Critical Mission Support Through Energy Security

Development of an Army Energy Security Assessment Model

FUPWG

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Purpose

- Provide an overview of the Army Energy Security Assessment (ESA) methodology
  - Being developed by Concurrent Technologies Corporation
  - Monitored by the US Army Corps of Engineers (USACE), Engineering Research and Development-Construction Engineering Research Laboratory (ERDC-CERL)
- Engage Utility and Government Stakeholders

Overall Program Objectives

- Develop/enhance the draft ESA methodology demonstrated under the Army Power and Energy Initiative (APEI)
  - Leverage existing processes (e.g., Anti-terrorism/Force Protection)
  - Critical Mission focused
- Validate the methodology at an Army installation
- Demonstrate at four additional installations for implementation toward improving their energy security posture
- Refine for potential use across the Army
- DD-254 Secret Level Project Classification

Program Drivers

- DoD Goals include increasing Energy Security
  - EPACT05
  - Defense Science Board Recommendations
  - Executive Order 13514 (supersedes EO13423)
  - Energy Independence and Security Act of 2007
  - NDAA of 2009 and 2010
- 2010 DoD QDR defines Energy Security as:
  - "…having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs."

Program Drivers

- Army-specific goals – Army Energy Security Implementation Strategy (AESIS)
  - ESG 4: Assured Access to Sufficient Energy Supply
    - Objective 4.1: Implement Energy Security Plans (ESPs)
      - Metric 4.1a: Provide an Army-level template for energy security plans
      - Metric 4.1b: Identify all Army critical facilities/installations
      - Metric 4.1c: % of installations with ESPs
      - Metric 4.1d: Review energy security and reliability considerations with utility suppliers and privatized utility service providers annually in accordance with the installation's ESP
      - Metric 4.1e: Implement recommendations to achieve reliable and adequate energy supply for critical facilities/installations

Program Benefits

- A standardized approach will provide a consistent methodology to assist installations in identifying mission-related:
  - Critical Facilities/Functions/(Sub)Components
  - Electrical requirements and infrastructure needs for those Critical Facilities
  - Potential energy security vulnerabilities
  - Prioritized energy security risks
- Provide actionable project solutions and business case justification for energy system enhancements
- Provide energy security documentation for future mission planning and energy system planning
- Ensure continuity of critical operations / enhanced mission capabilities

Overall Program Approach

- Establish an Army-level collaborative working group
- Working group expectations
  - Review current/enhanced ESA methodology
  - Provide candid feedback to improve the methodology
    - Identification of Critical Facilities
    - Vulnerability and Risk Management
- Continue to provide support to enhance and define the methodology

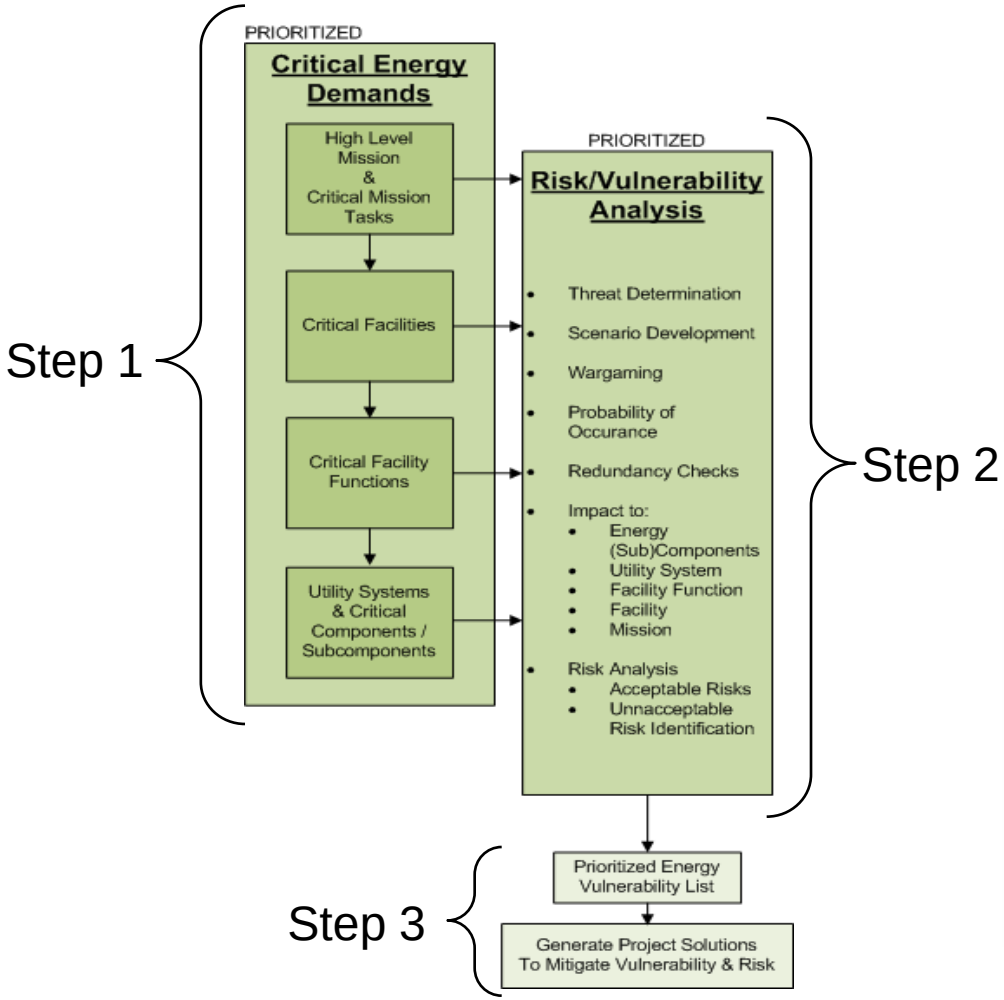
WG Members

- Assistant Chief of Staff for Installation Management (ACSIM)
- Deputy Assistant Secretary of the Army for Energy and Partnerships (DASA-E&P)
- ERDC-CERL
- Headquarters Department of the Army (HQDA)G-3/5/7
- HQDA G-3, Critical Infrastructure Risk Management (CIRM) Branch
- Installation Management Command (IMCOM)
- Pacific Northwest National Laboratory (PNNL)
- US Army Corps of Engineers (USACE), Defense Critical Infrastructure Program (DCIP)

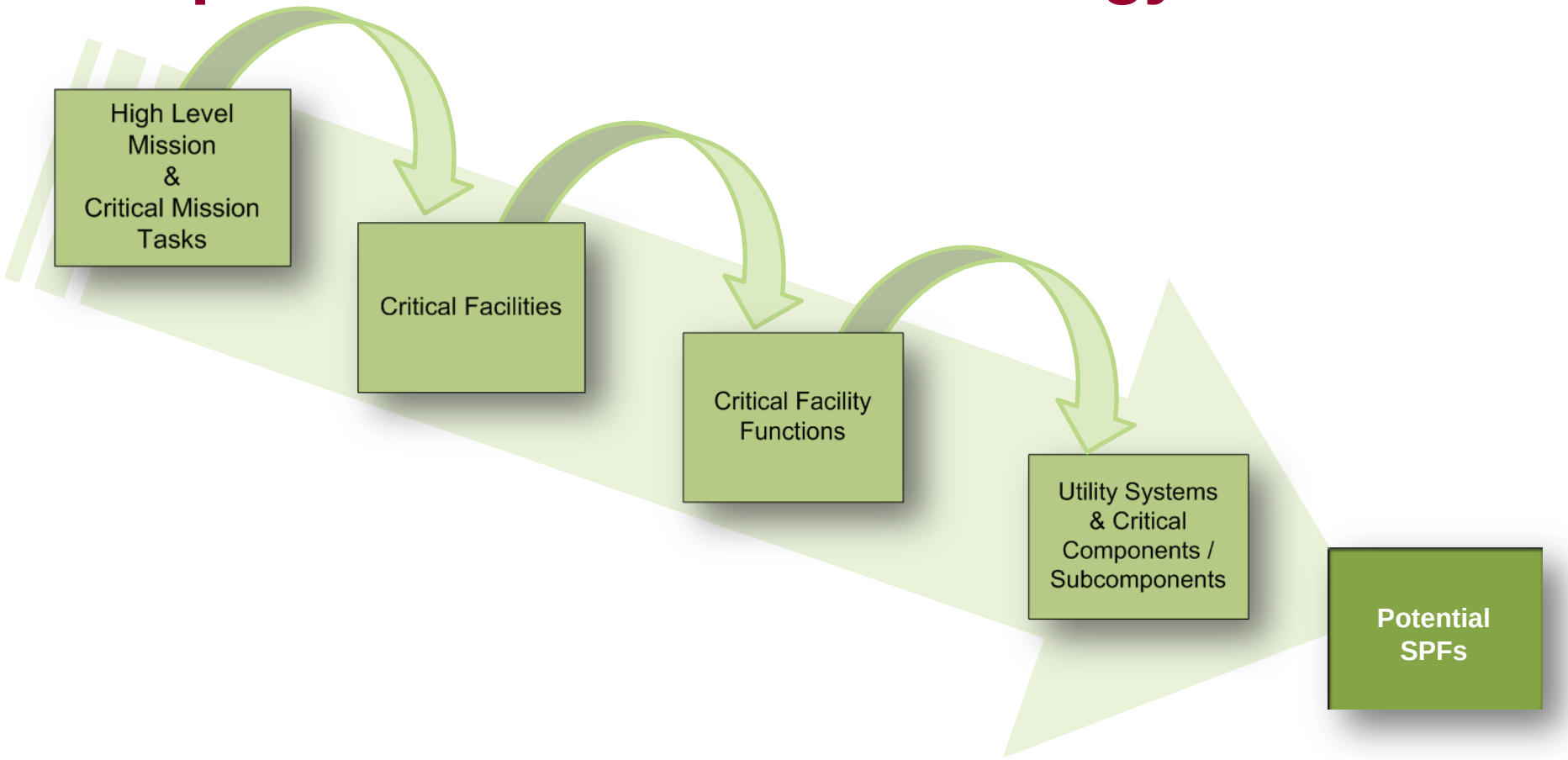
Current Assessments

- Many different critical asset lists are maintained
  - Mission Essential Vulnerable Areas (MEVA)
  - High Risk Target (HRT)
  - Directorate of Public Works (DPW) Critical Facilities List
  - Task Critical Assets (TCAs)
  - Joint Staff Integrated Vulnerability Assessment (JSIVA) reports/data
  - Risk Management Decision Package (RMDP) reports/data
- Currently, these lists are not integrated nor are energy issues specifically evaluated
- Objective of our ESA methodology is to do so

ESA Methodology



Step 1 - Prioritized Critical Energy Needs



Key Installation Personnel

- Garrison Commander (or delegate)
- Department of Public Works (DPW)/ Installation Services
- Directorate of Plans, Training and Mobilization – G3 (DPTM)
- Mission Owners/Major Unit Leads
- Directorate of Logistics (DOL)
- Directorate of Emergency Services (DES)
- Network Enterprise Center (NEC)
- Service Contracts and Inspections Office/Branch

Note: Some Army Installations may have a different organizational structure, but will still have personnel working within the scope of the descriptions provided.

Mission Decomposition

- Mission Decomposition will lead to a list of Critical Mission Tasks to prioritize
  - Mission Type
  - Mission Description
  - Mission Task
  - Mission Task Description
  - Mission Task Duration
- Mission Owners = Tenants, Units and Garrison
- Will loss of this Mission Task cause failure or severe degradation to the Mission?

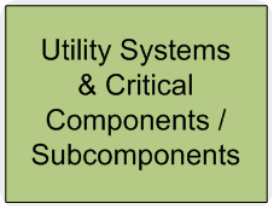
Critical Facility Prioritization

- Mission Task Analysis will lead to a list of critical facilities
- Ranking of facilities by:
  - DES
  - DPW
  - DOL
  - NEC
  - MEVA List
  - HRT List
  - TCA List
  - Mission Command Preference
  - Garrison Command Preference
- Interdependency Rating for Facilities to Critical Mission Tasks
- Will loss of the Critical Facility, cause failure or severe degradation to the Mission?

Critical Facility Functions

- Identification of critical facility functions will determine the interdependency of Utility Systems (on-post and off-post)
- Basis of Analysis
  - Energy needs to support the Mission
  - Adverse impact to Mission
  - Alternative Functionality
  - Time to Restore
  - Time to Impact Mission
- Will loss of this facility function, cause failure or severe degradation to the Mission?

Analysis of Utility Systems



- Identification of Critical (Sub)Components
  - On-Post
  - Off-Post
- Critical (Sub)Components can affect the functionality of:
  - Critical Facilities
  - Critical Facility Functions
  - Utility Systems
- Critical (Sub)Components can be identified as single points of failure

Step 2 - Risk and Vulnerability Analysis

Risk/Vulnerability Analysis

- Threat Determination
- Scenario Development
- Wargaming
- Probability of Occurrence
- Readiness Impact
- Impact to:
  - Energy
  - (Sub)Components
  - Utility System
  - Facility Function
  - Facility
  - Mission
- Risk Analysis
  - Calculated Risk Value
  - Risk Level Identification
    - Acceptable
    - Unacceptable

- Determine reality-based Initiating Events
- Develop reality based threat scenarios
- Analyze the prioritized Critical Facilities using a Wargaming process to determine
  - Probability of Occurrence
  - Readiness Impact/Severity
  - Calculated Risk Value
  - Risk Level/Acceptance versus Unacceptable
- Simulation & statistical analysis techniques to account for uncertainties
- Examine results to determine vulnerabilities

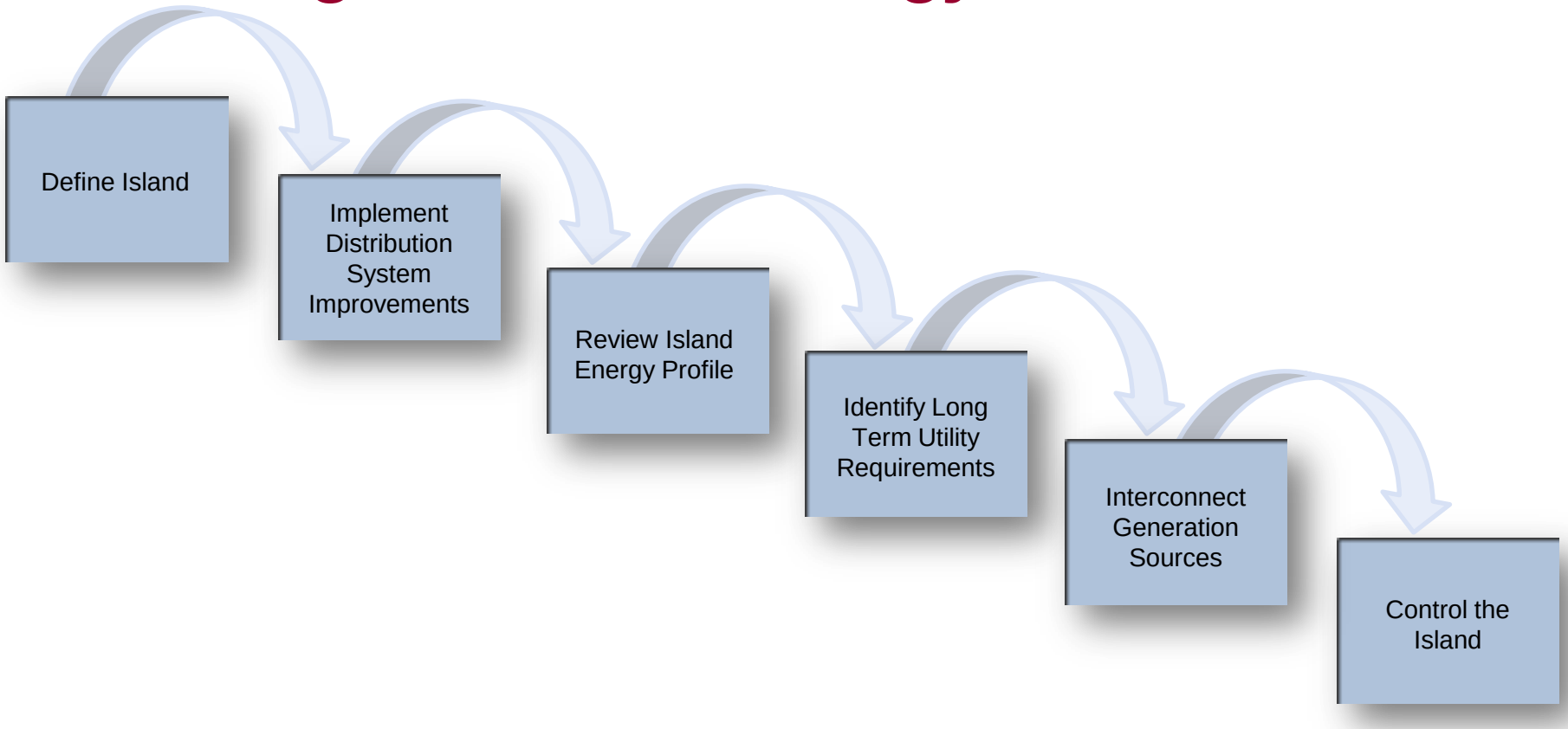
Step 3 – Installation Solutions

- Create a High Reliability Generation and Distribution System
  - Reduces Peak Demand
  - Increases Renewable Energy Application
  - Provides Quick Power Restoration
  - Provides Active Response to Weather, Aging, and Threats
- Eliminate Collocated Facilities
- Provide Redundancy
- Major Spare Parts Inventory
- Emergency Fuel Supply Plan

Islanding Plan

- High Reliability Generation and Distribution System
  - Intelligent Distribution System (Smart Grid)
  - Self Sustaining Electric Infrastructure
  - Onsite Electric Generation
  - Demand Response Control

Islanding Plan Methodology



Islanding Plan Methodology

- Define the Island
  - Identify operational needs based upon the Mission and Catastrophe
  - Create various operation scenarios from different situations
  - Prepare a hierarchy of loads
- Implement distribution system improvements to allow automated control and operation of the electrical system
  - Automated switching
  - Individual load control
- Review the Energy Profile of the Island
  - Electrical requirements
  - Distribution capabilities

Islanding Plan Methodology

- Identify the other Utility requirements to support long term operation
  - Water, Wastewater
  - Communication
- Interconnect to new and existing generation sources
  - Existing grid connected generation supply
  - New Generation assets, Renewable generation, Bio fuel generation
- Control the island
  - Monitor the generation assets
  - Control the distribution based upon the load needed
  - Isolate non essential loads when generation is over tasked
  - Control power flow to maintain the operation and mission

Path Forward

- Conduct Validation Assessment at Fort Detrick (Sept – Dec 2010)
- Schedule Pre-Coordination Meetings for final go-ahead
  - Joint Base Lewis McChord
- Continue discussions with:
  - Fort Bliss
  - Fort Bragg
  - Fort Stewart
- Meet with the ESA WG to discuss methodology and the results from the first site assessment (Dec 2010)
- Continue collaborations with PNNL to deliver the draft methodology to ACSIM
- Finalize data collection tool to support the methodology

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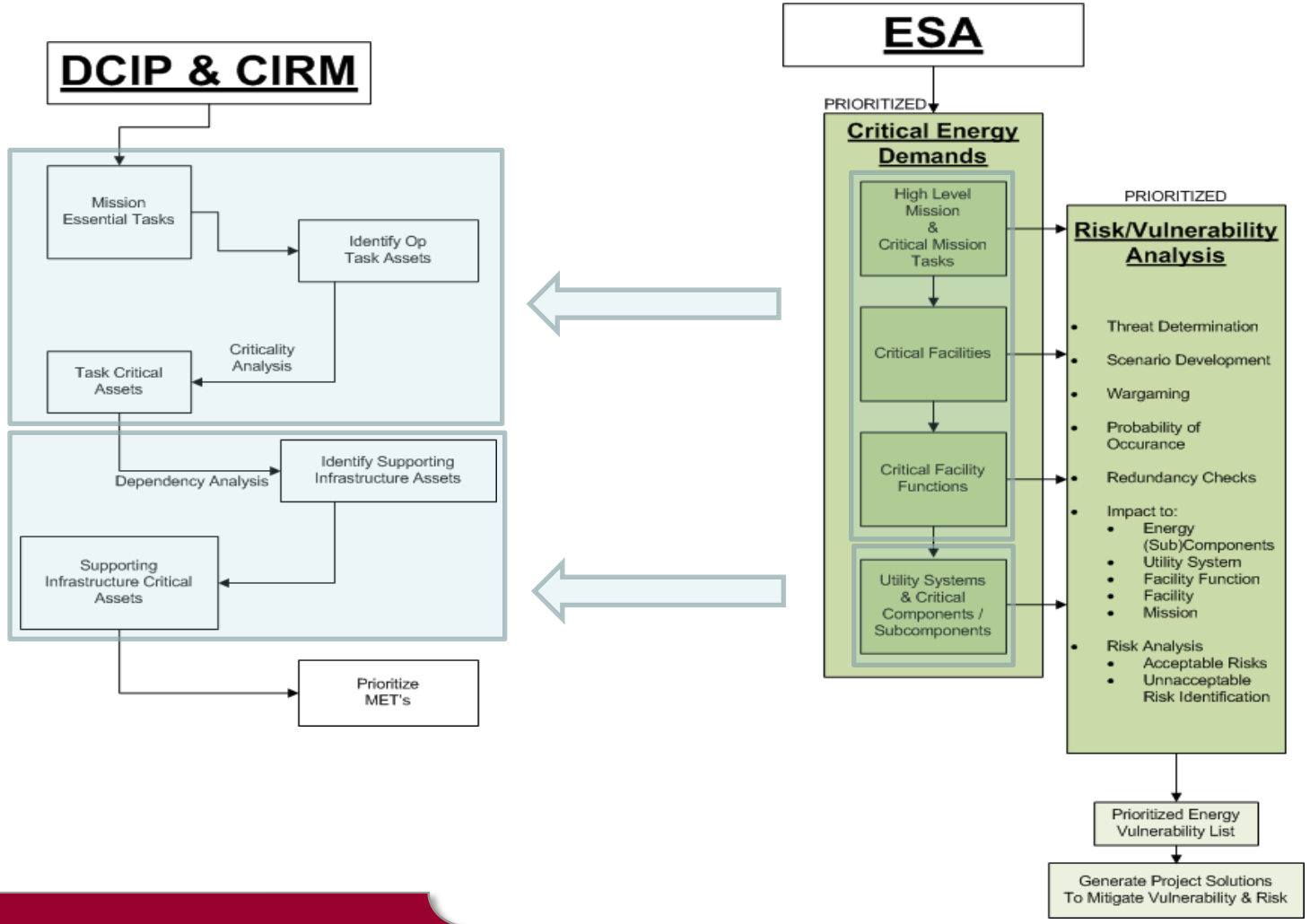
Thank You!!

Back Up Slides

Program Drivers

- Observations from the field
  - Many Army Installations have energy systems (to include backup generation) that require modernization
  - It is a challenge for Army Installations to identify and prioritize Energy Security Improvements
  - Typically no regular interface with DES, DPTMS and others who regularly analyze vulnerabilities
  - Many installation energy security assessments/plans are out of date
  - AT/FP assessments are focused on a specific location's ability to deter and/or respond to a terrorist event - energy disruptions and effect on mission execution are a secondary outcome
  - Other mandates and requirements result in an inability to focus on priority tasks

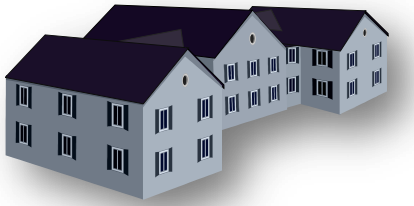
Leveraging the DCIP/CIRM Approach

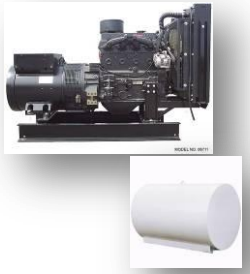


Notional Example – Fort Marshall

- Mission Decomposition
  - Sample Mission Description: ***Strategically deploy, conduct forcible assault, and secure key objectives for follow-on military operations in support of U.S. national interests***
  - Sample Mission Task: ***Conduct Command, Control, Communications, Intelligence, Surveillance and Reconnaissance from a central location***
  - Sample Task Description: ***Utilize Command Control HQ and worldwide communications to execute mission***
  - Sample Task Duration: ***One month***
  - Mission Owner(s): ***Unit Commander***

Notional Example – Fort Marshall



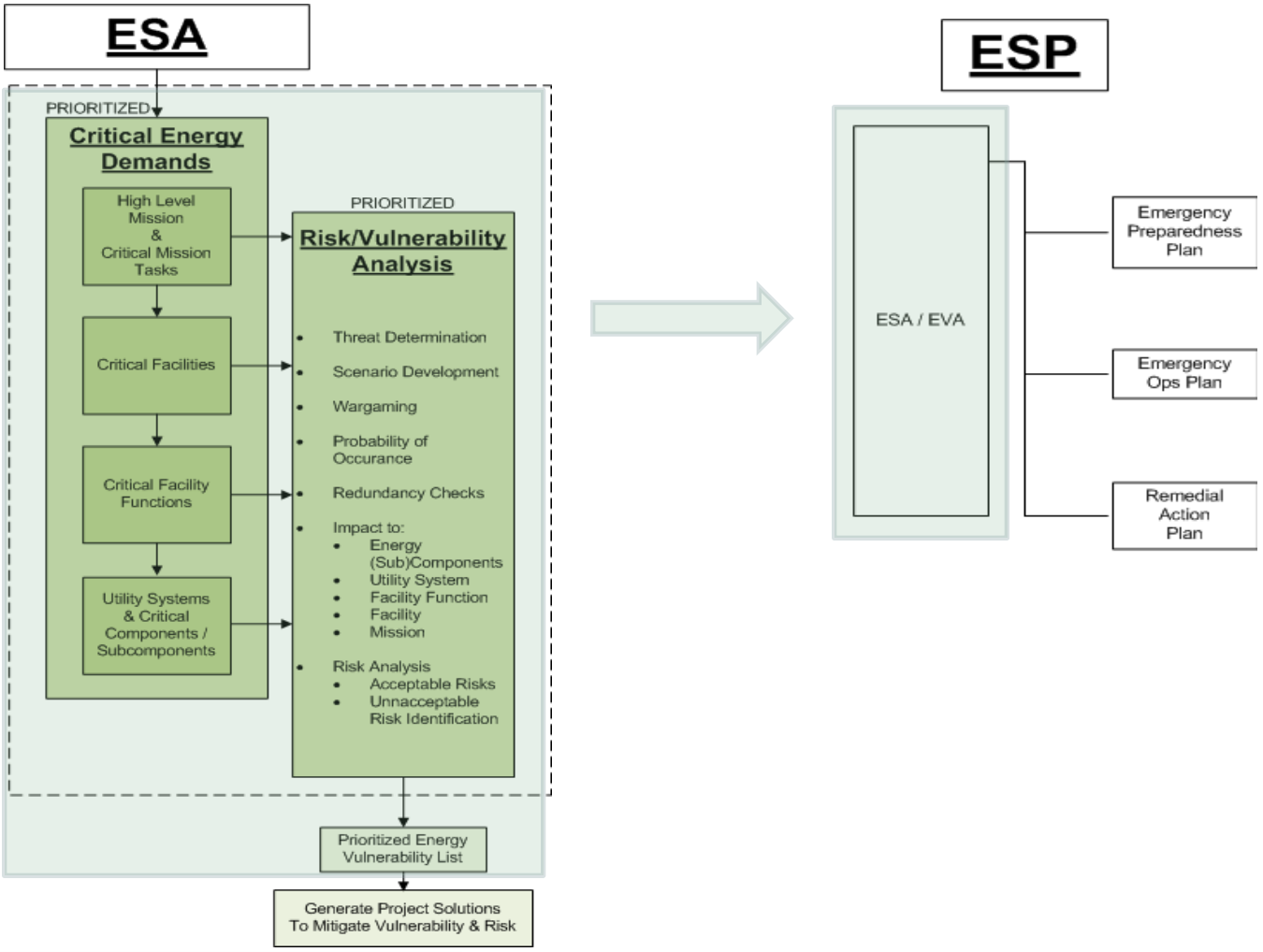


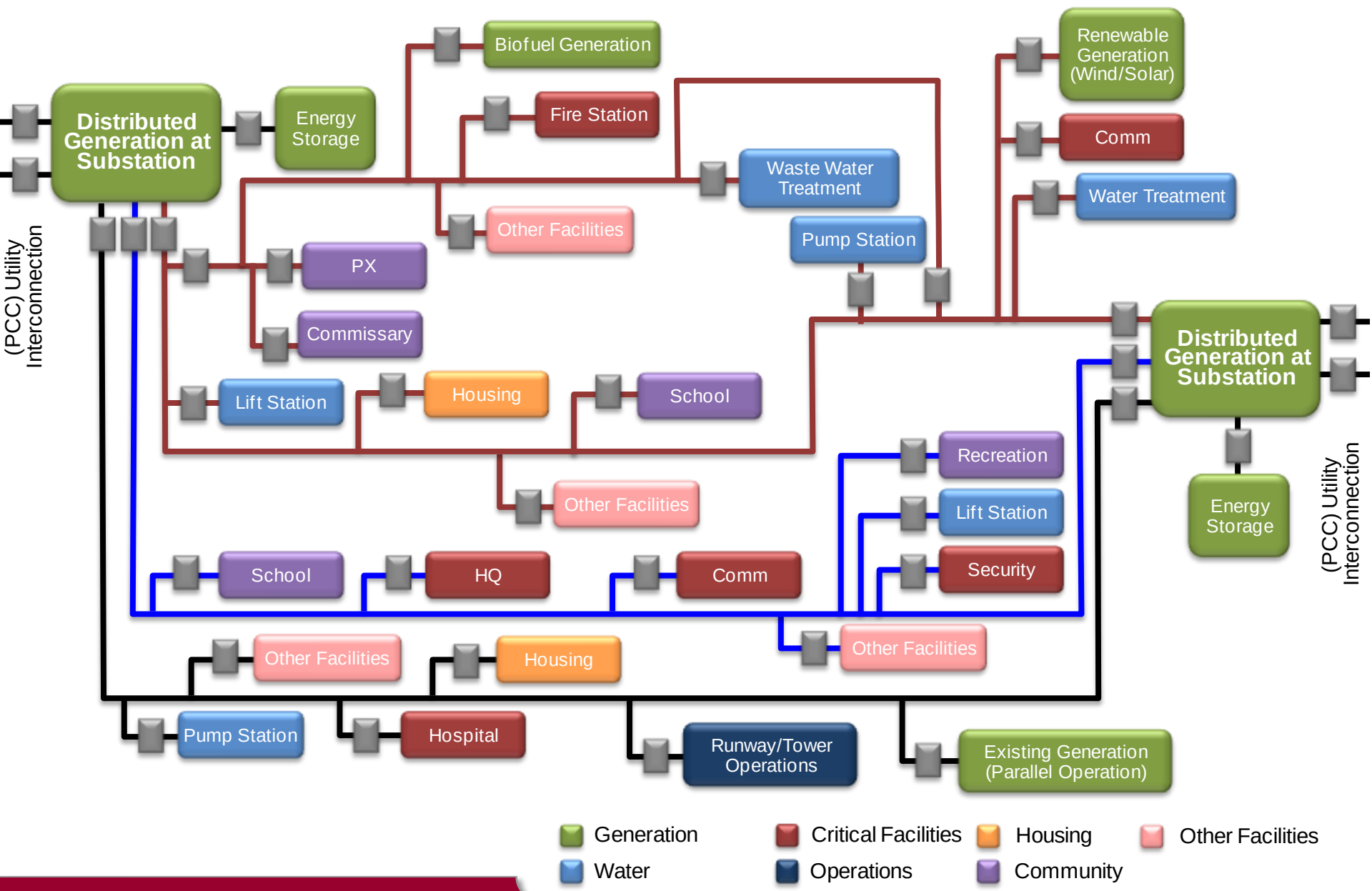
- Critical Facility: ***Command HQ Building, etc.***
- Critical Facility Function(s): ***HVAC, Data, Communications, etc.***
  - Energy needs to support the Mission - ***Electricity, etc.***
  - Adverse impact to Mission - ***Yes***
- Identification of Critical (Sub)Components
  - ***On-Site Distribution Line, Substation (Transformer)***
  - ***Off-Site Transmission Line, Substation (Transformer)***
- Alternate Functionality - ***Backup Diesel Generator with adequate fuel storage***

Notional Example – Fort Marshall

- Potential single points of failure
  - Dual electric primary feed to facility co-located on single structure
- Potential solutions to reduce risk/vulnerabilities
  - Work with Utility provider to separate primary feeds (Utility investment)
  - Provide redundant backup generator
  - Secure logistics plan for backup generator refueling during emergency conditions

Integration with ACSIM ESP




Distributed Generation at Substation
Energy Storage
Biofuel Generation
Fire Station
Waste Water Treatment
Other Facilities
Pump Station
PX
Commissary
Lift Station
Housing
School
Other Facilities
School
HQ
Comm
Other Facilities
Housing
Pump Station
Hospital
Runway/Tower Operations
Existing Generation (Parallel Operation)
(PCC) Utility Interconnection
Renewable Generation (Wind/Solar)
Comm
Water Treatment
Distributed Generation at Substation
Energy Storage
(PCC) Utility Interconnection
Recreation
Lift Station
Security
Other Facilities
Generation
Critical Facilities
Housing
Other Facilities
Water
Operations
Community

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