

# Sweet Potato Storage VFD Analysis

4 2hp fans=8hp , 7500 CFM per fan at .5" static pressure

Project Name **XYZ Potato Shed**  
 Contact **Sweet Potato grower**  
 Contact Phone No.  
 Location **MS,AR,NC,LA,CA**  
 Farm Name **Sweet Potatoes**  
 Storage Capacity (ton) **500**  
 Storage Capacity (BU) **20,000**  
 Design Airflow (cfm/BU) **1.5**  
 Total Fan HP **8**  
 Fan Motor Loading (est) **95%**  
 Fan Motor Efficiency **95%**  
 Calculated Fan Use (kW) **6.0**  
 VFD Efficiency **95%**  
 Total Measured Fan (kW) **6.0**  
 Refrigerated (Yes/No) **yes**

Blue = User Inputs

Utility Provider **Power Utility**  
 Utility Contact **Power Rep**  
 Energy Cost (\$/kWh) **\$0.100**  
 Avg Energy Consumption **27,011** kWh  
 Estimated Energy Savings **17,423** kWh  
 Percent Energy Savings **65%** (range 30-60%)  
 Energy Cost Savings **\$1,742.34** \$\$  
 Estimated Project Cost **\$1,800.00**  
 Potential Incentive **\$1,260.00** (may need to adjust formula)  
 Payback w/o incentive (yr) **1.0**  
 Payback with incentive (yr) **0.3** please contact PU

Fan output in cfm	7500	CFM per fan
at different air press	4	Number of fans
	30000	Total CFM at .5 static press
	0	Total CFM at .05 static press
	1.5	CFM per BU at .5 static press
	0	CFM per BU at .05 static press

No VFD (Current) Ventilation System Profile						
Storage Phase	Starting Dates	Days	Fans In-Use	Fan Run Time	Calculated Usage	Typical Fan Operation
			(%)	(hr/day)	(kWh)	
Harvest / Load	9/15/2006	5	100%	10	298	Start fans when loading
Cure / Suberize	9/20/2006	14	100%	24	2,005	Continuous/Recirc if no OSA
Ramp to Hold Temp	10/4/2006	30	100%	24	4,297	Run Anytime OSA Avail
Winter Holding	11/3/2006	90	100%	24	12,891	Run Anytime OSA Avail
Spring Holding	2/1/2007	60	100%	18	6,445	Run Anytime OSA Avail
Unload	4/2/2007	15	100%	12	1,074	Continuous w/ OSA or Refrig
empty	4/17/2007	0	100%	0	0	Run Anytime OSA Avail
Storage Season Length		214		<b>Total =</b>	<b>27,011</b>	<b>usage w/o VFD's in kWh</b>
					<b>\$2,701.12</b>	<b>En. cost w/o VFD's in \$\$</b>

Estimated VFD Ventilation System Operation Profile						
Storage Phase	Starting Dates	Days	Fan Speed	Fan Run Time	Calculated Usage	Typical Fan Operation
			(%)	(hr/day)	(kWh)	
Harvest / Load	9/15/2006	5	70%	10	124	Start fans when loading
Cure / Suberize	9/20/2006	14	100%	24	2,111	Continuous/Recirc if no OSA
Ramp to Holding Temp	10/4/2006	30	80%	24	2,532	Run Anytime OSA Avail
Winter Holding	11/3/2006	90	50%	24	2,238	Run Anytime OSA Avail
Spring Holding	2/1/2007	60	65%	18	2,214	Run Anytime OSA Avail
Unload	4/2/2007	15	65%	12	369	Continuous w/ OSA or Refrig
empty	4/17/2007	0	0%	0	0	Run Anytime OSA Avail
Storage Season Length		214		<b>Total =</b>	<b>9,588</b>	<b>usage with VFD's in kWh/Yr</b>

<b>Estimated Yearly energy cost =</b>	<b>\$958.78</b>	<b>En. cost with VFD's in \$\$</b>
<b>Estimated Savings =</b>	<b>17,423</b>	<b>kWh per year savings</b>
	<b>\$1,742.34</b>	<b>Net power savings/yr in \$\$</b>
<b>10 year lifespan of the project as per DOE</b>	<b>\$17,423.41</b>	<b>10 year savings \$\$</b>
<b>Avg cost of 20000 bu computerized system</b>	<b>\$9,000</b>	<b>total ventilation system cost</b>
	<b>-\$8,423</b>	<b>vent system net cost after</b>
	<b>193.59%</b>	<b>deduction of 10 yr/main fan VFD savings</b>

**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 60' FOR STORAGE OF 80'+ IN LENGTH - FANS SHOULD CARRY 75% OF THE TOTAL MAXIMUM AIR AVAILABLE**

