

DOE OFFICE OF INDIAN ENERGY

Renewable Energy Development

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U.S. DEPARTMENT OF
ENERGY

Office of
Indian Energy

Implementation Activities

- Pre-construction
 - Financial closing (if applicable)
 - Project kickoff
 - Design and construction documents, plans/schedules, submittals
- Contract execution
 - Contract oversight/quality control
 - Change control
- Interconnection
 - Application review and approval process
 - Final building inspection
 - Paperwork submittal to utility
- Project Construction
 - Contract oversight/quality control
 - Change control
- Commissioning
 - Testing and verification
 - Interconnection verification (utility)
 - Utility permission to operate
- O&M



Project Considerations



Economic feasibility and project sizing



Site electrical connection and system impact



NEPA, NHPA, FAA, other compliance



Roof and soil condition



Construction considerations and requirements



PPA legality, other policy issues and required approval



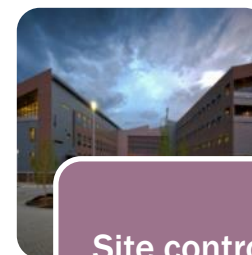
Compatibility with mission and future site plans, agency policies



Competitive electricity supply & distribution system ownership



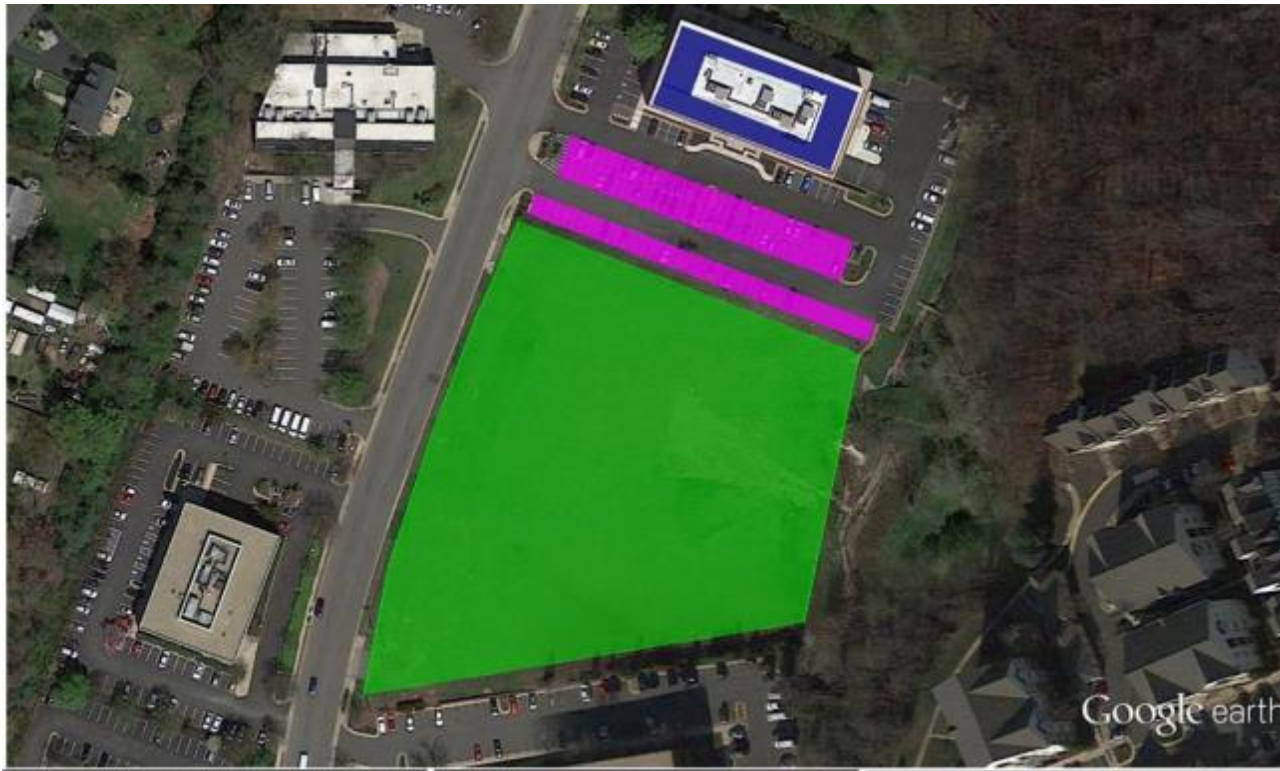
Utility coordination



Site control (site access agreement)

Google Earth is a Useful Tool

- Determine areas available
- Determine distance to nearest substation
- Google Earth can also be used during the procurement Phase



 Potential Roof PV Area 6,070 ft ²	 Potential Carport PV Area 16,367 ft ²	 Potential Ground PV Area 124,876 ft ²
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Flat Plate PV Systems

Dangling Rope Marina, Glen Canyon National Recreation Area, UT



Arizona Public Service, Prescott, AZ

Alamosa PV System, Alamosa, CO

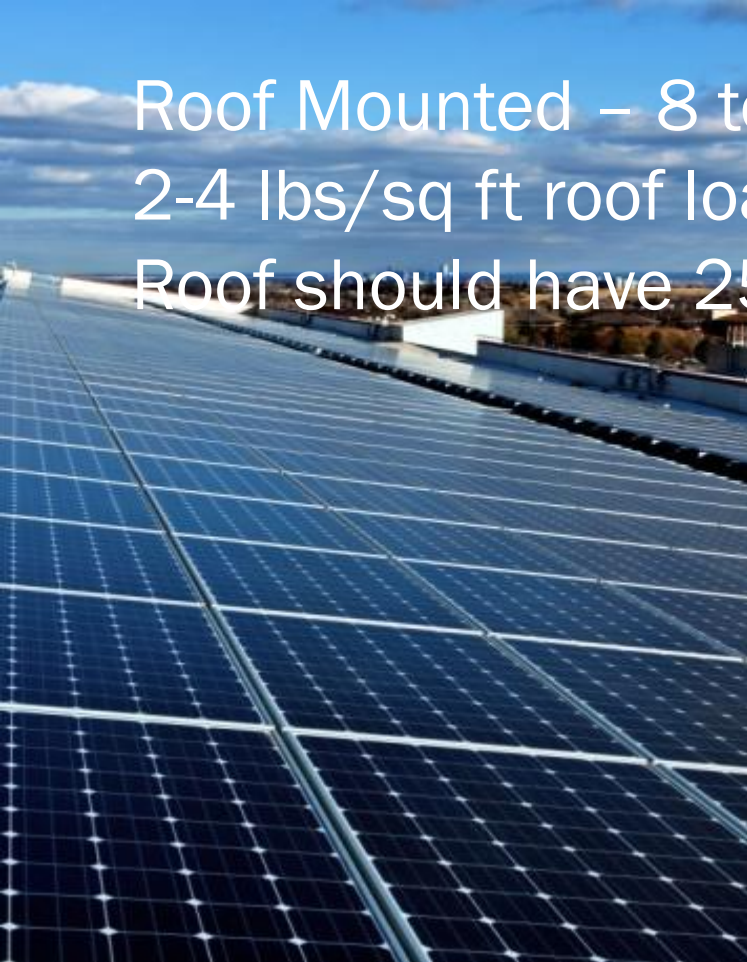


5 – 10 acres per MW for PV systems

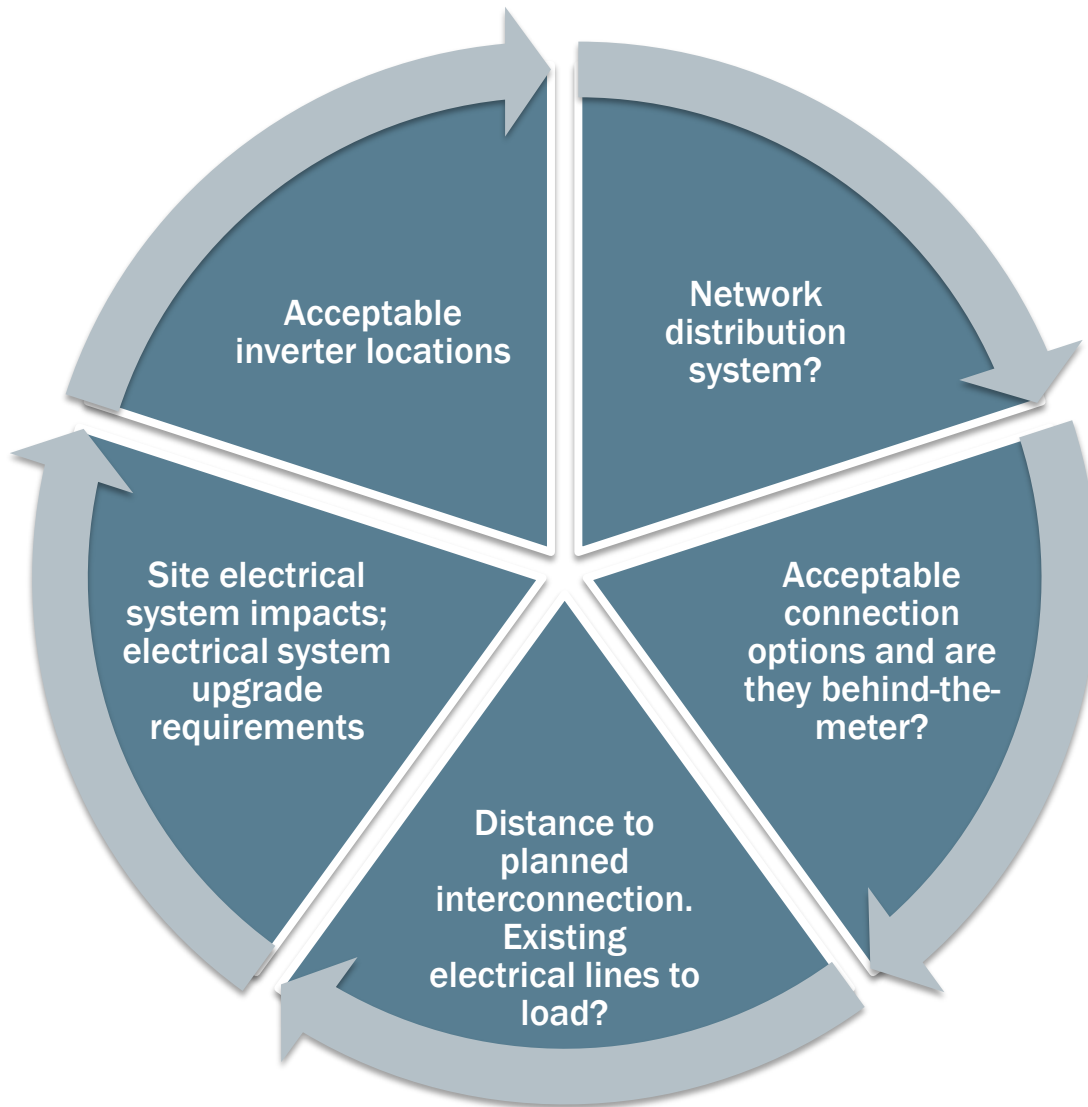
10% slope or less. Land can be left as is or graded

Provide Geotech reports if available

Roof Mounted – 8 to 18 W/ Sq. Ft. Available Area
2-4 lbs/sq ft roof load
Roof should have 25 year remaining life.



Electrical Considerations

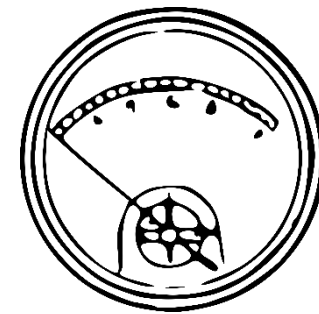


Permitting and Regulatory Key Considerations

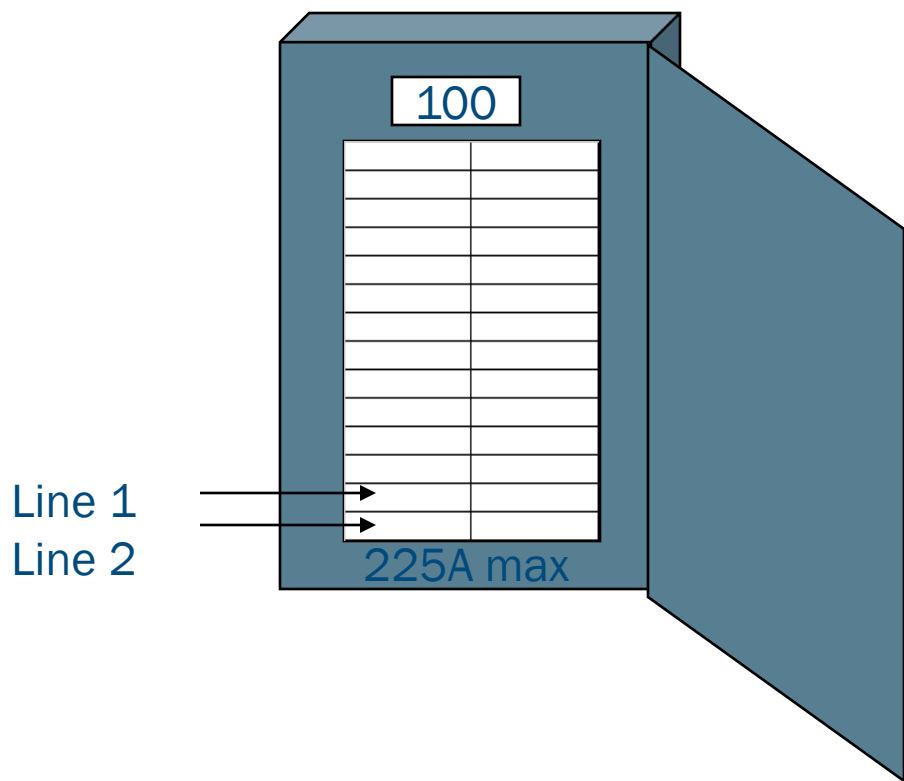
Action	Applicability	Timeline	Contacts
Interconnection	If on grid (with a utility)	Communicate with utility early; this should be one of the first topics that is discussed and finalized before construction	Local utility
Net metering	If available in state (check) (dsireusa.org)	Communicate with utility before construction	Local utility
Local tribal permitting	<ul style="list-style-type: none"> Internal tribal process approvals For off-reservation projects, state permits may apply 	Determine permitting requirements early	Tribal Historic Preservation Office (THPO) and local tribal government
Environmental	Impacts to: <ul style="list-style-type: none"> Wetlands/waterways Wildlife, habitat, flora Cultural resources 	<ul style="list-style-type: none"> May not be necessary Determine applicability early 	Applicable federal agency

Utility Coordination Topics

- Coordinate with the serving utility early in the process
- Interconnection requirements, process and costs
 - Interconnection application and study requirements
 - Time required for study completion
 - Costs (such as application fee, study fees, and possible equipment upgrade costs)
 - Current interconnection study queue
- Interconnection agreement
- Incentives and applicable policies
- Net metering policy details
 - Allowable renewable project size
 - How utility measures project capacity
 - Treatment of net excess generation, project RECs
- Impact on utility costs (applicable tariff, standby charges)



Utility Interconnection- Where to land the power?



- Backfeed Breaker in Building Panel (Sum of Main Breaker and PV breaker not to exceed 120% of panel rating for commercial building, 100% for residential)
- Too big?- Survey Loads and reduce main breaker rating
- Too big?- Upgrade Panel
- Too big?- Line-side-tap
- Too big?- Upgrade Electrical Service

Permitting and Regulatory Key Considerations Cont.

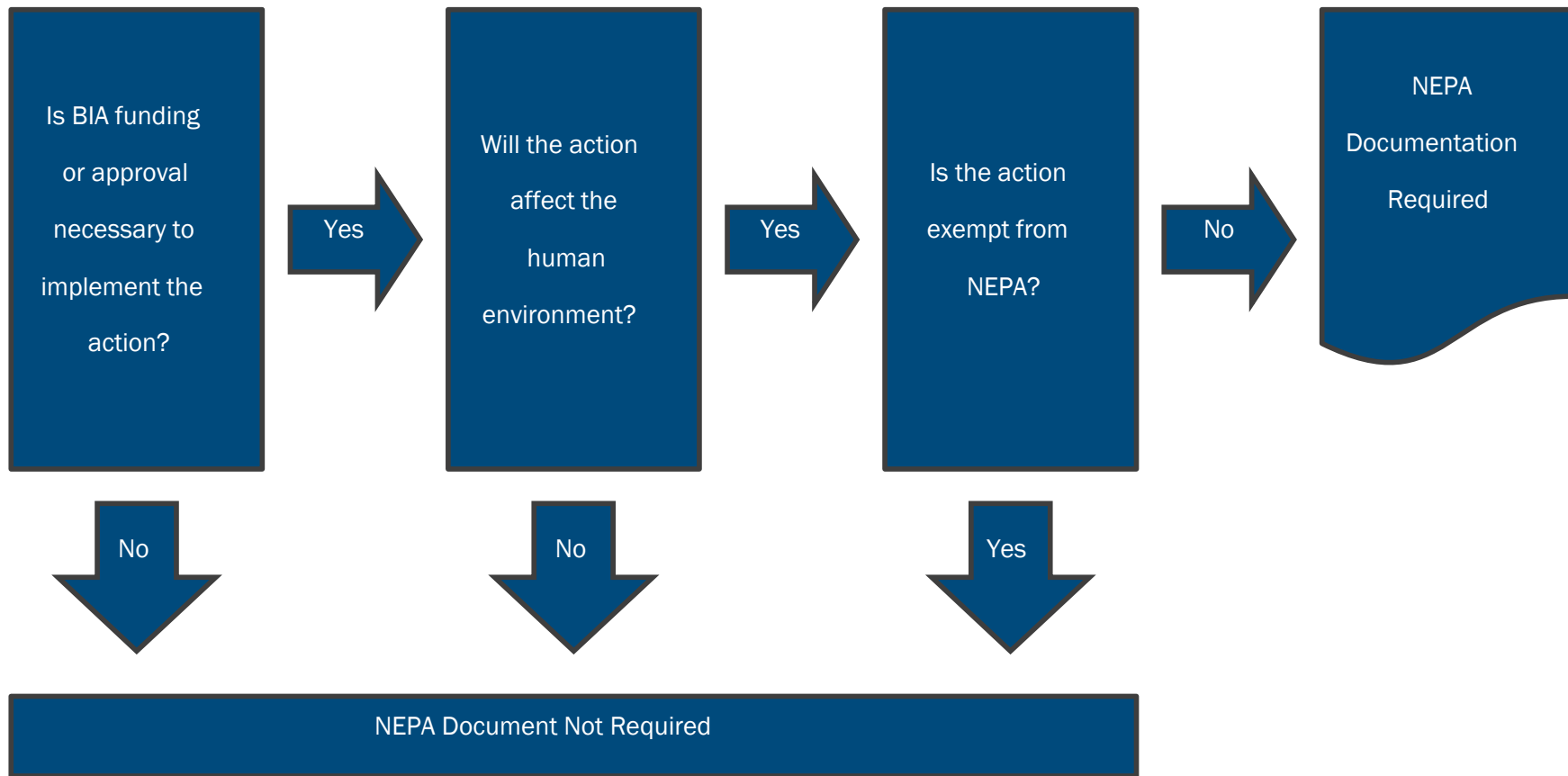
Outside Tribal Boundaries

- In general, if located on private, nontribal land, or state properties, local and state land-use policies do apply.
- If located on tribal-owned fee land outside of reservation boundaries, then project is subject to state and local land-use, permitting jurisdiction.

Inside Tribal Boundaries

- In general, state and local land-use laws do not apply.
- In addition, the extent to which federal rules and regulations apply depends on the type of project, its location, and size.
- Tribal law, regulations, and policies will apply.
- Tribes may “self-regulate” under federal law (e.g., Tribal Energy Resource Agreements, Hearth Act).

NEPA Decision Making Process



Adapted from <http://www.bia.gov/cs/groups/xraca/documents/text/idc009157.pdf>

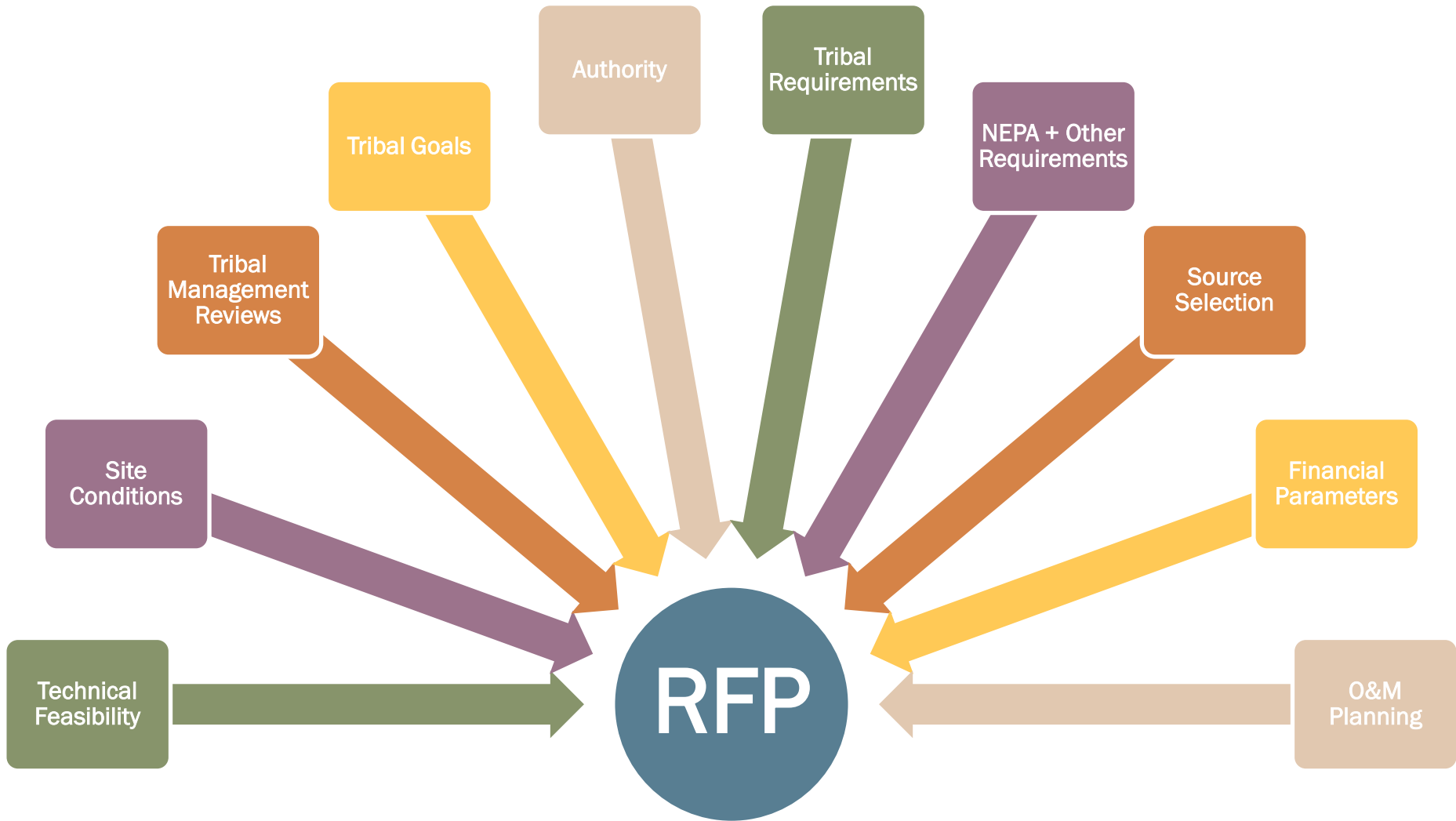
Procurement Process for Facility- and Community-Scale Projects



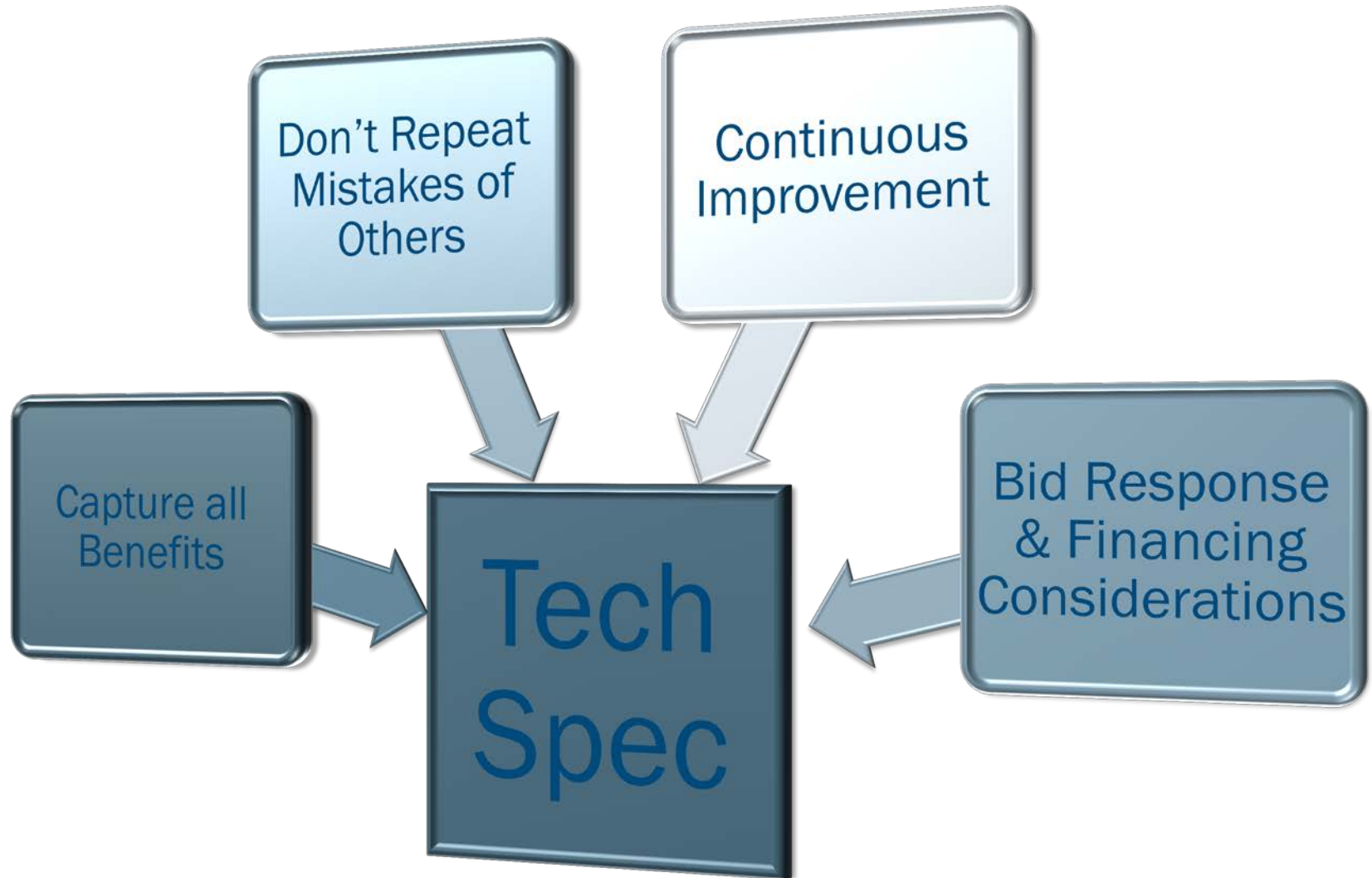
Potential Project Partners to Procure

- Consider GSA as a resource for procurement: <http://www.gsa.gov/portal/category/20998>
- Project developer
- Engineering, procurement, and construction (EPC) contractor
- Environmental permits contractor
 - May apply to some community projects, but not to others

Bringing It All Together: RFP and Other Solicitation Documents

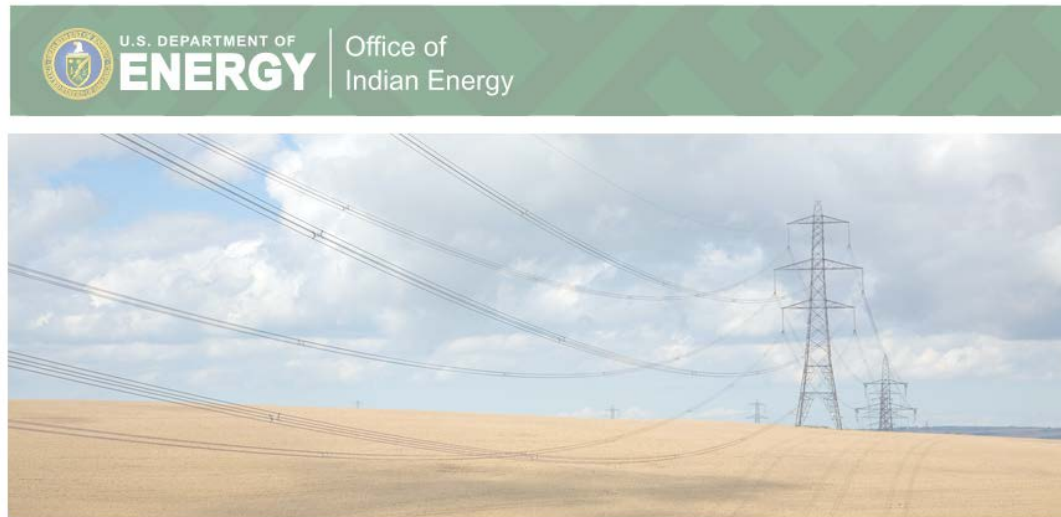


Motivations Behind Tech Spec Document



PV RFP Template - roof-mounted, ground-mounted and carport utility-interactive

- <https://energy.gov/indianenergy/downloads/doe-office-indian-energy-solar-rfp-template-draft>

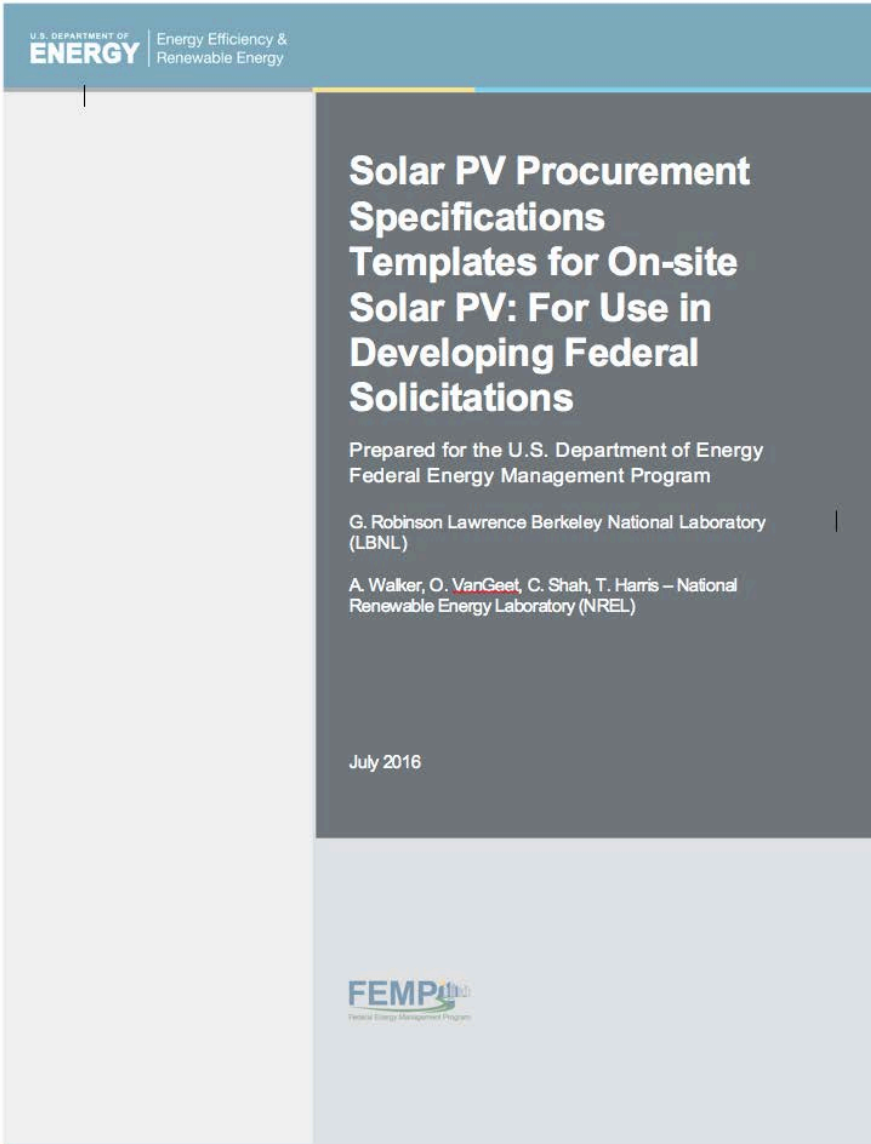


Solar RFP Template

K. Kiatreungwattana, B. Stoltenberg
National Renewable Energy Laboratory

August 2015

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Operations & Maintenance



Purpose: Conduct or ensure ongoing operations and maintenance (O&M), including repair and replacement (R&R)*

Task:

- O&M agreements
- Warranties
- Monitoring system
- System performance
- Production guarantees
- Buyout Options

Outputs:

- Ensure responsible party carries out O&M/R&R*
- Measuring and tracking success
- Correlate with business plan and strategic energy plan
- Contract compliance
- Reporting of generation
- Met or exceeded energy and financial performance

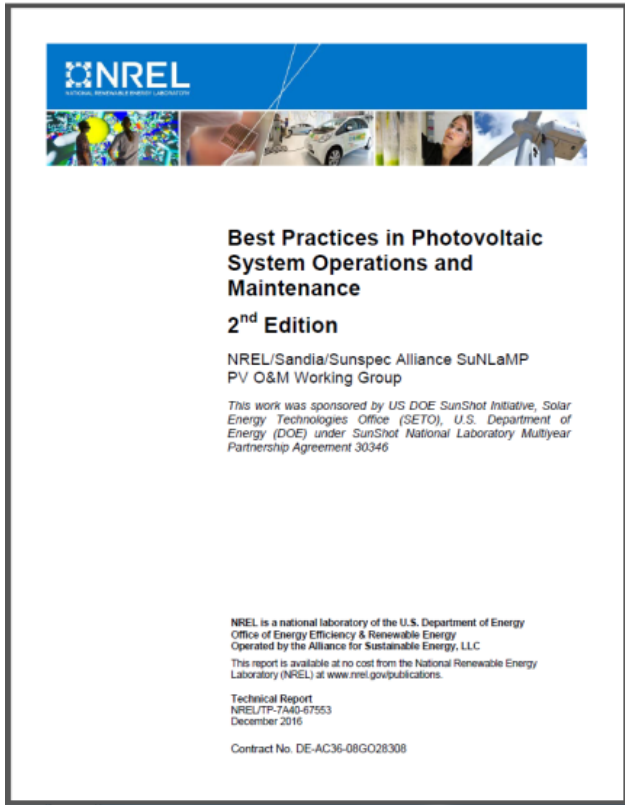
*Especially if owner – role of highest O&M risk



Photo by Warren Getz, NREL 00180

Best Practices in Photovoltaic System Operations and Maintenance: 2nd Edition

<http://www.nrel.gov/docs/fy17osti/67553.pdf>



- 7 Useful Checklists
- Key Chapters:
 - *O&M and the Financing of PV Assets*
 - *Scope and Prerequisites for a Successful O&M Program*
 - *Dependencies on PV System Type, Site, and Environmental Condition*
 - *System Performance and O&M Plans*
 - *O&M Provider Qualifications and Responsibilities*
 - *System Monitoring*
 - *O&M Supporting Systems and Implementation Strategies*
 - *Estimating PV O&M Costs*
- *Appendices with detailed information and resources.*

Basis of “Operations and Maintenance for Optimal Photovoltaic System Performance,” FEMP eTraining core course.

<https://www.energy.gov/eere/femp/articles/femp-offers-new-etaining-course-om-optimal-pv-performance>

Web Resources


- **FEMP Renewable Energy Procurement:** <http://energy.gov/eere/femp/renewable-energy-procurement-federal-agencies>
- **FEMP PPA:** <http://energy.gov/eere/femp/federal-site-renewable-power-purchase-agreements>
- **FEMP ESPC ESA Toolkit:** <https://energy.gov/eere/femp/energy-savings-performance-contract-energy-sales-agreements>
- **FEMP Renewable Energy Projects and Technologies:** <http://www.energy.gov/eere/femp/federal-renewable-energy-projects-and-technologies>
- **FEMP Training:** <https://www4.eere.energy.gov/femp/training/>
- **FEMP Assistance Portal:** <https://www4.eere.energy.gov/femp/assistance/>
- **RE Cost & Performance Matrix:** http://www.nrel.gov/analysis/tech_cost_dg.html
- **GIS Tools and Data:** <http://maps.nrel.gov/femp>
- **REopt:** <https://reopt.nrel.gov/>
- **On-Site PV Tech Spec:** <https://energy.gov/eere/femp/downloads/procurement-specifications-templates-site-solar-photovoltaic-use-developing>



FEMP Training: Renewable Energy

Please visit the FEMP Training Website: <https://www4.eere.energy.gov/femp/training/>

Trainings are certified for Continuing Education Credits by: 

- Combined Heat and Power: An Integrated Approach to Energy Resources 
- Distributed-Scale Renewable Energy Projects: From Planning to Project Closeout 
- Federal On-Site Renewable Power Purchase Agreements 
- FEMP Large-Scale Renewable Energy Guide
- Introduction to Alternative Financing for Energy Efficiency and Renewable Technologies
- O&M Best Practices for Small-Scale PV Systems 
- Procuring Solar Energy for Federal Facilities: Practical Guidance
- Renewable Energy (First Thursday Seminar) 
- Renewable Energy Technology Applications: Biomass Technologies
- Renewable Energy Technology Applications: Geothermal Energy Technologies 
- Renewable Energy Technology Applications: Hydropower and Ocean Technologies 
- Renewable Energy Technology Applications: Integration of Renewable Energy Systems 
- Renewable Energy Technology Applications: Photovoltaics and Daylighting Technology 
- Renewable Energy Technology Applications: Solar Thermal and Concentrating Solar Power Technology 
- Renewable Energy Technology Applications: Wind Energy Technology 
- Renewable Power Purchases and Renewable Energy Certificates
- Selecting, Implementing, and Funding Photovoltaic Systems in Federal Facilities 
- Strategic Planning for Renewable Energy Deployment: REopt (First Thursday Update)
- **Utility Green Tariff Programs (First Thursday Update)**
- **Operations and Maintenance for Optimal Photovoltaic System Performance** 



QUESTIONS?

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1,156 KW

50 KW

449 KW

408 KW

94 KW

524 KW

720 KW

NREL PV Systems -
South Table Mesa
Campus