# Basic Environmental Auditing Skills: Performing a PV Solar Site Audit

## Environmental Services

## 2020

# The focus of this training module is to understand the basics of conducting a photovoltaic (PV) solar site audit

## Introduction

- **Before going through this training module you should have completed the Basic Environmental Auditing Skills Training module and appropriate environmental media-specific modules**
- **This training module will focus on the physical inspection aspects of auditing large scale PV solar sites, including:**
  - The PV solar array
  - Pad mount transformers, inverters skids, and switchgear(s)
  - The operations and maintenance (O&M) facility
  - Storm water management features
  - Tools and supply warehouse
  - Oil/fuel and ancillary storage and waste accumulation areas

**There is a separate training module for the physical inspection of electrical substations, which may be contiguous to the solar site.**

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# Agenda of Basic Audit Skills Training

- Training Objectives
- What is Environmental Auditing?
- Facilities Typically Audited
- Types of Audits
- Topics and Media Typically Reviewed
- Key Skills and Attributes for Auditors
- Pre-Audit Activities
- Onsite Audit Activities
- Key Steps in Evaluating Audit Results
- Exit Meeting
- Recap of Main Points
- Knowledge Assessment

**The Environmental Audit Program audits all types of NextEra facilities**

# Audits cover a variety of media and topics that evaluate the facility's environmental compliance

## Topics and Media Typically Reviewed

- Environmental Management Systems (EMS)
- Water and wastewater
- Air emission
- Solid, hazardous, and universal waste management
- Above and underground storage tanks
- Special pollutants (e.g., PCBs, asbestos, pesticides)
- Transportation of hazardous materials in pipelines and over highway
- Oil spill prevention and control
- Threatened and endangered species

**Assistant auditors are expected to have a working knowledge and/or technical competency in at least one of these areas.**

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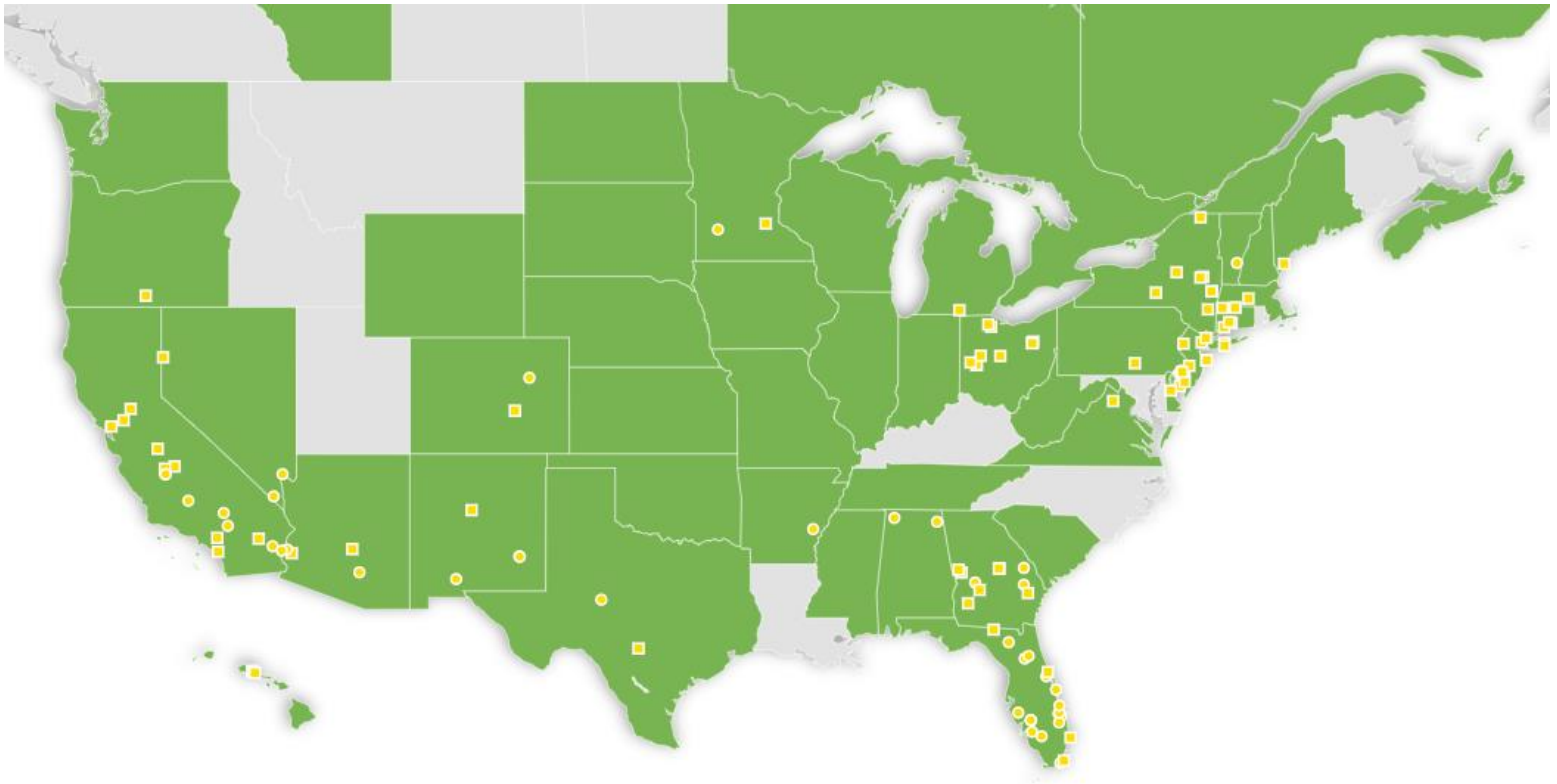
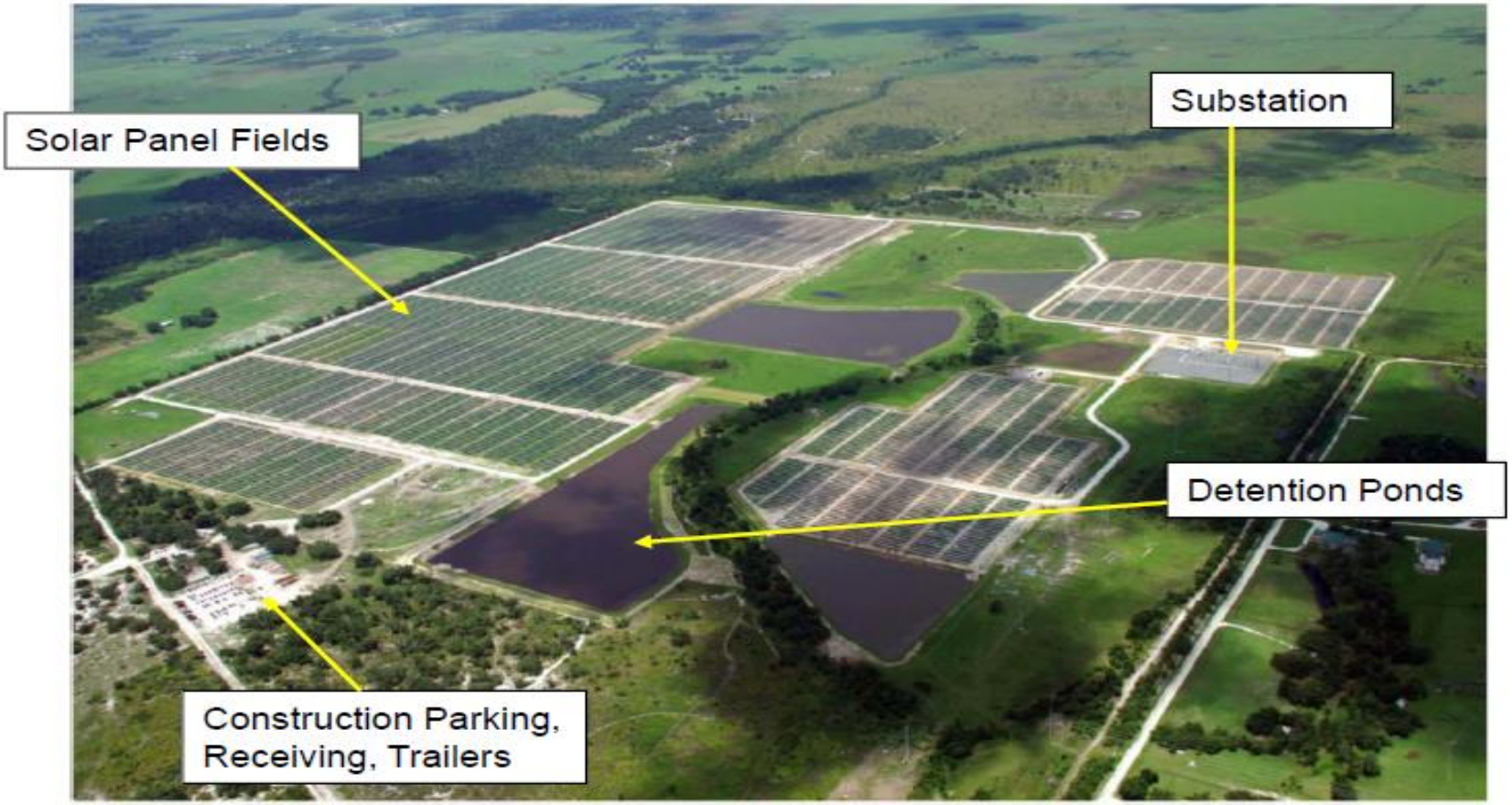
# NextEra Energy (through its subsidiaries NEER and FPL) build and operate renewable energy plants throughout the USA

## Solar Energy Assets



**FPL has publicly announced a "30 by 30 plan" to install more than 30 million solar panels by 2030**

# Overview of a typical PV solar site




**A PV solar generation facility consists of PV solar arrays, O&M facility, switchgear and inverters, pad mount transformers and storm water controls**

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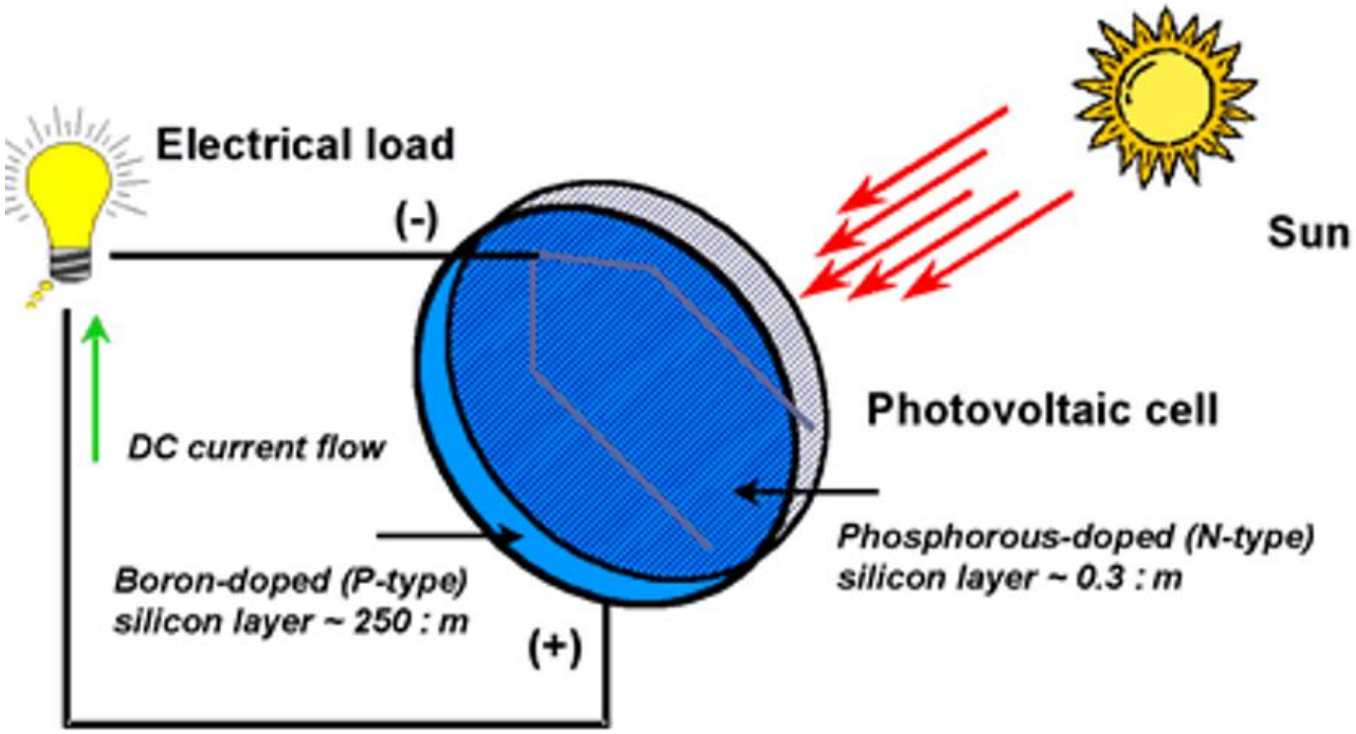
# Special photovoltaic cells absorb sunlight when light hits the solar panels

## How a Solar Photovoltaic Cell works




**Solar radiation is converted into direct current (DC) electricity and then alternating current (AC) used by local utilities.**

# Electricity travels through transformers and voltage is boosted for delivery onto transmission lines


**Local electric utilities can distribute the electricity to homes and businesses along the electrical grid.**

# Some PV solar sites have buildings or mobile trailers that support operation and maintenance activities

## Operations and Maintenance Facility (O&M)

- **The O&M facility may include, but is not limited to, the following activities:**
  - Vehicular maintenance
  - Refueling
  - Oil storage
  - Waste and recycling accumulation
  - Spare PV modules or transformer storage
  - Administrative offices
  - Inventory services
  - Water well
  - Septic system

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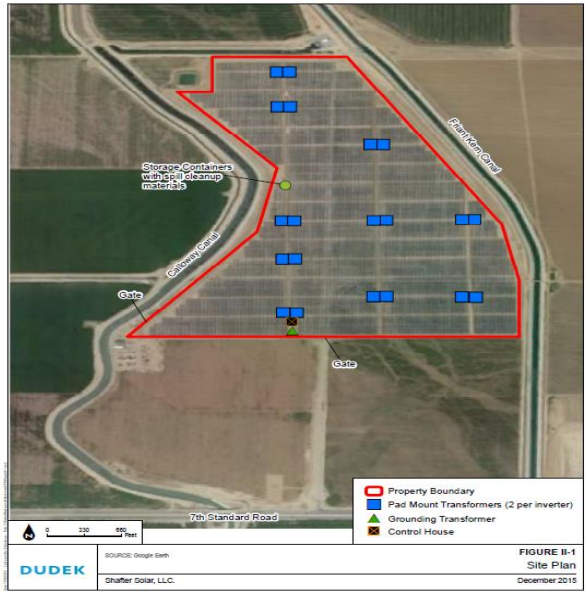
# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds

- Discuss with the site representative the areas of the site you would like to drive or walk through for the site inspection
- Use a copy of the site site diagram to follow along with your site inspection
- Conduct a safety tailboard and use proper PPE when walking through the facility grounds




# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds (Cont.)

- Verify that security features identified in the SPCC Plan and/or permits are in place and being implemented


- Check that awareness signs required by permits or state/local regulations have the proper language and are conspicuously posted


- Assess whether the natural areas are being maintained in accordance with the conditions of federal, state, and local permits (e.g., best management practices, re-vegetation, ditches, culverts, removal of non-native species, etc.)

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# There are issues to look for when inspecting a PV solar site

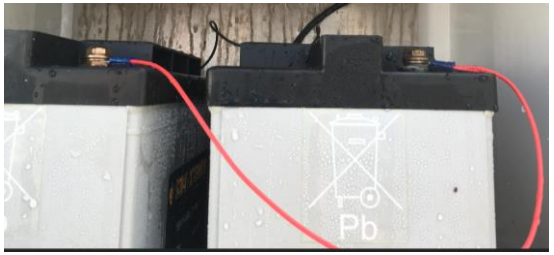
## Inspection of the Facility Grounds (Cont.)

- Verify that storm water drainage features described in the SPCC Plan match with what you observe at the site
- Look for drainage problems that can cause storm water retention in unwanted areas and cause local flooding
- Look for evidence of excessive sedimentation and erosion
- Compare how issues you found are recorded on formal inspection sheets and inquire about actions being taken, including internal and external reporting

# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds (Cont.)

- Inspect material laydown areas, particularly along the fence line, for liquid and/or solid chemicals exposed to the weather
- Check that storage containers are marked/labeled according to use or content (good management practice)
- Inspect contents of storage containers, if allowed
- Check whether amounts of batteries observed on the site trip the need for reporting in a Tier II or (in CA) under a Hazardous Materials Business Plan

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# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds (Cont.)

- If equipped with an emergency generator or fire pump, inspect conditions and compliance with applicable state permits, and federal RICE and SPCC regulations
- If required, check that water is available for dust control or fire control
- If there is a water well onsite, inspect its condition and that it is identified in a water use permit (if applicable), and meets conditions in applicable local small water systems rules and/or ordinances

# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds (Cont.)

- **Inspect that the septic system is permitted, maintained, and that the construction and location diagrams are available**
- **If present, inspect exterior conditions of the fuel tank and check:**
  - Gauges
  - Dispense nozzle and hose
  - Emergency shut off
  - Use of drip pans (if needed)
  - Secondary containment features
- **If a bird carcass is found or nesting bird is observed on property, ask the site representative to describe actions to be taken**


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# There are issues to look for when inspecting a PV solar site

## Inspection of the Facility Grounds (Cont.)

- **Look at the condition of oil drums and totes, and check for open lids or bungs and excessive corrosion and dents**
- **Observe and inquire how the site is managing the following waste streams that can be present at solar PV sites:**
  - Recyclable waste- Lead/Acid batteries, PV modules, used oil, spent inverter coolant
  - Non-hazardous waste- oily rags
  - Hazardous waste- certain PV modules and spent aerosol spray cans
  - Universal waste- spent lamps, rechargeable batteries, unused pesticides
- **Note that stricter waste rules apply for waste streams at PV solar sites in CA**

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# Inspect areas for staging oil products, oil-containing equipment

## Inspection of the Facility Grounds (Cont.)

- Check that all sources of oil you see with capacity of 55-gallons and greater are identified in the SPCC plan and the SPCC facility diagram
- Verify that adequate spill response supplies are available
- Check that appropriately sized containment is in place for bulk containers and general containment for other sources of oil
- Inspect secondary containment structures for cracks
- Check that drainage from diked storage areas is restrained by open/close valves to prevent discharges to the environment

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# Additional Resources

- **Additional resources can be found in the following ES Web Page links:**
  - Exceptional Practices
    - -- A compilation of good environmental, health and safety practices identified during audits of all NEE operational facilities
  - Waste Management Plan for PV Solar Sites
    - -- identifies waste streams associated with the operation of a PV Solar Site and how to manage them in compliance with applicable federal and most state requirements