U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

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ESPC ESA Webinar Series: Photovoltaic (PV) Project Considerations

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April 23, 2019

FEMP Federal Energy Management Program

Webinar Logistics

- This webinar is being recorded. The Q&A portion will not be made publically available.
- Your phone will be muted throughout the webinar.
- Enter any questions in the Chat or Question Box throughout the webinar.
- Instructions to take the quiz will be provided at the end of webinar.
- Slides will be sent out afterwards to those who attend the entire webinar

Webinar Overview

Agenda	
I.	Introduction and Webinar #1 Recap
II.	Considerations for a PV Project in an EPSC ESA
V.	Resources and Q&A

Learning Objectives

- Understand the benefits of PV projects.
- Learn how to determine if your PV project is cost-effective.
- Understand the key technical and other PV project development considerations to ensure a successful project.
- Understand considerations specific to privately owned PV projects.

Webinar Team

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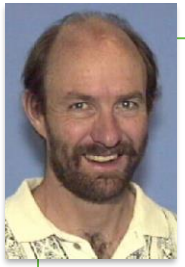

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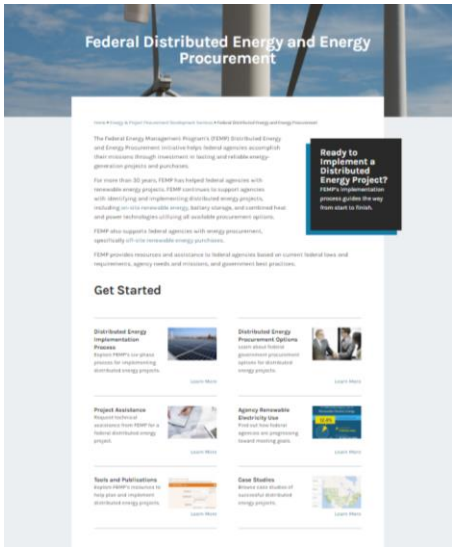
FEMP's Distributed Energy Program

FEMP's Distributed Energy (DE) Program facilitates the implementation of cost-effective on-site renewable energy, energy storage, and combined heat and power technologies for federal agencies.



[FEMP's Distributed Energy Program Website]

[FEMP's Distributed Energy Program Factsheet]

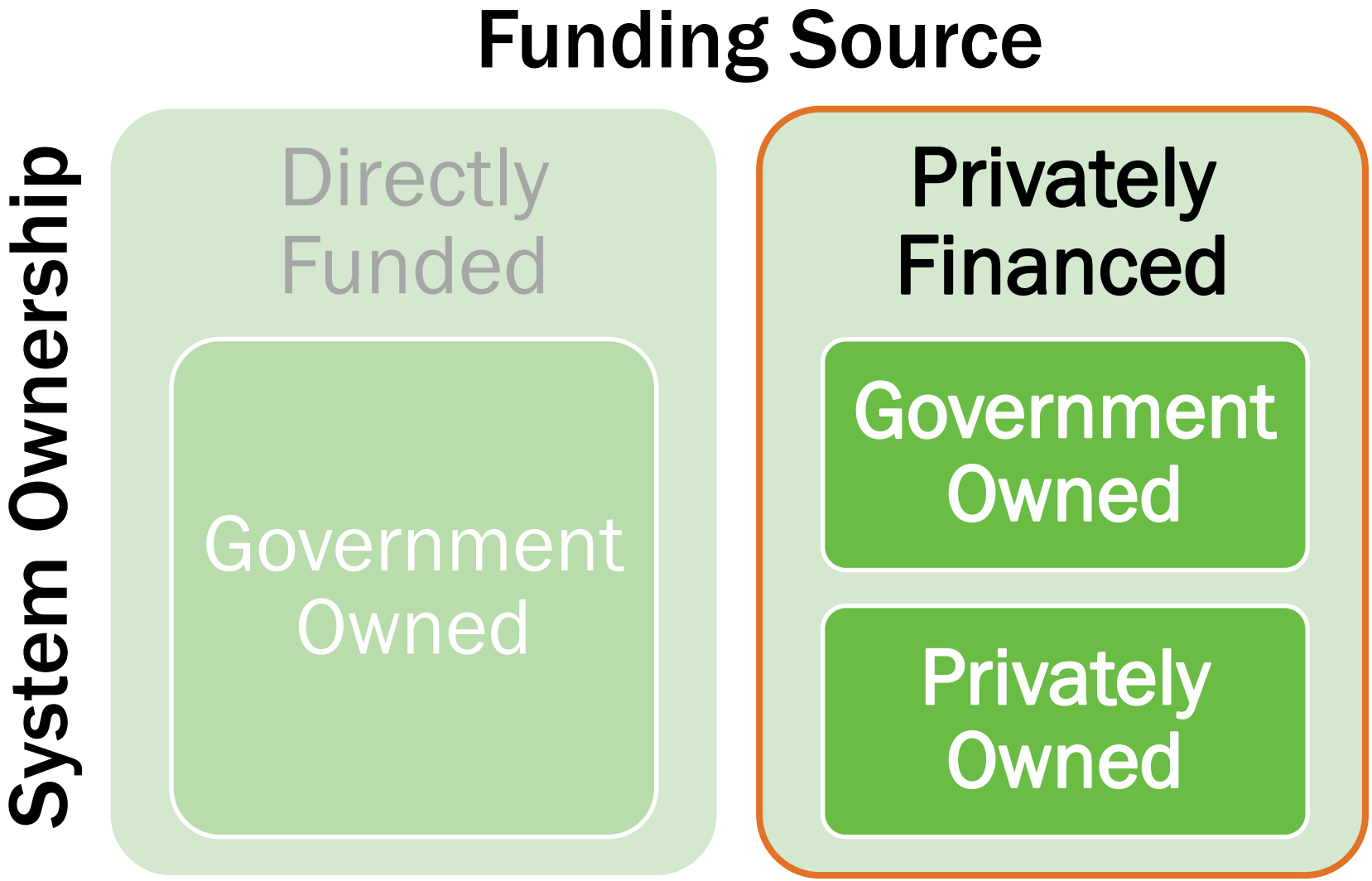
[FEMP's Distributed Energy Implementation Process Website]

ESPC ESA Webinar Series

Webinar #1	• ESPC ESA Overview and Requirements (March 12, 2019)
Webinar #2	• PV Project Considerations (April 23, 2019)
Webinar #3	• ESPC ESA Site-Specific/Stand-Alone (July 23, 2019)
Webinar #4	• ESPC ENABLE with an ESA (October 2019)

Webinar #1 Recap

Considerations for a Distributed Energy Project

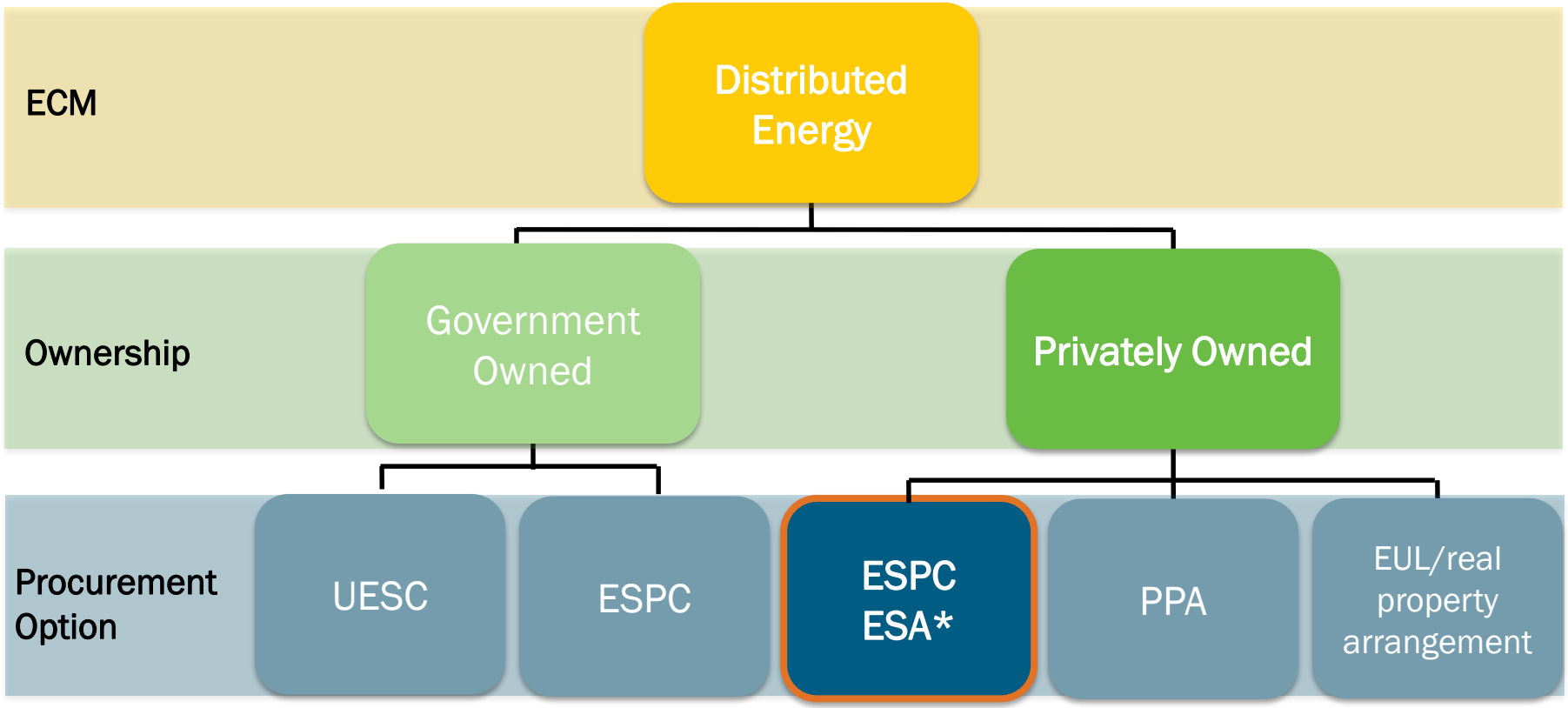


Considerations for a Privately Financed DE Project

Questions to Consider	Privately Financed	
	Government Owned	Privately Owned
Can the project take advantage of tax incentives?	No	Yes
Are there financing costs associated with the project?	Yes	Yes
Is the government responsible for operation & maintenance (O&M)?	Yes[1]	No
Can the associated renewable energy certificates (RECs) be sold to improve the project economics?	Depends on the agency	Yes

[1] Unless specified otherwise

Considerations for a Privately Owned DE Project



Legend & Abbreviations

ECM	Energy Conservation Measure	ESPC ESA	ESPC Energy Sales Agreement
UESC	Utility Energy Service Contract	PPA	Power Purchase Agreement
ESPC	Energy Savings Performance Contract	EUL	Enhanced Use Lease

*System is privately owned initially, government must retain title by end of the contract (OMB Memo requirement)

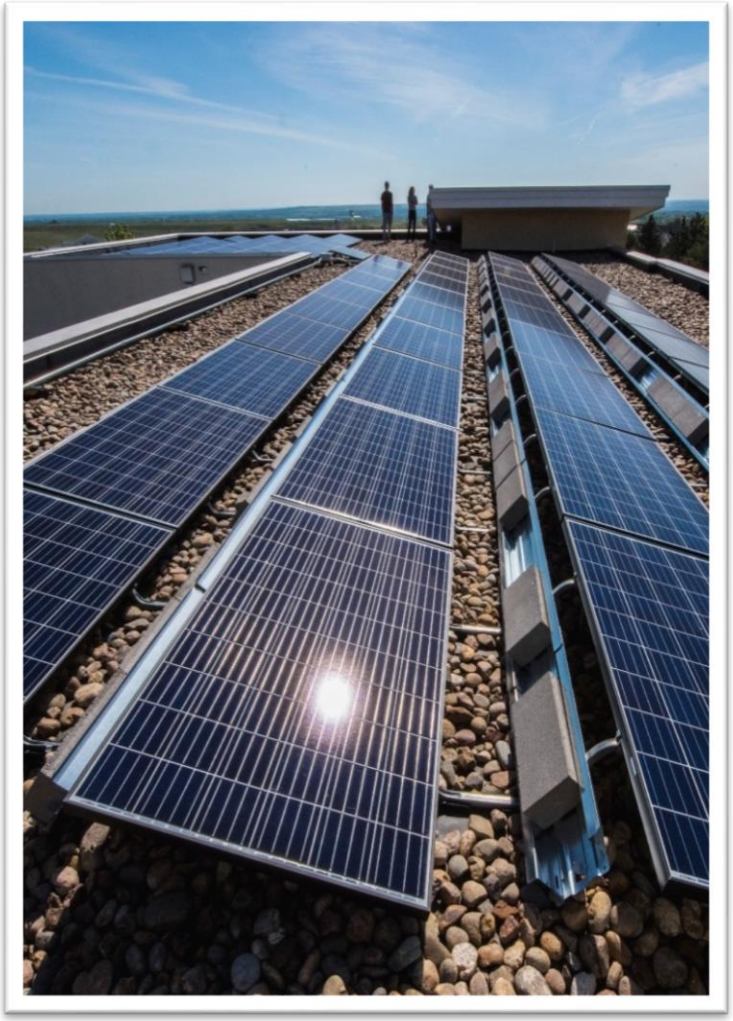
ESPC Energy Sales Agreement (ESA)

An energy savings performance contract energy sales agreement - referred to as an ESPC ESA or ESPC with an ESA - is a project structure that uses the multiyear ESPC authority to implement distributed energy projects on federal buildings or land.

A federal agency should consider an ESPC ESA if they:

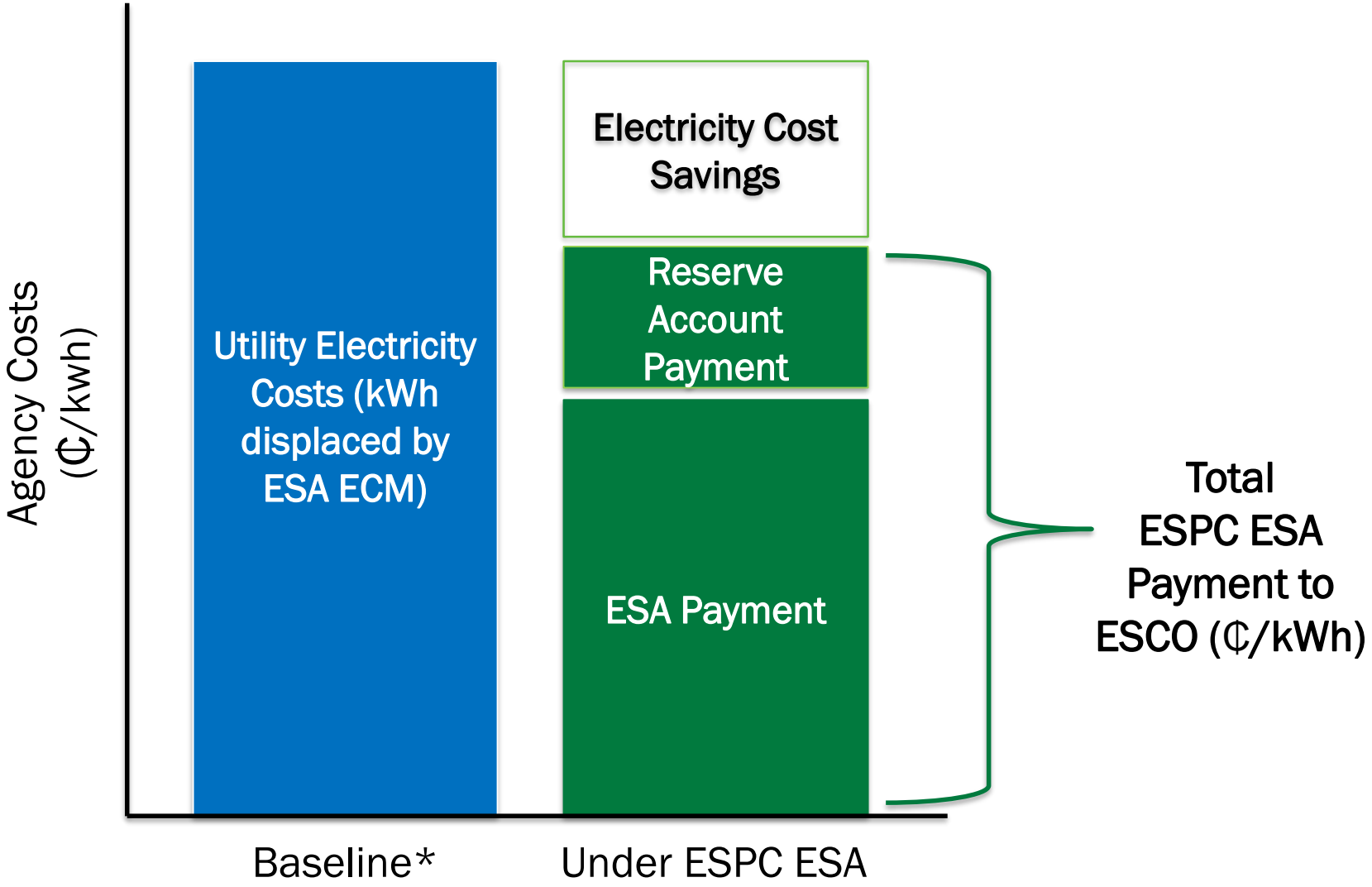
1. Are interested in a cost-effective distributed energy ECM
2. Have limited long-term contracting authority options
3. Lack upfront capital for a project
4. Think the intended project would benefit from tax incentives

ESPC ESA Basics



- ESA ECM is initially privately owned and the agency purchases the electricity; O&M/repair & replacement provided by the ESCO
- Similar to PPA but uses long-term ESPC authority
- Must meet cost savings and all other ESPC statutory requirements; OMB title retention requirement
- Differences from typical ESPC:
  - Payment is based on kWh generation; price is in ¢/kWh
  - Private ownership initially, allowing tax incentives to be captured **(act now for higher investment tax credit)**

Cost Savings With ESPC ESAs



*Either the blended rate or a rate that only considers costs offset by the ESA ECM.

ESPC ESA Contract Vehicle Options

All requirements apply regardless of ESPC ESA contracting option.

DOE Indefinite-Delivery, Indefinite-Quantity (IDIQ)

- A streamlined master contract that allows federal agencies to work with 21 DOE qualified ESCOs holding the current DOE ESPC IDIQ contract.

DOE ESPC ENABLE

- A standardized and streamlined procurement process to implement basic ECMs under an ESPC. There are over 20 DOE qualified ESCOs on GSA's Federal Supply Schedule 84, SIN 246-53.

Site-Specific/Stand-Alone

- An ESCO is selected through a request for proposal (RFP) process. The selected ESCO must be on DOE's Qualified List of ESCOs prior to contract award.

Army Corps MATOC (IDIQ, DOD Only)

- The U.S. Army Corps of Engineers' ESPC program awards master ESPCs and multiple award task order contracts (MATOCs).

Considerations for a PV Project in an ESPC ESA*

*Many considerations also apply to any PV project.

ESPC ESA – PV Project Considerations*

- Legality of Third Party Electricity Sale
- Land, Building, & Electrical
- Project Goals
- Project Acceptance
- Economic Viability
- Cybersecurity
- Agency Mission & Approval Requirements
- Construction
- Utility Coordination
- Operation & Maintenance

*Not a comprehensive list. Only covering topics in green for this webinar.

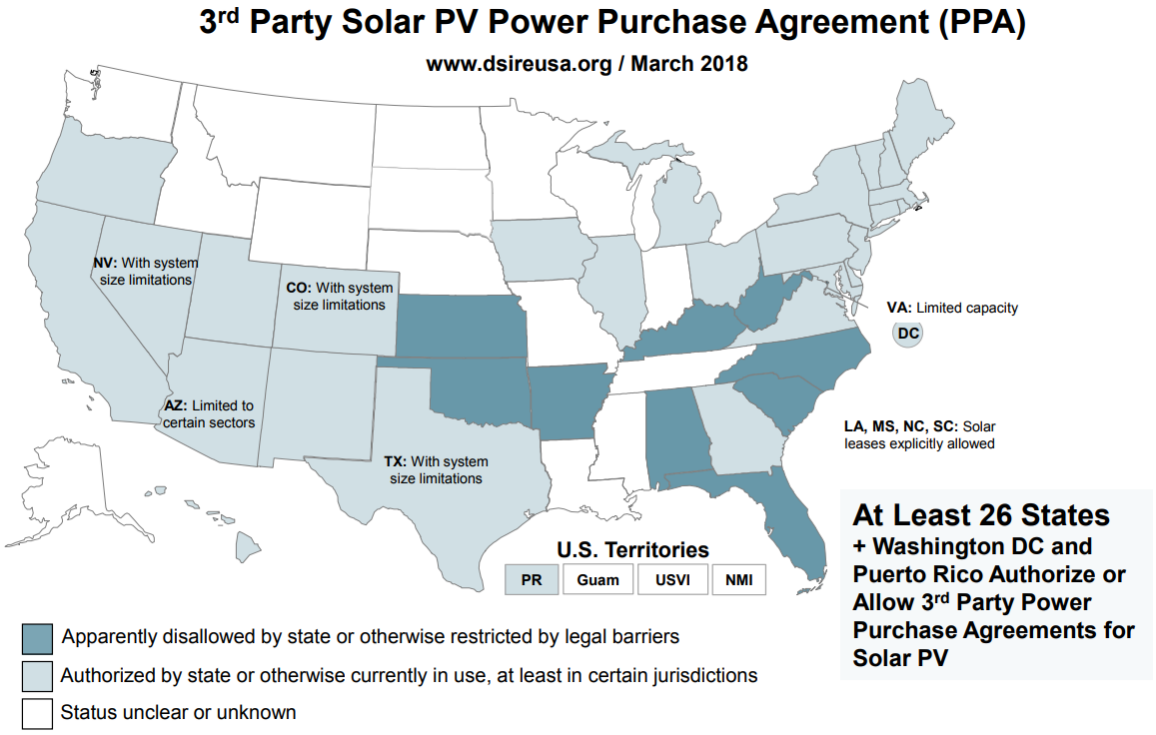
Legality of Third Party Electricity Sales

Legality of Third Party Electricity Sales – Key Considerations

- **Are third party electricity sales allowed in your state and utility service territory?**
  - Public utilities have different rules than investor-owned utilities
- **Is a third-party selling electricity considered a "utility", subject to Public Utility Commission regulation and/or certain approvals?**

Legality of Third Party Electricity Sales – Acton Items & Resources

- ✓ Check Database of State Incentives for Renewables and Efficiency (DSIRE) website for state policies
- ✓ Discuss planned project with your utility to confirm legal/regulatory considerations



Project Goals

Project Goals – Key Considerations

- **Will your project impact any existing or future activities (or vice versa)?**
  - Think holistically about your site, staff, agency-wide initiatives, etc.
- **What are the goals of your project?**
  - Realize cost savings
  - Stabilize electricity costs
  - Meet statutory or other executive requirements
  - Support agency mission
  - Enhance site resilience

Project Goals (Resilience) – Key Considerations

- Is your site considering resilience plans now or at a later time?
- Can a technology solution for resilience be included in the project while still ensuring the ESPC statutory cost savings requirement is met?
- What are the extra hardware requirements and costs?
- Can storage be added to the project to enhance cost savings?

Technology Solutions*	Description	Resilience Benefit	Added Cost
Microgrid-Ready PV	Practice of including low or no-cost measures when installing a PV system that will facilitate the integration of that PV system into a microgrid at a later point	Low	Low
PV and Storage	Energy storage (battery) added to a PV system to further accelerate cost savings and/or provide back-up power	Low to high	Low to high
Microgrid	A group of interconnected loads and distributed energy resources that can connect/disconnect from the grid.	High	High

*Not a comprehensive list of technology solutions to enhance site resilience

Project Goals (Resilience) – Action Items & Resources

- ✓ **Discuss resilience goals within your team, site, and agency**
- ✓ **Consider future site plans and coordinate with staff involved with existing and planned projects**
- ✓ **Learn more about technology solutions for your site**
  - Check out FEMP's factsheet on Considerations for Implementing PV plus Storage System at Federal Buildings and Campuses
  - Check out FEMP's factsheet on Microgrid-Ready Solar PV – Planning for Resiliency

Economic Viability

Economic Viability – Key Considerations

- **What is your current utility cost and structure?**

Bill component	How it's billed	How renewable energy can help
Energy Charges	Amount of kWh consumed (can vary by time of day)	Reduce the kWh purchased
Demand Charges	Based on highest demand (kW) of the month	Reduce kW if production coincides with monthly peak
Fixed Charges	Fixed cost per month	Cannot offset these

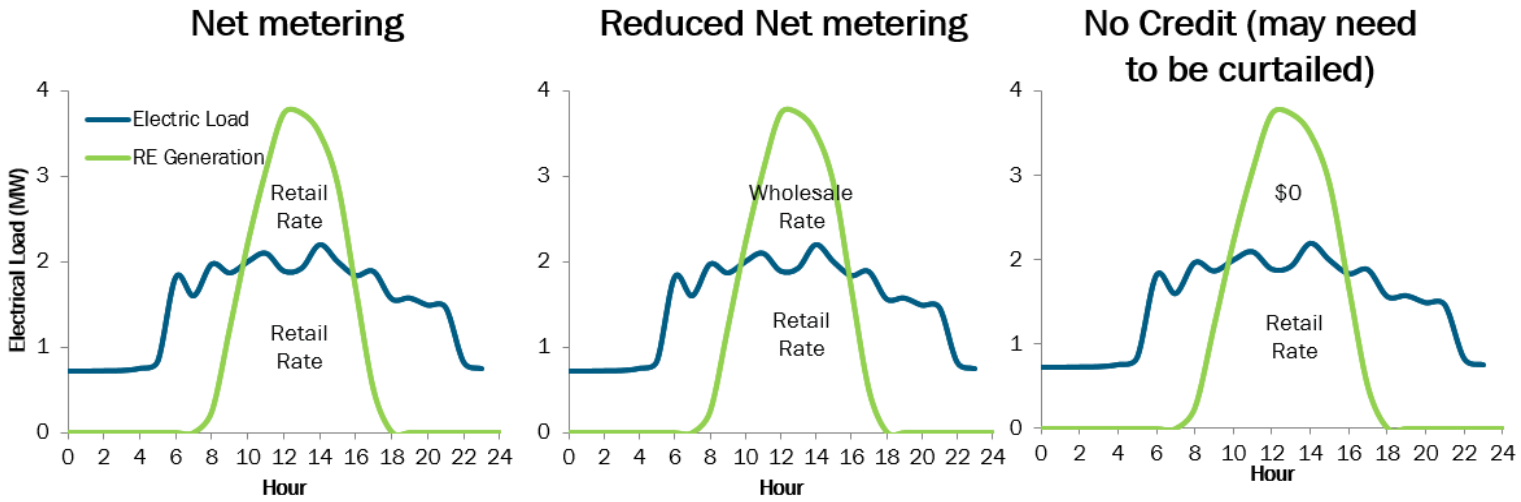
Other types of charges include minimum charge, departing load charge, and standby charge

- **What are potential incentive that can be applied to your project?**

Incentive Type	How they work	Unit
Capacity	Based on the total installed size of the system	$/kW
Production	Based on electricity production	$/kWh
Net metering	Credit if generation exceeds load	$/kWh

Economic Viability – Key Considerations Cont.

- **What is your site load compared to estimated PV generation?**



- **What are the financial parameters for this project?**

Parameter	Description	Impacts on renewable energy
Inflation Rate	General expected inflation rate	Future O&M costs
Utility Cost Escalation Rate	How electricity costs are expected to change	Costs that RE is offsetting
Discount Rate	Opportunity cost of money for owner	Helps to determine project financial viability

Economic Viability – Action Items

- ✓ **Learn about life cycle cost analysis for federal projects**
  - Compare base case and PV case, considering capital cost, O&M cost, avoided utility costs
  - Discount future costs to present value
  - 10 CFR 436 establishes a methodology and economic parameters
- ✓ **Define the goals of analysis**
  - Project ownership and technologies to evaluate
- ✓ **Collect and review data**
  - Start with readily available data
  - Obtain more detailed data if project appears feasible
- ✓ **Run analysis (iterative process)**
  - Run additional iterations to refine analysis
  - Results can determine initial indicator of techno-economic viability, but not final answer or result

Economic Viability - Resources

- National Institute of Standards and Technology's (NIST's) Building Life Cycle Cost (BLCC) Programs
- DSIRE website for incentives, interconnection, and net metering policies
- The following publicly available tools estimate initial potential, optimize system sizing, and refine project economics:

Tool	Expertise and Effort Needed	Required Inputs	Key Outputs
FEMP DG Screening Tool	Low	• Location	• Map interface with geospatial layers • High-level economics
PVWatts Calculator	Low	• Location • System configuration	• PV energy generation (no economics)
REopt Lite Web Tool	Medium	• Location • Energy Consumption • Rate tariff	• Optimized system size and dispatch • High-level economics
System Advisor Model (SAM)	High	• Energy Consumption • Rate tariff • Detailed system configuration • Financing inputs	• Detailed technology performance • Detailed economic modeling

Agency Mission & Approval Requirements

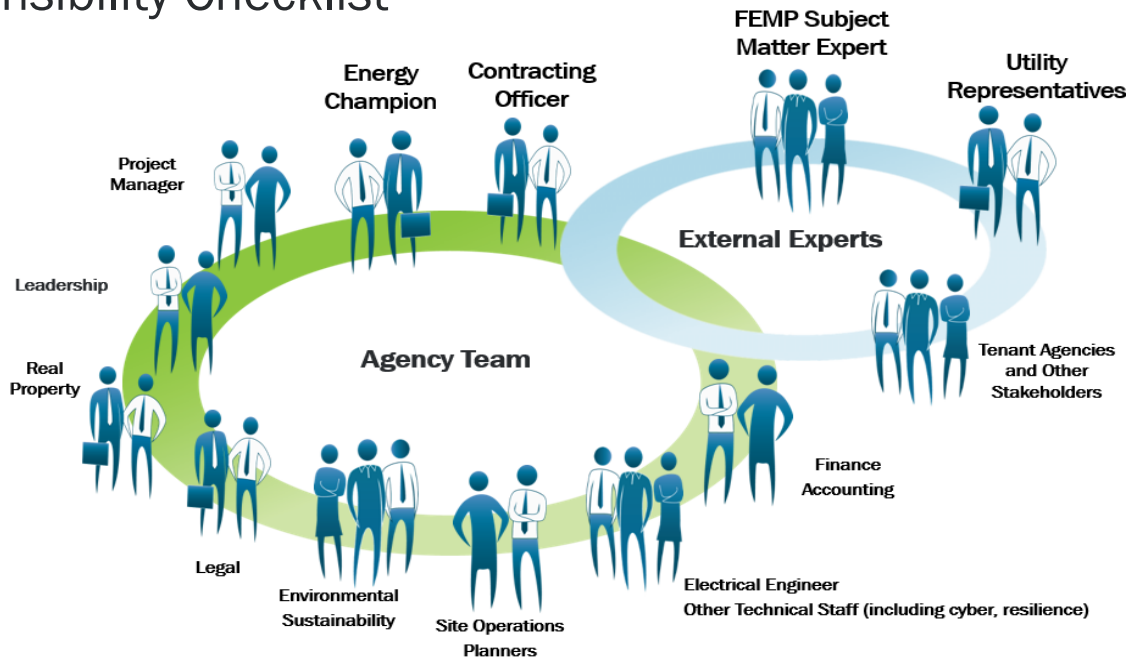
Agency Mission & Approval – Key Considerations

- **Does your project support or potentially conflict with agency's mission or future site plans?**
  - Could conflict if there are future site plans (e.g. new building) where project is proposed
  - Could support due to cost savings, if it provides site resilience, etc.

- **What are agency approval requirements?**
- **Does your agency own the land/building?**
  - Tenants/co-located agencies – obtain their buy-in and approval if necessary
- **Who pays the utility bill and do they report the energy usage?**

Agency Mission & Approval – Action Items & Resources

- ✓ **Develop a business case for project including connections between the project and agency mission, goals, and priorities**
- ✓ **Understand all the stakeholders and approval processes involved in the project**
  - Review FEMP's ESPC ESA Toolkit for Key Team Roles description and Responsibility Checklist



Utility Coordination

Utility Coordination – Key Considerations

- **What are your serving utility's interconnection requirements and process?**
  - Varies depending upon project size
  - Study requirements, time required, queue to start study
  - Fees for application, study, possible equipment upgrades
  - Utility participation in commissioning and final approval
- **Who needs to sign the interconnection agreement (ICA)?**
  - Agency may not need to sign (or it may be a tri-party agreement); in very limited cases an ICA may not be required
- **Does your serving utility have additional or specific requirements for batteries?**

Utility Coordination – Action Items & Resources

- ✓ Contact the utility early in the process, ask who signs the ICA and obtain copy of the template ICA if the government must sign (ideally a Federal / government-specific template)
- ✓ Discuss the following with the utility:

Available incentives	Project impact on utility costs	Net metering policy details	Other applicable policies	DE project connection plans
Rebates Other	Change to applicable tariff? Standby, departing load and/or other applicable charges? Time of use, seasonal rates; demand charges (rachet?)	Allowable project size How utility measures project capacity Treatment of net excess generation Project REC ownership	Feed-in tariff Virtual net metering	Behind the meter? In front of the meter?

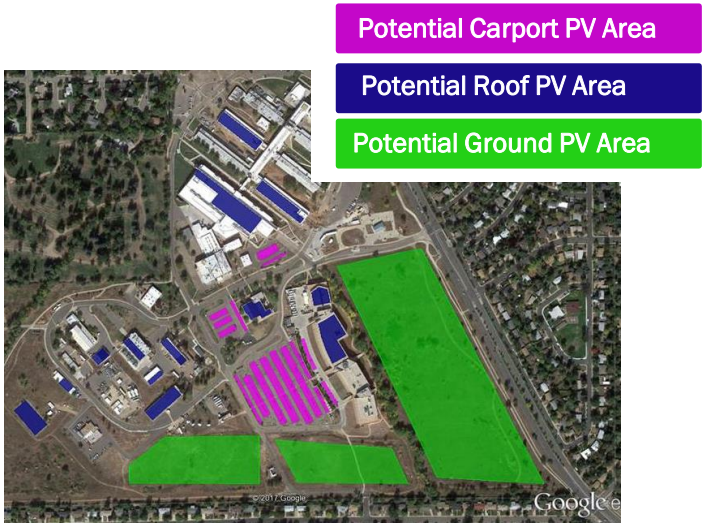
Utility Coordination – Action Items & Resources Cont.

- ✓ Have agency legal counsel and/or contracting officer complete ICA review early in the process to identify any problematic clauses
- ✓ Negotiate with the utility as needed
- ✓ Consider the GAO Comptroller General rulings regarding indemnification - 59 Comp. Gen 705 (1980) and B-197583 (1981)
- ✓ May be able to use GSA Areawide Contracts Exhibits
- ✓ **Include language regarding ESCO's interconnection responsibilities**
  - Typically the ESCO is responsible for ensuring that all interconnection requirements are met and they should communicate closely with the utility

Land, Building, & Electrical

Land, Building, & Electrical – Key Considerations

- **What space is available for your PV system?**
  - Where you install the PV system impacts:
    - Packing density
    - System cost
    - Tilt and orientation
    - Glare and viewshed
  - Typical packing density:
    - Ground: 3-6 acres/MW
    - Roof/carport: 10 Wdc/ ft^2



- **Will your system be roof or ground mounted?**

Roof-mounted	Ground-mounted
Type: metal, membrane, etc.	Contiguous? Distance to interconnection? Desired configuration (fixed vs. tracking)?
Condition, age, warranty	Slope, geotechnical
Structural (weight typ 2-4 Lbs./sq. ft)	Access roads, drainage, and ground cover
Set-backs and access pathways	Underground utilities

Land, Building, & Electrical – Key Considerations Cont.

- **What is near (or could be near) your PV system that produces shade?**
  - Trees, buildings, future construction plans (onsite or by neighbors)

- **What are some electrical considerations?**
  - Radical or network distribution system
  - Acceptable connection options and location (e.g. behind-the-meter)
  - Existing electrical lines and ownership
  - Site electrical system impacts, upgrade requirements
  - Acceptable inverter locations

Land, Building, & Electrical – Key Considerations Cont.

- **What environmental review is required for my project?**
  - National Environmental Policy Act (NEPA) is required for projects involving federal facilities/lands and federal funding
  - Typically an Environmental Assessment; in some cases an Environmental Impact Statement
  - Categorical Exclusion may be the outcome
- **What other special requirements may be applicable?**
  - National Historic Preservation Act, Endangered Species Act, cultural resources, permitting, other
- **How will you provide access to our building / land?**
  - Site access agreement provides access to land/building and is typically a separate agreement
  - Options include: license, easement, lease, FAR 52.241-5 Contractor's Facilities (grants a revocable permit or license), or other

Land, Building, & Electrical – Action Items & Resources

- ✓ **Evaluate shading concerns**
  - Publically available tools include: Aurora solar, SAM, Google Street View, Project Sunroof
- ✓ **Use Forge Solar's GlareGauge tool to check for glare (required near airports)**
- ✓ **Use FEMP's Solar PV Technical Specifications Document for templated Request for Proposal (RFP) language**
  - Provisions to include in RFP Sections C and E
  - Includes recommended standards and codes
- ✓ **Consider any severe weather that your site may experience**
  - Check out FEMP's Solar PV in Severe Weather: Hurricanes Factsheet

Land, Building, & Electrical – Action Items & Resources Cont.

- ✓ Discuss NEPA requirements with agency environmental staff
- ✓ Discuss the following site access agreement considerations with real property staff:
  - Agency authority(ies) and policies
  - Allowable contract length
  - Who will sign the agreement
  - Approval process
  - Expected approval timeframe

Project Acceptance

Project Acceptance – Key Considerations

- **How can you ensure that your project is designed and installed as intended?**
  - Commissioning ensures plant is complete and performs as expected
    - Safely put the plant into operation
    - Often required for warranty
    - Ensures complete and accurate documents
- **What are system acceptance testing requirements?**
  - Thirty (30) continuous days operation at estimated energy production levels, with 100% system availability
  - Meet all utility requirements

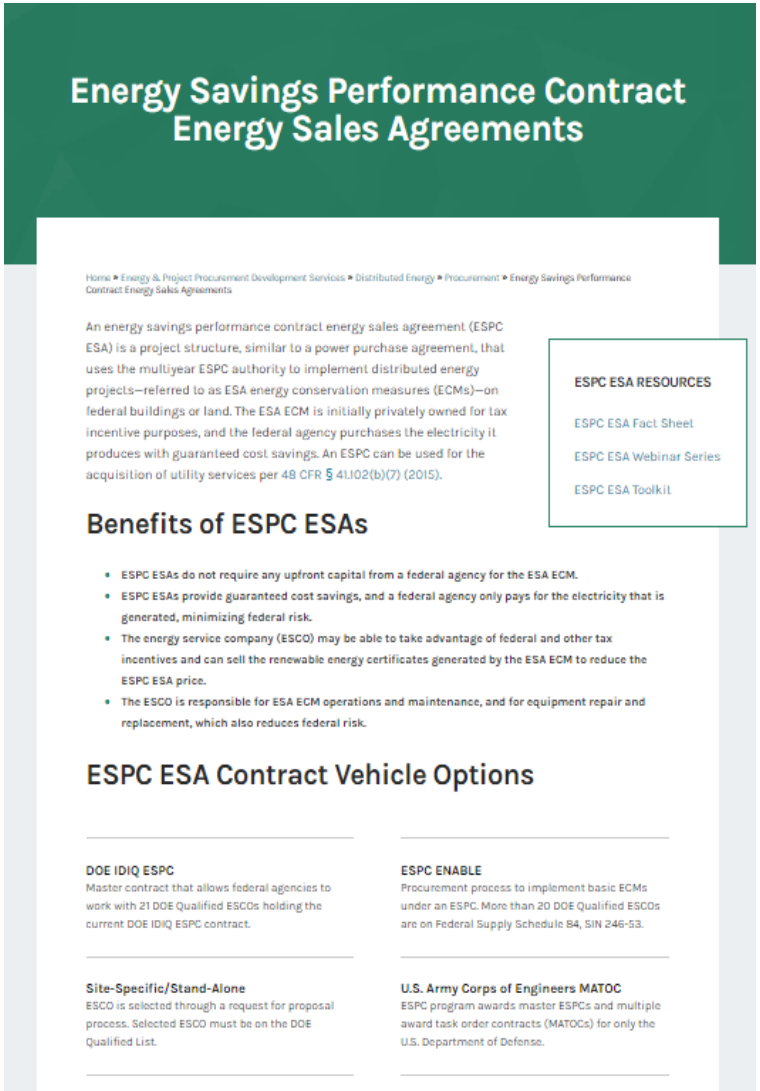
Project Acceptance – Action Items & Resources

- ✓ **Plan and complete system commissioning and acceptance testing**
  - Follow IEC 62446 Grid Connected Photovoltaic Systems
  - Consider using a third-party commissioning authority (or require contractor) to:
    - Review design submittal documents to ascertain the intent of the design
    - Prepare a commissioning plan
    - Perform testing of components and entire system
    - Issue commissioning report
  - Check out FEMP's ESPC Project Acceptance Guidelines
  - Check out FEMP's Procurement Specifications Templates for On-Site Solar Photovoltaic for templated RFP language
- ✓ **Obtain "as built" documents, M&V report, and manuals and ensure required training is completed**

Resources

Key ESPC ESA Resources

- ESPC ESA overview
- ESPC ESA fact sheet
- Contract vehicle options with ESA–specific templates
  - DOE IDIQ ESPC
  - DOE ESPC ENABLE
  - Site-Specific/Stand-Alone
- ESPC ESA Toolkit
- DSIRE website
- OMB Memo M-12-21
- IRS Revenue Procedure 2017-19 published in Internal Revenue Bulletin 2017-07



Energy Savings Performance Contract Energy Sales Agreements

Home ▸ Energy & Project Procurement Development Services ▸ Distributed Energy ▸ Procurement ▸ Energy Savings Performance Contract Energy Sales Agreements

An energy savings performance contract energy sales agreement (ESPC ESA) is a project structure, similar to a power purchase agreement, that uses the multiyear ESPC authority to implement distributed energy projects—referred to as ESA energy conservation measures (ECMs)—on federal buildings or land. The ESA ECM is initially privately owned for tax incentive purposes, and the federal agency purchases the electricity it produces with guaranteed cost savings. An ESPC can be used for the acquisition of utility services per 48 CFR § 41.102(b)(7) (2015).

ESPC ESA RESOURCES

ESPC ESA Fact Sheet

ESPC ESA Webinar Series

ESPC ESA Toolkit

Benefits of ESPC ESAs

- ESPC ESAs do not require any upfront capital from a federal agency for the ESA ECM.
- ESPC ESAs provide guaranteed cost savings, and a federal agency only pays for the electricity that is generated, minimizing federal risk.
- The energy service company (ESCO) may be able to take advantage of federal and other tax incentives and can sell the renewable energy certificates generated by the ESA ECM to reduce the ESPC ESA price.
- The ESCO is responsible for ESA ECM operations and maintenance, and for equipment repair and replacement, which also reduces federal risk.

ESPC ESA Contract Vehicle Options

DOE IDIQ ESPC
Master contract that allows federal agencies to work with 21 DOE Qualified ESCOs holding the current DOE IDIQ ESPC contract.

ESPC ENABLE
Procurement process to implement basic ECMs under an ESPC. More than 20 DOE Qualified ESCOs are on Federal Supply Schedule 84, SIN 246-53.

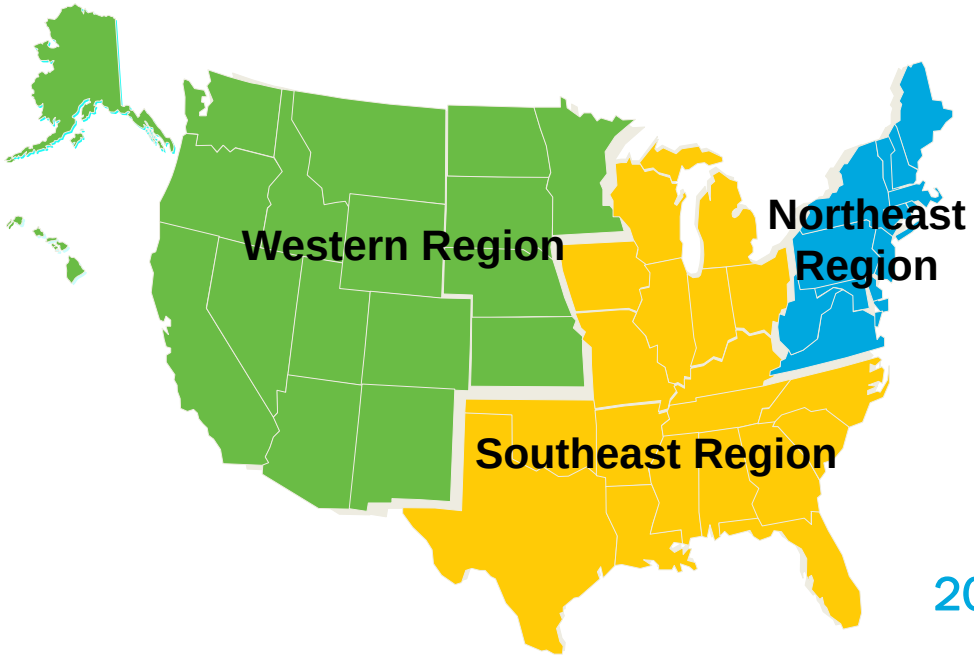
Site-Specific/Stand-Alone
ESCO is selected through a request for proposal process. Selected ESCO must be on the DOE Qualified List.

U.S. Army Corps of Engineers MATOC
ESPC program awards master ESPCs and multiple award task order contracts (MATOCs) for only the U.S. Department of Defense.

Key PV Project Resources

- Procurement Specifications Templates for On-Site Solar Photovoltaic
- Screening Tools: FEMP DG Screening Tool, PVWatts Calculator, REopt Lite Web Tool, System Advisor Model (SAM)
- Shading Tools: Aurora solar, SAM, Google Street View, Project Sunroof
- Forge Solar's GlareGauge tool
- Solar PV in Severe Weather: Hurricanes factsheet
- Considerations for Implementing PV plus Storage System at Federal Buildings and Campuses factsheet
- Microgrid-Ready Solar PV – Planning for Resiliency factsheet

Contact Information



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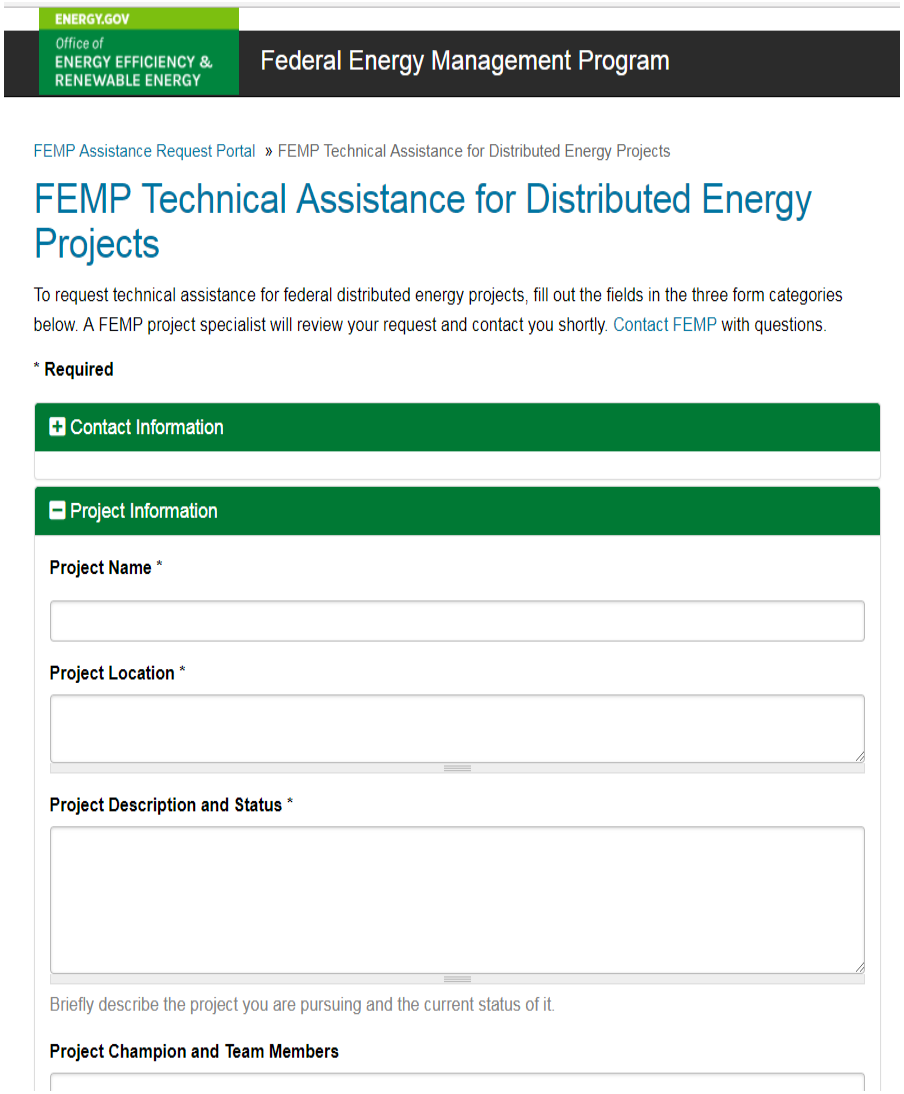
Ask for Project Assistance

- Request help with your project today!
- Fill out a quick and easy application through the FEMP portal

Submit a Request Here



IACET Credit for Webinar

The National Institute of Building Sciences' (NIBS) Whole Building Design Guide (WBDG) hosts the FEMP training program's learning management system (LMS).

The WBDG LMS:

- Allows for taking multiple trainings from multiple organizations through one platform.
- Houses the assessments and evaluations for all accredited courses.
- Allows you to:
  - Track all of your trainings in one place.
  - Download your training certificates of completion.
- Eases the CEU-achievement process.

Visit the WBDG at www.wbdg.org to view courses and create an account

IACET Credit for Webinar

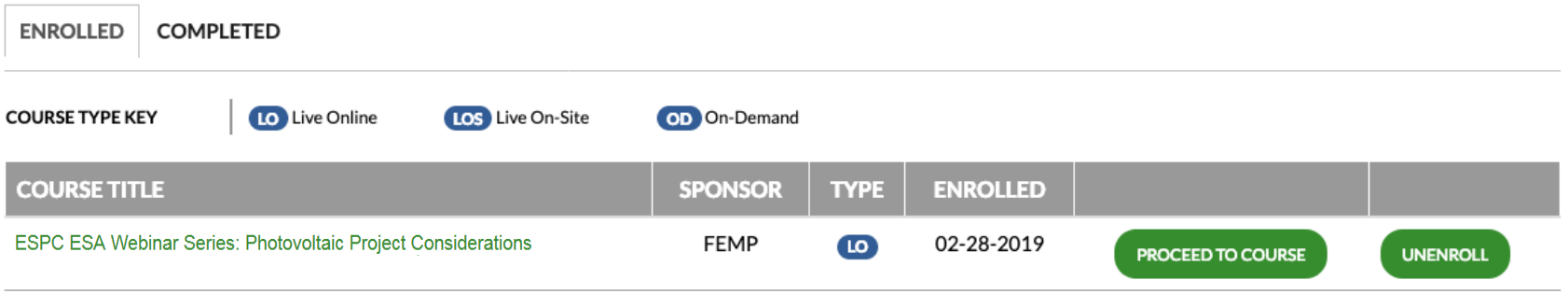
To receive IACET-Certified CEUs, attendees must:

- Attend the training in full (no exceptions).
  - If you are sharing a web connection during the training, you must send an e-mail to Elena Meehan (elena.meehan@ee.doe.gov) and indicate who was on the connection and who showed as connected (will reflect in the WebEx roster).
- Complete an assessment demonstrating knowledge of course learning objectives and an evaluation **within six weeks of the training**. A minimum of 80% correct answers are required for the assessment.

To access the webinar assessment and evaluation, visit:

https://www.wbdg.org/continuing-education/femp-courses/femplw04232019

If you have a WBDG account and enrolled previously, simply log in and click the *Continuing Education* tab on the user account page. Click *Proceed to Course* next to the course title.



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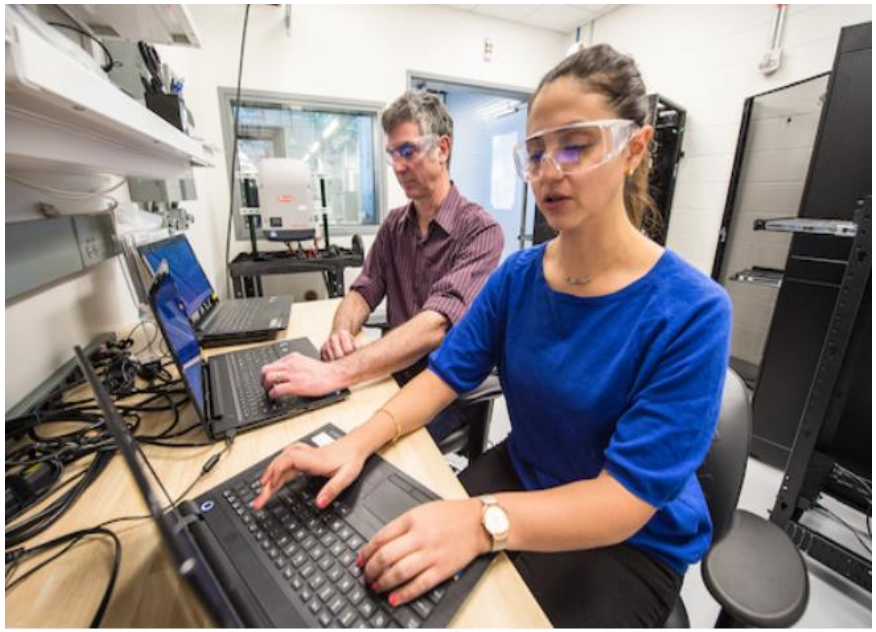
Appendix

Other Considerations

- Novation is a likely requirement
- For bundled projects: there may be a separate financier for the privately owned PV project
- Cancellation ceiling/termination liability
- FAR clauses
- Evaluation criteria

Cyber Security

- Involve network/cyber security personnel from start
- EO 13800: "Presidential Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure"



- Agency, NIST and/or other requirements may apply
  - FERC and NERC requirements for utility scale projects (>20 MW)
- Cybersecurity Procurement Language for Energy Delivery Systems (by Energy Sector Control Systems Working Group, April 2014)

Construction Considerations and Requirements

Permitting Requirements

- Conduct initial research to determine important requirements
- Determine responsible party
- Include applicable requirements in the contract

Stormwater Management

- EISA 2007 Section 438 outlines strict stormwater runoff requirements
- Maintain or restore pre-development hydrology

Erosion and Sediment Control

- EPA pollutant discharge rule for construction projects requires that erosion and sediment control measures be taken during construction

Contractor shall comply with all codes adopted by any authority having jurisdiction.

Perform Operations and Maintenance

Benefits of O&M

- Increase efficiency and energy delivery (kWh/kW)
- Decrease downtime (hours/year)
- Extend system lifetime (25-40 years)
- Ensure safety and reduce risk
- Often required by warranty

Elements of O&M plan: administration plan, planning and reporting, preventive maintenance plan, inspections, monitoring system, and sources of funds for corrective maintenance

FEMP Trainings:

"Operations and Maintenance for Optimal Photovoltaic System Performance"

"O&M Best Practices for Small-Scale PV Systems"