

IN-BUILDING ENERGY CONSERVATION CASE STUDY



inteliGlas Corporation
Authored by: Jennifer Mills / CFO



EXECUTIVE SUMMARY

Mayflower Office Building

This case study analysis is a two-year comparative study on the energy conservation effects of the inteliGlas™ smart virtual asset engineer software platform within a typical office building environment.

Specifically, the case study examines the billing from utility provider Southern California Edison™ for the property in question, an 85,000 ft², four-floor office building in Southern California, located at 1333 Mayflower St. Monrovia, CA 91016.

***“Even in a dynamically changing environment...
inteliGlas’ platform still pushed down kwh and costs
substantially year-over-year.”***

The examination concludes the actual and forecasted of twenty-two percent (22%) reduction of energy usage on projected cost savings of an estimated \$135,000 annually. Resulting property street value increase was \$2.25M due to the reduction in operating expenditures.

The case study provided herein covers the Problem Statement, Case Analysis, Outcome/Results, and Recommendations.

PROBLEM STATEMENT

The *problem* addressed herein is the question of whether inteliGlas’ platform can obtain energy efficiency to surpass the magic eighteen percent (18%) conservation ceiling estimated by the industry. The ceiling is the upper limit of what the commercial real estate and environmental industries consider as “waste” in the consumption

energy at office buildings generally attributed to mismanagement of building systems, including but not limited to the heating, ventilation, and air conditioning (HVAC) system.

CASE ANALYSIS

Energy consumption data at the Mayflower building was examined over an approximately two-year period from the calendar year 2018 through November 2019. Utility invoicing examined, detailed monthly aggregate billing and usage data for various “peak” pricing with categorical energy usage breakdown based on kilowatt-hours (kWh) consumed.

inteliGlas platform was initialized on the HVAC system in a software/hardware upgrade at the Mayflower, beginning in January 2019 and completing Phase I (i.e., basic upgrade to building management system (BMS) and associated protocol interfacing hardware)¹ in March 2019. Of particular interest, hit with many power outages, the Mayflower building had the functionality of a significant number of individualized components of the HVAC system disabled, including but not limited to variable-air-volume (VAV). The interesting result is an assumed artificial reduction of energy consumed at the building as a result of the dysfunctionality of the HVAC components.

March 2019 breathed new life into the Mayflower building by bringing back online all of the downed HVAC system components. This event caused the energy consumption at the building to increase as reflected in the April 2019 power utility invoicing.

Over the proceeding months to the present, inteliGlas instituted to its biological intelligence (i.e., human) testing of various energy conservation algorithms, including

¹ Schneider Electric, Building Management Systems, last accessed November 14, 2019, <https://www.se.com/ww/en/product-subcategory/1210-building-management-systems/>

adjustments to HVAC system schedules, sub-system mechanical adjustments, and certain lighting sub-systems measures. The algorithms incorporated – organically developed and industry provided – form the basis of the eventual application of machine-driven 24/7 artificial intelligence (AI) monitoring and autonomous-action (both in rules and machine-learning applications) upon building systems. This energy-saving measure includes algorithms written for the HVAC system as well; due to its primary position among building systems’ energy consumption. There is little comparison between the application of substantial energy conservation measures accomplished through AI over that of periodic human intervention on these systems.

Even in a dynamically changing environment of new construction, increased occupancy, and spiking utility rate increases, inteliGlas’ platform still pushed kWh and costs substantially down year-over-year.²

OUTCOME/RESULTS

Energy consumption data from March 2019 through November 2019 show a significant downturn in energy consumption of 22%, actual and projected, against a changing field of factors noted above. This consumption data translates into an estimated annual savings of \$135,344.00 over the 2018 data. Resulting cap-rates calculated at six percent (6%) from the reduction of operating expenses are estimated to contribute an additional \$2.25M to the street value of the Mayflower property.³

RECOMMENDATIONS

² Reference Appendix in this Case Study for actual electric utility billing data from Southern California Edison.

³ Wikipedia.org, various sources cited, last accessed November 14, 2019, https://en.wikipedia.org/wiki/Capitalization_rate

Institution of 24/7 AI monitoring and autonomous-action upon building systems with the goal of energy conservation above the holy grail target of eighteen percent (18%) appears very achievable in the near term.⁴ Estimated savings in certain modeling have projected excess of thirty percent (30%) to thirty-five percent (35%) savings possible.

⁴ Perry, Christopher. Research Reports, American Council for an Energy-Efficient Economy, Dec. 2017, aceee.org.

APPENDIX

SUMMARY COMPARISON

Invoice Summ		1333 Mayflower					Winter Rates		Summer Rates			Occupancy of	
Invoice No	Supplier	Invoice Date	Property	Invoice Amount	KW Used	Off Peak	Mid Peak	Peak	Mid Peak	Off Peak	Building	Vacant	
2308564772-	Southern California Edison	01/18/2018	Kare Foundation (3261)	11,713.85	87,211	39,443	47,768				60.0%		
2308564772-	Southern California Edison	02/15/2018	Kare Foundation (3261)	12,630.76	80,721	29,496	51,225				60.0%		
2308564772-	Southern California Edison	03/17/2018	Kare Foundation (3261)	10,645.53	73,775	31,406	42,369				60.0%		
2308564772-	Southern California Edison	04/18/2018	Kare Foundation (3261)	13,488.57	91,499	36,753	54,746				60.0%		
2308564772-	Southern California Edison	05/17/2018	Kare Foundation (3261)	12,368.79	82,551	32,901	49,650				60.0%		
2308564772-	Southern California Edison	06/20/2018	Kare Foundation (3261)	16,769.76	88,166	19,115	24,432	14,171	15,951	14,497	60.0%		
2308564772-	Southern California Edison	07/18/2018	Kare Foundation (3261)	25,647.35	104,441			31,278	34,496	38,667	60.0%		
2308564772-	Southern California Edison	08/16/2018	Kare Foundation (3261)	26,856.38	111,664			38,061	37,392	36,211	60.0%		
2308564772-	Southern California Edison	09/15/2018	Kare Foundation (3261)	21,628.09	98,848			31,536	31,418	35,894	60.0%	6.1%	
2308564772-	Southern California Edison	10/16/2018	Kare Foundation (3261)	15,401.15	88,429	16,352	22,119	15,338	14,916	19,704	60.0%	6.1%	
2308564772-	Southern California Edison	11/16/2018	Kare Foundation (3261)	9,496.54	72,003	34,916	37,087	Building Sold Nov 7, 2018 change over to new owner			69.0%	6.1%	
2412901498	Southern California Edison	12/19/2019	Chase Mayflower LP	16680.10	125,809	67,813	57,996				69.0%	6.1%	
2018 Invoices				193,326.87	1,105,117								
Invoice Summ		1333 Mayflower					Winter Rates		Summer Rates				
Invoice No	Supplier	Invoice Date	Property	Invoice Amount	KW Used	Off Peak	Mid Peak	Peak	Mid Peak	Off Peak	Super Off Peak		
2412901498	Southern California Edison	01/16/2019	Chase Mayflower LP	11,009.45	89,670	52,266	37,404					69.0%	20.5%
2412901498	Southern California Edison	02/15/2019	Chase Mayflower LP	10,268.41	83,023	44,183	38,840					69.0%	20.5%
2412901498	Southern California Edison	03/21/2019	Chase Mayflower LP	9,643.59	74,897	42,363	32,534					69.0%	20.5%
2412901498	Southern California Edison	04/16/2019	Chase Mayflower LP	12,272.72	84,084							69.0%	20.5%
2412901498	Southern California Edison	05/16/2019	Chase Mayflower LP	12,364.49	86,088							69.0%	20.5%
2412901498	Southern California Edison	06/17/2019	Chase Mayflower LP	16,471.01	92,105							69.0%	6.1%
2412901498	Southern California Edison	07/17/2019	Chase Mayflower LP	20,625.86	91,596							69.0%	6.1%
2412901498	Southern California Edison	08/15/2019	Chase Mayflower LP	21,109.68	90,280			21,784	2,244	66,252		74.2%	6.1%
2412901498	Southern California Edison	09/16/2019	Chase Mayflower LP	22,193.89	99,391			20,203	4,235	74,953		74.2%	6.1%
2412901498	Southern California Edison	10/16/2019	Chase Mayflower LP	13,313.45	80,670			6,936	9,964	44,603	19,167	74.2%	6.1%
2412901498	Southern California Edison		Chase Mayflower LP	0.00								74.2%	
2019 Invoices				158,769.09	943,807								
							Winter Rates		Summer Rates				
							Off Peak	Mid Peak	Peak	Mid Peak	Off Peak	Super Off Peak	
2308564772-	Southern California Edison	08/16/2018	Kare Foundation (3261)	26,856.38	111,664			38,061	37,392	36,211		60.0%	
2308564772-	Southern California Edison	09/15/2018	Kare Foundation (3261)	21,628.09	98,848			31,536	31,418	35,894		60.0%	6.1%
2308564772-	Southern California Edison	10/16/2018	Kare Foundation (3261)	15,401.15	88,429	16,352	22,119	15,338	14,916	19,704		60.0%	6.1%
2412901498	Southern California Edison	08/15/2019	Chase Mayflower LP	21,109.68	90,280			21,784	2,244	66,252		74.2%	6.1%
2412901498	Southern California Edison	09/16/2019	Chase Mayflower LP	22,193.89	99,391			20,203	4,235	74,953		74.2%	6.1%
2412901498	Southern California Edison	10/16/2019	Chase Mayflower LP	13,313.45	80,670			6,936	9,964	44,603	19,167	74.2%	6.1%

AUGUST – OCTOBER YoY COMPARISON

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK			
DELIVERY CHARGES																																								
Facilities demand																																								
2018	167	10.03	all	1	1,760.74		344	10.03	all	1	8,642.88		315	10.30	all	1	1,761.39																							
2019	346	11.88	9/29	5	1,278.74		0																																	
2018	346	11.30	20/29	5	2,898.41		288	11.30	all	5	3,254.40		247	11.30	all	1	2,791.10																							
2019	344	9.78	9/29	5	1,001.40		0																																	
2018	344	9.87	20/29	5	2,058.88		285	9.87	all	1	2,470.91		232	9.87	9/30	1	1,192.88																							
2019	341	10.42		1	1,631.43		282.3	10.97		1	1,721.11		242.11	10.90		1	1,184.39																							
2018	#####	0.41%			-4.47%		#####	0.29%			-42.49%		#####	#####																										
2019	#####	#####			-25.32%		#####	#####			-7.88%		#####	#####																										
Comments:	usage fluctuates as tenant improvements are in progress, however costs are decreasing even though rates increase																																							
Dish Bond Charge																																								
2018	111,684	0.00549		1	613.04		88,843	0.00549		1	342.83		11,429	0.00549		1	431.43																							
2019	90,210	0.00503		1	454.11		99,371	0.00503		1	495.94		10,870	0.00503		1	405.77																							
2018	#####	#####			-25.32%		#####	#####			-7.88%		#####	#####																										
2019	#####	#####			-25.32%		#####	#####			-7.88%		#####	#####																										
Comments:	decrease split between decrease in kWh and rate, kWh decrease as sensors are becoming operational and work the equipment more efficiently																																							
GENERATION CHARGES																																								
Demand Charges																																								
2018	387	21.73		1	8,480.51		344	21.73	10/30	1	2,000.05		390	18.14	10/31	1	2,486.77																							
2019	332	4.17		1	1,319.04		282	4.17	10/30	1	475.11		390	18.14	10/31	1	2,486.77																							
2018	344	18.44	10/30	1	3,393.22		282	18.44	10/30	1	1,466.58		274.2	18.14	10/31	1	2,000.05																							
2019	341	10.90		1	9,204.48		314.8	10.90		1	7,300.00		274.2	18.14	10/31	1	2,000.05																							
2018	344	18.14	10/31	1	2,000.05		282	18.14	10/31	1	5,480.55		243	18.14	10/30	1	2,316.41																							
2019	344	10.22	20/29	1	4,562.11		282	10.22		1	3,480.51		282	3.50	10/30	1	406.00																							
2018	344	19.39		1	5,649.28		282	19.39		1	3,480.51		282	3.50	10/30	1	2,742.45																							
2018	#####	#####			-32.18%		#####	#####			-25.32%		#####	#####																										
2019	#####	#####			-32.18%		#####	#####			-25.32%		#####	#####																										
Comments:	decrease in cost due to usage trending downward. As sensors are becoming operational, usage becomes more economical																																							
Energy Usage charges																																								
2018	33,061	0.02848		1	3,138.51		12,614	0.02848		1	1,040.11		15,338	0.07941		1	1,170.88																							
2019	37,392	0.03584		1	2,076.78		12,167	0.03584		1	897.97		14,918	0.04428		1	880.48																							
2018	36,511	0.03712		1	1,345.24		14,318	0.03712		1	233.40		19,704	0.02904		1	322.00																							
2019	344	10.22		1	1,800.00		18,922	0.04046		1	1,100.71		18,922	0.04046		1	1,100.71																							
2018	18,661	0.04203		1	782.31		22,110	0.04203		1	1,167.88		18,661	0.04203		1	887.80																							
2019	111,684	0.03333		1	4,560.50		93,948	0.03333		1	4,168.88		88,828	0.04078		1	4,284.12																							
2018	6,781	0.08907		1	612.34		6,781	0.08907		1	612.34		6,781	0.08907		1	612.34																							
2019	6,661	0.08146		1	567.50		6,661	0.08146		1	567.50		6,661	0.08146		1	567.50																							
2018	20,261	0.03318		1	1,201.86		20,261	0.03318		1	1,201.86		20,261	0.03318		1	1,201.86																							
2019	15,023	0.03807		1	1,318.10		20,261	0.03807		1	1,799.43		15,023	0.03807		1	1,318.10																							
2018	1,048	0.03811		1	124.81		4,255	0.03811		1	139.27		8,687	0.04018		1	149.18																							
2019	45,691	0.02849		1	2,407.48		74,653	0.02849		1	3,649.27		12,171	0.03808		1	718.81																							
2018	90,280	0.07453		1	1,640.57		99,191	0.07280		1	2,688.02		18,187	0.03720		1	184.23																							
2019	90,280	0.07453		1	1,640.57		99,191	0.07280		1	2,688.02		18,187	0.03720		1	184.23																							
2018	#####	#####			-16.83%		#####	#####			25.53%		#####	#####																										
2019	#####	#####			-16.83%		#####	#####			25.53%		#####	#####																										
Comments:	again, savings are hard to realize here as rates skyrocket																																							
Other Energy - Summer charges																																								
2018	18,091	0.01532		1	583.00		12,614	0.01532		1	189.23		15,338	0.01608		1	248.84																							
2019	37,392	0.01532		1	578.85		12,167	0.01532		1	182.53		14,918	0.01608		1	249.85																							
2018	36,511	0.01532		1	554.75		14,188	0.01532		1	219.86		19,704	0.01608		1	318.84																							
2019	15,023	0.01607		1	1,318.10		20,261	0.01607		1	1,799.43		15,023	0.01607		1	1,318.10																							
2018	1,048	0.03811		1	124.81		4,255	0.03811		1	139.27		8,687	0.04018		1	149.18																							
2019	45,691	0.02849		1	2,407.48		74,653	0.02849		1	3,649.27		12,171	0.03808		1	718.81																							
2018	90,280	0.07453		1	1,640.57		99,191	0.07280		1	2,688.02		18,187	0.03720		1	184.23																							
2019	90,280	0.07453		1	1,640.57		99,191	0.07280		1	2,688.02		18,187	0.03720		1	184.23																							
2018	#####	#####			-16.83%		#####	#####			25.53%		#####	#####																										
2019	#####	#####			-16.83%		#####	#####			25.53%		#####	#####																										
Comments:	again, savings are hard to realize here as rates skyrocket																																							
CPP Participation - new in 2019																																								
CPP event 070	879	0.40000		1	381.00																																			
CPP event 075							929	0.40000		1	371.80																													
CPP event 022							881	0.40000		1	352.40	</																												