

**Appendix S**  
**Facility Condition Assessments**

# Facility Condition Assessments Effective Useful Life Analysis Summary Report

April 29, 2016

Prepared for California State University, Office of the Chancellor

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## Abstract

To support energy efficiency efforts throughout the CSU system, the assessed effective useful life (EUL) from recent campus Facility Condition Assessments (FCAs) for various equipment types were analyzed and compared to standard assigned EULs from the Database for Energy Efficiency Resources (DEER). We found that assessed EULs are approximately double that of DEER assigned values. The analysis is based on a large sample set, comprising 10 CSU campuses, covering over 16,000 systems.

The following tables summarize the findings by campus and by end use.

Most systems assessed in the Facility Condition Assessments (FCAs) were found to have an effective useful life (EUL) far longer than the corresponding 2014 DEER EUL. The following is a summary of the number of systems in the FCAs where actual assessed EUL exceeds the DEER EUL, and the corresponding average EUL by campus. Non-energy related systems were removed from the sample set.

**Table 1: Assessed EUL Exceeds DEER EUL, by Campus**

	% of Systems Exceeding DEER EUL	Sample Size (# Systems)	Average DEER EUL for Systems (yrs)	Average Assessed EUL for Systems (yrs)	Standard Deviation for Assessed EULs (yrs)
Cal Poly SLO	90%	1,638	15.7	30.6	12.4
California Maritime Academy	92%	875	15.9	31.2	13.3
CSU Channel Islands	86%	1,345	15.5	28.4	15.9
CSU Chico	95%	383	15.4	37.1	16.6
CSU Dominguez Hills	94%	973	15.7	30.1	11.2
CSU East Bay	90%	297	15.2	26.2	7.9
CSU Fullerton	87%	2,342	15.6	28.1	11.7
CSU Northridge	93%	2,275	15.4	29.0	12.4
Humboldt State University	90%	3,117	15.5	31.1	13.8
San Francisco State	91%	2,730	15.7	34.1	17.3
<b>Grand Total</b>	<b>90%</b>	<b>15,975</b>	<b>15.6</b>	<b>30.6</b>	<b>14.0</b>

The following is a summary of the number of systems in the FCAs where actual assessed EUL exceeds the DEER EUL, and the corresponding average EUL by DEER End Use.

**Table 2: Assessed EUL Exceeds DEER EUL, by DEER End Use**

	% of Systems Exceeding DEER EUL	Sample Size (# Systems, % of data set)	Average DEER EUL for Systems (yrs)	Average Assessed EUL for Systems (yrs)	Standard Deviation for Assessed EULs (yrs)	Note
<b>AppPlug</b>	100%	14 (0.1%)	4.0	18.6	7.2	Includes primarily IT equipment
<b>BldgEnv</b>	96%	3,592 (22.5%)	18.7	38.8	15.9	All envelope components (window, walls insulation) etc
<b>CommRefrig</b>	87%	559 (3.5%)	15.0	24.6	8.1	Primarily walk-in refrigeration components
<b>FoodServ</b>	100%	92 (0.6%)	12.0	29.6	4.5	Kitchen Equipment, including exhaust hoods
<b>HVAC</b>	88%	6,127 (38.4%)	15.6	27.9	12.8	All HVAC systems (boilers, chillers, AHUs, Package Units)
<b>Lighting</b>	76%	2,271 (14.2%)	15.3	22.5	9.8	Includes interior and exterior
<b>Other</b>	100%	607 (3.8%)	15.0	31.9	9.5	Major systems not in DEER EUL table (e.g. transformers, air compressors, elevators, etc)
<b>Recreate</b>	100%	29 (0.2%)	5.0	23.5	12.9	Includes primarily pool equipment
<b>SHW</b>	97%	2,684 (16.8%)	12.3	33.9	12.8	Hot water end uses (water heaters, pumping, distribution insulation etc)
<b>All End Uses</b>	90%	15,975	15.6	30.6	14.0	

Details by campus & end use. Percentages represent the share of systems in the sample where actual assessed EUL exceeds the DEER EUL.

**Table 3: Frequency Details Assessed EUL Exceeding DEER EUL by Campus & End Use**

DEER End Use	California		CSU		Dominguez Hills		CSU East Bay		CSU Fullerton		CSU Northridge		Humboldt State University		San Francisco State		Grand Total
	Cal Poly SLO	Maritime Academy	CSU Channel Islands	CSU Chico	CSU East Bay	CSU Fullerton	CSU Northridge	State University	San Francisco State								
<b>AppPlug</b>	100% (Sample of 2)	No data	100% (Sample of 1)	No data	No data	100% (Sample of 4)	100% (Sample of 1)	100% (Sample of 3)	100% (Sample of 3)	100% (Sample of 14)							
<b>BldgEnv</b>	97% (Sample of 434)	96% (Sample of 281)	91% (Sample of 295)	98% (Sample of 60)	95% (Sample of 226)	92% (Sample of 50)	95% (Sample of 496)	98% (Sample of 417)	99% (Sample of 714)	97% (Sample of 619)	96% (Sample of 3592)						
<b>ComRefrig</b>	100% (Sample of 21)	91% (Sample of 33)	88% (Sample of 73)	100% (Sample of 7)	93% (Sample of 28)	80% (Sample of 15)	98% (Sample of 93)	88% (Sample of 98)	66% (Sample of 86)	89% (Sample of 105)	87% (Sample of 559)						
<b>FoodServ</b>	100% (Sample of 2)	100% (Sample of 4)	100% (Sample of 4)	No data	No data	100% (Sample of 5)	100% (Sample of 8)	100% (Sample of 26)	100% (Sample of 32)	100% (Sample of 11)	100% (Sample of 92)						
<b>HVAC</b>	90% (Sample of 574)	89% (Sample of 216)	82% (Sample of 466)	96% (Sample of 169)	96% (Sample of 357)	100% (Sample of 88)	82% (Sample of 1065)	90% (Sample of 1097)	88% (Sample of 1044)	90% (Sample of 1051)	88% (Sample of 6127)						
<b>Lighting</b>	60% (Sample of 245)	87% (Sample of 154)	71% (Sample of 207)	80% (Sample of 61)	89% (Sample of 169)	69% (Sample of 74)	68% (Sample of 240)	89% (Sample of 210)	75% (Sample of 509)	79% (Sample of 402)	76% (Sample of 2271)						
<b>Other</b>	100% (Sample of 56)	100% (Sample of 23)	100% (Sample of 50)	100% (Sample of 15)	100% (Sample of 39)	100% (Sample of 6)	100% (Sample of 98)	100% (Sample of 111)	100% (Sample of 101)	100% (Sample of 108)	100% (Sample of 607)						
<b>Recreate</b>	100% (Sample of 2)	100% (Sample of 2)	100% (Sample of 9)	No data	100% (Sample of 1)	No data	100% (Sample of 4)	100% (Sample of 8)	100% (Sample of 2)	100% (Sample of 1)	100% (Sample of 29)						
<b>SHW</b>	99% (Sample of 302)	94% (Sample of 162)	96% (Sample of 240)	99% (Sample of 71)	95% (Sample of 153)	100% (Sample of 59)	95% (Sample of 334)	99% (Sample of 307)	97% (Sample of 626)	97% (Sample of 430)	97% (Sample of 2684)						
<b>All End Uses</b>	90% (Sample of 1638)	92% (Sample of 875)	86% (Sample of 1345)	95% (Sample of 383)	94% (Sample of 973)	90% (Sample of 297)	87% (Sample of 2342)	93% (Sample of 2275)	90% (Sample of 3117)	91% (Sample of 2730)	90% (Sample of 15975)						

**Table 4: Details of Assessed EUL & DEER Average EULs by Campus & End Use (Years)**

DEER End Use	Cal Poly SLO		California Maritime Academy		CSU Channel Islands		CSU Chico		CSU Dominguez Hills		CSU East Bay	
	DEER	Assessed	DEER	Assessed	DEER	Assessed	DEER	Assessed	DEER	Assessed	DEER	Assessed
AppPlug	4.0	28.0	No	Data	4.0	17.0	No	Data	No	Data	No	Data
	(18.4 Yr Std Dev)				Single Sample							
BldgEnv	18.9	36.3	18.5	36.7	18.8	42.4	18.5	48.0	18.8	35.3	18.5	30.5
	(11.3 Yr Std Dev)		(14 Yr Std Dev)		(22.5 Yr Std Dev)		(21.2 Yr Std Dev)		(11.2 Yr Std Dev)		(9.8 Yr Std Dev)	
ComRefrig	15.0	23.9	15.0	24.4	15.0	22.4	15.0	22.7	14.9	23.1	15.0	24.0
	(6 Yr Std Dev)		(5.1 Yr Std Dev)		(6.4 Yr Std Dev)		(1.3 Yr Std Dev)		(6.8 Yr Std Dev)		(8.3 Yr Std Dev)	
FoodServ	12.0	30.0	12.0	27.5	12.0	27.5	No	Data	No	Data	12.0	28.0
			(5 Yr Std Dev)		(5 Yr Std Dev)						(4.5 Yr Std Dev)	
HVAC	15.5	29.5	16.5	28.2	15.6	23.7	15.4	37.4	15.6	29.3	16.0	24.9
	(13.2 Yr Std Dev)		(12 Yr Std Dev)		(11.1 Yr Std Dev)		(15.5 Yr Std Dev)		(11.4 Yr Std Dev)		(6.9 Yr Std Dev)	
Lighting	15.2	20.1	15.3	23.4	15.3	19.6	15.2	28.2	15.3	22.7	15.3	21.0
	(8.2 Yr Std Dev)		(7.5 Yr Std Dev)		(5.2 Yr Std Dev)		(13.3 Yr Std Dev)		(6.8 Yr Std Dev)		(4.7 Yr Std Dev)	
Other	15.0	30.0	15.0	28.3	15.0	27.6	15.0	36.9	15.0	33.3	15.0	25.8
	(7.4 Yr Std Dev)		(5 Yr Std Dev)		(5.3 Yr Std Dev)		(11.8 Yr Std Dev)		(7.2 Yr Std Dev)		(2 Yr Std Dev)	
Recreate	5.0	18.0	5.0	47.0	5.0	17.6	No	Data	5.0	26.0	No	Data
			(41 Yr Std Dev)		(0.9 Yr Std Dev)				Single Sample			
SHW	12.1	33.8	12.0	34.9	12.0	30.4	13.0	36.5	12.1	33.0	11.5	31.3
	(9.8 Yr Std Dev)		(14.4 Yr Std Dev)		(12.1 Yr Std Dev)		(13 Yr Std Dev)		(10.6 Yr Std Dev)		(6.4 Yr Std Dev)	
All End Uses	15.7	30.6	15.9	31.2	15.5	28.4	15.4	37.1	15.7	30.1	15.2	26.2
	(12.4 Yr Std Dev)		(13.3 Yr Std Dev)		(15.9 Yr Std Dev)		(16.6 Yr Std Dev)		(11.2 Yr Std Dev)		(7.9 Yr Std Dev)	

**Table 4: Details:Table 4: Details of Assessed EUL & DEER Average EULs by Campus & End Use (Years)**

DEER End Use	CSU Fullerton		CSU Northridge		Humboldt State University		San Francisco State		Grand Total	
	DEER	Assessed	DEER	Assessed	DEER	Assessed	DEER	Assessed	DEER	Assessed
<b>AppPlug</b>	4.0	20.5	4.0	15.0	4.0	15.0	4.0	15.0	4.0	18.6
	(3.9 Yr Std Dev)		Single Sample						(7.2 Yr Std Dev)	
<b>BldgEnv</b>	18.7	36.5	18.7	35.9	18.4	39.0	18.6	44.4	18.7	38.8
	(12.5 Yr Std Dev)		(12.2 Yr Std Dev)		(15.8 Yr Std Dev)		(19.2 Yr Std Dev)		(15.9 Yr Std Dev)	
<b>ComRefrig</b>	15.0	23.9	15.0	25.1	15.0	25.3	14.9	26.6	15.0	24.6
	(5.4 Yr Std Dev)		(8.4 Yr Std Dev)		(12.1 Yr Std Dev)		(8.2 Yr Std Dev)		(8.1 Yr Std Dev)	
<b>FoodServ</b>	12.0	29.5	12.0	30.7	12.0	30.3	12.0	27.5	12.0	29.6
	(4.9 Yr Std Dev)		(4.2 Yr Std Dev)		(4.6 Yr Std Dev)		(4.3 Yr Std Dev)		(4.5 Yr Std Dev)	
<b>HVAC</b>	15.4	25.3	15.3	26.7	15.8	28.7	15.7	30.0	15.6	27.9
	(10.6 Yr Std Dev)		(12.6 Yr Std Dev)		(12.5 Yr Std Dev)		(14.7 Yr Std Dev)		(12.8 Yr Std Dev)	
<b>Lighting</b>	15.3	20.0	15.3	21.7	15.2	22.6	15.2	26.5	15.3	22.5
	(6.5 Yr Std Dev)		(6.6 Yr Std Dev)		(8.8 Yr Std Dev)		(15.2 Yr Std Dev)		(9.8 Yr Std Dev)	
<b>Other</b>	15.0	30.3	15.0	32.3	15.0	33.4	15.0	34.2	15.0	31.9
	(7.9 Yr Std Dev)		(8.7 Yr Std Dev)		(9.3 Yr Std Dev)		(13.7 Yr Std Dev)		(9.5 Yr Std Dev)	
<b>Recreate</b>	5.0	33.5	5.0	21.1	5.0	23.0	5.0	18.0	5.0	23.5
	(17.9 Yr Std Dev)		(2.6 Yr Std Dev)				Single Sample		(12.9 Yr Std Dev)	
<b>SHW</b>	12.5	31.0	12.3	33.4	12.4	33.8	12.4	38.7	12.3	33.9
	(10.5 Yr Std Dev)		(11.7 Yr Std Dev)		(12.2 Yr Std Dev)		(17 Yr Std Dev)		(12.8 Yr Std Dev)	
<b>All End Uses</b>	15.6	28.1	15.4	29.0	15.5	31.1	15.7	34.1	15.6	30.6
	(11.7 Yr Std Dev)		(12.4 Yr Std Dev)		(13.8 Yr Std Dev)		Single Sample		(14 Yr Std Dev)	