



Headquarters U. S. Air Force

Integrity - Service - Excellence

Luke AFB 15 MW Solar Array Challenges and Lessons Learned



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Overview

- **Authorities**
- **Regional Utility Overview**
- **Initial Project Concept**
- **Unforeseen Site Conditions**
- **Current Project**
- **Lessons Learned**



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Authorities

- **Legal Authorities to be used by the project**
- **FAR Part 41 (utility service contract)**
 - **Arizona Public Service (APS) is electrical service provider**
 - **Utility Law Field Support Center/Rates and Renewables Team negotiated a Solar Service Agreement**
- **Land use authority (10 USC 2667)**
 - **Initial Concept was to provide utility an easement**



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Regional Utility Overview

- **Arizona Corporation Commission (ACC) sets state energy policies**
- **Directed a Renewable Energy Standard for providers**
 - **15% of power must come from alternative sources by 2025 (standard established during settlement of a rate case)**
- **Arizona Public Service is the Luke AFB provider**
 - **Luke's Solar Array was in initial set of projects to assist in meeting goal**



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Initial Project Concept

- **Negotiated rate for renewable electricity with Arizona Public Service (APS) – base utility provider**
 - **Utility builds, owns, and operates PV array**
 - **Anticipate 15 MW based on 106 acres**
 - **Luke uses 100% of production 99% of time**
 - **Special contract to purchase array output-**
 - **fixed “solar rate” for life of array**
- **Array output fed directly into APS side of grid**
- **Air Force provides clear site allowing reduced generation rate**



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Unforeseen Site Conditions

- **On-going archeological mitigation effort discovered more extensive and significant sub-surface artifacts than expected**
- **Known archeological location; surface artifacts discovered during 2004 land purchase**
- **Construction of two lane ammo haul road – 2005**
 - **Bi-sects solar array project site**
 - **Did not uncover any buried items**
 - **Surface artifacts removed**
- **Expectation that only surface artifacts would be encountered**



Unforeseen Site Conditions Discovery of Artifacts

- **Exploratory trenching discovered features 12-18 inches below surface**
- **Trenching expanded to discover limits/boundaries**
 - **44 of 106 acres impacted**
- **Initial estimates of range/numbers resulted in acceptable risk decision**
- **Site mitigation/stripping revealed numbers and significance greater than initially estimated**
 - **Numbers of pit houses, fire pits, etc twice as numerous as estimated**
 - **Carbon dating revealed some features 5000 years old**
 - **Oldest discovery in Phoenix area after 130 yrs searching**



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Current Project

- **Economic conditions/Utility Co needs changed in AZ during mitigation period (~ 2 years)**
- **“Fixed solar price” exceeds expected “brown power” rate**
- **Project changed from purchase project to leasing project**
- **Air Force will lease land to utility/collect rent instead of granting easement/purchasing electricity**
- **10 USC 2911 goal implications**



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Lessons Learned

- **Strong teamwork between utility and agency vital**
 - **Utility/Installation team in weekly contact during initial project planning**
 - **When artifacts discovered, team communication already established**
 - **Utility archeologist integral part of mitigation planning**
 - **Strong connection with SHPO/Tribes helpful**
- **NEPA process is “long pole in the tent”**
 - **Start early!**
 - **Communication lines must stay open**
- **Flexibility in the approach ensured project will be completed**
 - **AF team re-evaluated desired outcomes to redesign project**
 - **New project structure first “floated” by utility co**



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QUESTIONS?