Agenda

• Geographic/ facility overview
• Project Overview
• Technology Overview
  - CUP1
  - CUP2
  - EGEN
• Resiliency Initiatives
• Questions
White Oak Challenge

**Mission:**
- Campus integrates FDA’s functions to increase scientific synergy and collaboration.
- Protect consumers from unsafe products, address threats before they arise, and help deliver safer foods and safer, more effective medical therapies.

**Needs:**
- Energy security - supply
- Energy surety - reliability
- Energy efficiency, renewables mandates
- Ability to expand as campus expands

**Challenges:**
- Budget constraints (New construction ESPC)
- Ability to balance sometimes conflicting needs
- Aging utility infrastructure

Requires an islanded microgrid to meet GSA/FDA requirements
White Oak: Major Stakeholders

- **Federal Client**
  - Department of Energy (DOE)
  - GSA

- **Tenant**
  - FDA

- **Developer/Host**
  - FEMP

- **Campus A-E Designers**
  - KLINGSTUBBINS
  - RTKL

IN ASSOCIATION WITH
Close-up aerial view
Central Utility Plant 1

- **27,000 SF**
- **Electrical Generation – 25.8 MW**
  - One - 2.0 MW black-start generator (diesel)
  - One - 5.8 MW reciprocating engine (dual fuel)
  - Four - 4.5 MW turbine-generators (NG only)
- **Chilled Water – 10,460 tons**
  - Two - 1,100 tons absorbers
  - Two - 1,130 tons, three - 2,000 tons centrifugals
- **Hot Water**
  - Three – 10 MMBtu/Hr (dual fuel)
- **PV: 25 kW fixed, 5 kW tracking**

<table>
<thead>
<tr>
<th>Master Plan</th>
<th>Square Footage</th>
<th>Campus Population</th>
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<tbody>
<tr>
<td>1997</td>
<td>2,100,000</td>
<td>6,000</td>
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<tr>
<td>2006</td>
<td>3,200,000</td>
<td>7,500</td>
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Central Utility Plant 1
Central Utility Plant 2

- 50,000 SF (LEED Silver)
  - Electrical Generation – 29 MW
    - Two - 2.25 MW black-start generators (diesel)
    - Two - 7.5 MW turbine-generators (dual)
    - One - 4.5 MW turbine-generator (NG only)
    - One - 5.0 MW steam turbine
  - Chilled water - 7,500 tons
    - Three - 2,500-ton centrifugals
  - 2MM gallon chilled water storage tank
  - Steam
    - One 25 KPH dual-fuel Steam Boiler
    - Two (fired) HRSGs (on 7.5 MW turbines)
    - 112 MMBTUH heating HW converters

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<td>2009</td>
<td>3,900,000</td>
<td>9,000</td>
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ESPC III – Major Physical Features (CUP 2)
Emergency generation (EGEN) system

- Redundant system to serve select facilities in the event of primary system failure (power generation, distribution)
  - Would only operate in island mode, not paralleled to utility (NOT seamless) – transfer switches
- Remotely located power plant with five (5) 2.5 MW SDGs, individual weatherproof enclosures, 72 hours of diesel fuel storage
- Dedicated 15 kV feeder to critical building switchgear
  - SDGs start within 10 seconds
  - Switchgear at each building switches to EGEN feeder
Optimization: Key to successful partnership

Additional Value:

• Over-produce on ‘gold’ days for PJM ISO
• Automatic load shed scheme
• Dual-fuel generation assets

Honeywell, GSA and FDA work together to operate the facility in the best interest of the Government.
Surviving super storms, hurricanes, derechos, earthquakes (and those pesky squirrels!)  

- Fast, seamless separation from utility instability 
- Fast load management for generator demand control 
- Slow load management when time is not critical 
- Black start capability to island mode operation 

Transition to island-mode is reactive or proactive
FDA Headquarters, Labs Remain Online With Honeywell Microgrid During Bomb Cyclone

- 0715 White Oak loses first electric feeder
- Honeywell manually placed plant into island mode
- 30 Minutes later second feeder down – Campus without external grid power supply
- 0929 Local residents ‘Tweet’ of exploding transformer and loss of power
- FDA continued without power interruption for over 24 hours (ultimately)
- Using grid sampling and weather analysis tools Honeywell predicted when safe and prepared to come off island mode – Winds below 25 MPH monitored with “Thor Guard”.
- March 3 - 0800 FDA White Oak returned to grid power
Weekly operating report from 10/24/2018

<table>
<thead>
<tr>
<th>CUP Report</th>
<th>Cup statistics</th>
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<tbody>
<tr>
<td>76 - Island Mode YTD 2018</td>
<td>100% Power Generation</td>
</tr>
<tr>
<td>492 Days Uninterrupted Power</td>
<td>74.7% Fuel Tank Reserve On Hand (2 Trucks)</td>
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<td></td>
<td>89.8% EGEN's fuel On Hand</td>
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<tr>
<th>ISLAND MODE</th>
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<tr>
<td>2018 - Island Mode Operation Hours (YTD) - 191:48</td>
<td>76 Island Mode Initiation - 33 Automatic transfer, 43 manual</td>
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Last island mode was manual on 10/11/18 – 1457, Central utility plant in island mode; Thor Guard lightning detection system red alert, CUP Operator opened CUP CB 301, 401, 500 and 700. (CB203 - )
Questions?

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