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**Net Zero Plus JCTD:
Evaluation of Energy
Saving Technologies for
Expeditionary Shelters**

*Brant Lagoon
Project Lead
NSRDEC
Presented to JOCOTAS
4 November 2009*

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Report Documentation Page

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Net Zero + JCTD – NSRDEC Purpose



- **Leverage NSRDEC Energy Savings Technologies**

- **Photovoltaics**
- **Advanced Insulation**
- **LED-based Lighting**
- **Solar Shades**

- **Need for foam alternatives**

- **Force Provider, Field Hospitals**
- **Cost**
- **Safety**
- **Redeployment**

- **Quantify added value**

- **Transition plan**

- **PM Force Sustainment Systems**
- **Joint PM Collective Protection**
- **Army Medical Department**



Solar Covers Block 60% of Radiant heat. Modular from 900 sf to 10,000 sf



Aerogel Silica Mesh Insulation



L'Garde Air Cell Insulation



Electroluminescent Lighting System



Shelter LED Lighting with Ambience



Small Tactical Airbeam Tent Deployed as Force Provider 150 Soldier Base Camp



Modular Ballistic Protection System (MBPS) Set Up Time, 2 min. per linear foot

MBPS meets Unified Facilities Criteria for Blast Over Pressure



BB2950 Battery charger for Comms and Sensors



QUADrant units & Balance of Systems converts DC to AC and stores reserves



PowerShade (1 - 3KW) also blocks 90% of radiant heat

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Evaluation Overview



- **Goals**

- Compare baseline energy usage to energy efficient technologies
 - Evaluate various configurations for optimization
 - Relevant environmental conditions
- Create a comparative and comprehensive report
 - Power Usage will be primary metric – Generator and fuel usage
 - Draw conclusions on recommended shelter system configurations

- **Compare results to foam data**

- **Technologies**

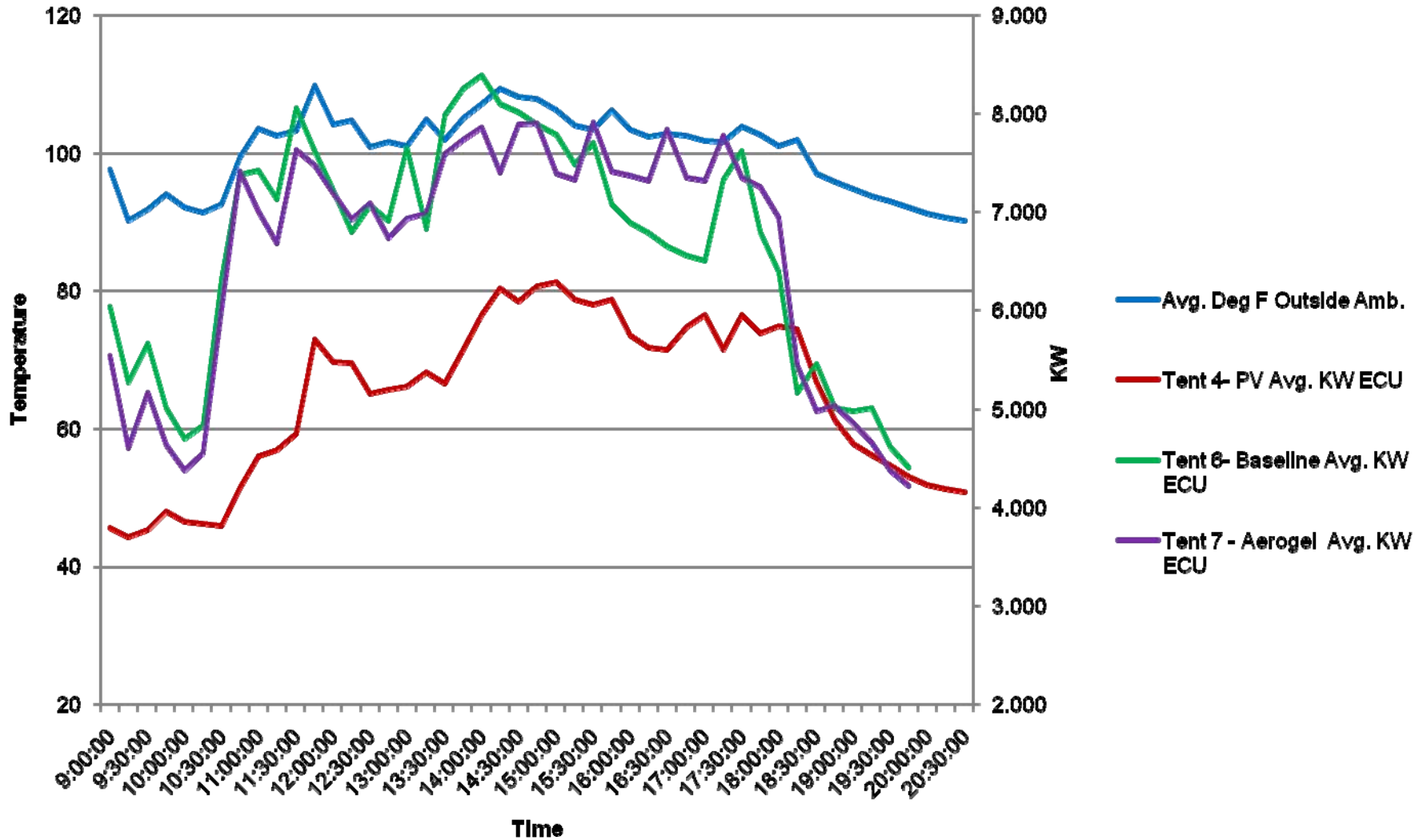
- Solar Barrier Systems:
 - Ultra Lightweight Camouflage Net System (*ULCANS*)
 - Advanced Solar Shades (new config)
 - Power Shade (including Photovoltaic Panels (2kW))
- High Efficiency Lighting Systems:
 - Light Emitting Diodes (Three Sets)
 - Electroluminescent Panels
- Advanced Insulation:
 - Aerogel Liner
 - FiFoil Insulation
 - TEMPER Insulated Liner
 - Improved Tent Liner (with solar barrier material)

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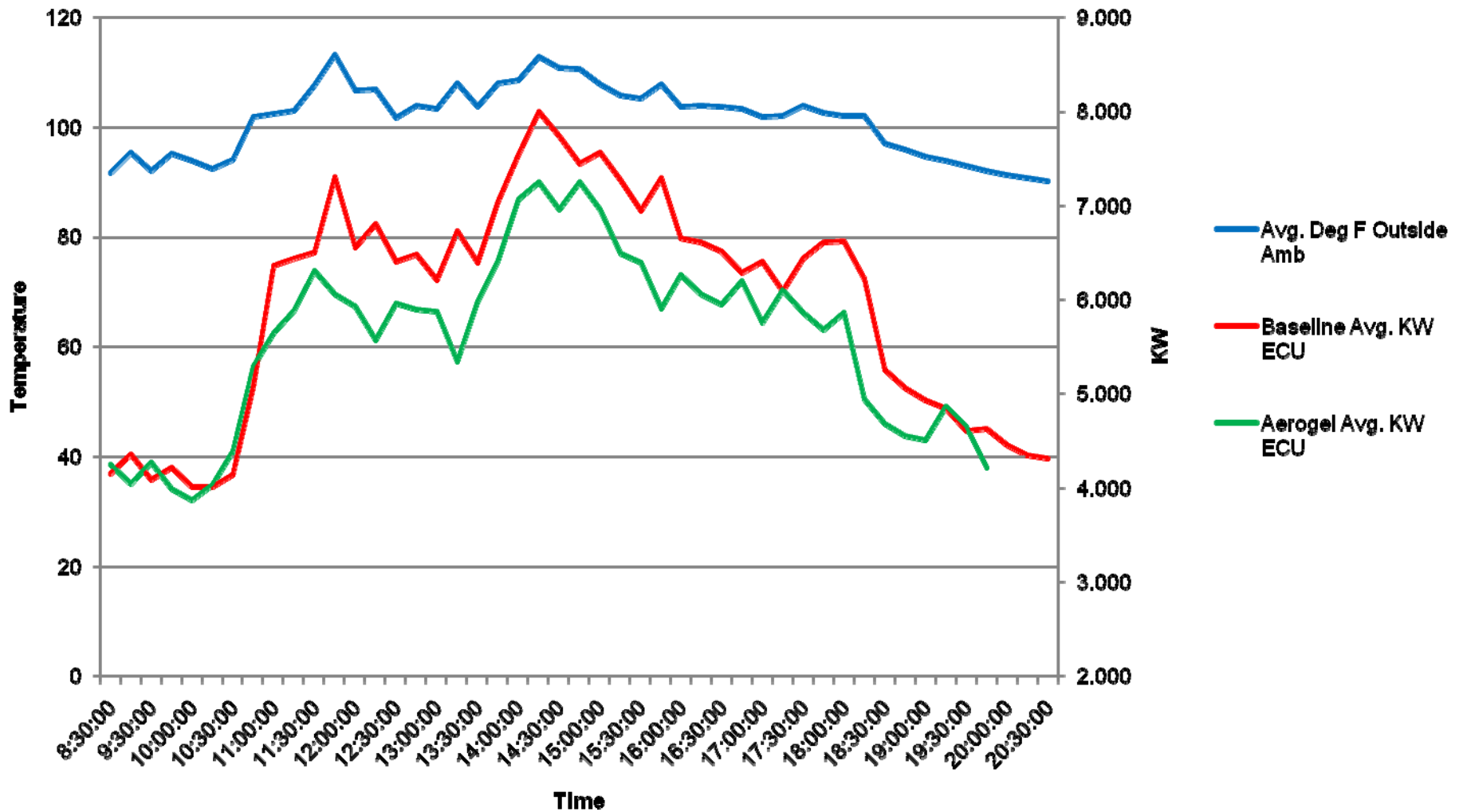
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All Airbeam Tents



All TEMPER Tents

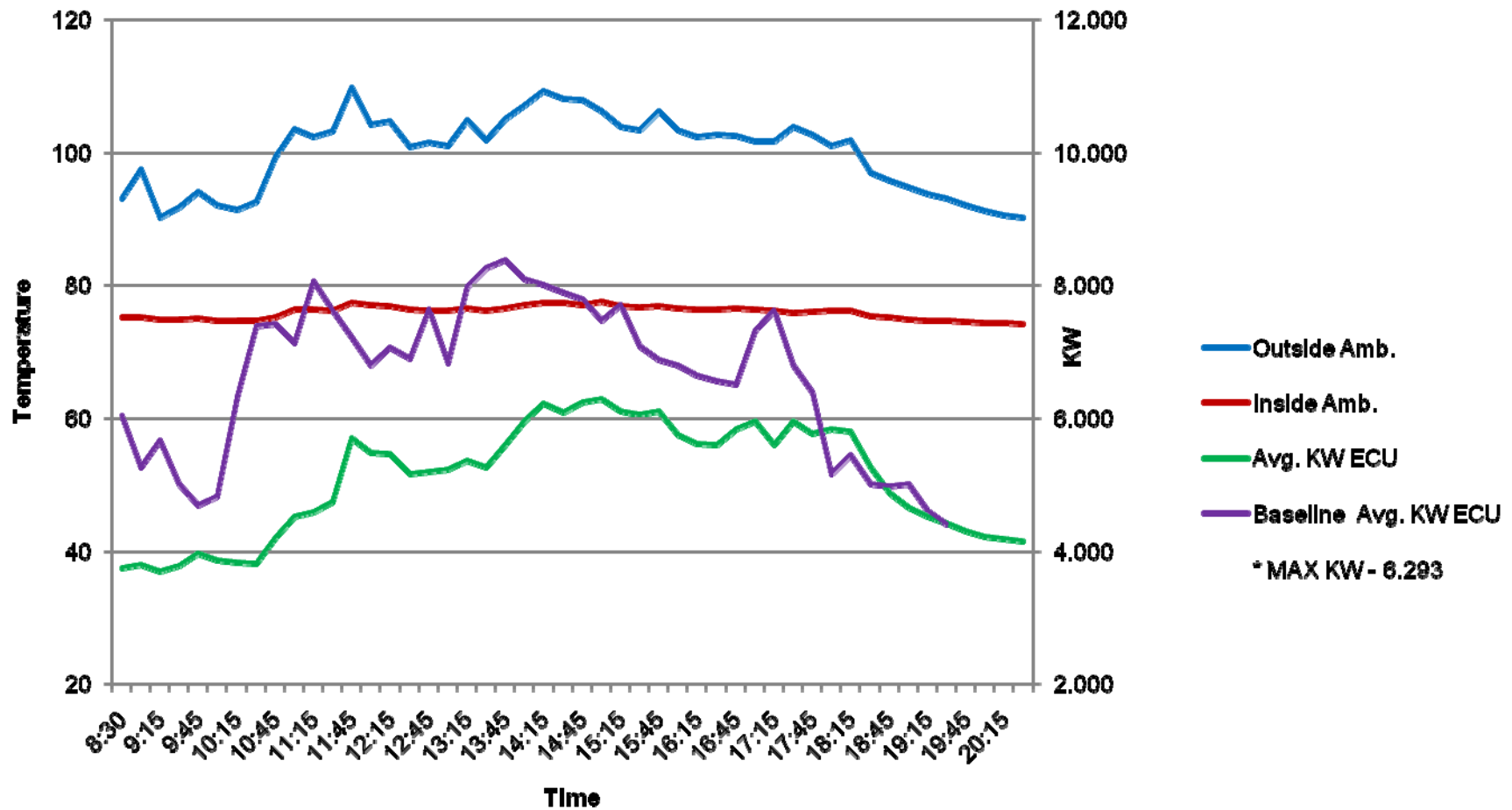




Airbeams



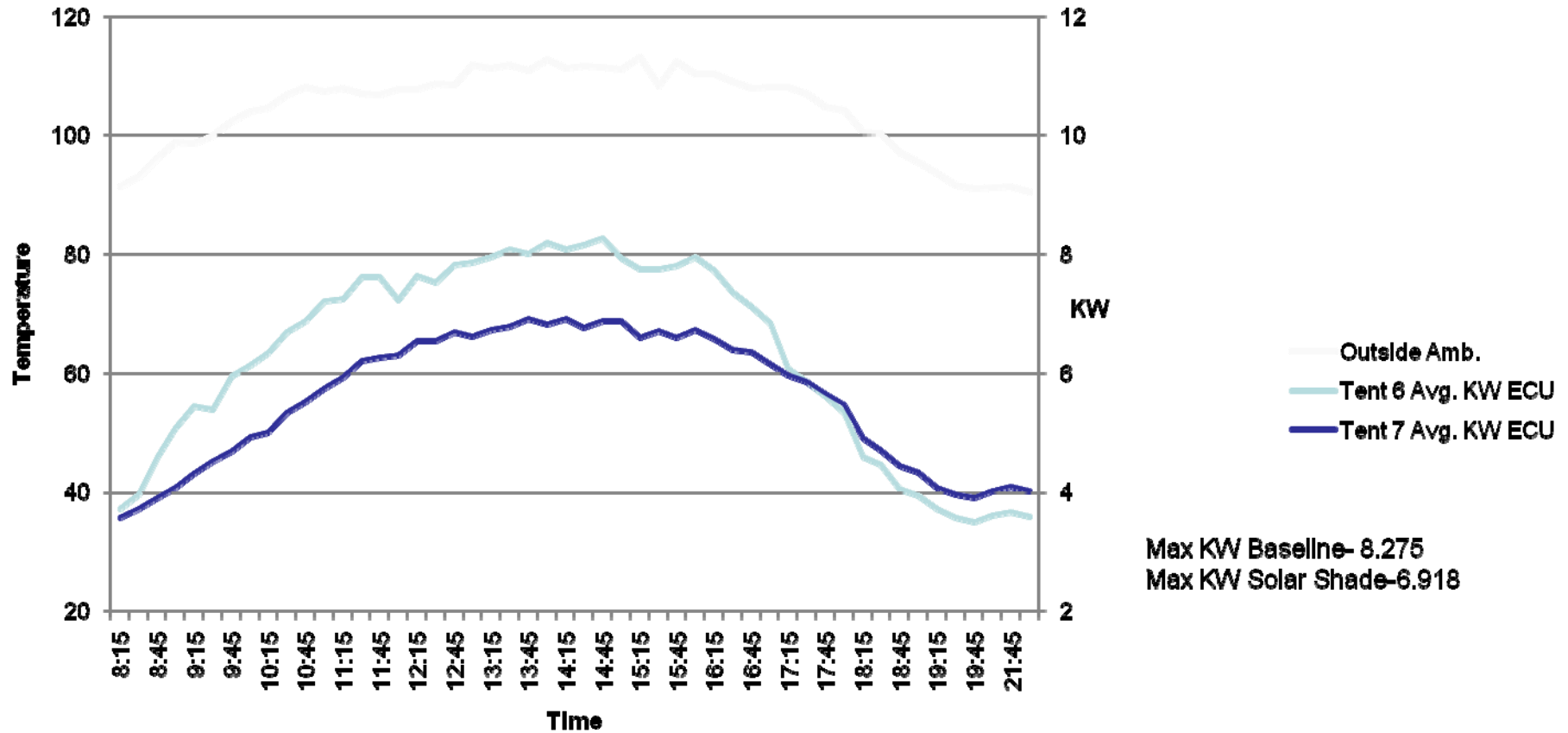
Baseline vs. Airbeam w/PV



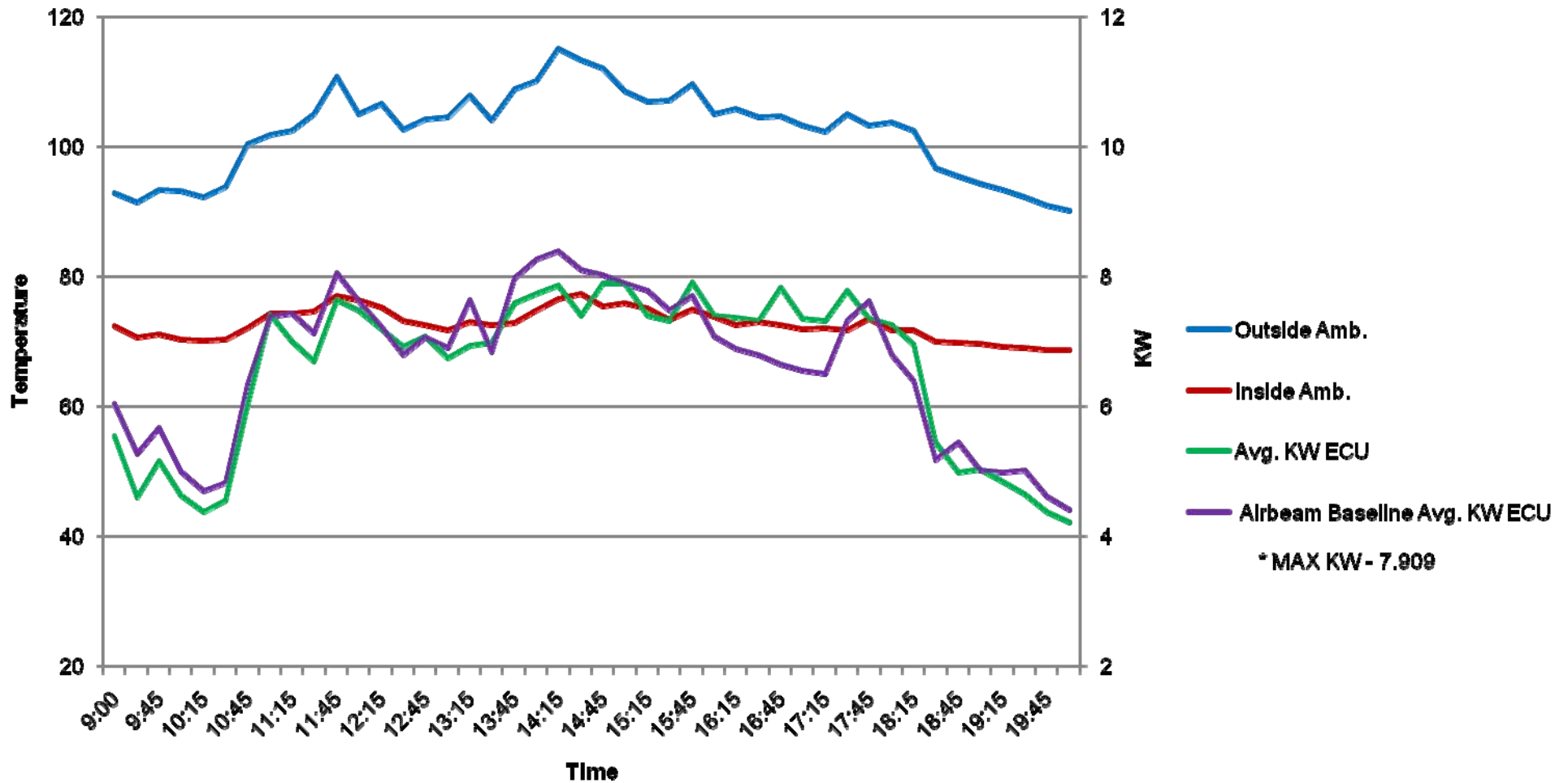
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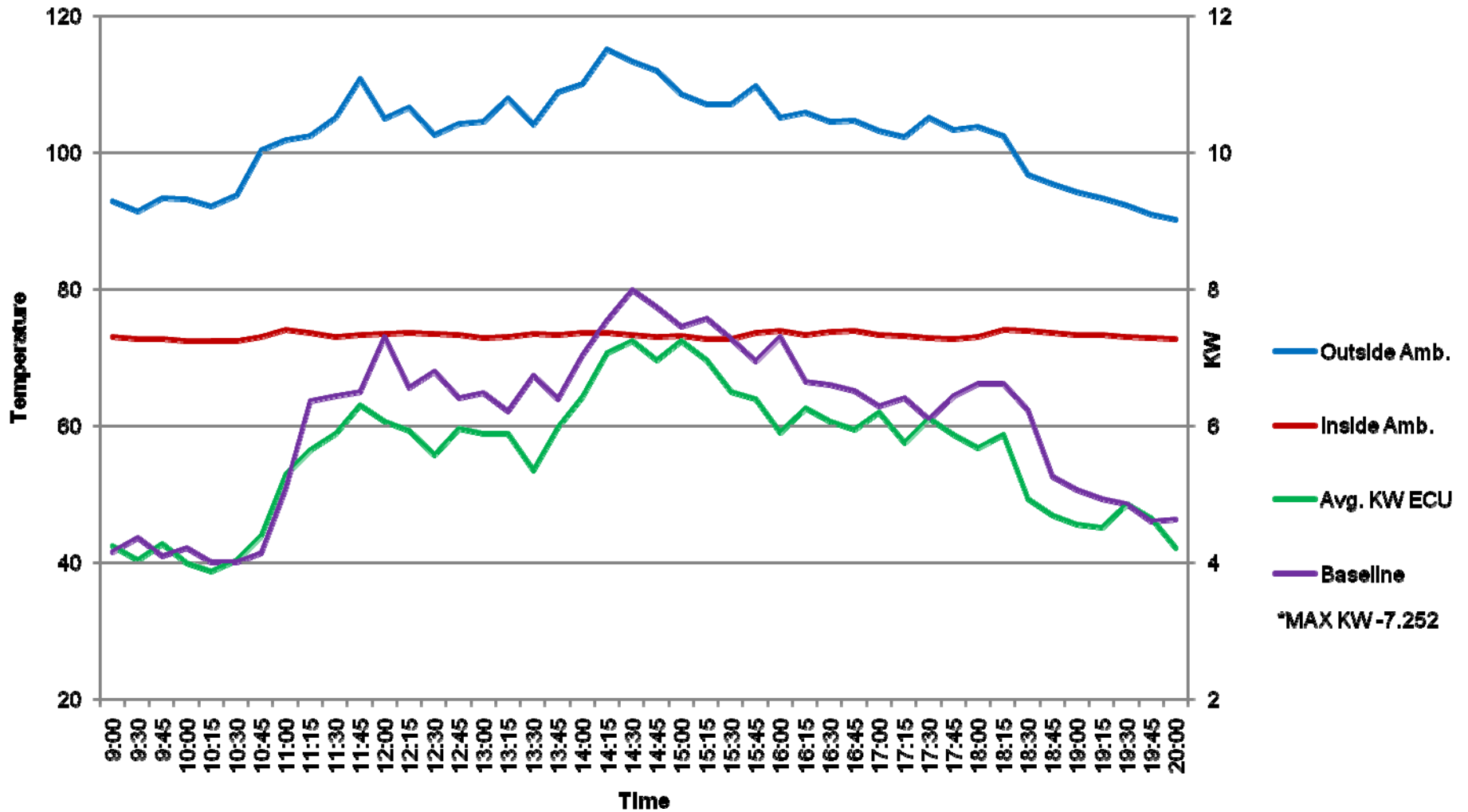
Baseline vs Solar Shade



Baseline vs Airbeam w/Aerogel



Baseline vs. Temper w/Aerogel



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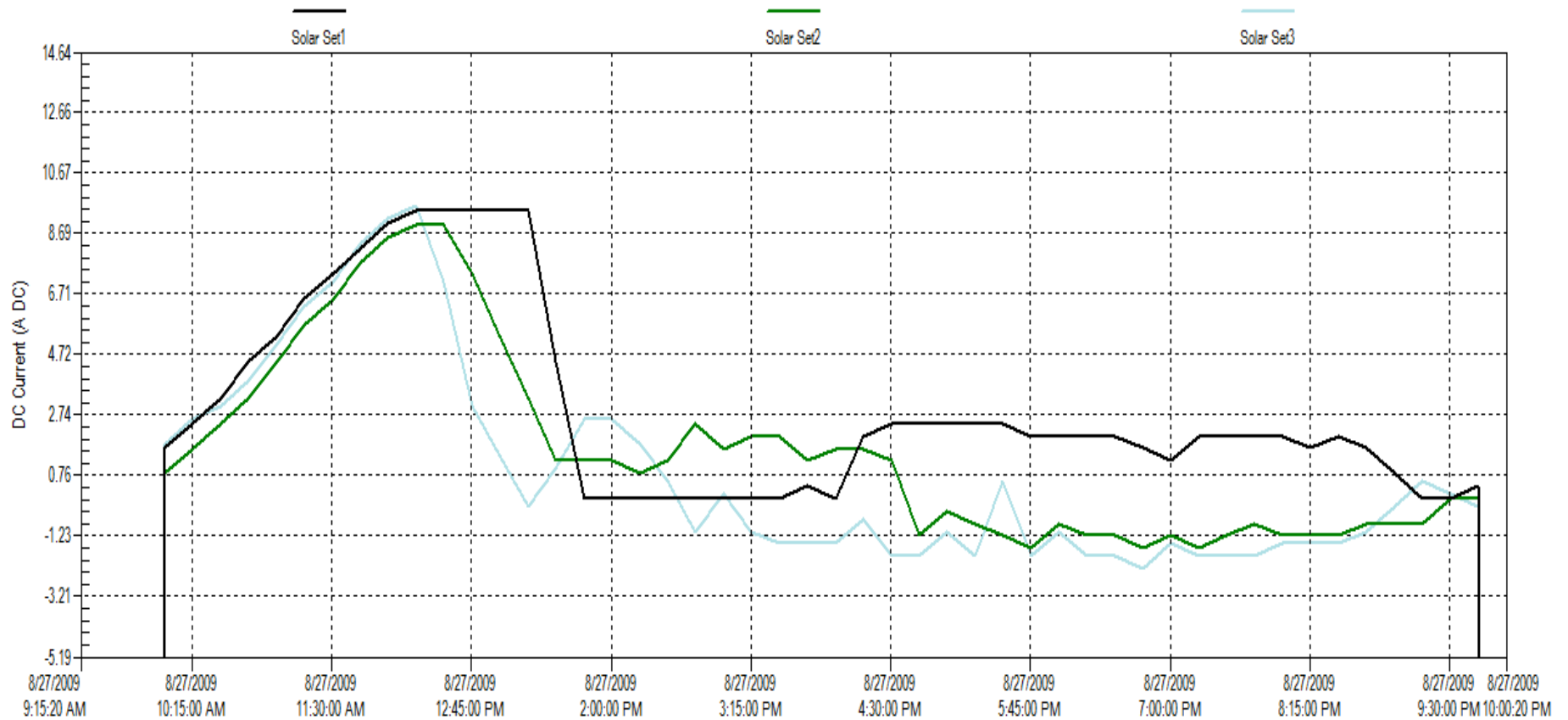
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PV Solar Production



86994 SRP-7-1.5M 0-25MA
86994 SRP-7-1.5M 0-25MA (2009-9-2 19.44.38)

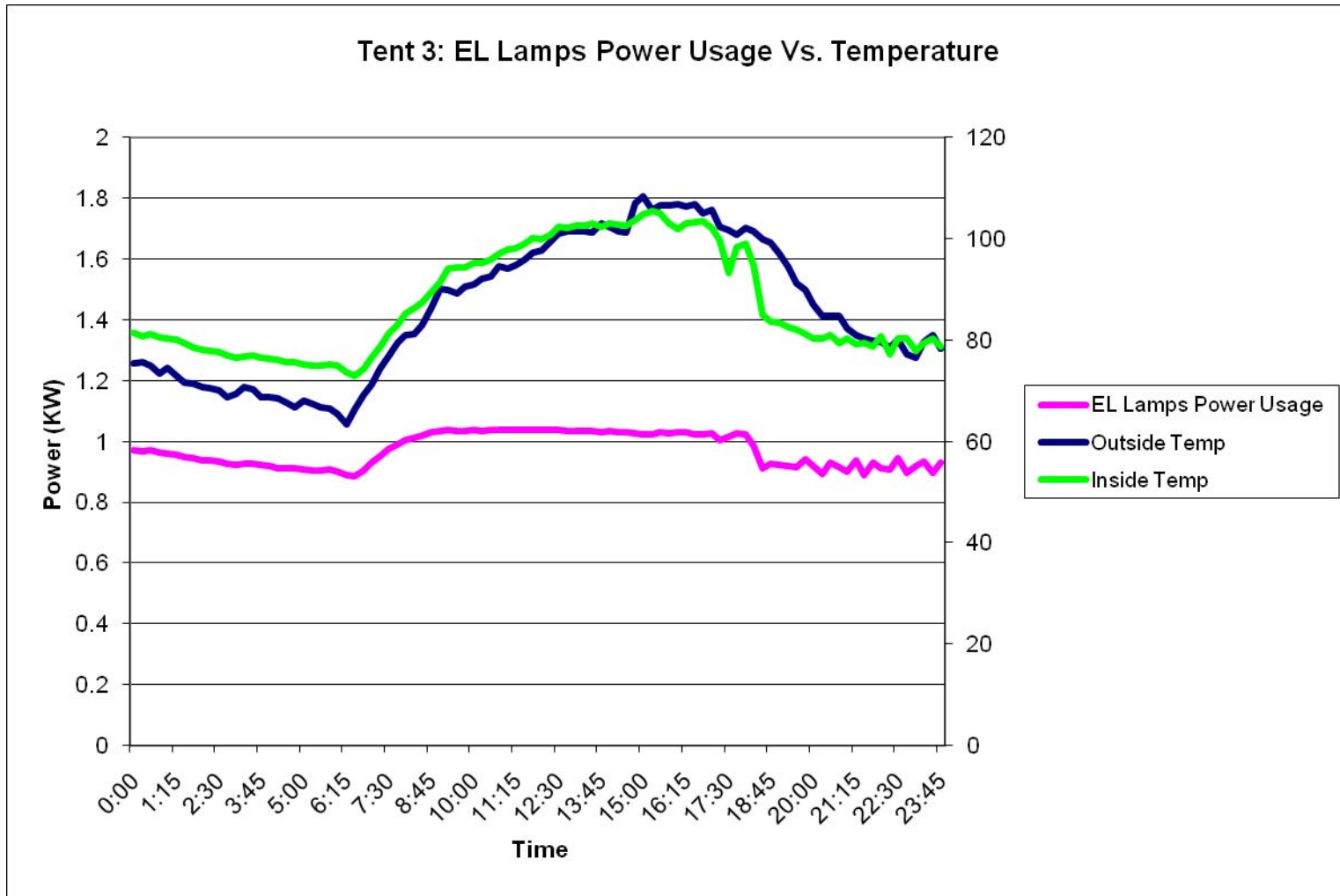


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Lighting Load Vs. Temperature



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Current Status



- **Seven Shelter Systems Established**
 - SOF compound at LSA Warrior at NTC
 - All seven tents now have air conditioning, data collection is being built currently, install planned for 16-20 Nov
- **NSRDEC making monthly visits to the evaluation site**
 - Download data and change out technology configurations
 - EPCC installed, ULCANS for fuel and water bladders
- **Soldier involvement is wild card; soldier feedback**
- **Next Steps**
 - Develop remainder of evaluation matrix
 - Challenge of winter
 - Changing out configurations
 - Air Force adds four tents – Nov
 - Priorities for FP are to field solar shade for airbeam and develop LED spec
 - Foam tents as baseline to aim for
 - Continue to analyze data for impacts on power and fuel usage
 - Run return on investment and life cycle cost analysis



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Questions?



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