

Farm Energy IQ


Farm Energy Audits

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Agricultural Energy Audit - Definition


“...to determine and document current energy usage, and to provide an estimation of energy savings from alternatives in the cultivation, protection, harvesting, processing and storage of agricultural commodities and in the feeding, housing and processing of farm animals and animal products.”



Source: American Society of Agricultural and Biological Engineers Standard S612


Questions an Energy Audit Should Answer

- How much energy does the operation use?
- What are the major uses of energy?
- Why?
- What steps will reduce energy consumption?




Conducting Energy Audits

- NRCS certifies Technical Service Providers (TSPs) to conduct agricultural audits.
- NRCS provides funding for agricultural audits based on a fee structure related to size and type of operation
- ASABE S612 discusses qualifications for audit professionals
- Not only is agriculture different from commercial and industrial operations, but different sectors within agriculture use energy in very different ways




Components of an Audit

- Compilation of utility bills
- Visual inspection
- Characterization of equipment and systems
- Interviews
- On-site measurement and testing
 - Blower door
 - Power measurement
 - IR imaging
 - Hours of operation - lights and motors
- Simulation modeling



What to Expect from an Audit

- Facility summary and status
- Summary of use by application or location
- Characterization of equipment and systems
- Identification of trends
- Interviews
- Summary of energy use by energy resource
- Summary of energy costs
- Identification of peak demands
- Compilation of energy use per unit
- Inventory of equipment and systems
- Energy conservation opportunities



Slide 1

JS2 None of the other presentations have authorship. We should discuss whether or not we'll have a contact slide for ASPs.

Jeannie Sikora, 1/5/2015



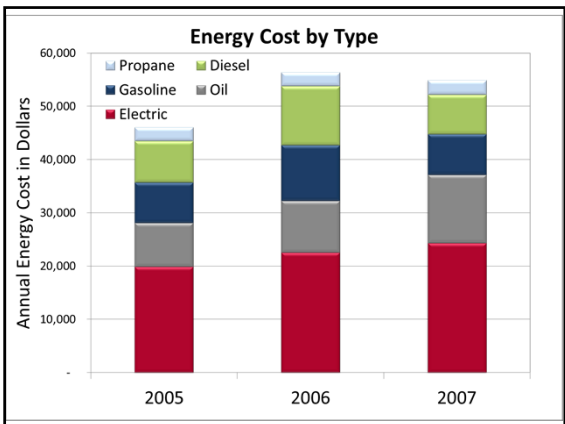
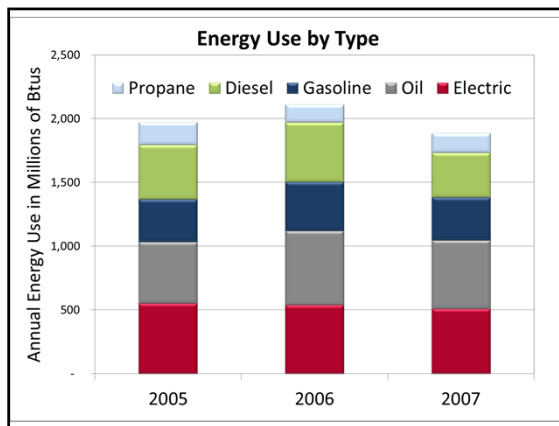
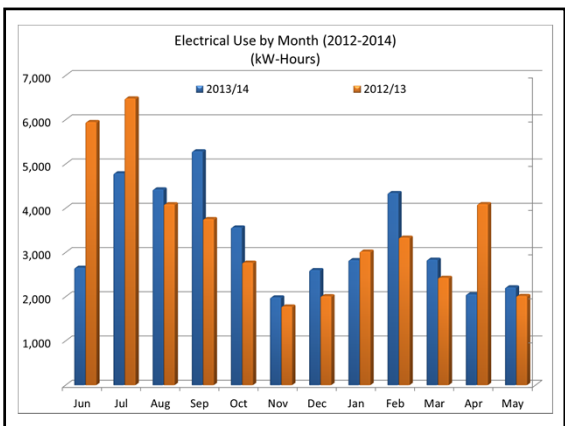
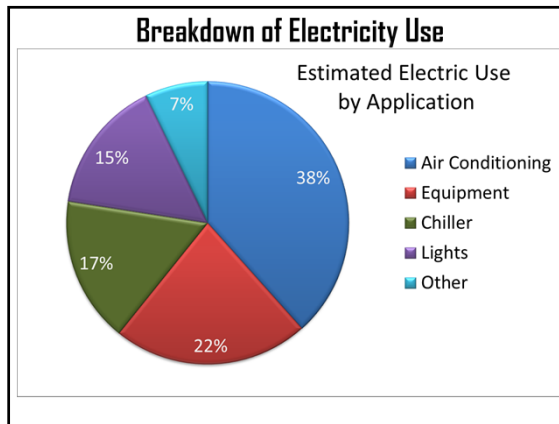
Slide 5

JS1 How often would this be used in agricultural audit? Might be off topic.

Jeannie Sikora, 1/5/2015

Facility Summary and Status

- Overview of the operation
- Building summary
 - Area
 - Use
 - Construction details
- Infrastructure summary
 - Electric supply
 - Fuels
 - Major systems

Electric Bills - Storage Barn

Meter # G123456789 (acct 0000000) Area: 4,800ft²

Billing Period	Amount Billed	kW-hr	KVA	¢/kW-hr	kW-hr per ft ²
Dec 15 to Jan 16	\$170.92	1,010	5.1	16.9	0.21
Jan 17 to Feb 15	\$176.80	1,059	4.9	16.7	0.22
Feb 16 to Mar 19	\$133.65	776	4.7	17.2	0.16
Mar 20 to Apr 18	\$127.23	763	4.5	16.7	0.16
Apr 19 to May 17	\$57.21	332	2.6	17.2	0.07
May 18 to Jun 18	\$218.14	1,105	5.1	19.7	0.23
Jun 19 to Jul 18	\$169.86	782	7.9	21.7	0.16
July 19 to Aug 16	\$510.64	2,966	6.9	17.2	0.62
Aug 17 to Sep 13	\$457.65	2,639	7.8	17.3	0.55
Sept 14 to Oct 12	\$445.43	3,167	8.0	14.1	0.66
Oct 13 to Nov 13	\$189.80	1,086	7.8	17.5	0.23
Total:	\$2,657.33	15,685			3.27
Maximum:	\$510.64	3,167	8.0	21.7	0.66
Minimum:	\$57.21	332	2.6	14.1	0.07
Average:	\$241.58	1,426	5.9	16.9	0.30

Equipment Summary

- Equipment summary by location
- Motors, refrigeration equipment, fans, boilers and furnaces, fans, pumps, other
- Equipment capacity, efficiency, and runtime
- Lighting summary by location
- Type
- Quantities
- Hours of use

Tabulation of Large Equipment

Location	Equipment	Manufacturer	Model	Motor										
				Manufacturer	Model	HP	KW	RPM	V	A	Ph	Hz	Eff.	P.F.
C/Winery	Pump	Liverani		SP-MINOR	2	1.5	27.8	220		7.4	3	60		
C/Winery	VFD Pump				1.2	0.8		220		4.88	3	60		
C/Winery	Pump	Liverani		M11244	15.5	44.0	1740	220		15.2	3	60		77%
C/Winery	Chiller Pump				2	1.5								
C/Winery	Compressor	Ingersoll Rand	2475N		7.5	5.5		230/460			3	60		
C/Winery	Crusher	ALPHA 80	Baldor	EM3615T	5	3.7	1750	208/230		13.9/13.4	3	60	90%	78%
C	Winery	Press	Della Toffola	Palmer Motors	1	0.7	1700	208		1.0	3	60		
C	Winery	Press		Rossi Motoriduttori	1.5	1.1	1420	230		3	50			75%
C/Winery	Steam Generator	Electro-Steam	EG-20		2	1.5		208		5.0	3	60		

Heating Equipment Summary

Location / Area Description	# of Heaters	Type of Heater	Btu/hr Output	Make / Model	Fuel Type
Propane Boiler	1	Gas-Fired Boiler	300,000	Slant Fin GG-375	Propane
Outdoor Furnace	1	Wood-Fired Boiler		Big Eliminator 60	Wood
Greenhouse #1	12	Forced Hot Air	180,000	Modine	Propane
Greenhouse #1	2	Forced Hot Air	300,000	Reznor UPAP300	Wood
Greenhouse #1	6	Forced Hot Air	89,000	Reznor WS96/120	Wood
Greenhouse #2	3	Forced Hot Air	180,000	Modine	Propane

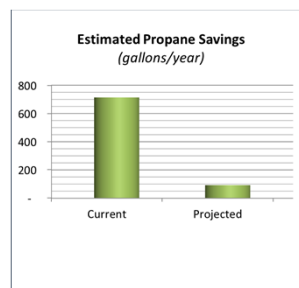
Lighting Summary

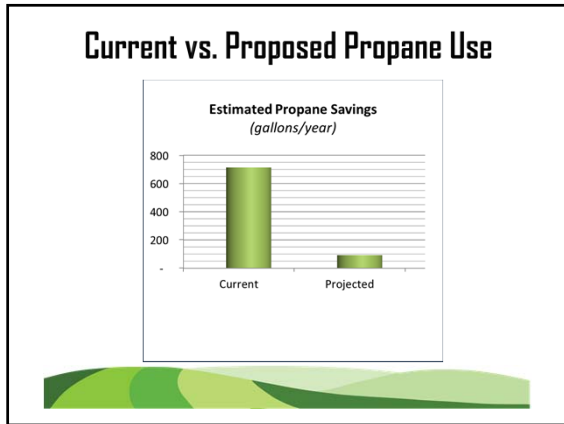
LOCATION	Hrs	CFL/LED			Incand.			Other			Linear fluorescent					
		Watts	Qty	kwh	Total	Watts	Qty	kwh	Total	Watts	Qty	kwh	Total			
Fasting Room				590				1,672					590			
Merzoning	7	17	13	565	56	2	286	15	1	131	Exit					
Bot	7	10	10	256	66	17	2,608	15	2	263	Exit					
	7				66	9	1,381	120	1	88	120	Rope				
Bathroom	1	15	3	14				25	1	9	25	Fan				
Office	8	104	1													
Office	2	36	4	88												
Lab/Office													820			
Lab	9										102	2	T12	1,381		
Office	9										50	4	T8	1,315		
Winery	10								15	2	263	Exit	105	5	T12	3,835
Exterior	12				150	3	164	450	1	104	450	HID				
TOTALS				923	589			4,489	2,122	450	1	919	995		6,331	1,870

Energy Conservation Opportunities

Location	Recommended Measure	Electric Savings (kWh)	Propane Savings (Gal)	Installed Cost	Energy Cost Savings	Payback (years)
Tasting Room	Replace incandescent bulbs with LEDs	3,403		\$650	\$851	0.8
Lab	Replace T-12 fluorescent fixtures with T-8 fixtures	197		\$200	\$70	2.9
Winery	Insulate Walls	2,069	828	\$13,600	\$3,748	3.6
Winery	Replace T-12 fluorescent fixtures with T-8 fixtures	548		\$500	\$137	3.7
Small Office	Replace refrigerator	404		\$800	\$101	7.9
Winery	Replace chiller	8,176		\$20,000	\$2,044	9.8
Lab	Replace hot water heater with 90% efficient heater		52	\$2,500	\$204	12.3

Current vs. Proposed Propane Use





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Questions?