Integrator Business Model I

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Topics

• Company Profile
• Business Strategy
• Reliability Implications
Company Profile
www.AmericanCapitalEnergy.com

• Founded 2005 by former RWE Schott Solar executives with over 60+ years of experience (partners Art Hennessey, Tom Hunton)

• A leading national independent large-scale solar photovoltaic (PV) system integrator and project developer

• Specialize in roof- and ground-mounted commercial projects of >500 kW and utility-scale PV installations

• Over 25 MW of projects completed; 35 MW+ under contract and/or construction in 2010
Business Strategy

• **Experience** and strong National Marketing and Sales presence

• **Solutions** – diversity in financial models and agnostic in PV technology

• **Flexibility** in new markets: Utility-scale PV

• **Customer Satisfaction** – enhanced by experienced and knowledgeable engineering - know customer hot buttons for risk aversion

  Enter: Reliability parameters and Data!
Business Strategy
– Know Funding Options in U.S.

• Purchase
  – Customer agrees to buy the system outright

• Power Purchase Agreement
  – ACE and finance company owns the system and sell power to the customer
    -Customer has no up front costs.

• Lease
  - Leasing company owns system and charges monthly fee to customer
    -Customer has the option to buy system at later date.
Reliability – Key Elements for Customers

To manage customer risk profile and expectations, need to demonstrate several key competencies:

• Knowledge of technology limitations
• Track record for technology
• Confidence in field data
Reliability
– Key Elements for Customers

Entry phone call to plant completion is all about managing the customers expectations

(I) Project scoping: ACE and proposed technology track records, manufacturers’ data, price vs technology trade-offs (predicted energy delivery)

(II) Site Development– design, interconnect (substations, transmission line, land prep, etc)

(III) Construction and commissioning

First concerns are for cost, financial returns
Key Elements for Customers:

(I) Project Scoping: Reliability Data

Cost implications arise from reliability of inputs to performance models (taken from PVWATTS)

- Module Nameplate rating
- Inverter/transformer efficiency
- Module mismatch
- Diodes and connections
- DC wiring
- AC wiring
- Soiling
- System availability

Bottom line: 15-20% power reduction from nameplate module power rating
Reliability Data (I)
– Managing Risk: Technology Limitations

• Up-to-date technology parameters
• Back up data/consistency for manufacturers’ claims
• Comparative studies, e.g.,
  – C-Si vs thin films
  – Inverter performance parameters
  – Roof mount vs ground mount
• Managing O&M expectations
Reliability Data (I)
– Managing Risk: Module Track Records

- Years in extreme (high heat, high humidity) outdoor conditions
- Accelerated testing of components
- Manufacturers’ data: e.g., cell temperature coefficients, degradation characteristics
Reliability Data (I)

– Managing Risk: Plant/Field Experience

• Monitoring/instrumentation

• Metrology – sensors and calibration: design vs real time

• Data collection – utility grade meter vs predictive performance models
  – PVWATTS, more version 2 requests

• Interactive grid models

Need to convince customer these are realistic!
Reliability Data (I) – Managing Risk: Track Record (PVWATTS)

Solar Generation vs. Energy Use and Average Utility Rate

- kWh
- Average Utility kWhr Rate
- Month
- PV Output
- Energy Use
- AVG kWhr Rate
Key Elements for Customers
(II) Site Development: Managing Customer Expectations, Step by Step to PV Plant Completion

Externalities to construction start-up: permitting examples, reliability issues *(R)*:
- 3-6 months, concurrent activities
1. Interconnect/electrical design and scoping (transmission line, substation access)*
2. Local impact statement (seismic, noise, environmental, glare)*
3. Wetlands
4. Cultural (archeological)
5. Soil erosion
6. Sediment control (grading, berms)
7. Environmental site assessment (brownfields-contaminated soil disposal)
8. Civil engineering (grading, ground mount prep, access, etc) *(R)*

* For commercial roof top arrays; *(R)* - Indicates reliability implications
Key Elements for Customers

(II) Site Development: Managing Customer Expectations, Step by Step to PV Plant Completion

Externalities to construction start-up (continued):

9. Conduit requirements, roof penetration issues *(R)*
10. Buried vs surface runs; metal vs plastic *(R)*
11. Codes and standards (PE stamps)*
12. Data acquisition systems (DAS) (data ports, functionalities) *(R)*
13. DC- and AC-side electrical system integration and interfaces
   (communications software and protocols, hardware stability) *(R)*

* For commercial roof top arrays; *(R)* - Indicates reliability implications
Key Elements for Customers

(III) Construction and commissioning: Managing Customer Expectations, Step by Step to PV Plant Completion

Construction elements (R):

1) ACE engineering expertise - design, inspections
2) Procurement knowledge – tight component specs
3) Subcontractors
4) Overall project knowledge and ACE expertise
5) O&M expectations – module, inverter warranties are first line of defense, no information on available on 10-20 year real costs for system repair and maintenance

Not documented: Benefits of labor force training (contractor responsibility, is solar experience required (?), NABCEP)
Company Profile/Projects
Atlantic City Convention Center

• 2.36 Megawatts
  – Over 13,000 modules, U.S. largest rooftop solar array
  – 6 mo. timeline from start to finish in December, 2008

• Power Purchase Agreement (PPA) with PETCO Energy, NJ
  – Project cost: $18 million
  – NJ State renewable energy credits helped make project financially viable