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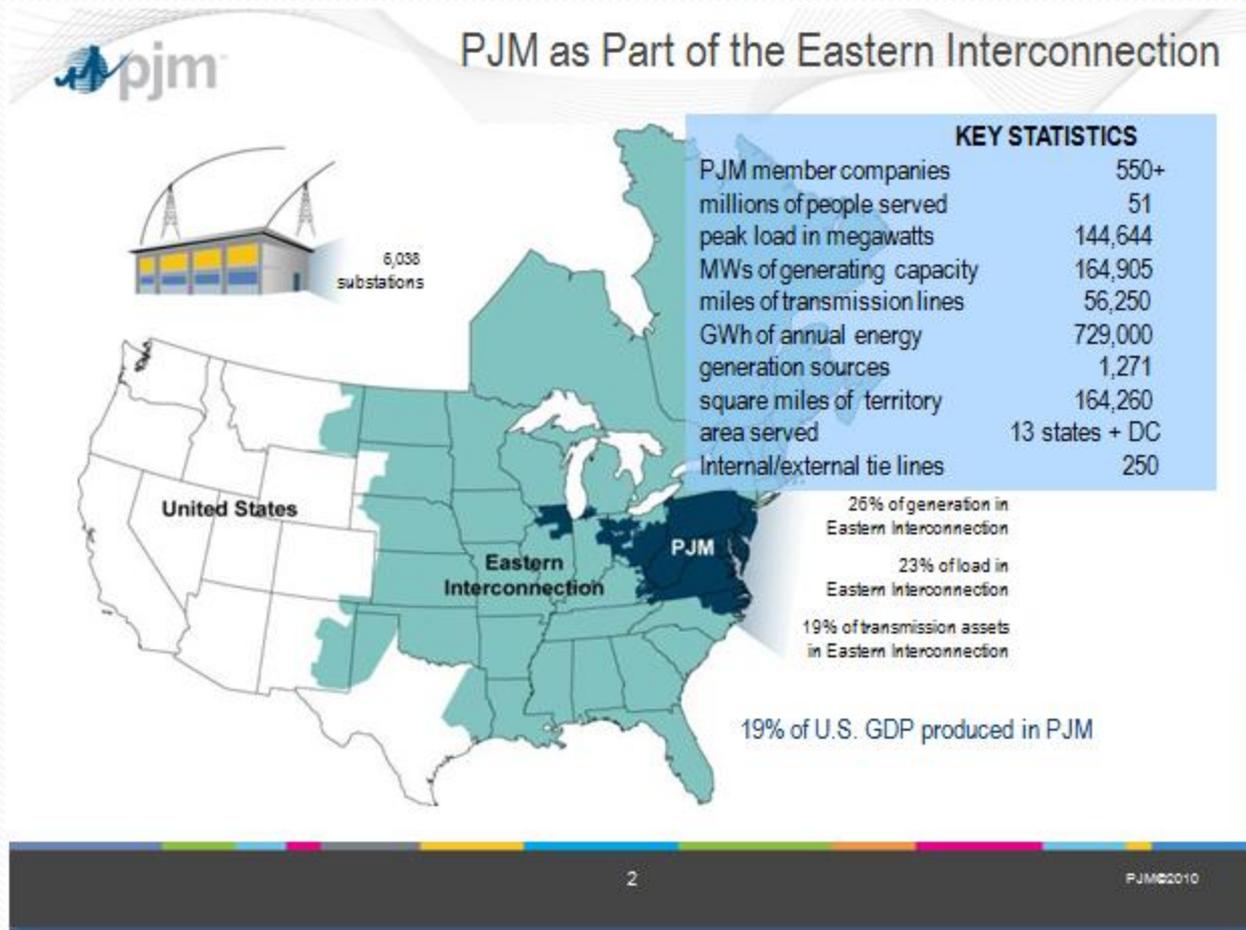
# **How to train your buildings to work with the regional grid operator**

Tony Karwoski ARMY REM with SAIN Engineering



# Advantages of Building Energy Management in Response to the Regional Utility Grid---What's in it for the Fort Meade Campus?

# GRID RUSH HOUR IN THE N.E.

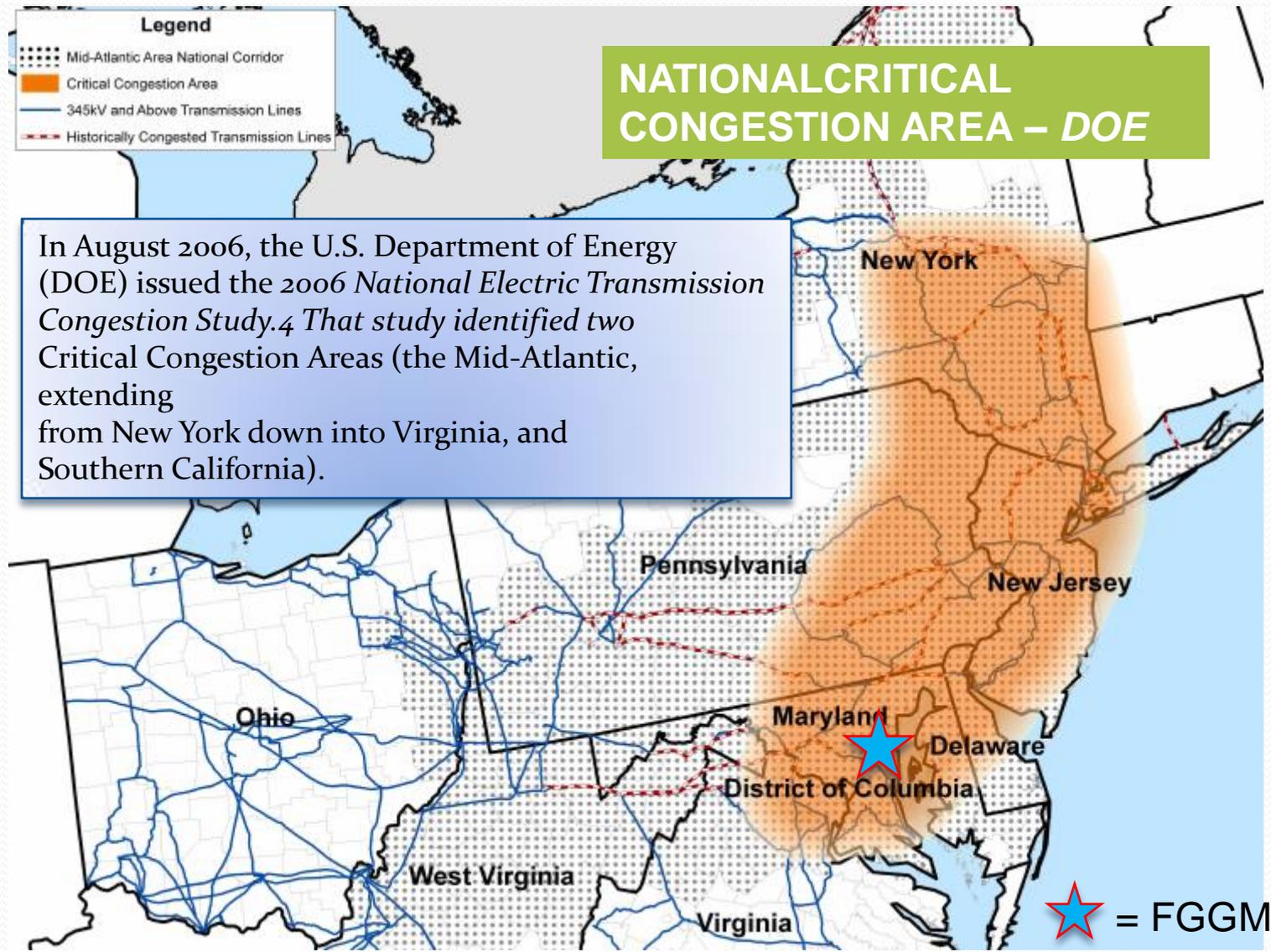


# Critical Congestion Corridor and Energy Security



**NATIONAL CRITICAL CONGESTION AREA – DOE**

In August 2006, the U.S. Department of Energy (DOE) issued the 2006 *National Electric Transmission Congestion Study*.<sup>4</sup> That study identified two Critical Congestion Areas (the Mid-Atlantic, extending from New York down into Virginia, and Southern California).



## Capacity

Available for emergency events: (up to 10 times during delivery year, up to 6 consecutive hours for each event between 12pm and 8pm during May-September, between 2pm and 10pm during October-April, 2 hour minimum notification for each event)

## Energy/Economic Market

Economic Load Response Program provides a mechanism by which any qualified market participant may offer Demand Resources the opportunity to commit to a reduction and receive payments

## Synchronized Reserve

Synchronized Reserve service supplies electricity if the grid has an unexpected need for more power on short notice. Demand Response assets must respond within 10 minutes for up to 30 minutes

## Regulation Services

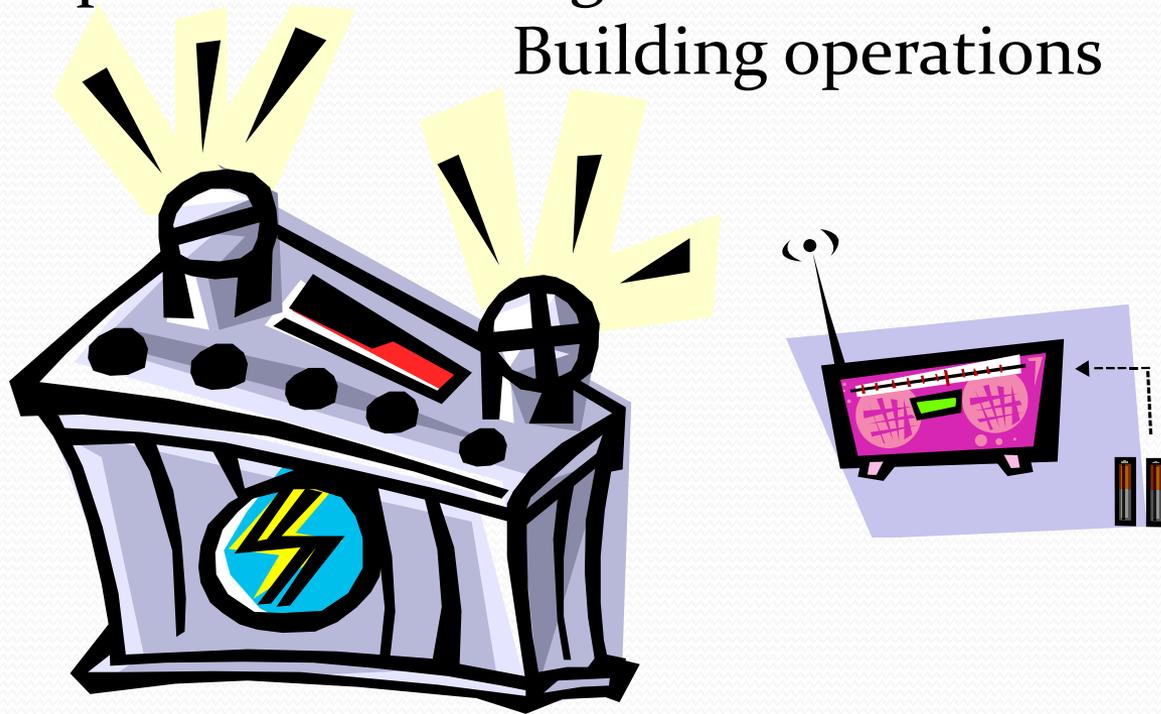
PJM's Regulation market is designed to ensure that the Grid operates within a narrow band around 60 hertz. For regulation services, assets must be able to respond rapidly to up/down signals provided by the Grid operator.

# Utility Billing Consequences

- Mitigate impacts of peak and intermediate peak loads during the 101 days of summer
- Drop peak loads with thermal storage, generators, lighting and DX chiller control
- Standby Revenue from DR market participation
- Economic Program Revenue
- Benefits of Load Testing and Re-testing for generators and building energy management systems

# Using Demand Optimization for building energy management

- Can a building be run as a 'battery' model in response to curtailment and economic programs offered by Power Grid Operators? Scaling from the Grid to the Campus to Building operations



# Strategy at Ft. Meade

- Run buildings like a 'battery' system
- Be a proactive user of electric power
- Tune-up through testing and re-testing of systems
- Look for energy consumption patterns that can be adapted to provide virtual power to the grid
- Achieve more comfort and reliability

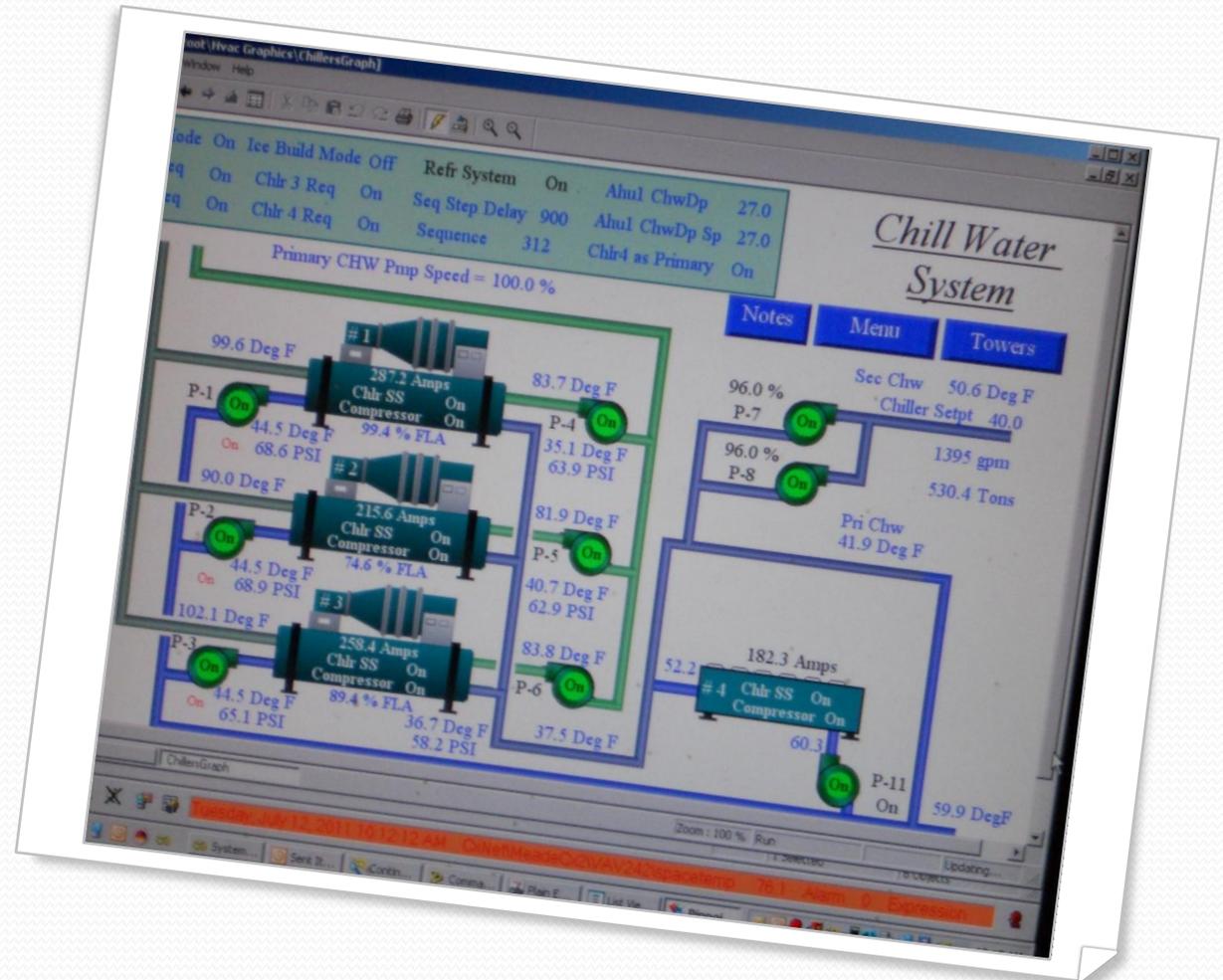
## Thermal Storage System

Ice Storage at Fort Meade used for Capacity, Energy and Ancillary Market Participation



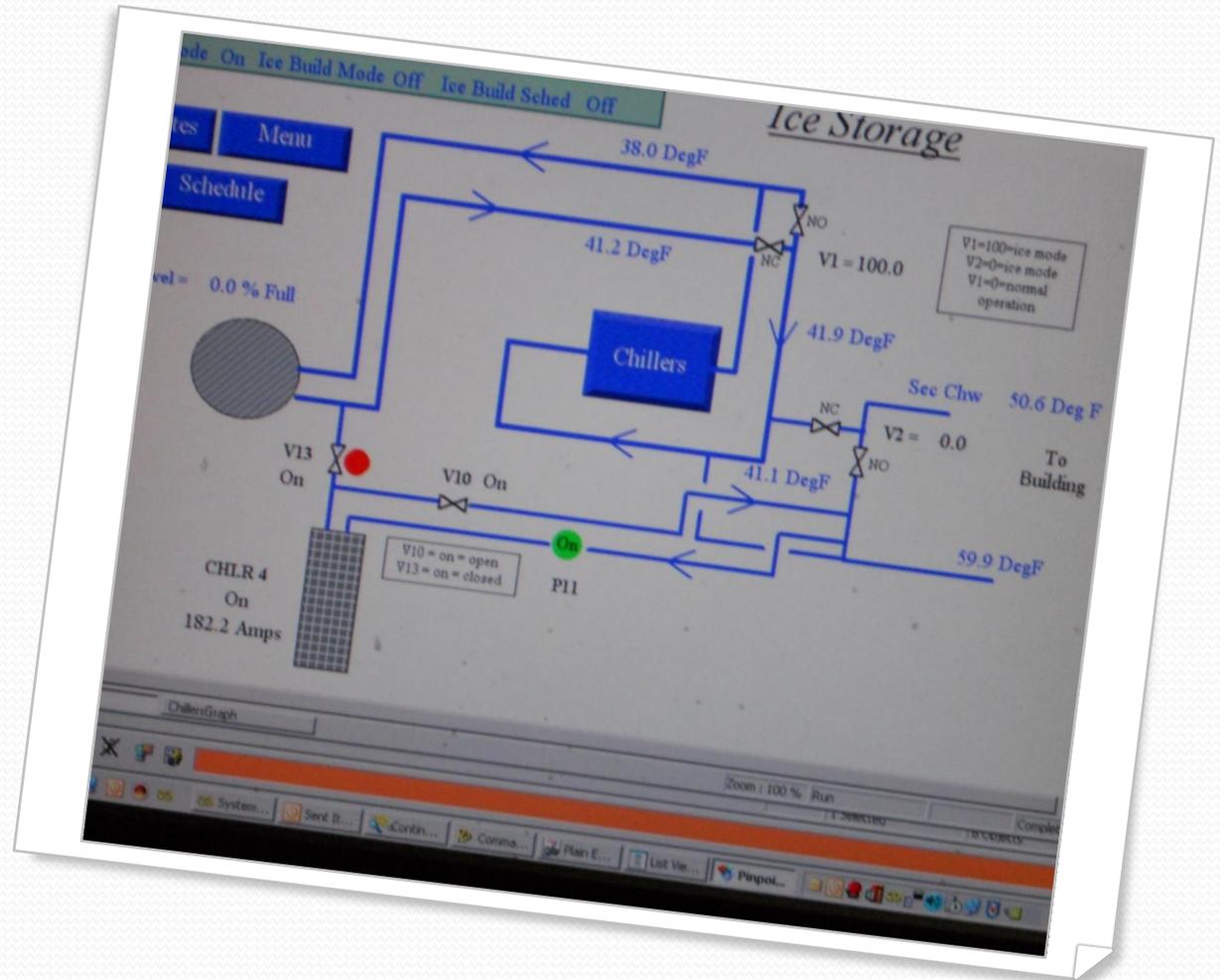
## Chiller Status at Front-end

Sensor and temperature checks for “Ice Build” operations



## BEMS Screen showing Ice Build and Burn Protocols

Ice Storage configured for both economic and curtailment response, a first for PJM and Viridity Energy



## Generator Protocols

Load tests of diesel &  
natural gas gen-sets  
at key facilities  
ensure response to  
grid emergencies  
Not ideal for  
economic response  
programs with short  
windows



## Track 5 Holistic Building Management

Presented by Tony  
Karwoski Army  
Resource Efficiency  
Manager at Ft. George  
Meade, MD on behalf  
of SAIN Engineering  
Associates  
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