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TurningPoint Energy Overview

• Denver-based clean-tech development, advisory and investment firm with a focus on:
  • Developing solar, storage, and related clean-tech projects for commercial and utility clients
  • Advising utilities, public sector entities, solar companies and emerging new clean-tech companies on go-to-market strategies, mergers and acquisitions, organizational systems, processes, tools and efficiencies
  • Investing in solar projects, emerging clean-tech companies and unique opportunities

• Combined $1.7 billion (540 MW+) in developing, financing, installing and servicing solar and energy efficiency projects over the last 12 years throughout North America

• http://turningpoint-energy.com/
# TurningPoint Energy Current Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Partner/Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st 1.98MW AC Community Solar in TX</td>
<td>Mid-South Synergy</td>
</tr>
<tr>
<td>1MW AC NM with No ITC</td>
<td>Springer Electric Cooperative, Inc.</td>
</tr>
<tr>
<td>25MW AC in NM</td>
<td>TRI-STATE Generation and Transmission Association, Inc.</td>
</tr>
<tr>
<td>DOE-backed MREA Solar for Universities</td>
<td>mrea midwest renewable energy association</td>
</tr>
<tr>
<td>500kW AC Elementary School in CO</td>
<td>D E Shaw &amp; Co</td>
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<tr>
<td>500kW AC Elementary School in CO</td>
<td>Xcel Energy</td>
</tr>
<tr>
<td>Developing 2017 – 2022 Pipeline of New Projects Across the US</td>
<td>TurningPoint Energy</td>
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</table>
The Solar Endowment:
A PV Investment Roadmap for US Universities and Foundations

Led by student teams, the project aims to showcase investment and programmatic potential of solar energy projects to university governance boards in an effort to:

• Generate investment through university foundations
• Advance favorable board policies that govern investments in solar assets
• Develop roadmaps for universities to deploy PV on their campus and make investments that advance foundation and sustainability goals

More information at [www.solarendowment.org](http://www.solarendowment.org)
Agenda

Description

PV Development Considerations for US Universities

Content outline

• Section 1 – Structuring Solar Development Teams
• Section 2 – Best Practices and Rules of Thumb for PV Development
• Section 3 – University Financial Options for PV Investment
• Section 4 – Best Practices for PV Procurement
SECTION 1

STRUCTURING SOLAR DEVELOPMENT TEAMS
What is the Solar Development Process?

Solar Project Development Steps

- Origination
- Development
- Financing
- Engineering, Procurement & Construction (EPC)
- Operations & Maintenance (O&M)
Our Focus to Start: Origination, Development & Financing

Solar Project Development Steps

- Origination
- Development
- Financing
- Engineering, Procurement & Construction (EPC)
- Operations & Maintenance (O&M)

What We Will Focus on For Our Efforts
Origination

Project Origination Steps

- Utility Solar Project & Building Energy Analysis
- Site Selection
- Economics Analysis
- Feasibility Level Layout / Design
- Permitting & Interconnection Qualification
Development

Project Development Steps

- Land Development Studies (geotech, environmental, survey, etc.)
- Local, State, and Federal Permitting
- Interconnection application, study process and agreements
- Stakeholder education and buy-in to the Project/s
- Confirmation of Financing Sources / Path to Success
Financing

Project Finance Steps

- Validation of Origination Assumptions for Financial Modeling
- Financial Structuring Analysis / Validation
- Procuring Solar Financing Industry Utilizing All Development Stage Documentation
- Financing Company Negotiations
Skill Sets Required to Be a True Solar Development Company – Project Leadership

**Project Management / Leadership** – Graduate student. Must have the ability to understand and apply all below steps in general (not as expert but as manager). We typically hire MBAs to join our teams as analysts into our companies that support the entire origination process. Very typical for this person to be in charge or origination for a region and typical to go into company leadership / management down the line.
Skill Sets Required to Be a True Solar Development Company – Engineering & Construction

**Engineering** – they must appreciate the abstract and also be good with the details of solar engineering.

**Site Layout / Feasibility Design** – Typically an engineer with CAD skills / capabilities. Could see architects / design specialists in this role.

**Interconnection** – engineering required but can be lead by permitting / land development, legal or others that can simply lead the process forward. Engineering will learn the most here.

**Permitting / Land Development** – commercial real estate professional skill set if University has such expertise in its education programs. If not, engineering, construction, etc. are typical skill sets for this space.
Skill Sets Required to Be a True Solar Development Company – Business Finance / Analytics

**Energy analysis** – analyzing utility bills, rate tariffs, existing solar programs, etc. Business, finance, legal, math, spreadsheet gurus are good in this area.

**Business Finance** – financial modeling, spreadsheet analysis, etc. Similar to energy analysis skill set.
Skill Sets Required to Be a True Solar Development Company – Legal

*Legal* – Analyzing existing solar programs available, upcoming policy changes, contract negotiations / navigation related to finance, permitting, etc. Not a must have for this team but a nice to have for sure. May make sense for this type of project. University-dependent.
SECTION 2

BEST PRACTICES AND RULES OF THUMB FOR PV DEVELOPMENT
Development Best Practices
– Start with the End in Mind
Development Best Practices
– Start with the End in Mind
Development Best Practices
– Start with the End in Mind

1. Know your economic profile before you start
2. Maximize / standardize design efficiencies
3. Selecting the right site/s
4. Development / permitting
5. Interconnection
6. Standard template / form for site visits
7. Other areas where projects survive….or die
Know your economic profile before you start – Back into your projects (instead of force fitting them)
Know your economic profile before you start – Back into your projects (instead of force fitting them)

Understand what is allowed for solar generation per state and local law and utility commission rule/s
Collect rate tariff and 24 months of bills for all buildings
  • Some buildings may have multiple meters
Analyze rate tariff/s and verify the part / portion of the tariff that solar can support
Validate any federal, state or local incentives or additional revenue sources available (pay more for covered parking?)
Model pricing that is acceptable for the host client (building owner / energy user)
  • Savings requirement?
  • Break even requirement?
  • How much more will they pay?
Financial structures / project investors that support required pricing in concept
Determine what project designs will work with these economics
  • Roof, ground and/or canopies?
Maximize / standardize design efficiencies
Maximize / standardize design efficiencies

Select “standard” inverter and module for ground mount, roof top and canopy

Select “standard” sizes for projects that maximize design efficiencies
  • ALWAYS size project to inverter spec
  • NEVER create odd configurations
  • RARELY will breaking up the array on a roof or ground make economic sense

Select “standard” PV Syst data set from the start and agree on system losses up front (what will the investor’s independent engineer accept?)

Scale economies and efficiencies are critical to good economics for a solar project most of the time
  • < 100 kW = lose all scale efficiencies
  • > 1 MW = start to maximize scale efficiencies
  • Portfolios provide partial scale (financing and procurement efficiencies gained)
Selecting the right site/s
Selecting the right site/s

Know how much space you need first

• 10 – 15K square feet required per 100 kW roof top
• 4 – 5 acres required per 1 MW of ground mount space
• 40-50 parking spaces per 100 kW parking canopies

Qualify / disqualify buildings second

• Roof mounts – 5 year old roof or less OR ready to re-roof now
• Ground mounts – adjacent to buildings / meters AND South facing AND relatively flat
• Parking / shade canopies – South facing

NIMB issues, visual desires or related marketing value (or lack there-of)

Disqualify all sites that do not provide efficient scale immediately

Other best practices

• Photograph sites
• Measure available space as exactly as possible
• Keep thinking about design configuration
• Talk with facility manager about site and ask about their building standards / requirements upfront
• Discuss long term plans for sites with client real estate / planning team upfront
Development / Permitting

= 

Money
Development / Permitting

Confirm which federal, state and local jurisdictions have oversight of your project locations

Confirm the permitting process for your project

- Roof mounts typically easiest and straight forward
- Canopy projects require some flood plain and related analysis efforts
- Ground mounts can be complex and require special use permits and heavy analysis on land development studies and property tax requirements that can take months and cost $100K+

Development requirements

- Typically 5 – 10 different studies for ground-mounted projects that will take 60 – 90 days
- Roof mounts require little more than qualifying the roof integrity, structure, design capability and roof warranty requirements
Interconnection
Interconnection

Engage your utility early and qualify the interconnection process and all requirements up front

Obtain interconnection agreements and forms up front

Take photos of the current meter, locate on your site map and think about how the wire would get from your solar project inverter to that meter

Interconnection (I/C) requirements can kill a project quickly (new transformer required, upgraded service/s)

Combining multiple meters / accounts on a site can create scale efficiencies and save money in some instances
Standard template / form for site visits – Create Institutional Memory for Your Project
Standard template / form for site visits – Create Institutional Memory for Your Project

Create an Excel spreadsheet form upfront to include all the above items and fill in for each building so you can:

- Gain alignment on project requirements with your host client and project team up front
- Keep a log of all sites qualified / disqualified and why
- Compare buildings / projects quickly and efficiently
- Capture all the required information that project developers, investors, EPC firms and host clients will want to review
- Share with the entire team efficiently and quickly
Other Ways Projects Survive...Or Die

Survival

Death
Other Ways Projects Survive...Or Die

- Contracts, lawyers and what is allowed per university charter / bylaws / local law / state law vs. what solar industry can accept to finance contracts
- Expectations and politics not aligned (or change mid-process) from faculty to staff to administration to executive team
- Ever changing policy and program by the utility, utility commission, state government
- Not selecting the right company that can actually deliver through procurement
- Unknown state and local tax requirements for a project
- Ever-changing price of electricity and forecasts
SECTION 3

UNIVERSITY FINANCIAL OPTIONS FOR PV INVESTMENT
Solar Financial Structures
Solar Project Structure Options

- **Buy Solar REC**s on the Open Market Only
- Lease Land / Roof Only
- **Buy Solar Electricity Only**
- Energy Generation Asset for Operations
- Solar as an Investment for University Endowment Fund
Solar Project Structure Options – Third vs. First Party

Easiest (& Lowest Value) to Most Complex (& Highest Value)

Third party owned-solar project financing structures

- Buy Solar RECs on the Open Market Only
- Lease Land / Roof Only
- Buy Solar Electricity Only

First party owned-solar project financing structures

- Energy Generation Asset for Operations
- Solar as an Investment for University Endowment Fund

First big decision is ownership decision and what level of complexity and risk your culture will allow for.
Solar Project Structure Options – Third vs. First Party

Easiest (& Lowest Value) to Most Complex (& Highest Value)

Third party owned-solar project financing structures

- Off-campus project
- Commodity purchase

First party owned-solar project financing structures

- Buy Solar RECs on the Open Market Only
- Lease Land / Roof Only
- Buy Solar Electricity Only
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Solar Project Structure Options – Third vs. First Party

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On-campus project
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- On-campus project
- Off-campus project – community solar
- Off-campus project – deregulated market
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## Complexity of Financing Structures

### Complexity, Time Commitment & Cost to Structure

<table>
<thead>
<tr>
<th>Simple Transactions</th>
<th>Buy Solar Electricity Only</th>
<th>Buy Solar Asset for Operations and/or Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 15 – 25 year property lease (roof or ground)</td>
<td>• Third Party PPA</td>
<td>• Pre-paid PPA</td>
</tr>
<tr>
<td>• Purchase SRECS (solar renewable energy credits)</td>
<td>• On-campus</td>
<td>• PACE</td>
</tr>
<tr>
<td></td>
<td>• Off-campus</td>
<td>• Performance lease</td>
</tr>
<tr>
<td></td>
<td>• Pre-paid PPA</td>
<td>• Capital lease</td>
</tr>
<tr>
<td></td>
<td>• PACE hybrid PPA</td>
<td>• Loan</td>
</tr>
</tbody>
</table>

(1-3 months to negotiate)

(3-6 months to negotiate)

(6-24 months to negotiate)
Solar Financing Realities and Success Factors

- Financial models are proprietary in the solar industry... no one shares.
- Validate your internal return / price targets and requirements up front.
- Get a credible third party to accurately model your project early. It’s worth the consulting fee as the rest of the process will demonstrate.
- Because of the federal ITC, most projects are third party owned (90%+) and remember that means rates of return in the 7-9% pre-tax, 12 – 15%+ post-tax.
- Be ready to share three years audited financials and your credit rating with the solar market.
- Solar project investors are different for different project shapes and sizes.
One More Solar Financing Reality

Project Finance Process

Developers
- Respond to RFPs
- Develop projects
- Sometimes build
- A few remaining vertically integrated groups do 2 of 3 steps

Aggregators

Financing Arrangers
- Vertically integrated shops
- Hedge funds
- Pure finance shops

Actual investors
- Pension funds
- Banks
- Large IPPs
- Yield Cos...for now
SECTION 4

BEST PRACTICES FOR PV PROCUREMENT
The Rules of Good Procurement

Know thy self.

Be upfront and brutally honest with your stakeholders and solar industry.

If you do this, you will get what you want, or at least be efficient with your time and find out what you can have.
Best Practices for PV Procurement

• The further your project is developed, the less change you will see from beginning procurement to signed contract

• Know your objective and outcomes pre-RFI, pre-RFQ or pre-RFP upfront

• Assemble a procurement review team that matches your development team

• Notify a broad enough spectrum of the solar industry to get best results (but not so broad you get chaos)
The further your project is developed, the less change you will see from beginning procurement to signed contract

• This is where your work from self development pays off (from Section 2)

• The less developed your project, the more assumptions and the more risk for price increases from procurement beginning to signed contract end

• Developers classically start pricing low with pile of assumptions and move price up as process goes forward and assumptions are validated
Know your objective and outcomes pre-RFO, pre-RFQ or pre-RFP upfront

- What are you trying to accomplish? Know it and what procurement product makes sense as a starting point
  - RFI = request for information...dipping your toe in the water.
  - RFQ = determining the right solar developers to work with.
  - RFP = getting the price, terms, conditions, design and related deal parameters right. Very serious about your project.
- What is your return / price maximum, minimum and target
- What other strategic goals, scope and legal requirements do you have? Tell the industry up front to get what you want
- Your procurement process will determine your reputation and perception quickly with the solar industry
Assemble a procurement review team that matches your development team

- Include your internal development team in your procurement process – at least as advisors for input
  - They should not be the final decision makers but do provide data and recommendations to the decision making team
  - Great learning process if students involved (but you have to respect confidentiality and procurement process limitations here)
- Operations, finance and legal team members all have to buy-off eventually...including them up front can cut to the chase
- Solar expertise – internal or external – will ensure you get the best possible deal
Notify a broad enough spectrum of the solar industry to get best results (but not so broad you get chaos)

- Do you want 100 proposals from all over the planet that won’t match what you want or 10 really good proposals from the right companies?
- Target those companies that meet your qualifications criteria to transact with only
- Use solar media channels to spread the word...or regional or local channels...depending on your location and needs
- Solar industry expert on your team can help to achieve this
Thank You

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