



Kennedy Space Center
Center Operations Directorate

Construction of Facilities Division

“Green/Platinum” Building Net Zero Energy Design

KSC - Propellants North Administrative and Maintenance Facility

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Agenda

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- ◆ Net Zero Facts
- ◆ Design Strategies for Low and Net Zero Energy
- ◆ Other Sustainable Systems Included in the Building
- ◆ Solar Array Installed on the Roofs
- ◆ Solar Array System
- ◆ Lessons Learned
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Net Zero Energy Building

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Net Zero Energy Building

◆ Propellants North Building Facts

- Two story Administrative Building, 9,500 square feet
- Single story Shop Building, 1,800 square feet
- New construction project, repair by replacement
- Orientation utilizing best design practices for sustainability
- Curve roof to utilize full potential of sunlight exposure

◆ Guiding Principles: NPD 8820.2C Design and Construction of Facilities

- (d) Industry-best practices of sustainable design, maintainable design, building commissioning, and safety and security shall be incorporated, to the maximum extent possible, into the planning and execution of facility projects. The use of these practices ensures that facility projects are delivered with the most economical life-cycle cost, least environmental impact, and maximum benefits in occupant's health, safety, security and productivity.



Net Zero Facts

◆ Net Zero Building System Decisions

- Design decisions help achieve energy reduction goals. Design did everything possible to reduce building energy consumption.
- Net zero means that the building generates as much power and energy as it consumes
- Renewable technology needs to be incorporated into the design
- Building requires one year cycle to evaluate data to determine actual performance of net zero energy system.
- Energy model study data is based on what is expected of building energy demands vs. size of solar array
- Energy metering will be used to record data on a monthly basis
- System performance using actual loads vs. consumption loads is the best way to verify the net zero system design



Design Strategies for Low and Net Zero Energy

◆ Building System Performance Design

- Good design practices reduce overall electrical energy demands
 - THERMOMASS Insulation Building System/TEX-COTE cool wall
 - Highly insulated roof system
 - Daylighting, fenestration minimized on south wall/max on north wall
 - 2 story vs. 1 story, centralized mechanical/electrical rooms, shorter distribution runs
 - Energy efficient insulated window system
 - HVAC and electrical systems
 - Xeriscape, use of native plants reduce water consumption, use of harvested rainwater for 1 yr to establish plants

◆ Systems incorporated into the design as bid options.

- Solar Photovoltaic
- Wind Turbine
- Rainwater harvesting



Other Sustainable Systems Included in the Building

◆ Sustainable Systems

➤ Mechanical/plumbing

- Split DX HVAC with energy recovery technology, Cromer Cycle desiccant wheel technology
- HVAC system is anticipated to be 40% more efficient than ASHRAE 90.1 requirements
- Rainwater harvesting, recovery and recycling, reuse in toilets and urinals
- Water conserving fixtures, low flow, dual flush

➤ Electrical

- Day lighting controls and occupancy sensors
- Building is +42% more efficient than traditional buildings
- Electric EcoSpace Traction Elevator
- Photovoltaic System



Solar Array Installed on Roofs

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Solar Array System

◆ PV Crystalline Panel System

- PV Crystalline modules, utilizing the most efficient panel at the time of construction
 - 2.5'x5' panel at 235 watts per panel, 78,960 watts of power
 - 336 panels located on building roofs
 - Life expectancy of panels is 25 years on power output at 80%
 - Expected payback period is 7 years
- Photovoltaic System located on the roof act as an umbrella
 - Panels protect the roof from environmental damage
 - Panels keep the roof cooler aiding in smaller cooling demands





Lessons Learned

- ◆ PV Crystalline solar panel system
 - Panel bracket system needs to be compatible with roof seam
 - Watts/square foot rating achieved by using crystalline system
 - Important to train and educate community on system
 - Added additional conduit for future installation
 - Safety concerns
 - Minimal maintenance required for panels
 - 2 years from now KSC will report on functionality and performance of the solar array system. A report will be developed that will include lessons learned, determine what is working/ or not working or what needs improvement



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Questions

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