



SUSTAINING LONG-TERM ENERGY SAVINGS FOR A MAJOR TEXAS STATE AGENCY PERFORMANCE CONTRACTING INITIATIVE

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Background

- ▶ 10 mental health & 13 mental retardation facilities with 24 hour-7 days a week care:
 - Over 1,300 buildings with 10 million ft²
 - Current replacement value \approx \$1.6 billion
- ▶ Special needs of clients
 - Specially designed to serve those with mental illness and mental retardation
 - One maximum security unit. One facility to address needs of youth
 - Aging population
- ▶ Buildings built
 - 25% constructed prior to 1951
 - 50% constructed prior to 1976



Background

- ▶ Over \$15 million in energy projects over 9 years through SECO's LoanSTAR
 - Included lighting, air-conditioning/heating, motors, energy management control systems
- ▶ Consulting services provided
 - Owner's representative
 - Commissioning work
 - Technical expertise



Main Facilities

➤ Phase I Sites

- Austin State Hosp (ASH), Austin State School (AUS), Kerrville State Hosp (KSH), San Antonio State Hosp (SAH), San Antonio State School (SAS)

➤ Phase II Sites

- Abilene State School (ABS), Lubbock State School (LSS), San Angelo State School (SGS), El Paso State Center (ESC), Big Spring State Hosp (BSH)

➤ Phase III Sites

- Denton State School (DSS), Mexia State School (MSS), Waco Center for Youth (WCY), North Texas State Hosp Vernon (NTSH-V), North Texas State Hosp Wichita Falls (NTSH-W)



Main Facilities

➤ Phase IV Sites

- Brenham State School (BRS), Corpus Christi State School (CCS), Richmond State School (RSS)

➤ Phase V Sites

- Lufkin State School (LFS), Rusk State Hosp (RSH), Terrell State Hosp (TSH),

➤ Phase VI Sites

- Laundry Sites (ABS, NTSH-W, RSS, MSS - 4 sites)

➤ Phase VII Sites

- San Antonio State Hosp (SAH), San Antonio State School (SAS), Texas Center for Infectious Diseases (TCID)



Challenges

➤ Funding

- 12% Statewide budget cut
- Efficiency mandates
- Funding for repair/replacement reduced from \$72 million to \$35 million

➤ Liabilities

- Deferred repairs/replacement: >\$250 million

➤ Organizational

- Geographic – HHSC covers Texas
- O&M Staffing
- Utilities - regulated/unregulated,
 - 7 electricity,
 - 7 natural gas



Solution

- ▶ Energy Savings Performance Contract (ESPC)
 - 10 year straight line payback
 - Includes O&M and M&V
- ▶ Procurement Process
 - Request for Qualifications
 - Detailed selection process
- ▶ Contract Development
 - Detailed utility audit contract
 - Implementation contract
 - Each phase carefully reviewed



The Plan

- Contractor Selection
- Preliminary Utility Audits
 - Site visits
 - Collect utility data
 - Collect deferred repair/replacement data
 - Over 10,000 repair/replacement needs have been evaluated
 - Three categories of deficiencies
- Develop Strategic Plan
 - Divide 23 sites into seven phases
 - Identify agency-wide renovations
 - Identify agency-wide standards



The Plan (continued)

➤ Detailed Audit

- Texas A&M's Energy Systems Lab is providing expertise

➤ Financing

- Financing by the Texas Public Finance Authority
- Additional funding from the Texas LoanSTAR Program

➤ Approvals

- Reviewed by 3rd party engineer
- Approved by State Energy Conservation Office

➤ Implementation



Implementation

➤ Phase I

- 5 Sites – 100% Complete
- Cost - \$13.9 million
- Savings - \$ 1.5 million

➤ Phase II

- 5 Sites – 100% Complete
- Cost - \$11.5 million
- Savings - \$ 1.2 million

➤ Phase III

- 5 Sites – 100% Complete
- Cost - \$13.1 million
- Savings - \$ 1.4 million



Implementation

➤ Phase IV

- 3 Sites – 75% complete
- Cost - \$11.4 million
- Savings - \$ 1.2 million

➤ Phase V

- 3 sites – 40% complete
- Cost - \$12.1 million
- Savings - \$ 1.3 million

➤ Phase VI

- 4 Sites – 100% Complete
- Cost - \$5.2 million
- Savings - \$0.57 million



Implementation

▶ Phase VII

- 3 Sites – 50% complete
- Cost - \$7.4 million
- Savings - \$0.81 million



Detailed M&V

- ▶ Measurement and Verification for Each Phase
 - Option A used for whole campus water project
 - Option B used for continuous batch washers
 - Option C used for whole campus metering
- ▶ M&V costs averaging 5%
 - 10 to 30% of the savings decrease over time
 - 15 year guarantee period
 - Without M&V, large amount of savings may not materialize



Detailed M&V

➤ O&M Includes

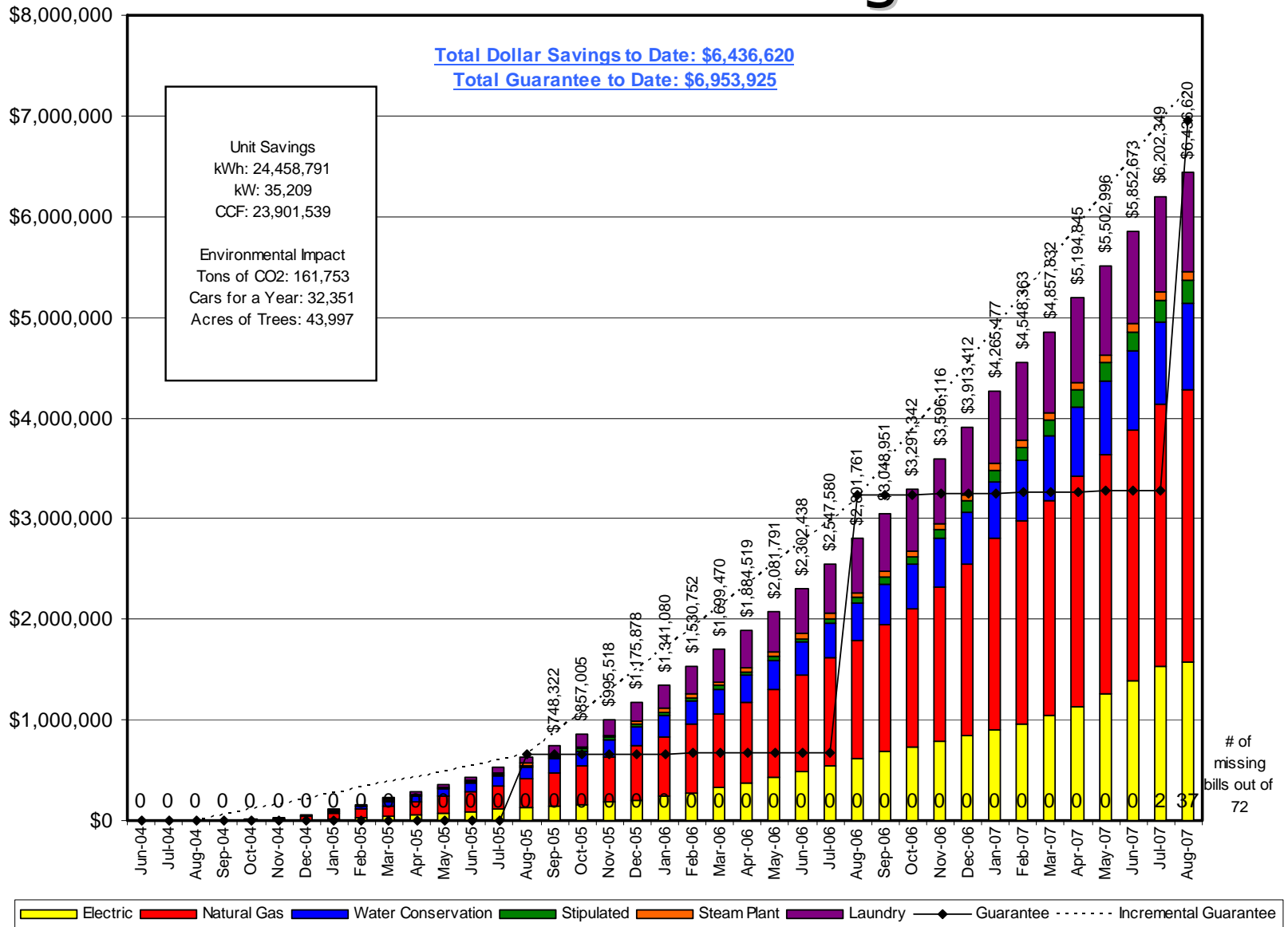
- Regular on-site assistance
- Periodic training
- Operations and Maintenance consultation (24-7)
- O&M costs under 5%

➤ Agency and ESCO Developed M&V

- On-going communication
- Worked together to achieve best possible result
- Independently verified baseline models
- Developed metrics to perform spot checks



Cumulative Savings



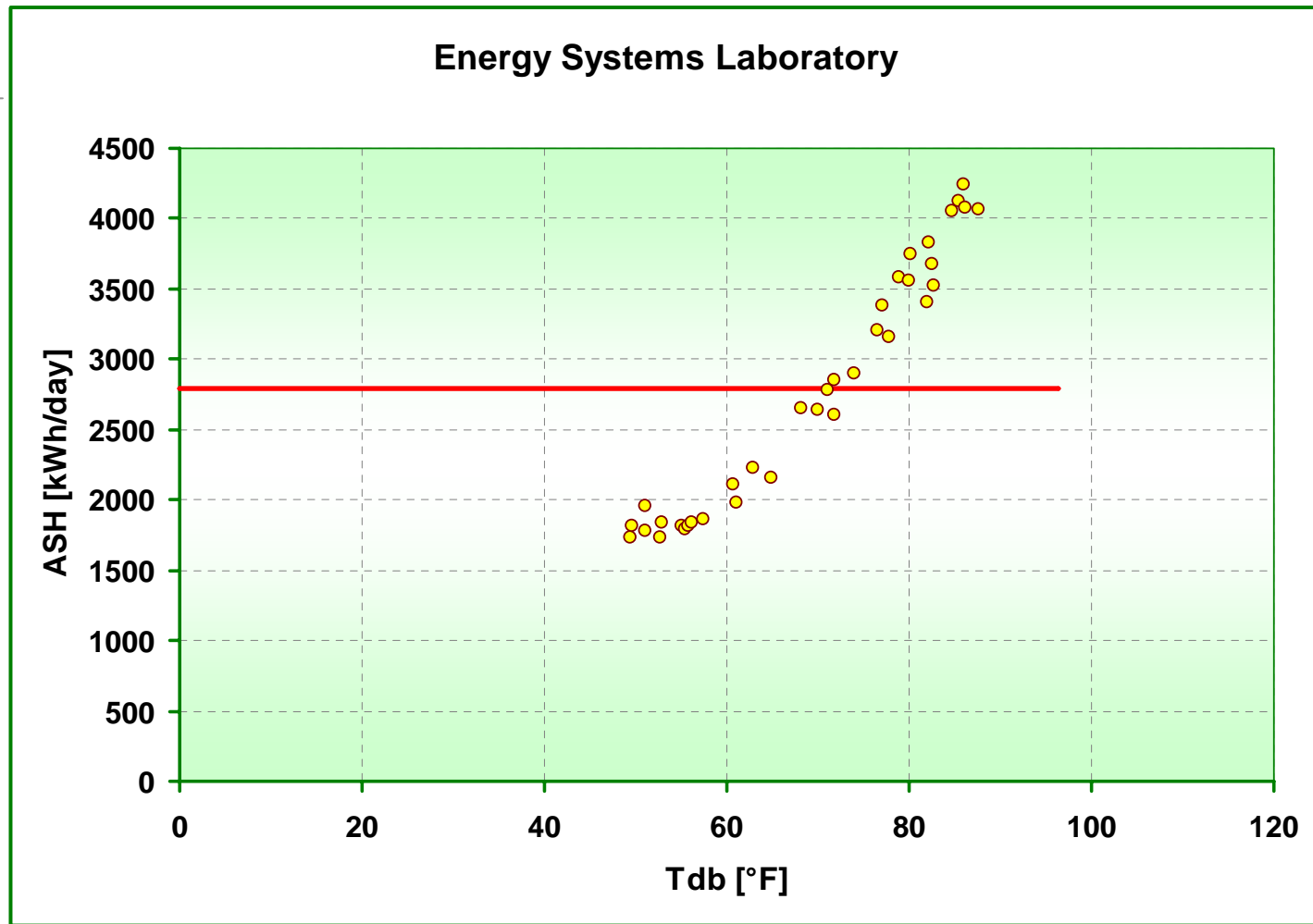


Model Comparisons

- ▶ Performance Contractor Model
 - Degree-day method incorporating variable-based degree-day
- ▶ Comparison Model
 - ASHRAE's Inverse Model Toolkit
 - Change point regression model

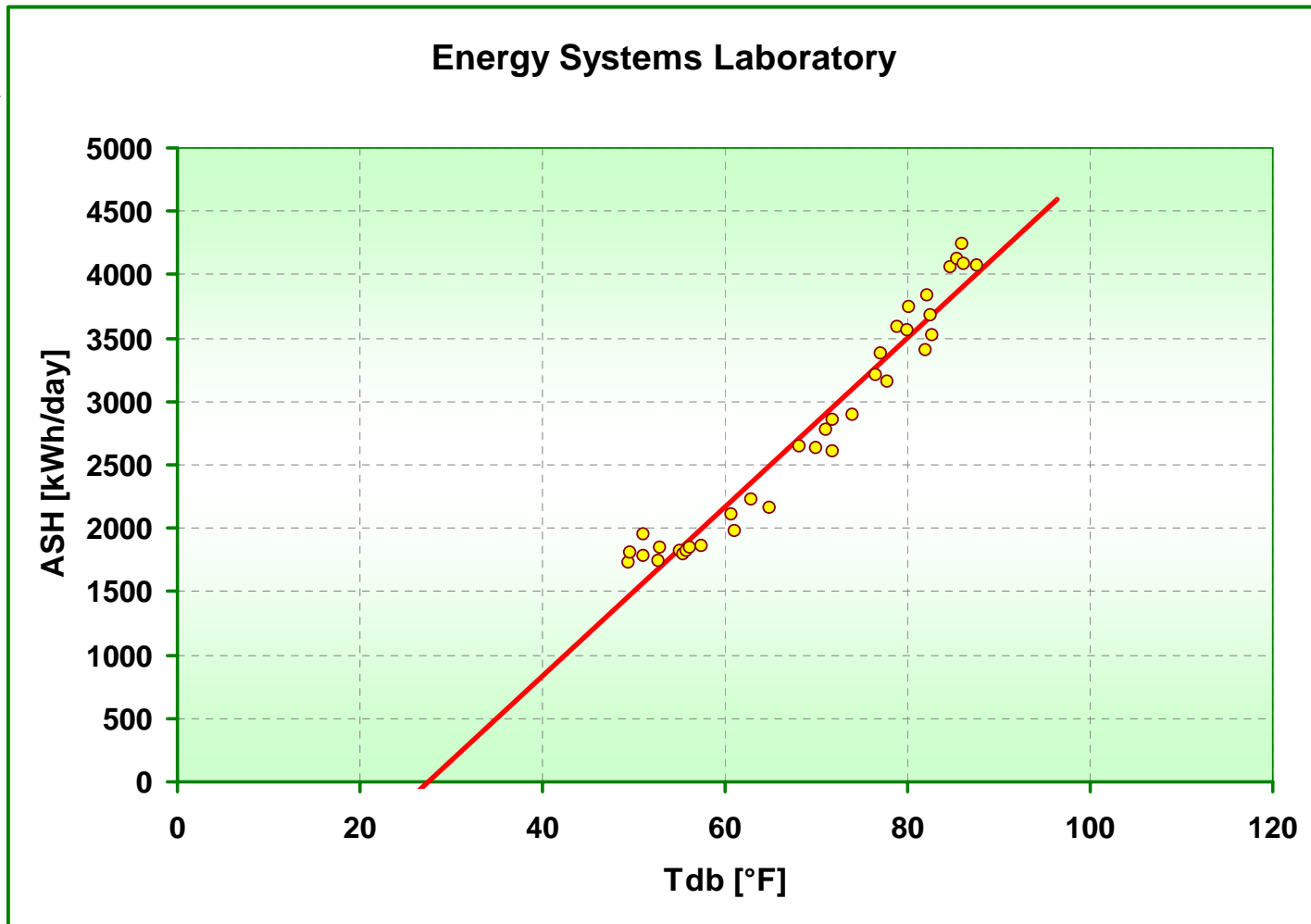


Simple Mean Value

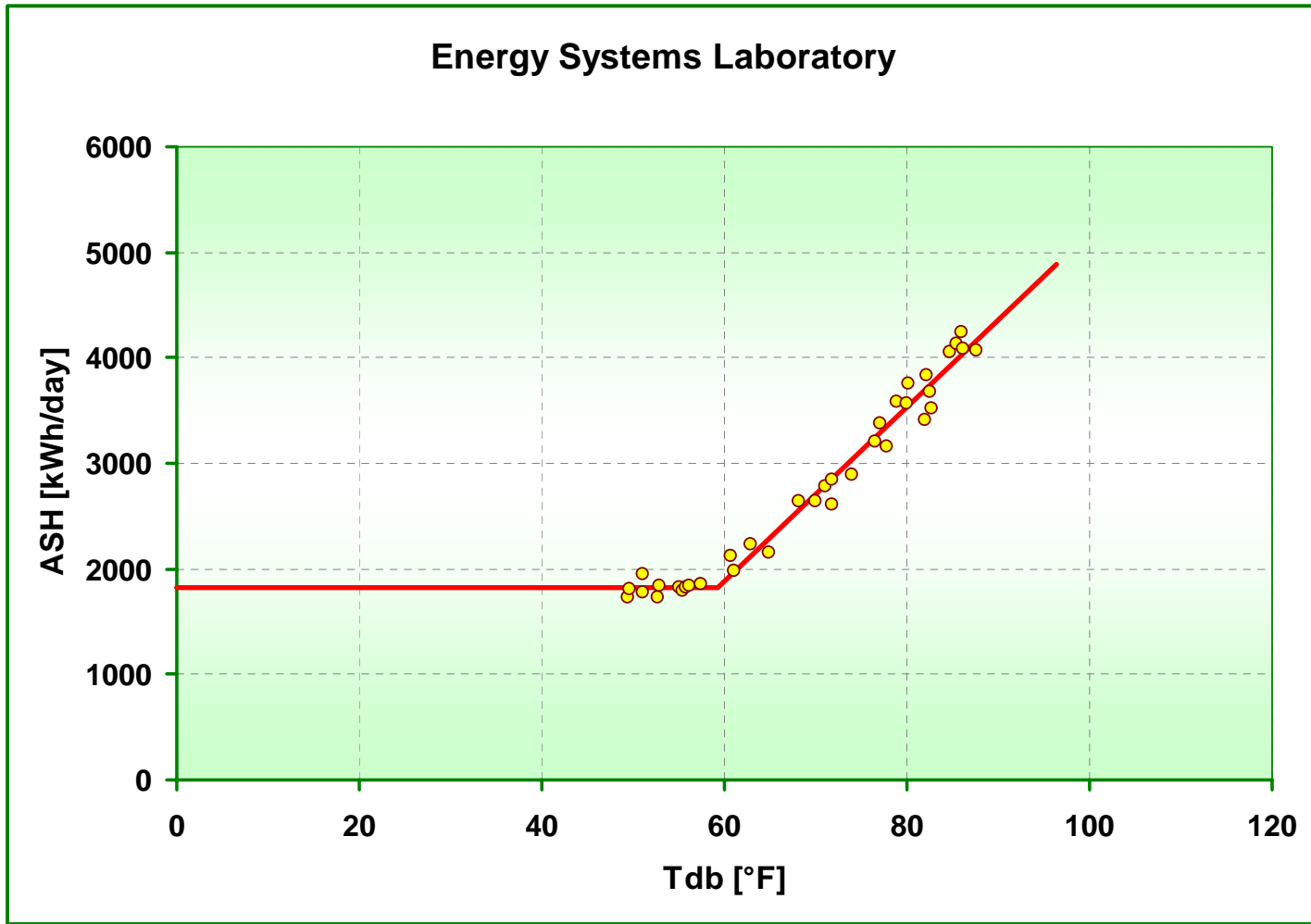




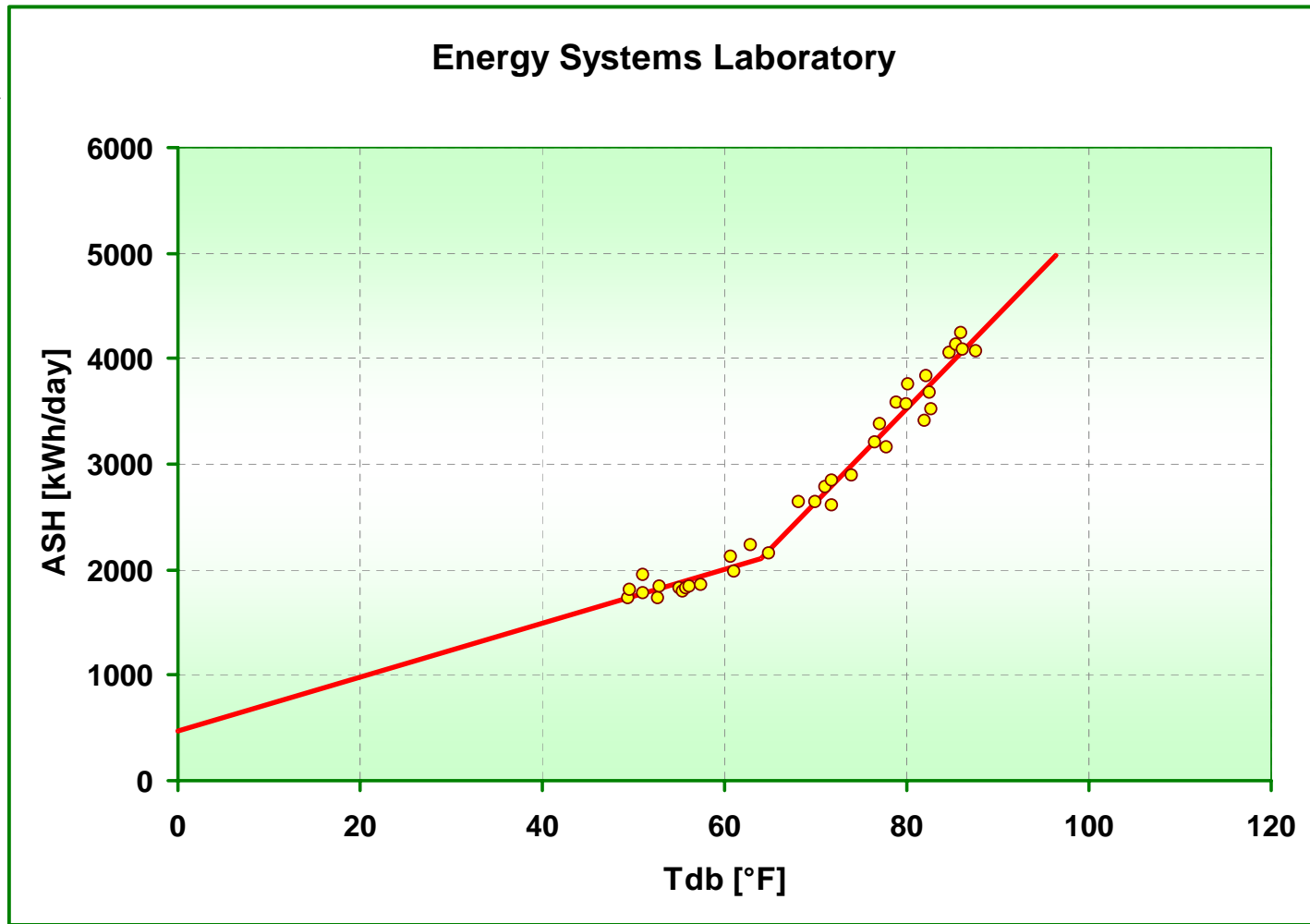
2 Parameter Linear Regression



3 Parameter Change Point



4 Parameter Change Point





1st Year Model Summary

	Vendor Calculation	Agency Calculations				
	Savings	1P	2P	3P	4P	
Jan	12,212	37,940	7,049	10,646	10,628	kWh/Mth
Feb	14,100	40,366	14,390	12,097	14,394	kWh/Mth
Mar	14,426	39,055	21,577	12,710	15,250	kWh/Mth
Apr	14,174	27,109	23,530	18,054	15,748	kWh/Mth
May	20,989	12,149	24,421	22,960	22,045	kWh/Mth
Jun	29,016	-3,633	25,605	28,284	28,789	kWh/Mth
Jul	29,174	-9,135	24,534	27,997	28,744	kWh/Mth
Aug	28,248	-9,500	23,371	26,936	27,746	kWh/Mth
Sep	35,142	-1,296	31,040	34,177	34,813	kWh/Mth
Oct	17,868	23,997	24,105	19,973	18,169	kWh/Mth
Nov	19,110	33,635	23,523	16,453	13,600	kWh/Mth
Dec	15,634	47,280	12,534	15,112	15,730	kWh/Mth
Total	250,093	237,968	255,679	245,400	245,658	kWh/yr
% Deviation		4.8%	-2.2%	1.9%	1.8%	



2nd Year Model Summary

	Vendor Calculation	Agency Calculations				
	Savings	1P	2P	3P	4P	
Jan	9,764	36,849	15,824	9,555	13,333	kWh/Mth
Feb	14,327	41,108	13,832	12,839	14,636	kWh/Mth
Mar	25,640	37,359	32,112	25,932	23,356	kWh/Mth
Apr	25,105	18,487	28,976	27,230	26,230	kWh/Mth
May	24,739	10,660	26,665	26,115	25,513	kWh/Mth
Jun	38,615	7,136	35,939	38,214	38,554	kWh/Mth
Jul	42,503	1,855	36,793	40,862	41,845	kWh/Mth
Aug	36,932	-7,154	30,034	34,802	36,038	kWh/Mth
Sep	29,095	5,287	28,956	29,980	29,890	kWh/Mth
Oct	12,608	15,462	18,403	14,963	13,396	kWh/Mth
Nov	12,127	30,231	19,553	12,344	9,443	kWh/Mth
Dec	11,519	41,434	8,421	9,266	10,551	kWh/Mth
Total	282,974	238,715	295,509	282,101	282,785	kWh/yr
% Deviation		15.6%	-4.4%	0.3%	0.1%	



Summary

- HHSC is a large state agency with significant challenges to maintain facilities
- HHSC chose ESPC as the solution to rebuild the facility infrastructure and achieve energy efficiency
- M&V Plan requires measured performance and independent verification
- This structure provides savings and measurement based assurance that the savings will continue