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Presenters

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***Using Sustainable Biomass Fuels to Support
Mission-Critical Energy Infrastructure in the United
States Air Force, Eglin Air Force Base, Florida***



Presentation Overview

- **Introduction**
- **Goals**
- **Purpose**
- **Project**
- **Project Factors**
- **Payoff**
- **Way Ahead**

Creation of sustainable energy supply...

The United States represents 4% of the world's population, but uses 25% of petroleum supplies – This is not sustainable!

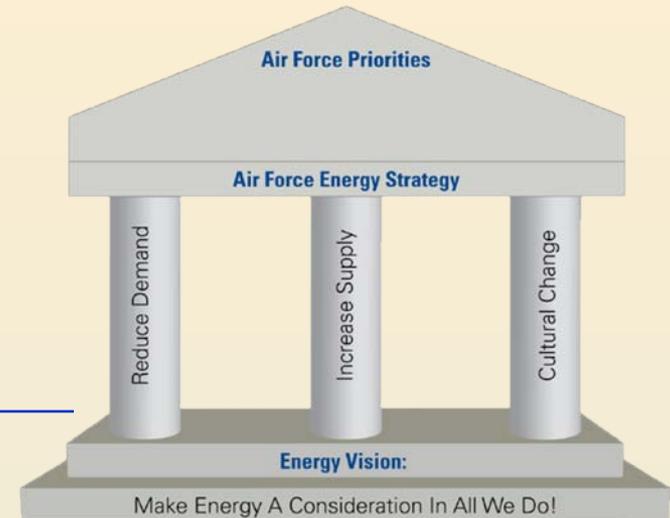
The United States Air Force is the Department of Defense's largest energy consumer...



Energy Goals

According to the Air Force Energy Strategic Plan Objectives Include:

- Increase alternative fuel usage
- Increase renewables usage
- Utilize public private partnerships
- Enhance energy security



Implementation Objectives Include:

- Develop renewable resources on base
- Procure commercially produced alternative/renewable energy
- Identify /develop privately financed/operated energy production on Air Bases

Energy Requirement Metrics Include:

- Percent alternative/renewable fuels used for installation energy requirements.



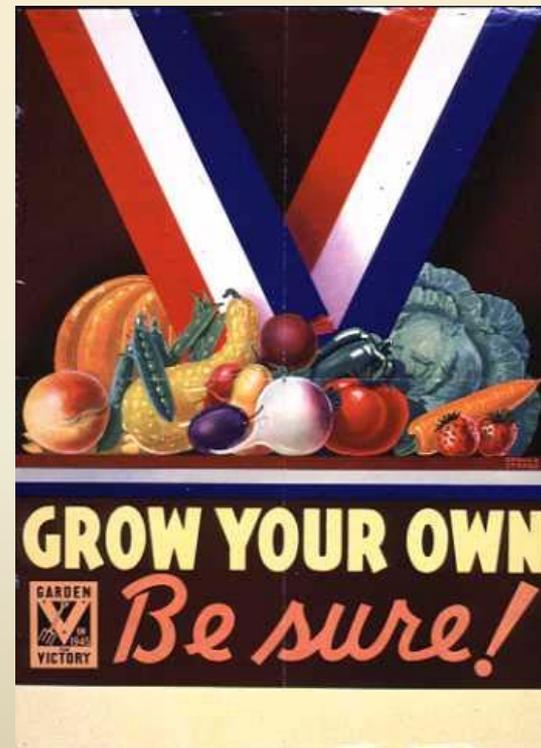
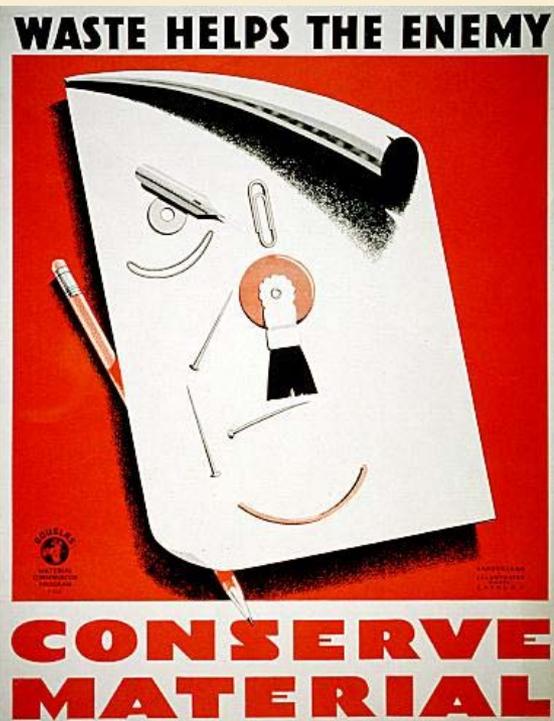
Energy Goals (Continued)

- **Energy Policy Act of 2005**
 - *Sets annual goals for renewable energy*
 - **3% by FY 07**
 - **5% by FY 10**
 - **7.5% by FY 13**
- **10 USC 2911 National Defense Authorization Act of 2007**
 - *Sets DOD renewable energy goal of 25% by 2025*
- **Executive Order 13423**
 - *Half of renewable energy consumption from new sources (post 1/1/99).*
 - *Implement renewable energy projects on agency property for agency use.*
- **Executive Order 13514**
 - **Consider environmental measures as well as economic benefits, social benefits, and costs in evaluating projects and activities based on life-cycle return on investment.**
 - **Consumption - 1% by FY 12 and 3% by FY 15**
- **Air Force Infrastructure Energy Strategic Plan-2008**
 - **Construct on-base renewable energy production**



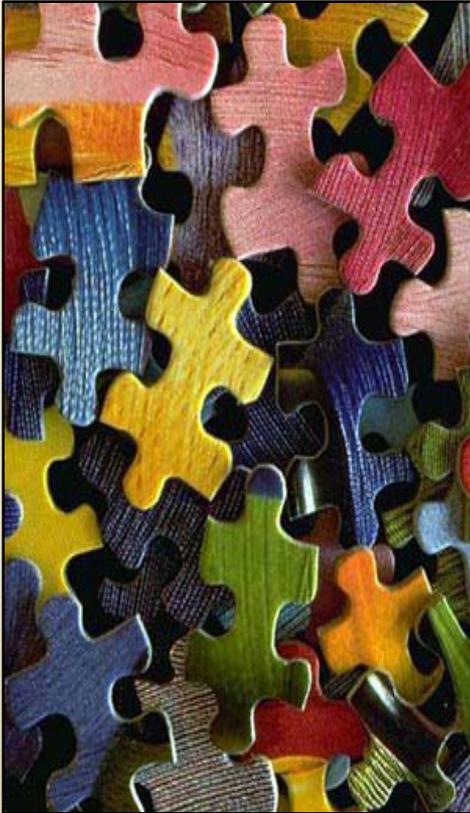
Achievable...

Supply independence; conservation, sustainability, and efficiency in consumption patterns; and awareness regarding cultural change...really are not *new* ideas...





Purpose



Feasibility Study Evaluated:

- Existing Energy Usage
- Feasibility of Using Biomass Energy Sources
- On-site Renewable Energy Generation
- Fossil Fuel and Greenhouse Gas Reduction

Feasibility Study Included:

- Significant Stakeholder Involvement
- Screening of Multiple Resource Areas
- Screening of Commercially Available Energy Conversion Technologies
- Screening of Renewable Energy Projects
- Business Case Analysis

The Feasibility Study was funded through the American Recovery and Reinvestment Act .



Putting the Pieces Together

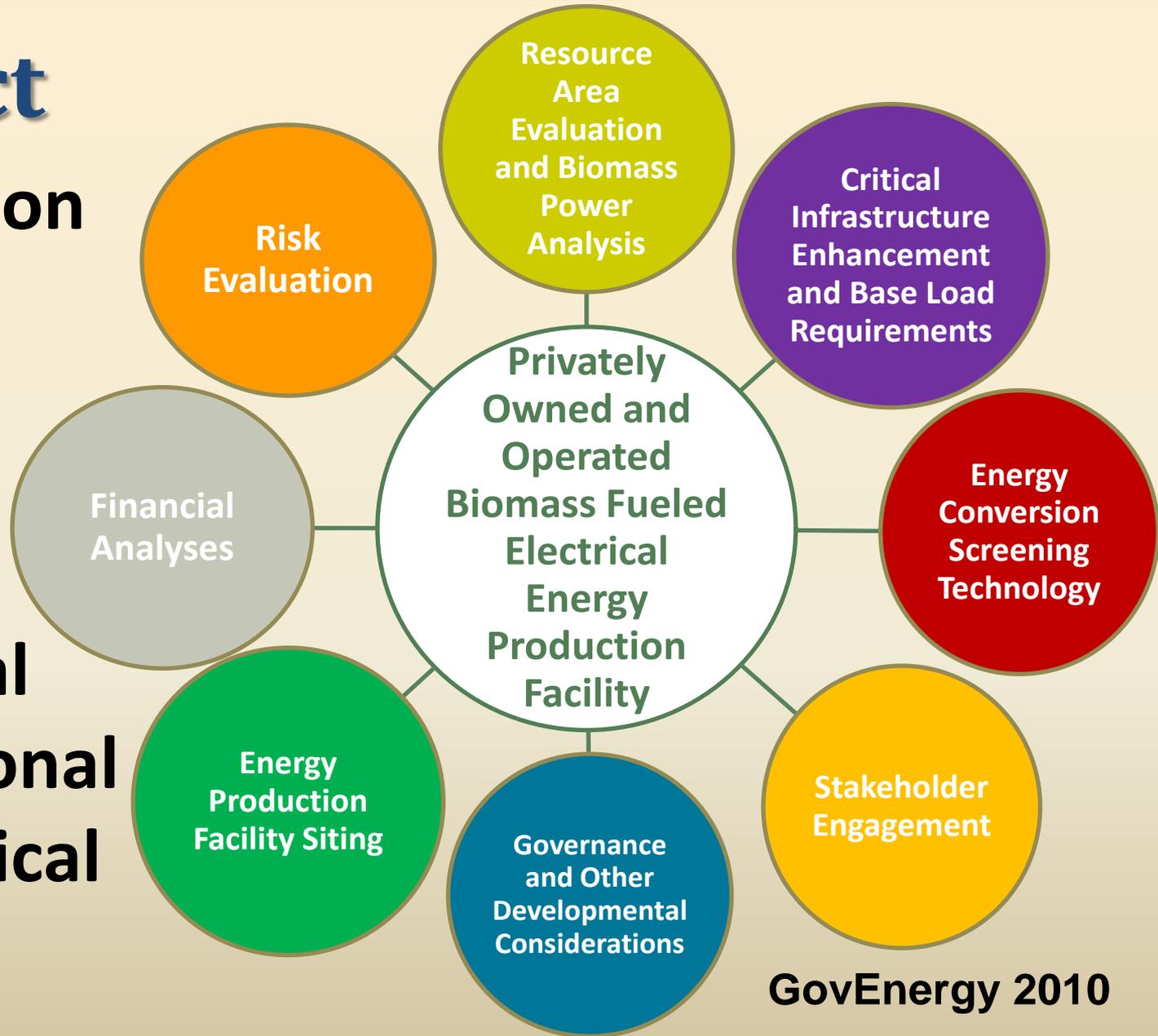
- Provides a Complete Picture
- Potential Fuel Streams are Understood
- Energy Recovery Potential is Understood
- Reductions of Fossil Fuel Dependence and Greenhouse Gas Emissions
- Regional Economic Development and Creation of New Sustainable Jobs Consistent with American Recovery and Reinvestment Act Initiatives.



Project

- Evaluation of key project factors:

- Technical
- Operational
- Economical

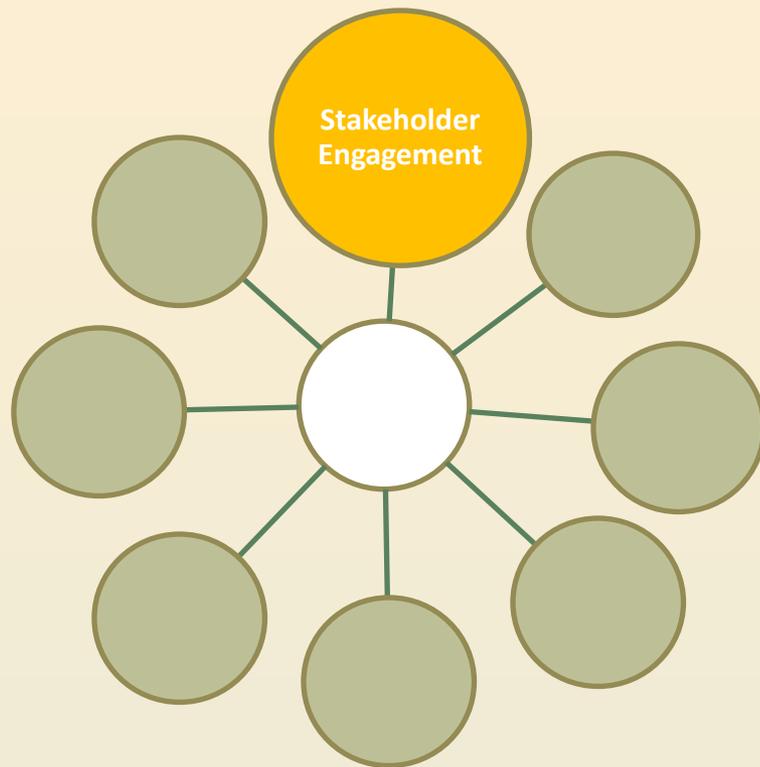




Project Factors

Stakeholder Engagement

charrette (shar-ette') *n.* **1. A small cart. 2. A collection of ideas.** During the 19th century, students of l'Ecole des Beaux Arts in Paris would ride in the cart sent to retrieve their final art and architecture projects. While en route to the school in the cart, students frantically worked together to complete or improve these projects. The meaning of the word has evolved to imply a collection of ideas or a session of intense brainstorming. **3. An intensely focused activity intended to build consensus** among participants, develop specific design goals and solutions for a project, and motivate participants and stakeholders to be committed to reaching those goals. Participants represent all those who can influence the project design decisions. [Fr. *charrette*]



- **Set Goals**
- **Build Consensus**
- **Exchange Ideas**
- **Integrate**
- **Set Path Forward**

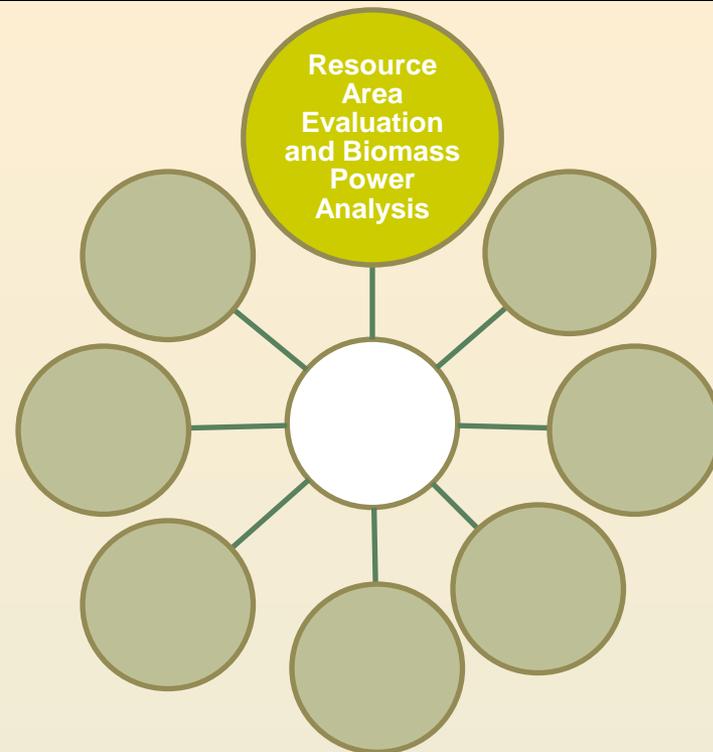
Discuss the scope and objectives of the Feasibility Study, and provide the opportunity to clarify specific issues and receive additional guidance and information from the stakeholders.



Project Factors

Resource Area Evaluation and Biomass Power Analysis

EAFB Resources Evaluated for Energy Recovery

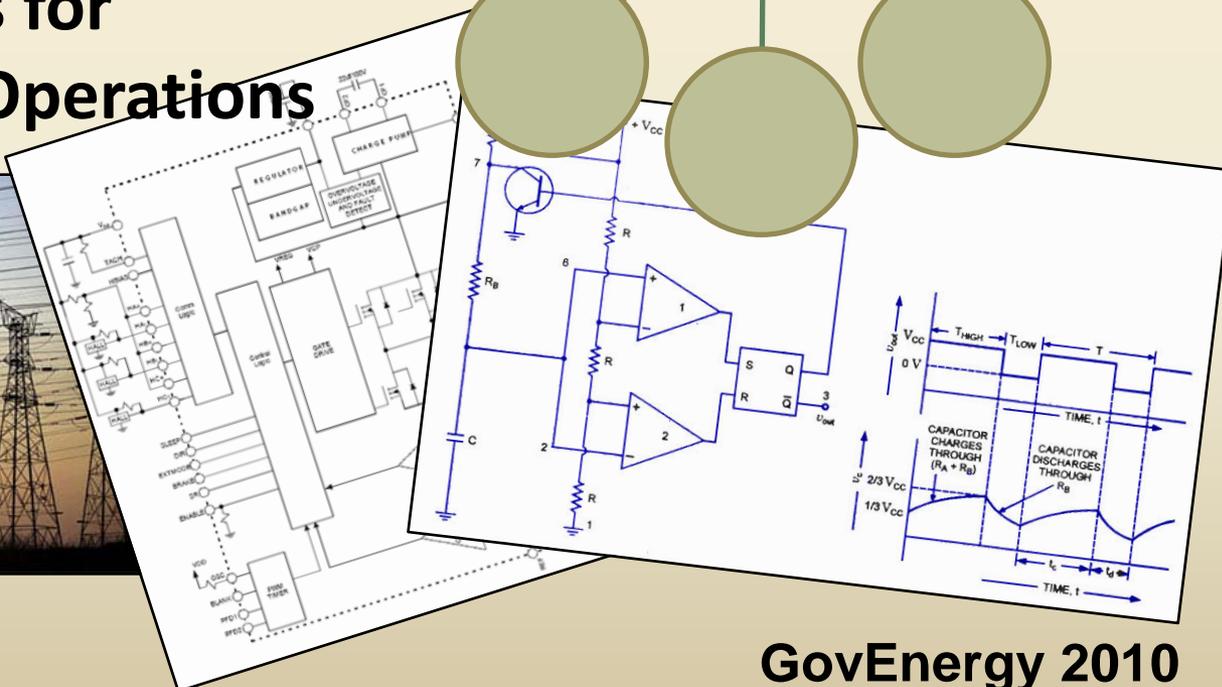
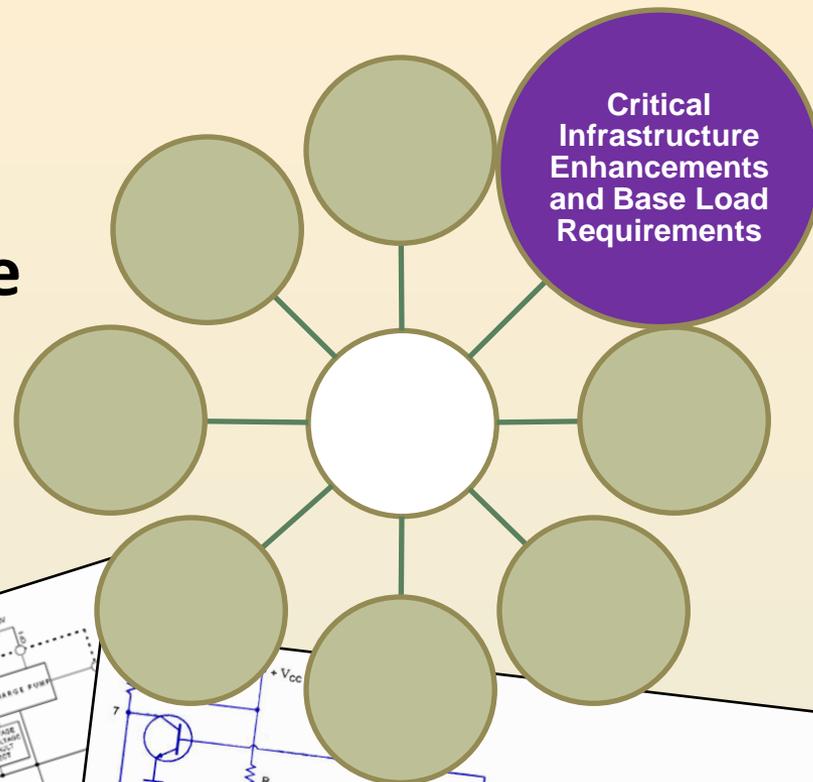


- Wood from both existing forest harvests and forest harvest residue
- Solid waste streams and other organic material
- Sewage and effluents from wastewater treatment plants



Project Factors

- Critical Base Load Estimate
- Energy Reliability/Redundancy Enhancements for Continuity of Operations

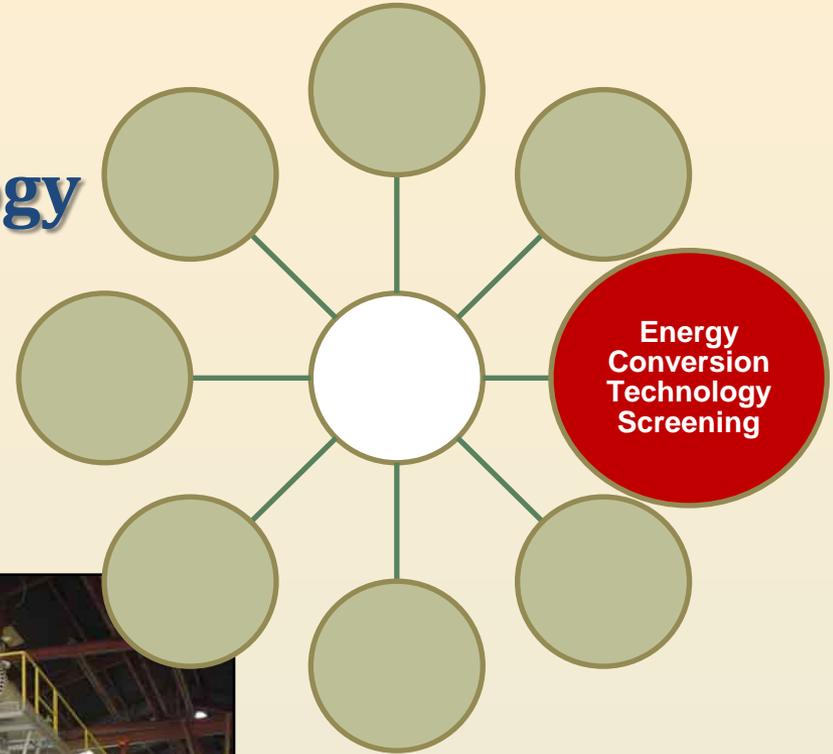




Project Factors

Energy Conversion Technology Screening

- Thermal and Electrical Energy Generation
 - Combustion
 - Gasification
- Liquid Fuel Generation
 - Gasification
 - Pyrolysis
- Anaerobic Digestion of WWTP Effluents



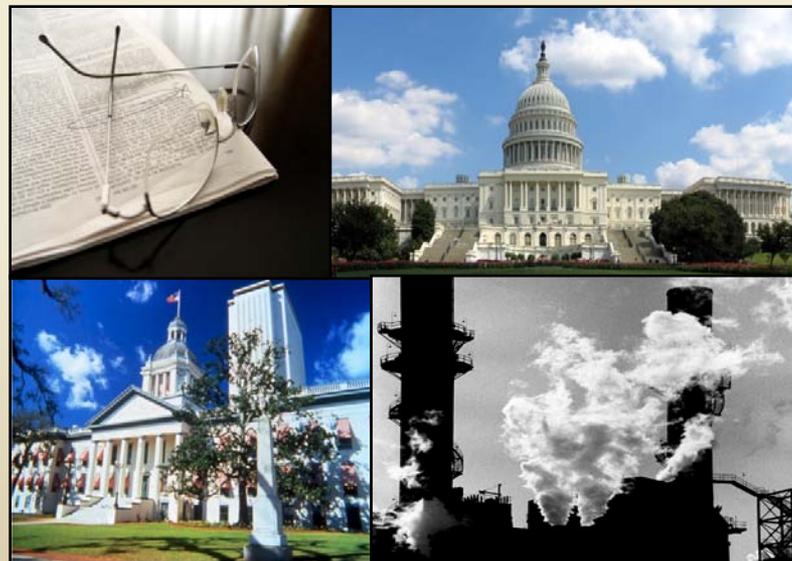


Project Factors

Governance and Other Developmental Considerations

- **Permitability Analysis**
 - Air
 - Water

- **Utilities and Energy**
- **Production Facility Logistics**
- **EAFB-Specific Procedures for Project Development**

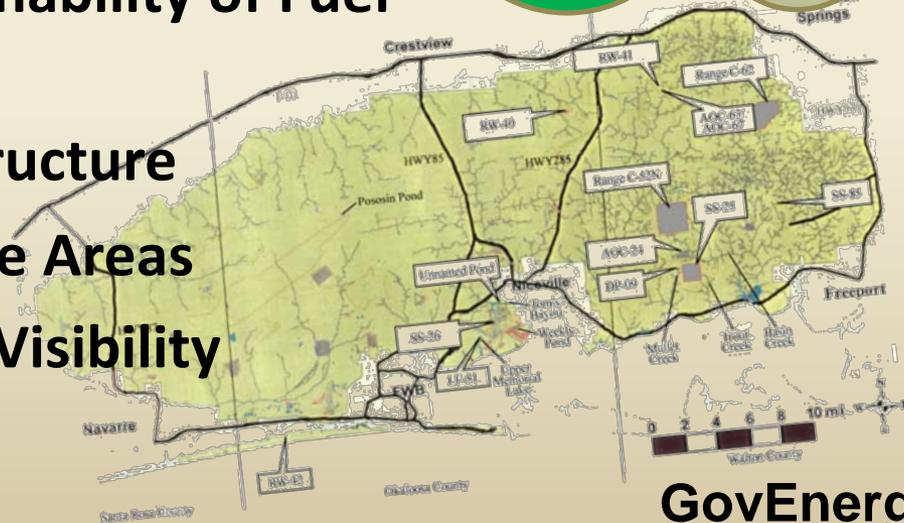
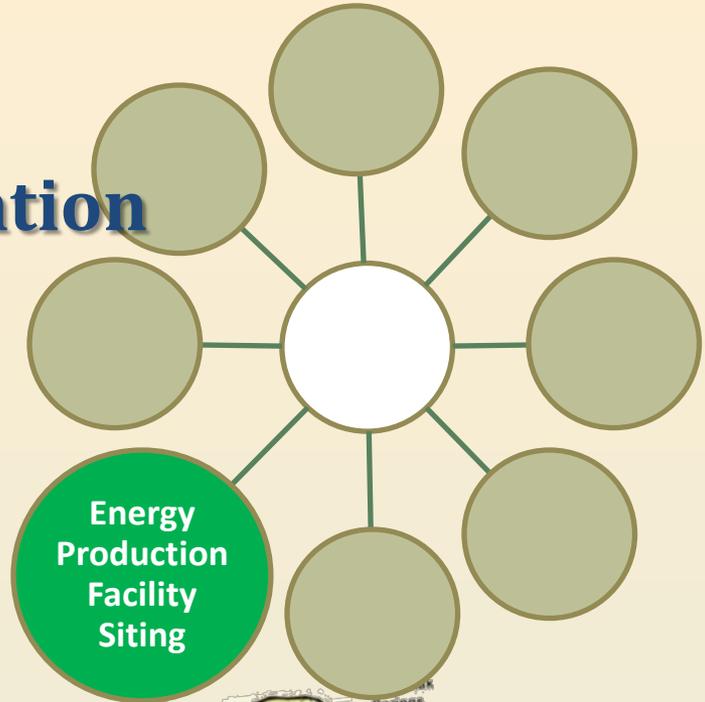


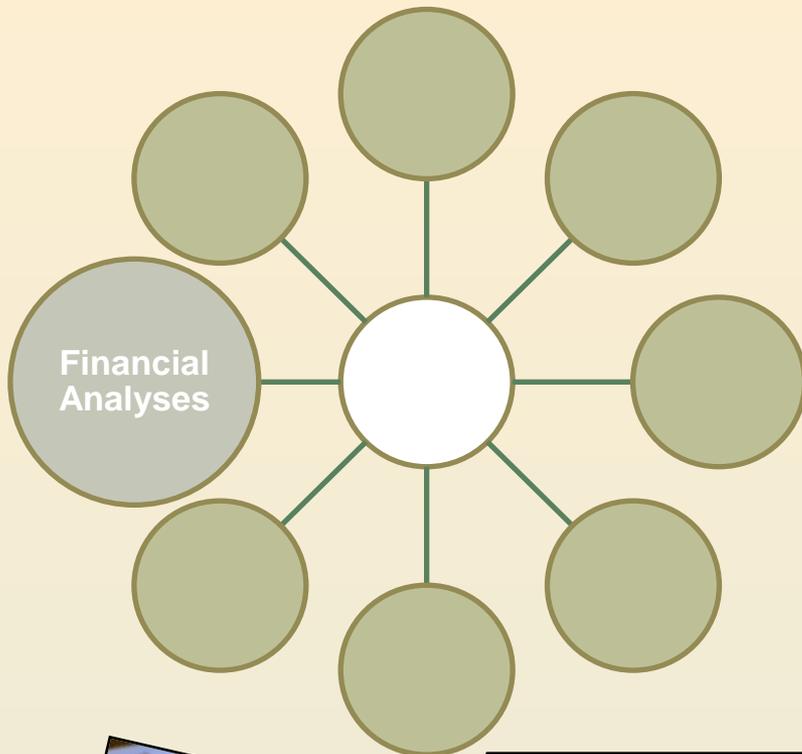


Project Factors

Energy Production Facility Location Screening Criteria

- Utility Interconnection
- Water Supply Infrastructure
- Energy Reliability
- Proximity and Sustainability of Fuel Source
- Fuel Delivery Infrastructure
- Proximity to Sensitive Areas
- Stack Height/Plume Visibility





Project Factors

- Evaluated 3 Facility Size Scenarios
- Electricity Price Based On Projected Rates From 5 Years of EAFB Data
- 25 MW Facility Scenario presents the least financial risk



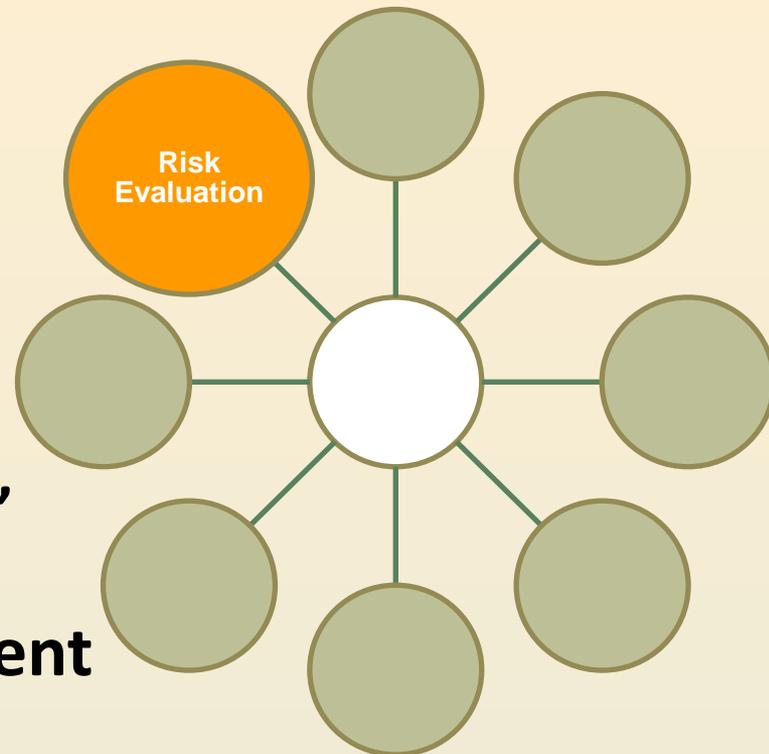


Project Factors

Risk Evaluation

Major Risks

- **Fuel**
 - Availability, Sustainability, Price, Quality
- **Power Purchase Agreement**
 - Long Term, Robust
- **Governance**
 - Mission Priorities, Permit Acquisition, Permit Compliance, Regulation Changes





Project Details

- ***Privately owned and operated 25-MW facility***
 - Located on base
 - Founded on long-established combustion and steam turbine generator technology
 - Incorporates state of the art water use minimization and emissions controls technology.
- ***Business Case Analysis included an optional energy reliability/redundancy enhancement project to cross-tie major on-base electrical infrastructure.***





Project Details

- 389,000 green tons of fuel per year
- 75-mile fuel procurement area
- Infrastructure supported location options
- Environmentally responsible location options





Project Details

Sustainable?

- Net annual timber change is estimated at +3,000,000 green tons per year in procurement area. (total annual timber growth minus annual timber removals)
- The net annual change for fuelwood is estimated at +300,000 green tons per year.
- The existing fuelwood quantity is 500,000 tons per year, but representative of only a portion of the total fuelwood production in the study area.





Payoff

- **When coupled with a power purchase agreement/land use instrument**
 - Meets operational, technical, and economic drivers
 - Supports and enhances EAFB's mission and goals achievement including:
 - Increased energy independence by meeting critical infrastructure base loads with capacity for expansion.
 - Energy reliability/redundancy enhancement for continuity of operations.





Payoff (Continued)

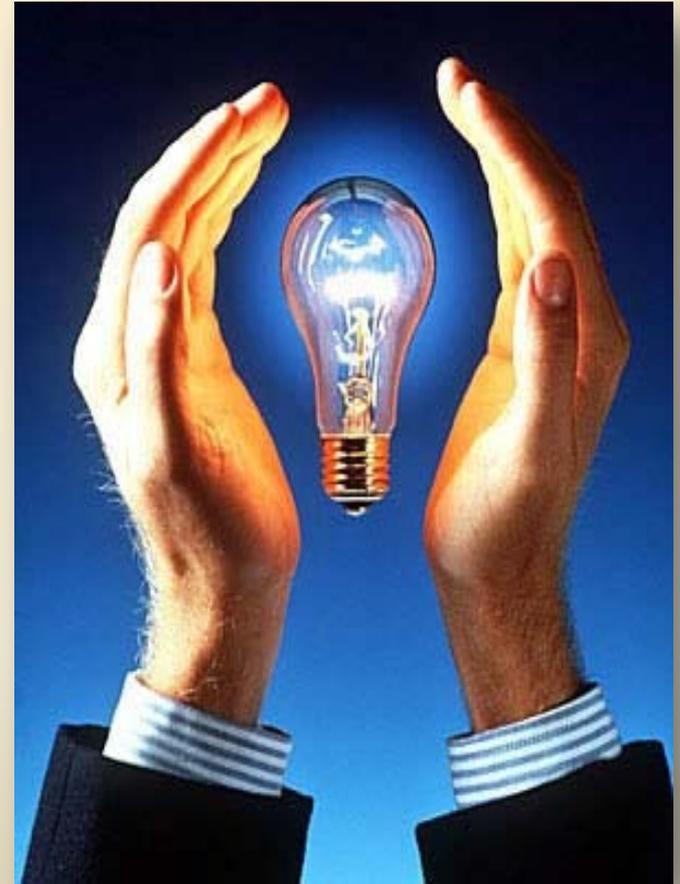
- **Energy Policy Act of 2005**-Sets annual goals for renewable energy
 - On-track with energy goals - 7.5% by FY 13.
- **10 USC 2911 National Defense Authorization Act of 2007**
 - On-track with DOD renewable energy goals- 25% by 2025.
- **Executive Order 13423**
 - Creates *new* energy source.
 - Privatized renewable energy project on agency property.
- **Executive Order 13514**
 - Measurable environmental and economic benefits.
 - Life-cycle return on investment.
 - Results in reduced Greenhouse Gas Emissions.
- **Air Force Infrastructure Energy Strategic Plan-2008**
 - Results in on-base renewable energy production.
 - On-track with goals - 3% of consumption by FY 15.





Payoff (Continued)

- **Managed Energy Costs**
- **Greenhouse Gas Emissions Reduction**
- **Positive Economic Impact**
- **Regional Economic Development and Creation of New Sustainable Jobs**
- **No Up Front Capital Costs**
- **Ability to Monetize Tax Incentives**
- **No Operations and Maintenance Responsibilities**
- **Minimal Risk to the USAF**
- **Shorter Implementation Period**
- **Allows USAF to Focus on Core Mission**





Way Ahead

- **Developer Procurement**
 - Engagement of developer
 - **Must be involved in subsequent steps**
- **Plant Site Selection**
- **NEPA Process**
 - Part of site selection process
- **Secure Fuel Supply Agreements**
 - **Without long term fuel agreements project viability is at risk.**
- **Secure Power Purchase Agreement**
 - **Without a long term PPA in-place project viability is at risk.**

Department of Environmental Protection
Division of Air Resource Protection
APPLICATION FOR AIR PERMIT - LONG FORM

1. APPLICATION INFORMATION

Air Construction Permit: Use this form to apply for an air construction permit.
 • For any proposed project at a facility operating under a Schedule 1 authorized state air operation permit (FACOP) Title V air operation permit.
 • For a proposed project subject to preconstruction notification (PCN) review, installation of new source control, or maintenance of significant deterioration (SSD) review, installation of such as PSD review, attainment new source review (NSR), MACT, or Title V, or
 • To submit a revision to the proposed conditions of use or more pollution to escape a requirement for such a review, or to request a permit modification to escape a requirement for such a review.
Air Operation Permit: Use this form to apply for:
 • An initial facility authorized state air operation permit (FACOP), or
 • An initial, revised, or renewed Title V air operation permit.
 To ensure accuracy, please see form instructions.

Identification of Facility:

1. Facility Owner/Company Name: _____
 2. Site Name: _____
 3. Facility Identification Number: _____
 4. Facility Location:
 Street Address or Other Locator: _____
 City: _____ County: _____
 5. Hazardous Facility? Yes No
 6. Existing Title V Permitted Facility? Yes No

Application Contact:

1. Application Contact Name: _____
 2. Application Contact Mailing Address:
 Street Address: _____
 City: _____
 3. Application Contact Telephone Number: _____ Date: _____
 Telephone: () - - ext. _____ Zip Code: _____
 4. Application Contact E-mail Address: _____ Fax: () - -

Application Processing Information (APP):

1. Area of Jurisdiction of Application (APP): _____
 2. Project Number(s): _____

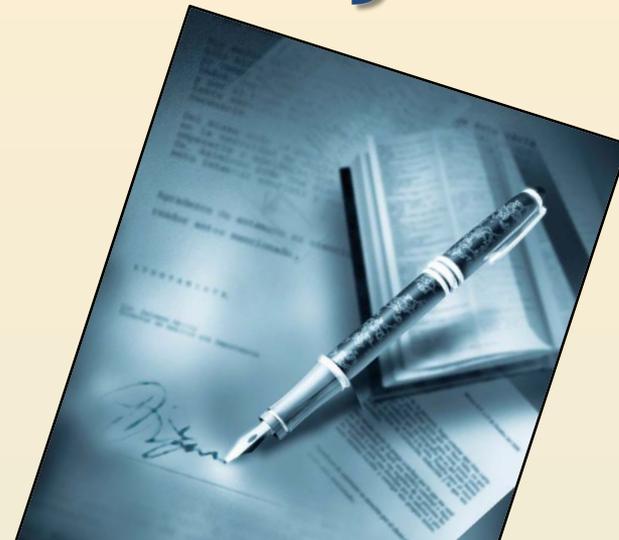




Way Ahead (Continued)

- **Land Lease Agreement**
 - Impacts project economics and logistical issues.
 - Without an acceptable agreement project viability is at risk.

- **Air Permit Acquisition**
 - Issuance required before construction starts.





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Questions

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Thank you!