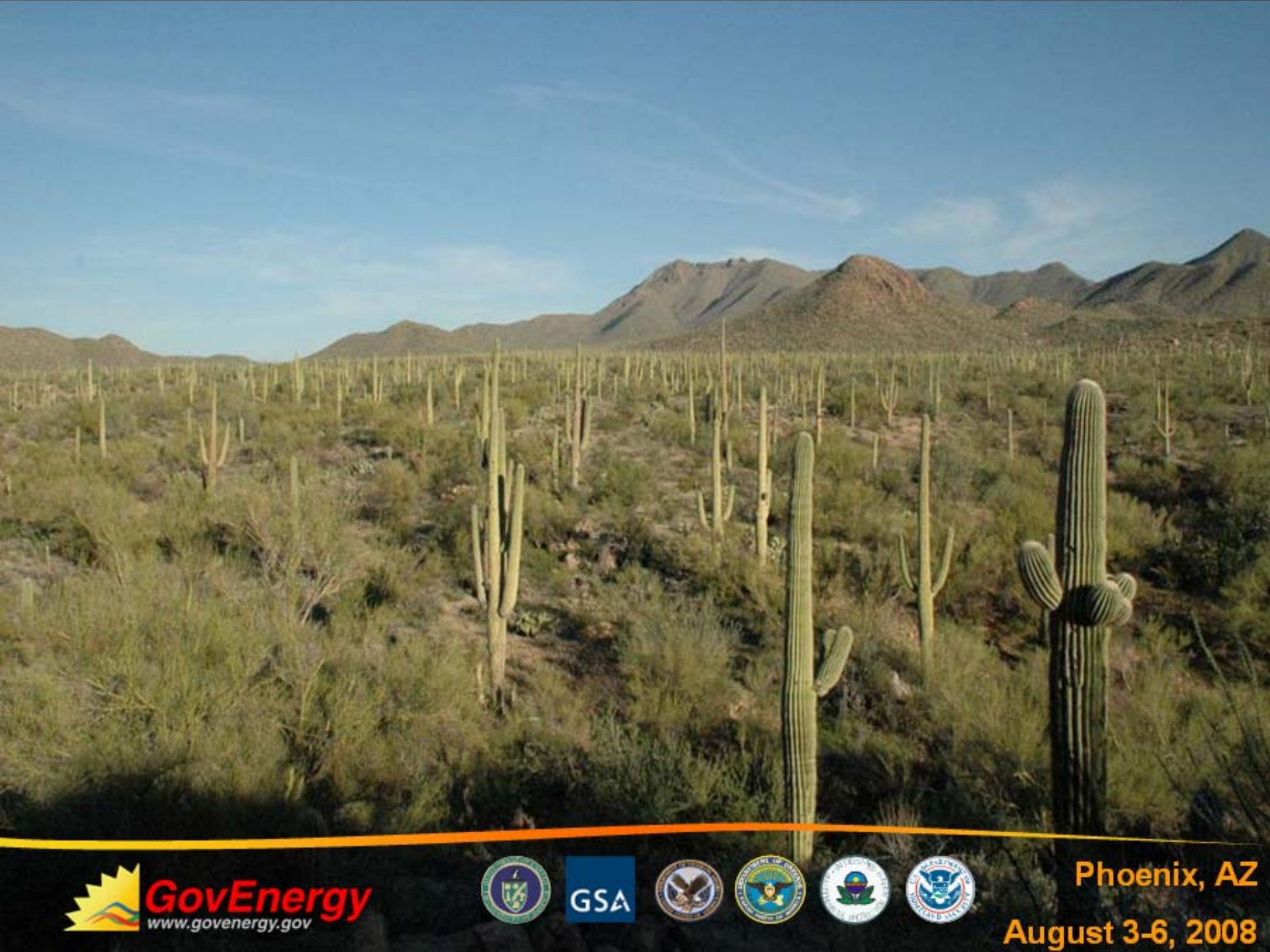
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August 3-6, 2008

Latest Trends in Measurement & Verification

Rex Noble, P.E.

Director of Construction FPLES

July 2008

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Who we Are…

- FPL Energy Services Inc. is an energy services company providing customers, particularly government facilities, performance contracting solutions.
- With nearly 20 years experience, we provide expertise in energy consulting, implementation of large and small performance contracts and renewable energy systems.
- Our commitment is to our customer; understanding their needs, providing personal service and efficient solutions. FPLES is a subsidiary of FPL Group, Inc., the leader in renewable energy and ranked #1 among electric and gas utilities by Fortune magazine.

Agenda

- What is Measurement & Verification
- The M&V Process
- M&V Options to be Considered
  - **Scope of Energy Conservation Measures**
  - **Cost**
  - **Applications**
- Example Project - M&V
- Questions & Answers

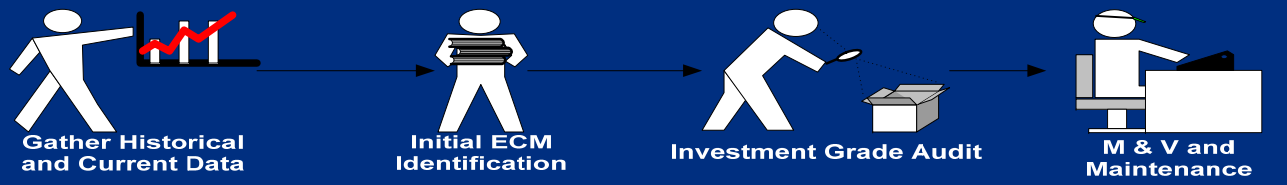
UESC – Measurement and Verification

Definition of M & V…

The measuring of energy or water consumption over time at a facility through the use of measurement devices and then examining the data on it's suitability for the intended purpose.

This process is based on using one of the four IPMVP options

UESC – M&V Process



Gather Historical and Current Data	Initial ECM Identification	Investment Grade Audit	M & V and Maintenance
Historical Utility Information	Evaluate Findings	Perform Detailed Facility Survey	Post-install Measurements
Facility Data	Develop Initial ECM's	Mod Baseline using Trane and calibrate to utility bill	Begin Annual M&V Reconciliation
Prioritize Facilities for Surveys		Form Baseline, Lay in ECM's	On-going maintenance
		Develop New Building Consumption	
		Develop Project Guarantee Documents	

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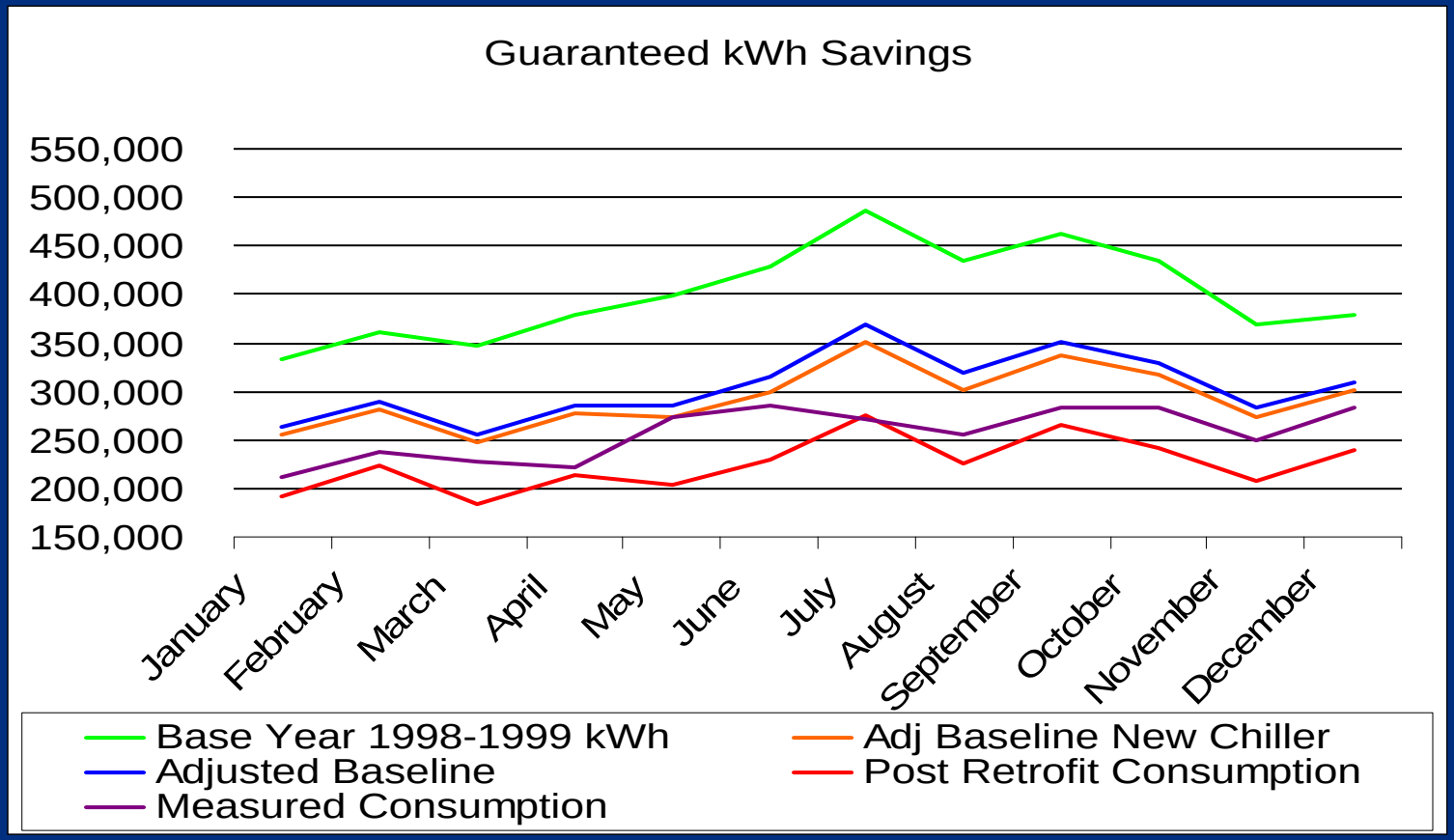
UESC – M&V Process



UESC – M&V Process

Option B Measurement Schedule	July			
	Week 1	Week 2	Week 3	Week 4
ECM 1 Lighting				
KW Metering				
ECM 2 Water Conservation				
Gal Measurements				
ECM 3 High Efficiency Motors				
KW Metering				
Calculations				
Report Preparation				
Customer Presentation				

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UESC – M&V Options

- **Follow International Performance M&V Protocol (IPMVP)**
- **Determine Option for M&V**
  - Option A – Scope, cost and Applications
  - Option B – Scope, cost and Applications
  - Option C – Scope, cost and Applications
  - Option D – Scope, cost and Applications

UESC – Measurement and Verification

Option A

A verification approach that is designed for simpler projects, in which the performance potential needs to be verified, but the actual savings can be stipulated.

- **Isolated Systems such as lighting ECM or water conservation**
- **Inspection and spot measurement of load reductions achieved by typical installations of measures**
- **Perform engineering calculations to determine savings**
- **Cost 1-5% of construction cost**
- **Lighting and Water Fixtures**

UESC – Measurement and Verification

Option B

- Verifying actual performance by end use, isolated ECM
- Measuring load reductions by spot metering
- Perform engineering calculations to determine savings
- No Stipulations
- Cost 3-10% of Construction Costs
- Lighting and water fixtures, chillers motors

UESC – Measurement and Verification

Option C

- Verifying that the measure has the potential to perform an verifying actual performance (whole building analysis)
- Savings measured by total metering or sub metering with computer simulation
- Agrees upon adjustment are usually made
- Cost is 3-10% of Construction Cost
- Varying ECMS – lighting, chillers, controls and variable speed pumps


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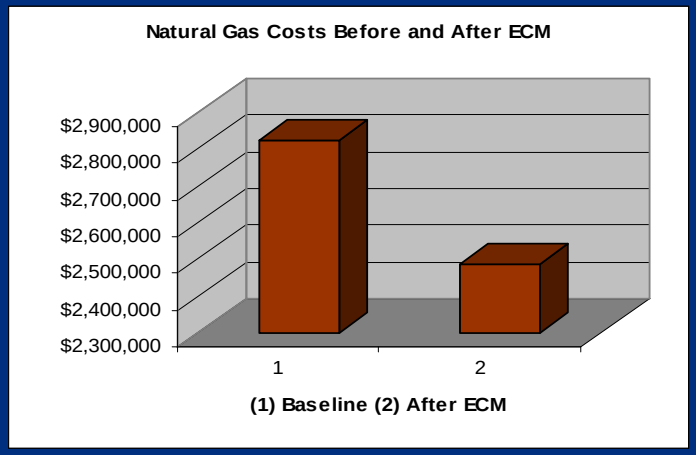
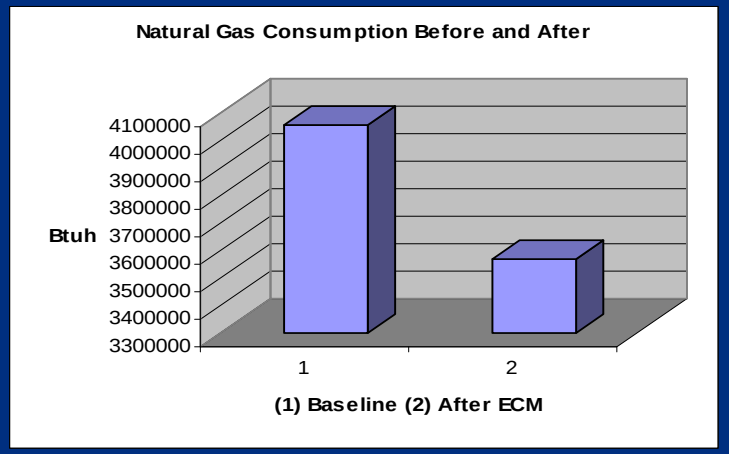
UESC – Measurement and Verification

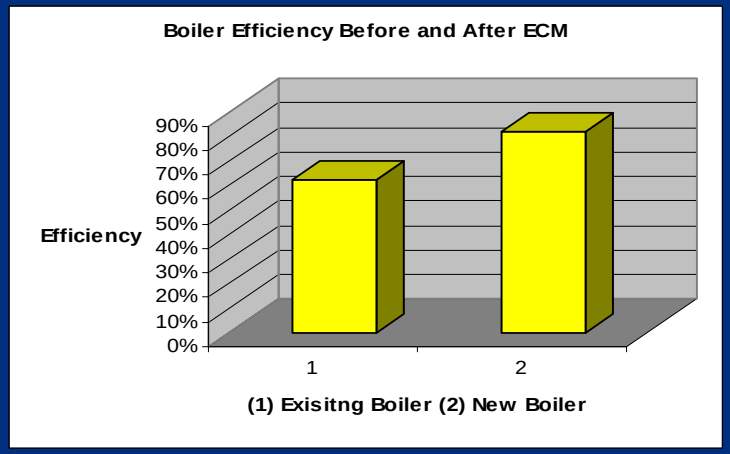
Option D

- Savings calculated by building simulation
- Performance verification techniques involve whole-building utility meter analysis and/or computer simulation calibrate with utility billing data.
- Option D is the one M&V option that addresses aggregate, coincident demand and energy savings from multiple resources at a single site.
- Cost 3-15% of Construction Cost
- Varying ECMS – lighting, chillers, controls and variable speed pumps

UESC – M&V
NASA ARF Boiler Replacement







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Questions?

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For More Information

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