



PETRA SOLAR®

Intelligent Energy By Design

Industry Hiring Expectations

ECEDHA 25th Annual Meeting

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Founder, President & CEO



PETRA SOLAR

Intelligent Energy By Design

Agenda

- Introduction
- Hiring Expectations. A Petra Solar Perspective
 - Solar Energy Conversion
 - Smart Grid
 - System Integration
- Note on Strategy and Change
- Q&A

Introduction

- Unique challenge of a recession and high unemployment rate, yet we cannot staff well-funded programs!!
 - Mismatch of skill sets and industry needs
 - Different from case in late 1990's
- Global problem
- Academic and Industry challenge
- As a practical case study, this presentation will focus on Petra Solar (PV, Smart Grid and System Integration)



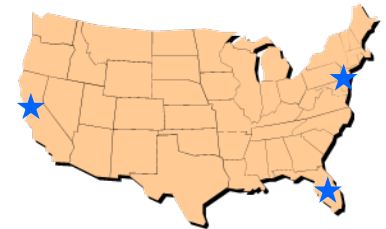
Background

- Mega trends fueling explosive growth in Renewable Energy:
 - Environmental Awareness
 - Sustainable Development (Socioeconomic and Environmental)
 - Political Will
 - Growing interest in energy education and research
- Growth being slowed down by:
 - Low energy prices
 - Recession
- Due to massive funding by the private and public sectors
Renewable Energy is on a high growth curve

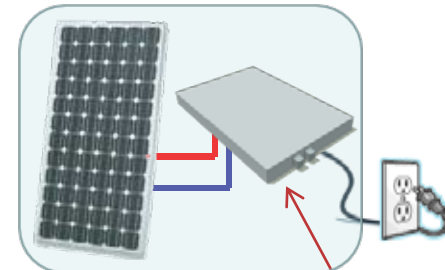


Case Study : Petra Solar

- US company founded in October 2006. HQ in NJ.
- \$14M Series A financing
- Strong Board and Management Team
- Extensive IP portfolio
- Successfully developed Utility-Grade, Single Panel Solar Systems
 - AC Modules
- Leader in Solar, Pole-Attached Utility and Smart Grid markets
- Broad range of expertise on board from semiconductors to Utility scale energy systems

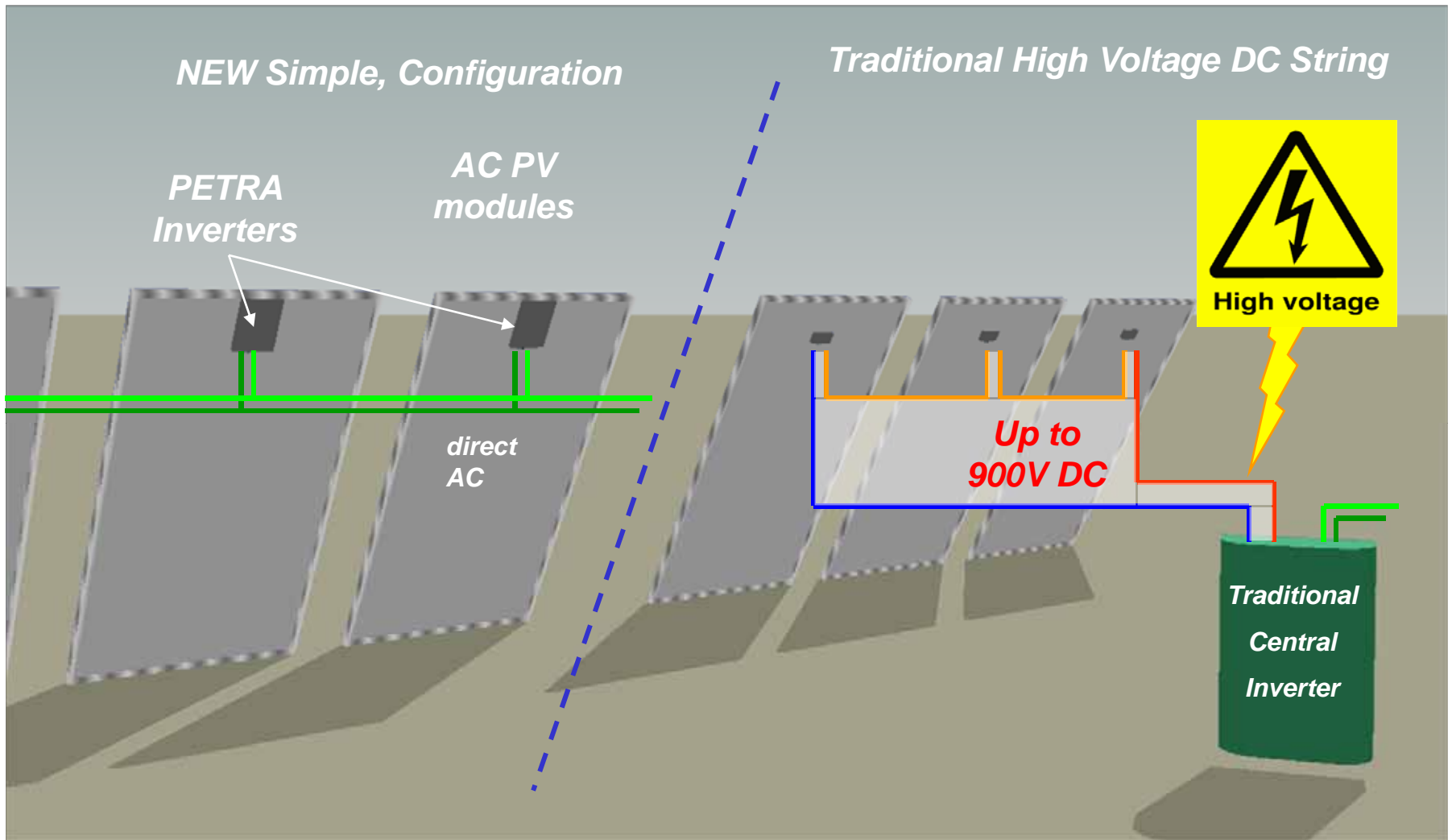


Dr. Greg Olsen



**Petra Solar
μ-Inverter**

Our Products: AC Modules



Our Position in the Value Chain

Except for the solar module, we design and manufacture the complete system:

- Power Electronics
- Mechanical Mounting Systems
- Communications



Polysilicon



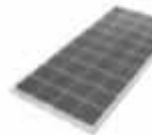
Wafer



Cell



PV Module



PV System & Installation



Major Areas of Expertise Needed

- Solar Energy Conversion
 - Power Electronics
 - Controls
- Smart Grid Design
 - Signal Processing
 - Controls
 - Sensing
 - Communication
- System Integration
 - Software and Networking
 - Management Systems
 - Web Design
 - Communication
 - Cost and Failure Analysis

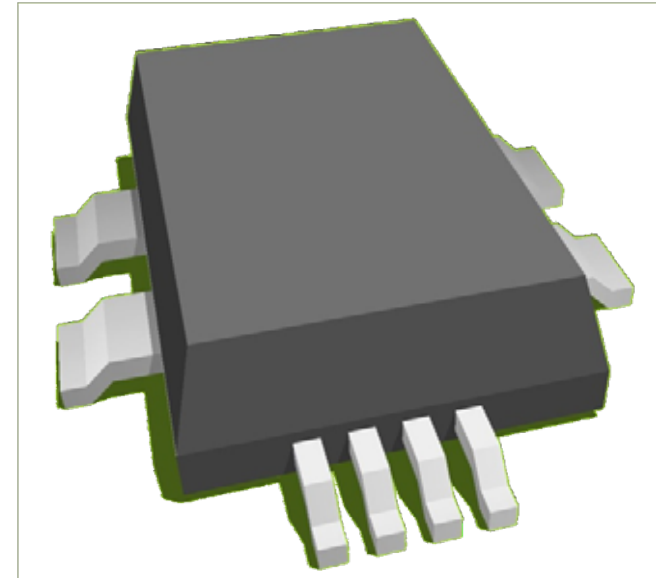


Micro-Inverter Specific Skill Sets

- Power Electronics
 - DC/DC
 - DC/AC
- Controls
 - Digital
 - Analog
- Analog Design
- DSP
- Reliability
 - Physics Based Failure Analysis
- Thermal Design
- Encapsulation
- Magnetic and Opto-coupled Circuit Design
- Power Line Communications
- Wireless Communications
- Mechanical Design
- Test Engineering

Nano-inverter Specific Skill Sets

- IC Design
 - Power Management
 - Synthesizers and PLL
 - Drivers
 - Mixed Signal
 - Digital
 - PLC
 - RF
- Microcontrollers
- Semiconductor Packaging
- Device Physics
 - High Frequency
 - Power Semiconductor
 - High Voltage
 - SOI
 - Reliability



Smart Grid Specific Skill Sets

- Power Systems
- Grid Control
- Transmission and Distribution
- Software Engineering
- Computer Networking
- Wireless Communications
 - RF
 - Mesh Networks
- Network Security
- Battery Charging
- Lighting Controls
- Sensor Technology
- Mechanical Design
- Wind Analysis
- Energy Analysis
- Systems Engineering
- Engineering Management
- Cost Estimation
- Economics
- EV and Plug-In HEV
- Motor Drive Controls
- Motor Drive Electronics
- Electric Machines
- Web Design/Data Base



Change We Need from Academia

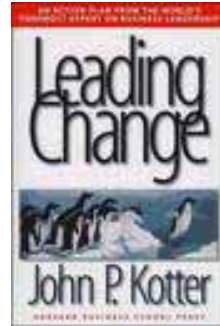
- New classes and disciplines
- Explore new educational delivery approaches
 - Better use of technology
- More industry engagement to help with practical training and with market needs
- More rounded graduates. Might need to look beyond the 4-year degree
- New approaches to teaching innovation and market driven solutions
 - For example: Case Study based classes with multi-disciplined industry, VC and academic participation



But, Change Is Very Difficult

John Kotter's 8-Step Change Model

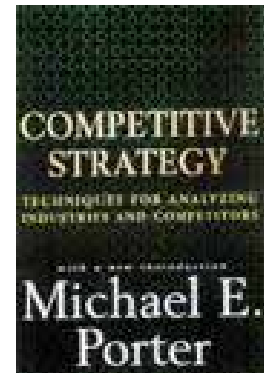
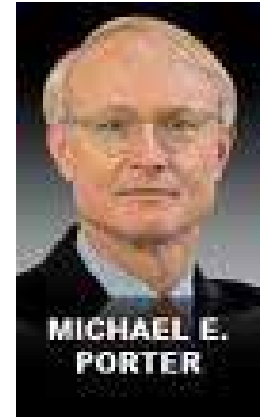
1. Establish a sense of urgency
 - Global Warming. Unemployment. Recession.
2. Create a guiding coalition
 - Academic-Industry Partnerships
3. Develop a vision and a strategy
 - U.S. as a world-leader in renewable technologies
4. Communicate the change vision
 - Seminars. Youtube ..etc.
5. Empower employees for broad-based action
 - Engage students, professors, local community and elected officials
6. Generate short-term wins
 - Celebrate new graduates, inventions, spin-offs ..etc.
7. Consolidate gains and produce more change
 - Continuously set higher goals
8. Anchor new approaches in the culture
 - Academia stepping up to lead the world out of global recession



Strategy for Academic Institutions

Personal Perspective

- Scan the environment
- Establish sustained differentiation
- Remain relevant
- Lead change



Thank you!

Q&A

