

Sweet Potato Sto VFD Analysis NC style

8 3hp fans=24hp , 16,800 CFM per fan at .5" static pressure

Project Name
 Contact
 Contact Phone No.
 Location AR, LA, MS, NC, CA
 Farm Name Sweet Potatoes
 Storage Capacity (ton) 1,250
 Storage Capacity (BU) 100,000
 Design Airflow (cfm/BU) 1.5
 Total Fan HP 24
 Fan Motor Loading (est) 95%
 Fan Motor Efficiency 95%
 Calculated Fan Use (kW) 17.9
 VFD Efficiency 95%
 Total Measured Fan (kW) 17.9
 Refrigerated (Yes/No) No

Blue = User Inputs

Utility Provider Power Utility
 Utility Contact Power Rep
 Energy Cost (\$/kWh) \$0.100
 Avg Energy Consumption 93,924 kWh
 Estimated Energy Savings 64,507 kWh
 Percent Energy Savings 69% (range 30-60%)
 Energy Cost Savings \$6,450.74
 Estimated Project Cost \$5,400.00
 Potential Incentive \$3,780.00 (may need to adjust formula)
 Payback w/o incentive (yr) 0.8
 Payback with incentive (yr) 0.3 please contact PU

| | | |
|------------------------|--------|--------------------------------|
| Fan output in cfm | 16800 | CFM per fan |
| at different air press | 8 | Number of fans |
| | 134400 | Total CFM at .5 static press |
| | 160000 | Total CFM at .05 static press |
| | 1.344 | CFM per BU at .5 static press |
| | 1.6 | 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 | 895 | Start fans when loading |
| Cure / Suberize | 9/20/2006 | 14 | 100% | 24 | 6,016 | Continuous/Recirc if no OSA |
| Ramp to Hold Temp | 10/4/2006 | 15 | 100% | 24 | 6,445 | Run Anytime OSA Avail |
| Winter Holding | 10/19/2006 | 105 | 100% | 24 | 45,118 | Run Anytime OSA Avail |
| Spring Holding | 2/1/2007 | 90 | 100% | 18 | 29,004 | Run Anytime OSA Avail |
| Unload empty | 5/2/2007 | 30 | 100% | 12 | 6,445 | Continuous w/ OSA or Refrig |
| | 6/1/2007 | 0 | 100% | 0 | 0 | Run Anytime OSA Avail |
| Storage Season Length | | 259 | | Total = | 93,924 | usage w/o VFD's in kWh |
| | | | | | \$9,392.44 | En. cost w/o VFD's in \$\$ |

| 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 | 373 | Start fans when loading |
| Cure / Suberize | 9/20/2006 | 14 | 100% | 24 | 6,332 | Continuous/Recirc if no OSA |
| Ramp to Holding Temp | 10/4/2006 | 15 | 80% | 24 | 3,798 | Run Anytime OSA Avail |
| Winter Holding | 10/19/2006 | 105 | 50% | 24 | 7,833 | Run Anytime OSA Avail |
| Spring Holding | 2/1/2007 | 90 | 65% | 18 | 9,961 | Run Anytime OSA Avail |
| Unload empty | 5/2/2007 | 30 | 50% | 12 | 1,119 | Continuous w/ OSA or Refrig |
| | 6/1/2007 | 0 | 0% | 0 | 0 | Run Anytime OSA Avail |
| Storage Season Length | | 259 | | Total = | 29,417 | usage with VFD's in kWh/Yr |

| | | |
|--|-------------|---|
| Estimated Yearly energy cost = | \$2,941.69 | En. cost with VFD's in \$\$ |
| Estimated Savings = | 64,507 | kWh per year savings |
| Savings \$\$\$\$ | \$6,450.74 | Net power savings/yr in \$\$ |
| 10 year lifespan of the project as per DOE | \$64,507.44 | 10 year savings \$\$ |
| Avg cost of 100,000 bu computerized system | \$65,000 | total ventilation system cost |
| | \$493 | vent system net cost after |
| | 99.24% | 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

