Planning, Developing & Connecting Solar Power Projects on Environmentally Impacted Lands

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Brightfields: Old Sites Using the Latest Technologies

It dries the washing using the very latest technology - a combination of solar and wind power
China and the US led the growth in annual installed solar photovoltaic capacity (MW)

Source: SolarPower Europe

New solar capacity rose 50% in 2016
Brownfields Land Supply for Renewable Energy?

- >400,000 Brownfield sites in the United States
- 16 million acres available for renewable energy
- Can generate 3,175,000 MW
- Hoover Dam generates about 2,000 MW
Impacted Sites Possibly Suitable for Utility-scale Renewable Power Generation on Tribal Lands.
Does it make sense to make my site a Brightfield?
Consider Solar on a Site while Remediation Occurs

What are my options?

Route 1: “Traditional” Through Investigation & Dev.
- Phase I: Assessment
- Phase II: Site Characterization
- Remediation
- Development

Assess solar feasibility as Route 1 (above) plays out

Key Criteria:
- Understanding of Route 1’s timeline
  - >15 years is a must
- 5+ acres (larger, better)
- Interconnect feasibility
- Regulatory concurrence
- Land lease (favorable terms)
Some Examples of Brownfields Potentially Suitable for Solar

Sites where:

- Cleanup costs exceed anticipated profits from “standard” redevelopment
- Long-term remediation; e.g., closed landfills
- Only a portion of site has planned redevelopment
- Timing of redevelopment >15 years
As Sub-Surface Remediation Occurs, Install Solar

Criteria: PV needs at least a 15+ year time window

Interim PV solar

Brownfield Site 5+ acres

Groundwater Monitoring Well

Vadose Zone

Saturated Zone

NAPL

Groundwater impacts necessitating cleanup

Soil gas impacts

SVE
Advantages of Brownfields PV Installations

- Generate income
- Investment; No capital needed from property owner
- Less restrictive cleanup requirements?
- Easier permitting requirements (Vs greenfield solar)
- Strong public support
- Energy independence
- Cash flow
- EPA Brownfields funding is available
Advantages of Brownfields PV Installations (2 of 3)

- Positive environmental impacts
  - Substantial GHG benefits compared to “greenfield” development, opportunities for Renewable Energy Credits
- Easier permitting requirements
- Local, sustainable power production
- Strong public support
- Energy independence, resilience through distributed power generation
Advantages of Brownfields PV Installations (3 of 3)

- Increased value of surrounding properties
- Potential cash flow
- EPA Brownfields funding is available to support challenging initial stages of project development
Utility Scale PV for Tribes – Step-by-Step

**STEP 1**
Perform a detailed project economic/FS analysis

**STEP 2**
Power Purchase Agreement (PPA) negotiations with power off-taker

**STEP 3**
Project financing

**STEP 4**
Complete agreements and environmental studies

**STEP 5**
Design / Build

**STEP 6**
Start up and long term operations
Key Criteria Renewable Power Installation Development

- Appropriate Geographic Location
- Land Control (Title or Long-Term Lease)
- Environmentally Impacted Land (Restricted Future Use)
- Nearby Interconnection Point
- Project Financing
  - External
  - Internal
- Technical & Economic Feasibility for a Brownfield Site to Host a Solar Renewable Power Installation
- Green Goals
- State-Mandated Renewable Portfolio Standards
- Adjacent Load (PPA Approach)
Case Study: PVN Has Planned, Permitted and Installed a 3MW Solar Power Facility at the Milliken Landfill, Ontario, CA...

Key Facts
- Racking of 9,500 X 335W solar panels
- Ballasted ground mount; No cap penetration
- 6 X 500 kW inverters
- 6 X 500 kVA step-up transformers
- 12.5kV AC switchgear for metering and interconnect to SCE
- 50-60 construction personnel at peak times
- Forecasted operation by December, 2016
- System owned and operated by PVNavigator
...Site Post-Closure Permitting was Primarily with the County of San Bernardino and the Water Board...
...with a Total of 9,500 PV Modules Being Racked (No Cap Penetration) for the 3.1MW Solar Power Installation...
...Which, is Operating Synergistically With the Landfill’s Cap and Landfill Gas Extraction Remedy.

PVN Contact for Milliken Project:

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Brea, CA 92821
PVN is also Active in the NE; PVN’s 3 MW Somerdale Road Landfill Solar Installation, Gloucester Township, NJ.

Installation conceived and fully permitted via NJDEP and PSEG; Sold to Marina Energy (South Jersey Industries) for design, construction and operation.
PVN’s Beacon Falls 0.3MW Installation at Town’s Waste Water Treatment Plant, Beacon Falls, CT.

Solar Facility is Operational as of April 2016. Owned and Operated by PVN.
TAKE-AWAY: No. 1. Excellent Guidance Exists (e.g. EPA & NREL). (e.g. “Best Practices for Siting PV Solar on Landfills”)
TAKE-AWAY: No. 2.
It’s a Multi-Step Process Necessitating Diligent Stewardship

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TAKE-AWAY: No. 3.
Many Untapped Sites Exist; Simply Require Quick Assessments

- Capitalize on existing interconnect
- Declining $/watt construction costs ($1/watt)
- State and EPA “encouragement”
- Project financing at an acceptable return
- Offtaker’s purchase price (Need at least 8 c/kWhr)
- Interconnect studies costs
- Site post-closure permitting efforts and costs

1,000’s of sites

(Only) Scores of Projects Realized in Western US
TAKE-AWAY: No. 4. 
Multiple Skillsets Required: Find the Right Partners

**SOLAR POWER EXPERTISE**
Electrical Engineering, Project Cost Projections

**PROJECT FINANCING & LEGAL**
Deal Structuring, Contracts, Risk Mitigation

**LANDFILLS/CAPS AND SITE MANAGEMENT EXPERTISE**
Environmental Engineering, Permitting, NEPA

**OPTIMAL TEAM**
Integrates all 3 capabilities
Sustainable Solutions for Environmental Liabilities

PV NAVIGATOR, LLC
www.PVNavigator.com
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- PV solar on landfill sites
- Site sourcing
- Interconnect & Offtake Analysis
- Permitting

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