Challenges and Solutions
Large-Scale Solar Development
2011 and beyond

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SEG Snapshot

• Founded in 2009 by a 12 year solar industry veteran

• Vision: By developing cost-effective, predictable and highly durable solar solutions, Solvida will aid solar’s acceptance as a mainstream energy resource

• Mission: To help clients specify and build bankable solar solutions that:
  • meet or exceed capital budget targets
  • generate predictable energy harvest and cash flow
  • are innovatively designed for sustained long term performance
  • enable efficient deployment and installation processes
SEG Snapshot

Services

- Appropriate technology selection
- Financial modeling-proprietary LCOE Model
- EPC strategies for managing high volume installation and system operation
- Professional engineering for PV/CPV solar power plants
- Owner’s representative
- Independent third-party analysis of project components, engineering design and EPC techniques
Why execution matters

Cost Breakdown - Utility Scale PV Project

EXECUTION BOS MODULE
Why execution matters

• The focus on driving project costs closer to grid parity has shifted from component improvement to project execution.

• Project financiers require demonstrable competency from the project execution team as well as a guarantee on product performance before financing a project.

• Project sizes continue to expand. Efficient and effective project designs and execution plans can save firms millions of dollars and reduce excessive project cycle time.
Complexities in Project Design

Inter-dependent Project Design Strategy Decisions

- Technology
  - Thin Film
  - Mono Crystalline
  - Polycrystalline
  - CIGS
  - CPV

- Inverters/BOSS
  - Central Inverter
  - Distributed
  - Combiner Size
  - Wire Length

- Mounting
  - Fixed Tilt
  - 1-Axis Tracking
  - 2-Axis Tracking

- Site Conditions
  - Flat
  - Expansive Area
  - Varied Slope
  - Restricted

- Methods
  - Concrete Use
  - Steel Alternatives
  - Trenching

- Strategy
  - Low Install Cost
  - LCOE
  - Investor Return
SEG Professional Services Goals

Reduce Cycle Time
- Install Efficiency
- Complementary Components
- Maximize Daily Production Rates

Mitigate Project Risk
- Production Risk - Long-term
- Construction Risk - Short-term
- Asset Protection

Clarify Scope
- Enable accurate costing
- Contractually bind subs
- Enable high quality workmanship
Project Structures

• Smaller scale project structure (e.g. 1-3MW project)
  – EPC
  – Owner
  – Utility
Utility Scale Project Structure

- I.E.
- Financiers
- Developers
- Owners
- Utility

EPC
Identifying Risk

• Risk identification occurs when the project manager and EPC team study contract deliverables
• In order to increase the effectiveness of this process, EPC input should be solicited
  • EPC partners should be asked to include risk identification and value add during the bid process
  • EPC partners should be asked to participate in the project design and for construction design processes
  • EPC partners should collaborate on pre construction logistics and project scheduling
Identifying Risk

• Most commonly identified risks include
  – Performance of Product
    • Primary Concern of EPC “wrapping” project guarantee to Owner/Financier
  – Liquidated Damages- “exposure” to financial penalties for non-performance
  – Worksite Safety
  – Quality issues with project components
  – Logistics delays
  – Unfamiliarity with product and/or application
  – Size of labor force
  – Planning changes made “in the field”
Delineating Risk

- EPC will assign identified risks to its subcontractors and component providers
  - Require component and logistics companies to share risk in exposure to contractual Liquidated Damages
  - Require module companies to guarantee output of their panels
  - Require Inverter companies to guarantee availability of project inverters
  - Require letters of credit from US banks from component vendors so they can draw against the credit if needed.
Mitigating Risk

• Quality issues with project components
  – Solution: Offsite verification of primary component manufacturing and validation of vendors
  – Example: For 100MW projects, EPC will send inspectors to module factories, inverter factories and steel mills to confirm compliance with design and gauge manufacturing capabilities

• Quality issues with project components
  – Solution: Actionable and transparent QA Plan on-site required of EPC with Stakeholder Buy-in
  – Example: 100MW Project site will require ~1500 delivery trucks that need to go through QA while staging to deliver for installation
Regulatory Hurdles

GIP study process timeline

- $50,000 base deposit + $1,000/MW
- Weed out speculation
- Can utilities manage cluster process any better?
Environmental/ Land Use Hurdles

- Williamson Act Projects
  - Tax incentive to farmers for maintaining land in agricultural status
  - State not reimbursing counties
  - Counties incentivized to circumvent/repeal
  - Solar projects stuck in the middle and saddled with costs

- CEQA
  - Compliance adds months/years to project cycles
  - RPS and Climate Change Ordinances hope to expedite shift away from fossil fuels
  - Counties comply with CEQA, not developers or project integrators
    - Labored and lengthy processes
Beyond 2011

• Module ASP down 20% in Q2 2012

When one constraint goes away, equilibrium can radically shift
Beyond 2011

• Decreased project costs (and improved execution)
  – Expands regions for revenue positive projects
  – Move away from fragile ecosystems
  – Enables projects on highly disturbed land
  – Forecast pricing for 2013-2015 projects

• Continuous industry consolidation
  – Best in class small companies absorbed
  – Larger companies provide surety for project finance
  – Innovations are well-funded and lead to incremental improvements
Beyond 2011

• Solar projects demystified
  – Accrual of multi-year performance data
  – Environmental issues understood
  – Bringing solar to the masses instead of the masses to solar
    • Standardize equipment and processes
    • Streamline pre-construction compliance
    • Generate success stories