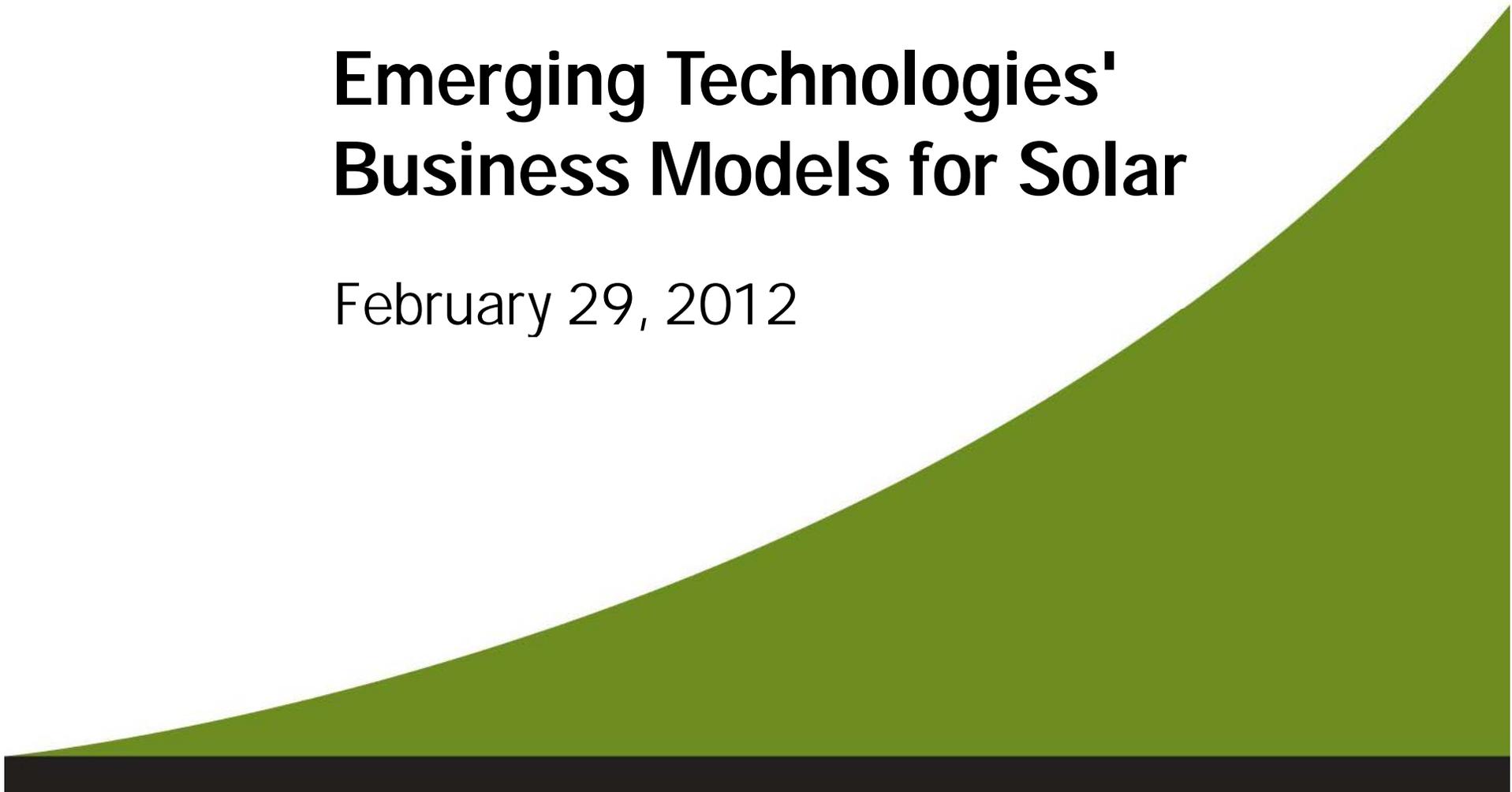




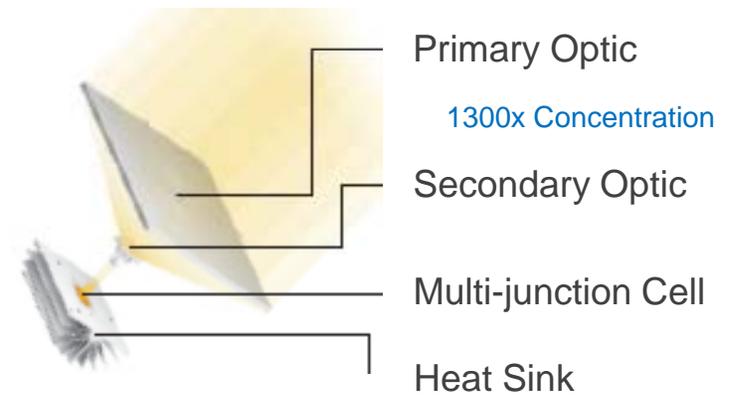
Emerging Technologies' Business Models for Solar

February 29, 2012



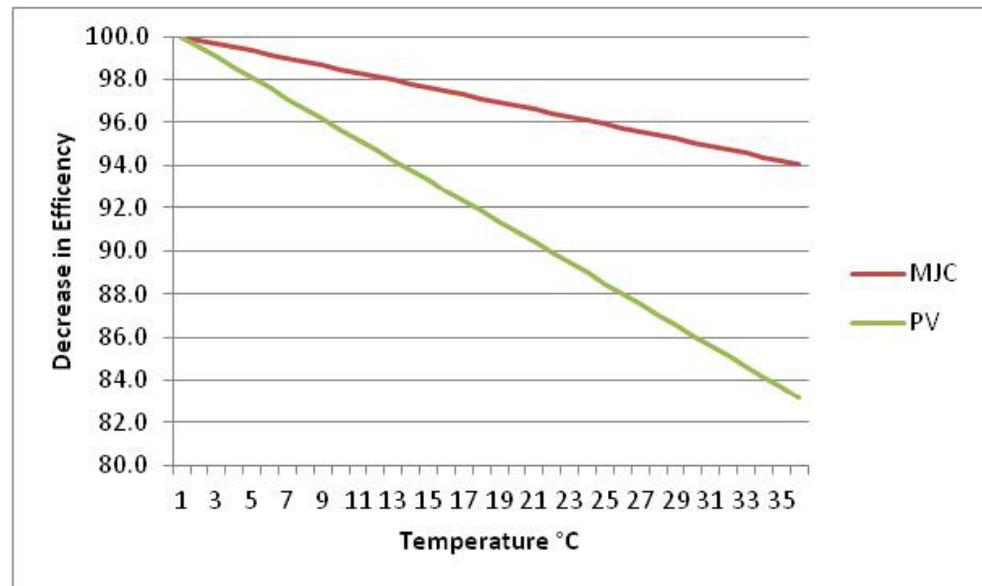
CPV Technology

- CPV products, though perceived as newer, are emerging as a credible, bankable option for sites with a higher solar resource such as the southwest US
- Dual-axis solutions becoming more reliable
- The technology is emerging as viable business option
- Business model evolution will be required to overcome PV defacto status



CPV Advantages

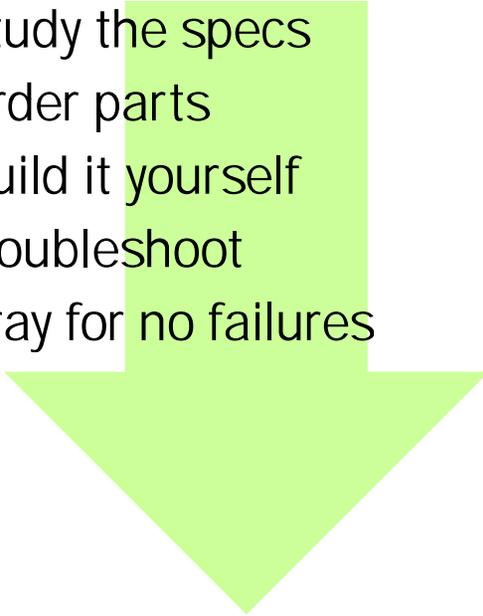
- Operates better than PV in higher temperatures
- At 21°C:
 - CPV loses ~3%
 - PV loses ~10%
- Dual axis tracking provides better production when TOD rates are at their maximum



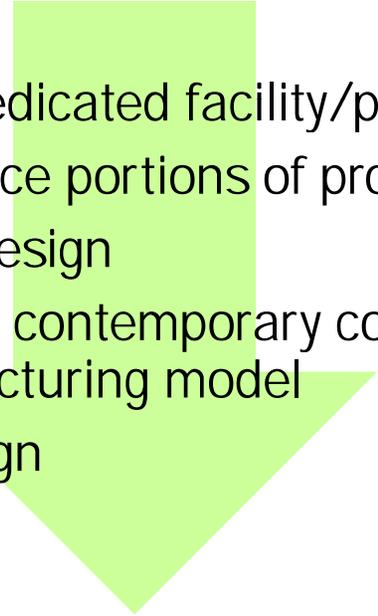
Evolution of Solutions and Business Models

Stepping away from the existing methods for delivering solar plants and compare to other industries and technologies

• User

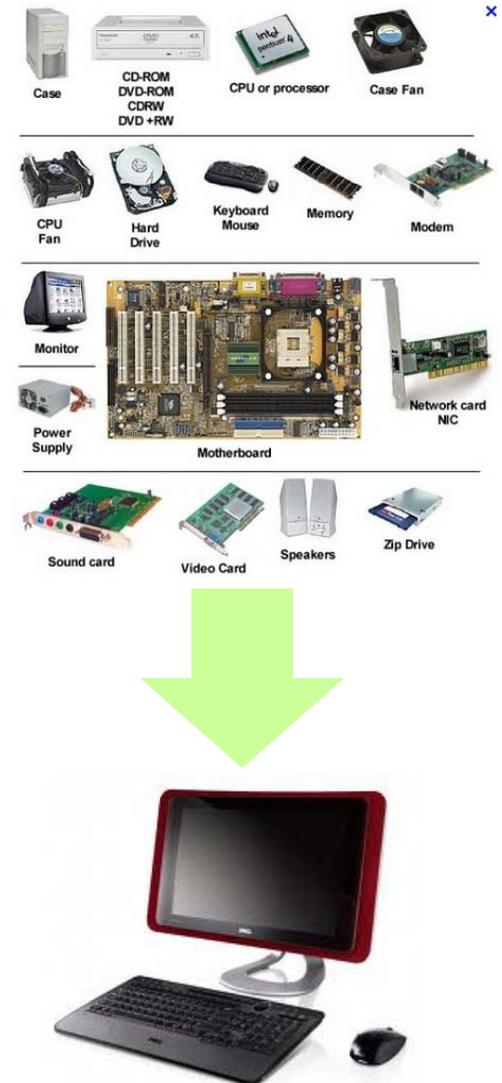
- Study the specs
 - Order parts
 - Build it yourself
 - Troubleshoot
 - Pray for no failures
- 

• Manufacturer

- R&D
 - Build dedicated facility/plant
 - Outsource portions of product
 - Adapt design
 - Move to contemporary contract manufacturing model
 - Re-design
- 

Evolution of Solutions and Business Models

- Eventually manufacturers emerge with full systems or integrators emerge with turnkey
- Installation is simplified
- Cost reductions reveal lower levels
- Quality improves
- Footprint gets smaller
- Performance improves
- Innovation is advanced
- This enables the distributed models to gain traction
- Support from one source under one warranty



Today's Business Model for Solar Projects

- “Solar Manufacturers” specialize in components
 - Panels
 - Inverters
 - Racks
 - Monitoring Software
- “Solar EPCs” have extended their specialization to design from the an la carte menu of components
- Solar component warranties are separate and un-aligned

An Emerging Technology Solution - More Than Components

- In the solar industry, CPV is still perceived as a newer technology
- The core technology itself isn't actually new, but the delivery as a solution is emerging.
- 2010 GreenVolts redirected the company to begin leveraging adjacent industry practices



An Emerging Technology Solution - More Than Components

- What became important
 - Advanced technology with upside potential in performance
 - Fully integrated – designed from the ground up to maximize performance
 - Designed for contemporary contract manufacturing model and top tier supply chain management
 - Optimized design for plug and play yet flexible installation
 - Removal of margin stacking to drive costs down
 - Manage the output of the product as a commodity
 - “System” warranty
 - Like other industries, lower costs and easy management supports distributed installations

The Result

- Performance in high DNI locations that can be as much as 35% greater compared to fixed tilt PV
- Cell and other technologies efficiency increasing at +1%/yr
- Product design decisions that contemplates the “whole”, some examples:
 - System control unit that contains; inverter, motion control, gps, disconnects, communication and CPU
 - Only 3 size installation bolts across paddles, modules, inverter, stanchions
 - Paddle positioning based on the inverter I-V max power point
 - DC wiring produced at factory, no onsite DC construction
 - High precision tracking with wide acceptance angle optics
- Software automation that communicates with the entire system and based on internal and external stimulus
- Using existing manufacturing processes, parts and tools from adjacent industries

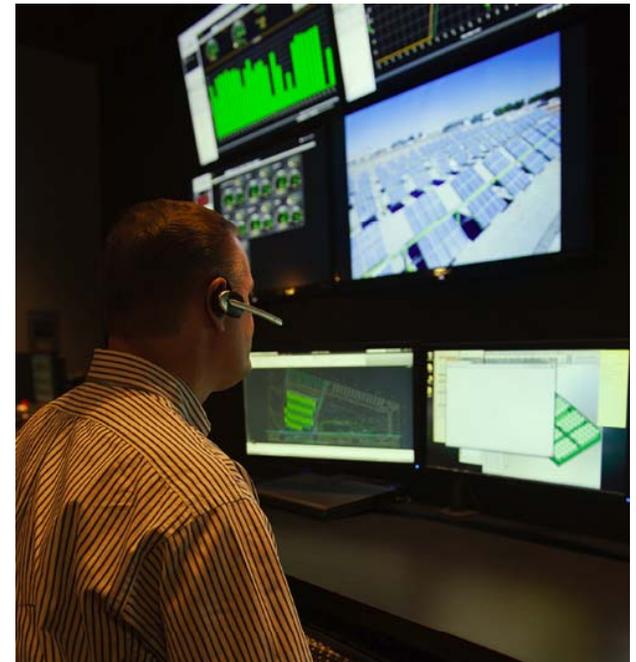
The Result

- Uses 25% of the wiring required by a PV plant
 - Provides cost reduction of the most expensive material on the site
 - Reduces the labor cost of the most expensive sub-contractor
- Enables the installation of 2kW paddles at the rate of one every 7-10 minutes
 - 4 bolts, 1 bearing, 1 cap, 2 DC connectors, 1 ground
 - No racking in the field
- Flexible foundation solutions for various types of soil conditions (driven piers, monolithic, elevated, hybrid, spread)



The Result

- “ONTG” - Single interface for:
 - Service
 - System warranty
 - Ongoing monitoring
 - Customer support
 - One number to call
- Features unique to both PV and CPV industry
- Entire system design decisions based on total installation “time in motion” studies
 - How paddles are installed
 - Hinged frames and turnbuckles
- Detailed asset management to the cell level from a barcode reader during registration



GreenVolts

- Linking emerging technology and adjacent industry proven practices for a new business model for the solar industry

