective



Commercialization Milestone



Part of 350 kilowatt installation at APS

Pollution-free and no water required for operations

Advantages

AMONIX



Amonix can scale-up production twice as fast and at one-third the cost of other PV manufacturers.

- Solar cell designed to be manufactured using excess capacity of commercial foundries
 - Low capital requirements
 - Rapid manufacturing scale-up
- System uses 250+ times less silicon material
 - Manufacturing capacity readily available
 - Not subject to shortages and price pressures

Cost Advantage



Potential of generating lowest-cost solar electricity

Summary

- Amonix has an innovative technology with several important and distinct cost advantages
 - Achieve ~\$4.50/w (installed) as little as 10 MW
 - <\$2.50 at 100 MW per year
 - No basic technical breakthroughs needed
- Over 350 kW deployed = Field Experience
 - New 5 MW installation begun in Prescott

AMONIX



First Commercial 100 kilowatt IHCPV installation in Glendale, Arizona



Prescott 5 MW + Project



Field Installation



Installation



Quick and Efficient Assembly



Generations of Improvements

