



# Ascent Solar Technologies

2011 Joint Service Power Expo



# Company Snapshot



***R&D Magazine Selected Ascent as one of the 100 Most Innovative Technologies in 2010***

- **Founded:** 2005 (technology development started at ITN Energy Systems in early 1990's)
- **IPO:** July 2006
- **Headquarters:** Thornton, CO
- **Manufacturing:** Colorado
- **Technology:** Thin-Film CIGS (flexible, plastic substrate)
- **Manufacturing Process:** Roll-to-roll manufacturing, monolithic integration, intelligent process control
- **Status:** Commercially producing modules
- **End Markets:** Defense, Consumer, Transportation, Aerial, Off-Grid and BIPV/BAPV



# Defense: Cost of Fuel

Solar has the potential to become a significant source of fuel savings

## Battlefield Fuel Consumption

Generators are the Army's single largest user of fuel on the battlefield during wartime.\*



\*Report of the Defense Science Board Task Force on DoD Energy Strategy

"Towards Developing Fully Burdened Costs" - Headquarters USMC  
Edward Blankenship, PA&E  
Randal Cole, Ph.D., CNA

Up to \$1-billion in annual savings  
assuming average cost \$50-gal



## Fully Burdened Cost Of Fuel

The Fully Burdened Cost of Fuel is defined as the cost of the fuel itself plus the appportioned cost of all of the fuel delivery logistics and related force protection required for delivery

## Cost to Deliver Fuel to Forward Bases

Convoy with Security	\$9.20 - \$11.81/gal
Convoy with Air Security	\$15.63 - \$18.59/gal
Air Drop	\$28.94 - \$30.78/gal
Air Drop with Security	Up to \$400/gal

## Fuel Savings from Solar

Total Number of Gallons Consumed = 357-M  
DoD reports that 5% solar adoption could save 17.8-M gallons of fuel

# The Current Problem

- We're spending \$12B per year in fuel for cbt sys\*
- FOB "X" in Afghanistan
  - 53 wired generators
  - Less than 20% efficient
  - Total cap. 10 MB
  - Peak demand 2MB
  - 4900 gal for generators / day
  - \$10/gal (burdened)
  - \$49,000 for generator fuel / day
  - \$1.5M/mo; \$18M / year



Deloitte, Energy Security America's Best Defense, Study 2009

# Value Proposition

## Defense Applications

- Scalable power generation to meet any need
  - 5 watts to 15+ kilowatts
- Light weight enables portable solutions
- Excellent power density
- Voltages match battery ecosystem
- Ruggedized for defense applications



# Ascent Solar Certification MIL-STD-810G

- ✓ Sand
- ✓ Dust
- ✓ High Temp storage
- ✓ Low Temp storage
- ✓ Immersion
- ✓ Loose Cargo Vibration
- ✓ Thermal Shock
- ✓ Altitude
- ✓ Transit Drop
- ✓ Rain
- ✓ Salt-Fog



Rain



Vibration



Sand



Transit drop

**MST**

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Fax: 480.845.8222  
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Test Report: 9120-0230  
Part Name: Solar Ascent: 25040321034  
Release Date: 20 February 2010

Prepared For: Ascent Solar Technologies, Inc.  
1300 N. Deer Road  
Tempe, Arizona 85281

Performed By: NTS-National Technical Systems  
Arizona Testing Division  
1150 West 27th Street  
Tempe, AZ 85282

Test Specification / References:  
MIL-STD-810G  
MIL-STD-810E

National Technical Systems, Arizona Division performed: Low Temperature Storage; High Temperature Storage; Altitude; Immersion; Thermal Shock; Salt Fog; Rain; Transit Drop; Loose Cargo Vibration; Blowing Dust; and Blowing Sand testing for Ascent Solar Technologies, Inc. Low Temperature Storage; High Temperature Storage; Altitude; Immersion; Thermal Shock; Salt Fog; Rain; Transit Drop; Loose Cargo Vibration; Blowing Dust; and Blowing Sand testing was performed on the parts identified as Solar Panels. Testing was conducted in accordance with Ascent Solar Technologies, Inc. defined MIL-STD-810G and MIL-STD-810E, as directed in Ascent Solar Technologies, Inc. P.O. # 2009-002105-2.

The attached report has been reviewed and approved by the undersigned, representing the J2AF Arizona Testing Division.

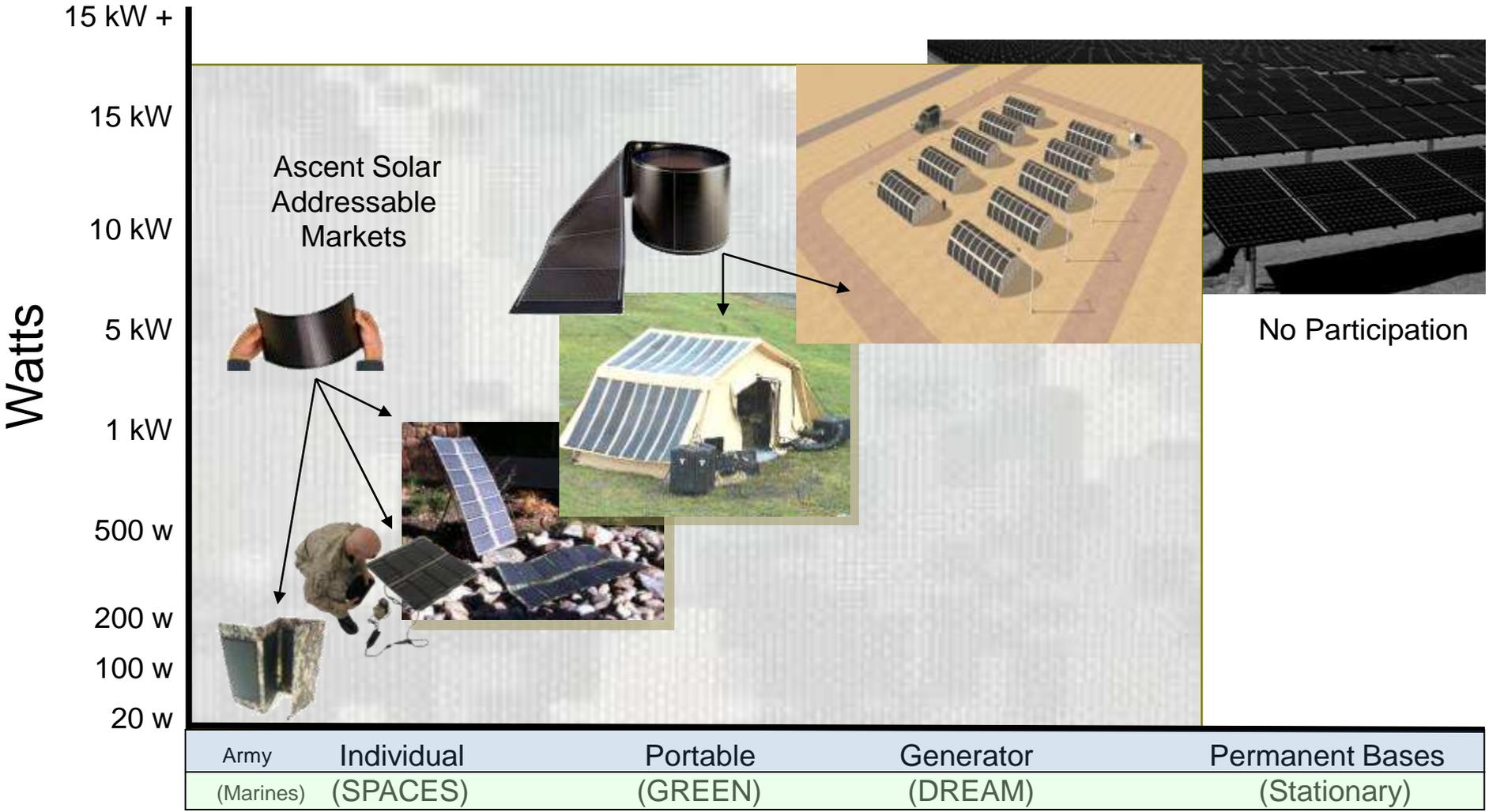
APPROVED BY: *[Signature]* DATE: 20 February 2010  
Brent L. [Name], J. [Title]

APPROVED BY: *[Signature]* DATE: 20 February 2010  
[Name], [Title]

APPROVED BY: *[Signature]* DATE: 20 February 2010  
[Name], [Title]

APPROVED BY: *[Signature]* DATE: 20 February 2010  
Todd [Name], [Title]

# Where Ascent Plays



## Applications

# Current Defense Projects



Ascent Fabric laminated modules for large scalable system integration



## Status:

### Energy Technologies

- Ascent selected for two existing projects
- Received Air Force Research Lab order
  - Currently under AFRL Retest

### 2<sup>nd</sup> Customer Scalable Tent Fly

- Product design completed and under evaluation
- Scalable Tent Fly for large power generation of 1Kw to 15Kw+

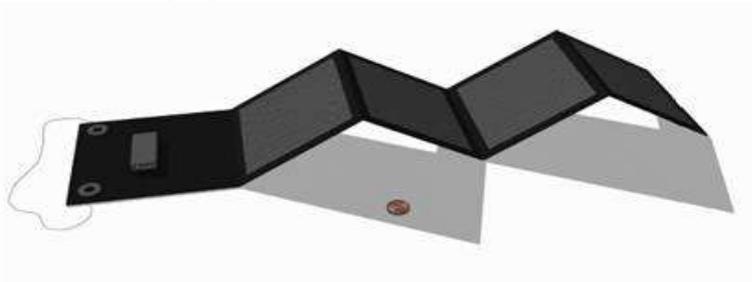


# Personnel Power

Ascent Products Integrated into  
Samsonite Business Carrying Case  
USA, February 2011



Ascent Solar USB  
compact high power  
mobile charging solution



## Personnel Power

- Foldable and deployable power solution
- Power ranges from 5 to 120 watts

### Samsonite

- Joint product development since 2010

### Integrators

- Ascent technology being considered for complete replacement of a-Si across ecosystem

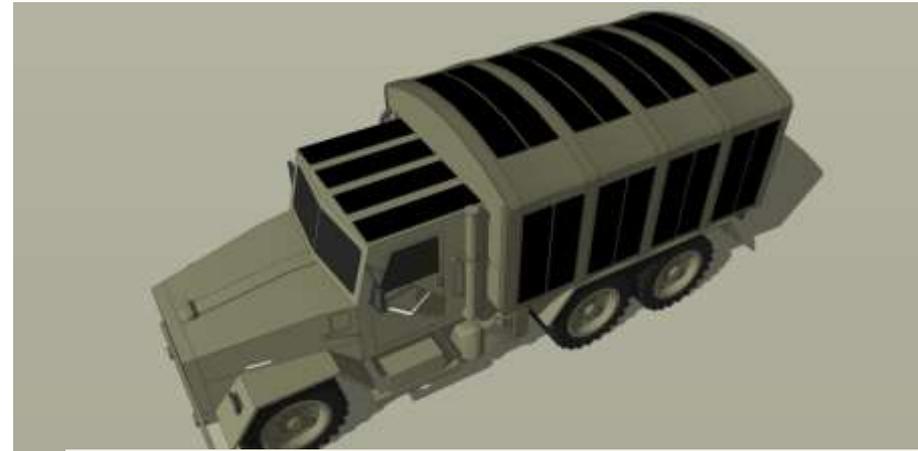
### Distributors

- Specialized in portable power systems for Defense and Recreational use



# Possible future applications

PV integrated into composites



PV integrated into vehicles



PV integrated into vessels





# Ascent Solar Technologies

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