Sweet Potato Sto VFD Analysis NC style

6 5hp fans=30hp , 16,000 CFM per fan at 1.25" static pressure

Project Name	**XYZ Potato Shed**	Blue = User Inputs	Fan output in cfm	**16000**	CFM per fan
Contact	Sweet Potato grower		at different air press	**6**	Number of fans
Contact Phone No.				96000	Total CFM at 1.25 static press
Location	MS,AR,NC,LA,CA			96000	Total CFM at 1.25 static press
Farm Name	Sweet Potatoes	**Utility Provider**	Power Utility	1.454545455	CFM per BU at 1.25 static press
Storage Capacity (ton)	1,650	**Utility Contact**	Power Rep	1.454545455	CfM per BU at 1.25 static press
Storage Capacity (BU)	**66,000**	**Energy Cost ($/kWh)**	**$0.100**		
Design Airflow (cfm/BU)	**1.5**	**Avg Energy Consumption**	**128,148**	**kWh**	
Total Fan HP	**30**	**Estimated Energy Savings**	**92,113**	**kWh**	
Fan Motor Loading (est)	95%	**Percent Energy Savings**	**72%**	**(range 30-60%)**	
Fan Motor Efficiency	95%	**Energy Cost Savings**	**$9,211.30**	**$$**	
Calculated Fan Use (kW)	22.4	**Estimated Project Cost**	**$6,750.00**	**$225.00**	**cost of the VFD per hp**
VFD Efficiency	95%	**Potential Incentive**	$4,725.00	**(may need to adjust formula)**	
Total Measured Fan (kW)	**22.4**	**Payback w/o incentive (yr)**	**0.7**		
Refrigerated (Yes/No)	yes	**Payback with incentive (yr)**	**0.2**	please contact PU	

No VFD (Current) Ventilation System Profile

Storage Phase	Starting Dates	Days	Fans In-Use (%)	Fan Run Time (hr/day)	Calculated Usage (kWh)	Typical Fan Operation
Harvest / Load	8/20/2015	5	100%	10	1,119	Start fans when loading
Cure / Suberize	8/25/2015	10	100%	24	5,371	Continuous/Recirc if no OSA
Ramp to Hold Temp	9/4/2015	21	100%	24	11,280	Run Anytime OSA Avail
Fall/Winter Holding	9/25/2015	150	100%	24	80,568	Run Anytime OSA Avail
Spring Holding	2/22/2016	60	100%	18	24,170	Run Anytime OSA Avail
Unload	4/22/2016	21	100%	12	5,640	Continuous w/ OSA or Refrig
empty	5/13/2016	0	100%	0	0	Run Anytime OSA Avail
Storage Season Length		267		**Total =**	**128,148**	**usage w/o VFD's in kWh**
					$12,814.79	**En. cost w/o VFD's in $$**

Estimated VFD Ventilation System Operation Profile

Storage Phase	Starting Dates	Days	Fan Speed (%)	Fan Run Time (hr/day)	Calculated Usage (kWh)	Typical Fan Operation
Harvest / Load	8/20/2015	5	70%	10	466	Start fans when loading
Cure / Suberize	8/25/2015	10	100%	24	5,654	Continuous/Recirc if no OSA
Ramp to Holding Temp	9/4/2015	21	80%	24	6,647	Run Anytime OSA Avail
Winter Holding	9/25/2015	150	50%	24	13,988	Run Anytime OSA Avail
Spring Holding	2/22/2016	60	65%	18	8,301	Run Anytime OSA Avail
Unload	4/22/2016	21	50%	12	979	Continuous w/ OSA or Refrig
empty	5/13/2016	0	0%	0	0	Run Anytime OSA Avail
Storage Season Length		267		**Total =**	**36,035**	**usage with VFD's in kWh/Yr**
			Estimated Yearly energy cost =		**$3,603.49**	**En. cost with VFD's in $$**
			Estimated Savings =		**92,113**	**kWh per year savings**
					$9,211.30	**Net power savings/yr in $$**
			10 year lifespan of the project as per DOE		**$92,112.96**	10 year savings $$
			Avg cost of 66,000 bu computerized system		**$78,000**	total ventilation system cost
					-$14,113	vent system net cost after
					118.09%	deduction of 10 yr/main fan VFD savings

Notes:

Use utility billing history to help verify storage time

Work with grower to determine tonnage/BU by month (eg unloading reduces refrigeration need)

Please check with power utility on rebate and power filtration system requirements

For these estimates, use 50% as the lowest VFD speed

Savings should be based on kWh per day, however, tonnage/BU may also need to be factored in.

Energy savings may not be reflected on power bill until later in storage season.

For verification of savings, update spreadsheet using actual monthly VFD run time and kWh data and billing history

BOOSTER FANS ARE NEEDED TO CARRY THE AIR OVER 50', FOR STORAGES OF 60'+ IN LENGTH FANS SHOULD CARRY min 75% OF THE TOTAL AIR AVAILABLE