

Remote Monitoring for Technical Support

Denali Commission
June 3, 2010



Alaska Energy Authority

Rural Energy Group

Remote Monitoring for Technical Support

907-771-3000

1-888-300-8534 toll free

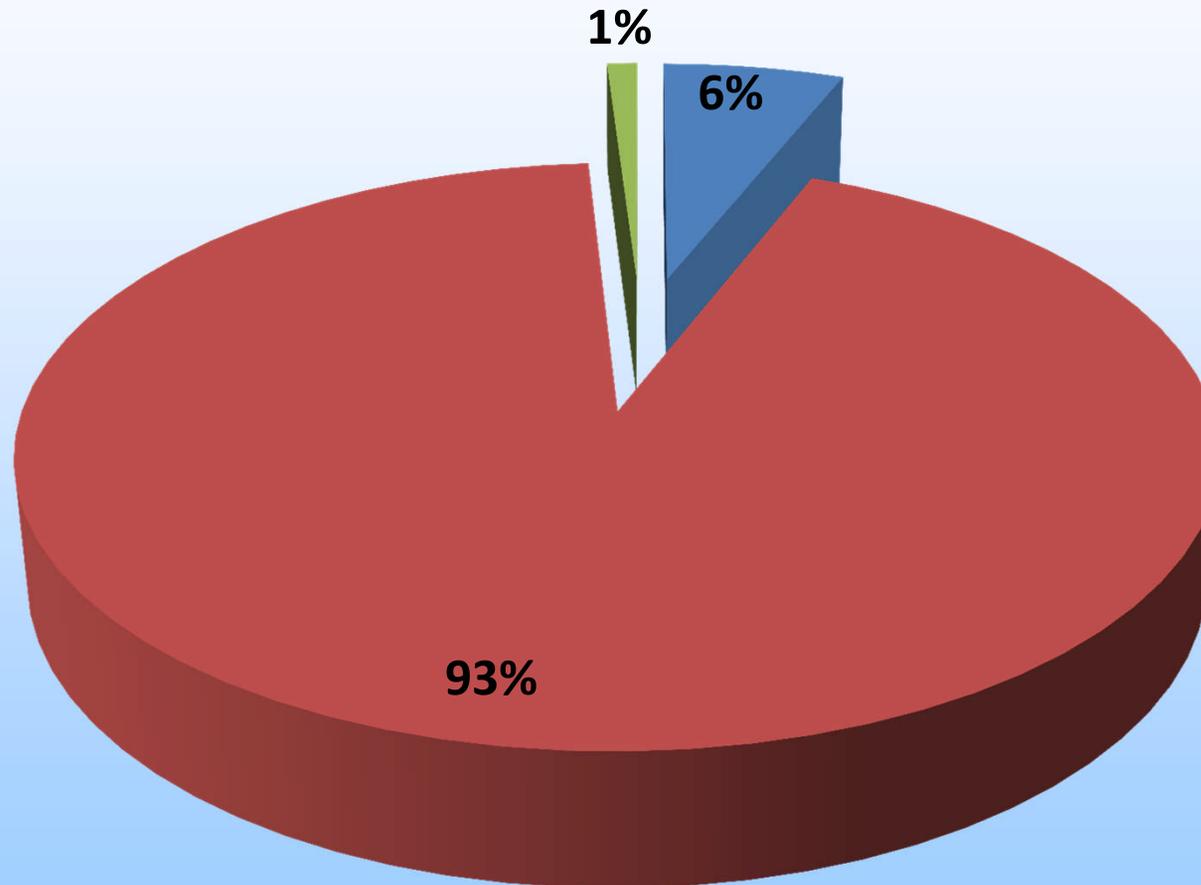
afetters@aidea.org

<http://www.akenergyauthority.org/>



Realities of Rural Power Generation

■ Hydro ■ Diesel ■ Wind



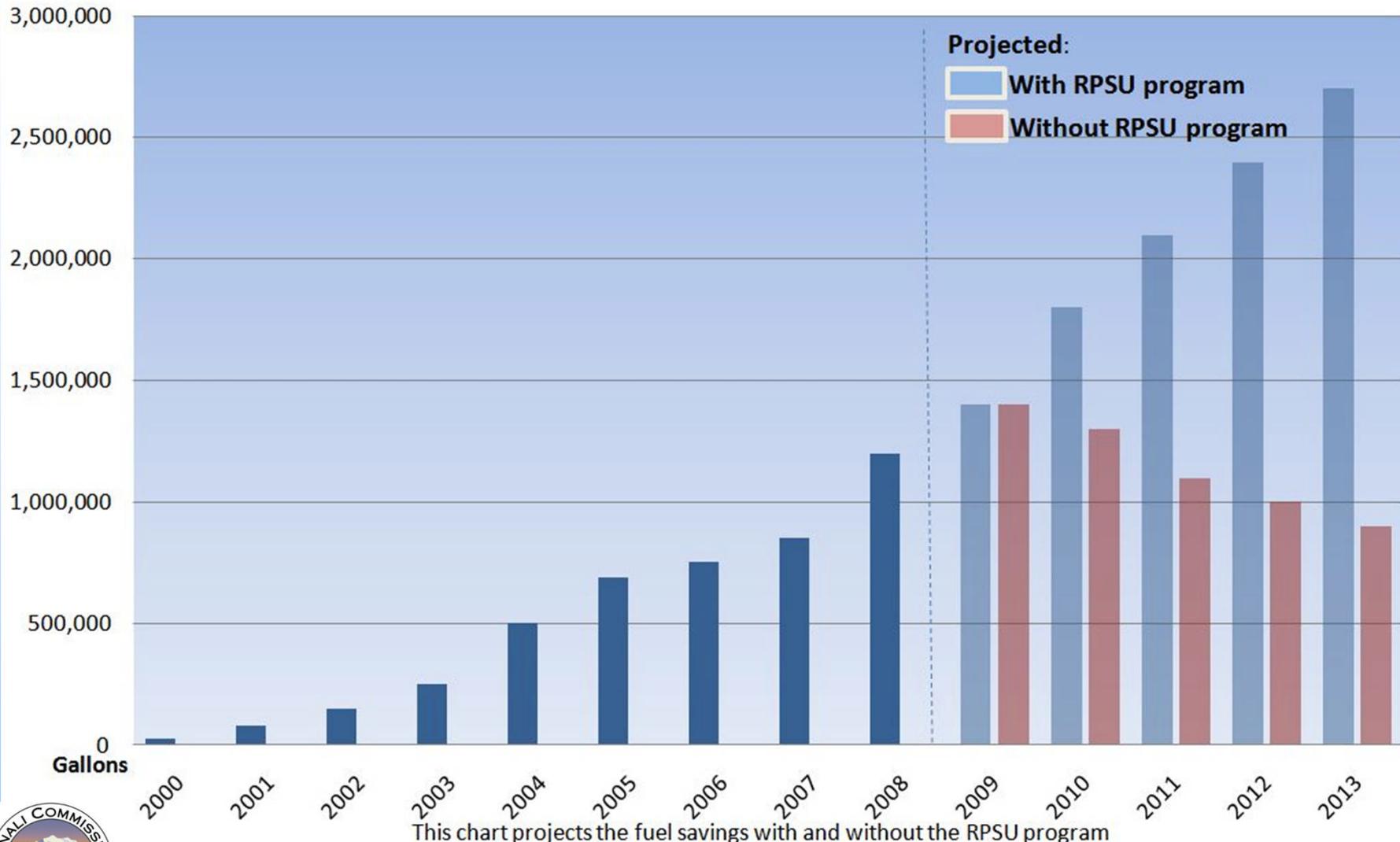
Data from FY2008 Power Cost Equalization (PCE) report

Alaska Energy Authority RPSU Program



We must never forget who our clients are and the difference energy infrastructure makes in their lives

Cumulative Fuel Savings from RPSU Program



2009 equal 14,735 tons of CO₂



- An important part of the RPSU program is ongoing Technical Assistance which includes on call technicians and remote monitoring of the powerhouses.
- A key component of Technical Assistance is the modern switch gear with remote monitoring or SCADA. (Supervisory Control And Data Acquisition).
- This system plays an important role for the rural utilities. A modern SCADA system allows numerous benefits.



- Remote trouble shooting and reduction in travel costs
- Measuring and verification of performance along with historical trending
- Readily accessible information for managers and operators
- Ability to assist more communities for less cost.
- Accurate information for future infrastructure improvements especially renewable sources
- Necessary for successful integration of most all renewable energy sources



Automatic Paralleling & Load Sensing Switchgear



Training and Routine Maintenance is Important



New paralleling, load sensing training switchgear was recently installed at AVTEC this past January by AEA just in time for the new class

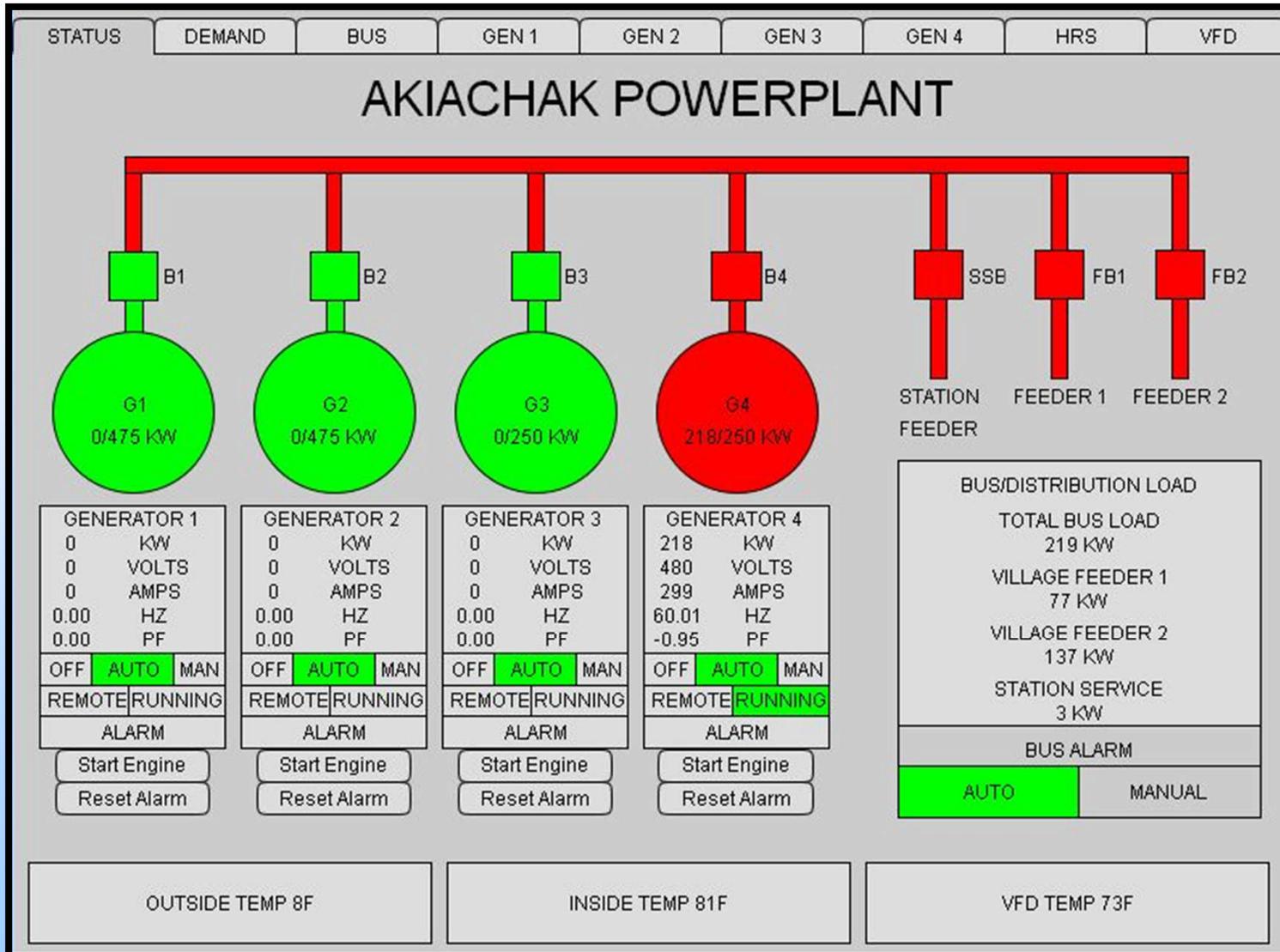


Switchgear

- The brain of the switchgear is a Programmable Logic Controller (PLC)
- Source of majority of Supervisory Control & Data Acquisition (SCADA) information
- Monitors power demand and automatically dispatches most efficient generation source, diesel or alternative
- Monitors maintenance intervals. Will automatically put replacement engine on line, shuts down and locks out overdue engine



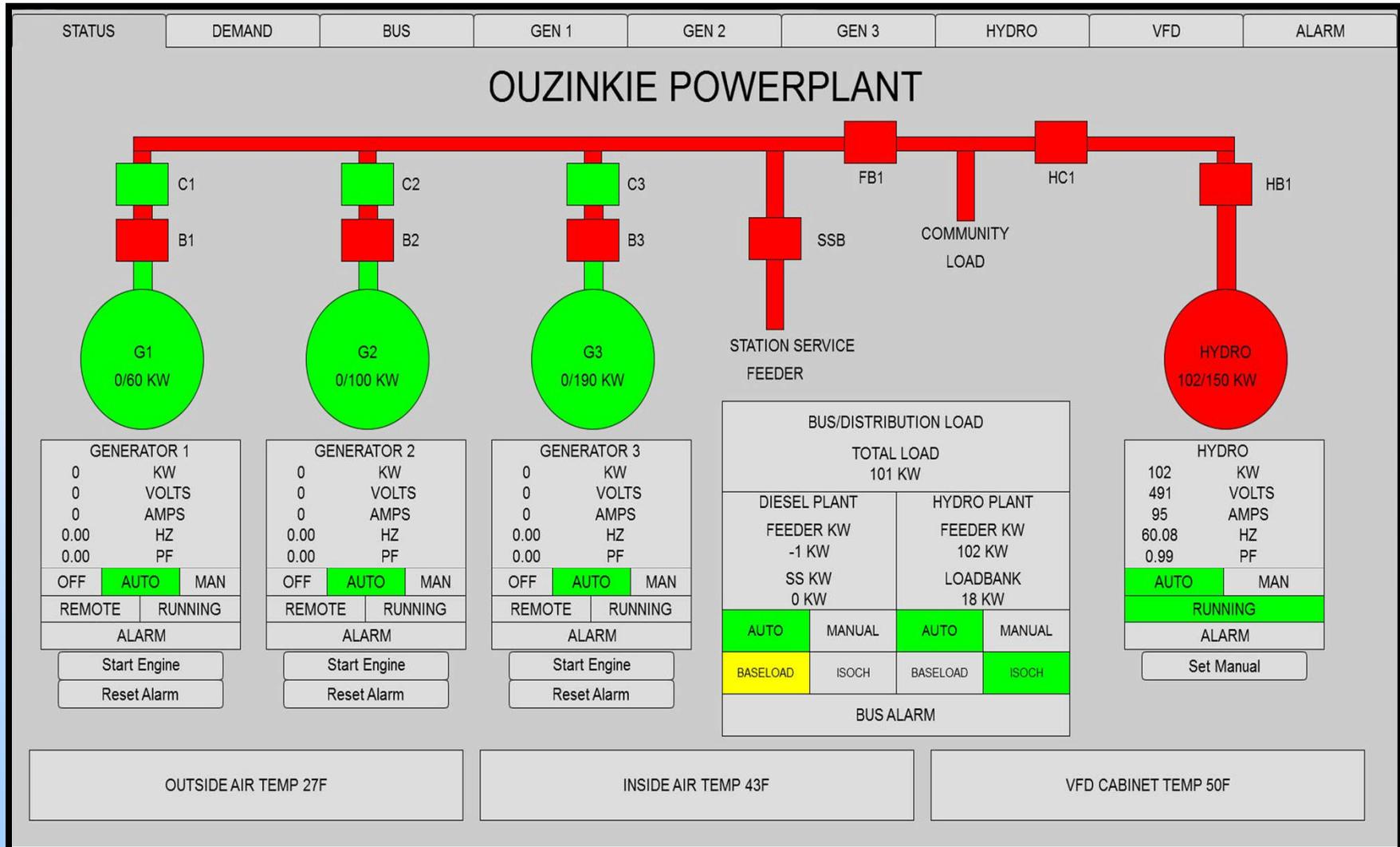
Remote Monitoring or SCADA



Supervisory Control and Data Acquisition or SCADA



Diesel and Hydro Integration



OUTSIDE AIR TEMP 27F

INSIDE AIR TEMP 43F

VFD CABINET TEMP 50F



| STATUS | DEMAND | BUS | GEN 4 | GEN 3 | GEN 2 | GEN 1 | HYDRO | HRS | VFD | ALARM |
|-------------------|--------|-----|--------------------|-------|-------------|------------------|------------------|-----|----------------------|-------|
| STATUS | | | | | | | | | | |
| NORMAL STOP | | | | | | | | | | |
| ENGINE RUNNING | | | | | | | | | | |
| COOLDOWN | | | | | | | | | | |
| NOT IN AUTO | | | | | | | | | | |
| ALARM/LOCKOUT | | | | | | | | | | |
| ALARMS | | | | | | | | | | |
| SERVICE ENGINE | | | | | | | | | | |
| RUNNING TIMEOUT | | | | | | | | | | |
| OVERCRANK | | | | | | | | | | |
| OVERSPEED | | | | | | | | | | |
| OIL LEVEL | | | | | | | | | | |
| LOW OIL PRESSURE | | | | | | | | | | |
| HIGH WATER TEMP | | | | | | | | | | |
| AIR FILTER PLUGGD | | | | | | | | | | |
| REVERSE POWER | | | | | | | | | | |
| FAIL TO SYNCH | | | | | | | | | | |
| OVERCURRENT | | | | | | | | | | |
| UNDER FREQUENCY | | | | | | | | | | |
| OVER FREQUENCY | | | | | | | | | | |
| UNDER VOLTAGE | | | | | | | | | | |
| OVER VOLTAGE | | | | | | | | | | |
| CHARGER FAILURE | | | | | | | | | | |
| INTAKE AIR TMP | | | | | | | | | | |
| VFD BRK OPEN | | | | | | | | | | |
| BREAKER | | | | | | | | | | |
| OPEN | | | | | | | | | | |
| CLOSED | | | | | | | | | | |
| | | | VOLTS L-L | | VOLTS L-N | | AMPS | | | |
| | | | 479 | A-B | 279 | A-N | 398 | A | | |
| | | | 481 | B-C | 278 | B-N | 404 | B | | |
| | | | 482 | C-A | 279 | C-N | 381 | C | | |
| | | | HERTZ | | KW | | PF | | | |
| | | | 60.02 | | 323 | | -1.00 | | | |
| | | | RPM | | | OIL PRESSURE | | | WATER TEMP | |
| | | | WTR RTRN TMP | | | EXHAUST TMP | | | CHARGE AIR | |
| | | | | | | | 20.47 GPH | | 15.78 KWH/GAL | |
| | | | DC BATTERY VOLTAGE | | START COUNT | | ENGINE HOURS | | HOURS UNTIL SERVICE | |
| | | | 26.00 | | 273 | | 3216 | | 215 | |
| | | | FUEL GALLONS | | | DIAGNOSTICS | | | | |
| | | | 53581.25 | | | 0 | | | | |

Note efficiency of 15.78 kWh/gallon



Small Hydro Control

STATUS
BUS
HYDRO STATUS
ALARMS

LARSEN BAY HYDRO

| HYDRO | |
|-----------------|-------|
| 114 | KW |
| 481 | VOLTS |
| 109 | AMPS |
| 60.02 | HZ |
| 0.99 | PF |
| AUTO MAN | |
| RUNNING | |
| ALARM | |

RUN

STOP

DEMAND SIGNAL

BASELOAD

ISOCH

STATUS

OPEN

CLOSED

DEFLECTOR

| HYDRO SETPOINTS | | LOADBANK SETPOINTS | |
|-----------------|-------|--------------------|-------|
| BASELOAD | 40 KW | ISOCH | 30 KW |
| CURRENT | 40 KW | DEAD BUS | 40 KW |
| | | SYNC | 5 KW |

BASELOAD-

Baseload CMD

BASELOAD+

Start Hydro

Stop Hydro

Reset Alarm

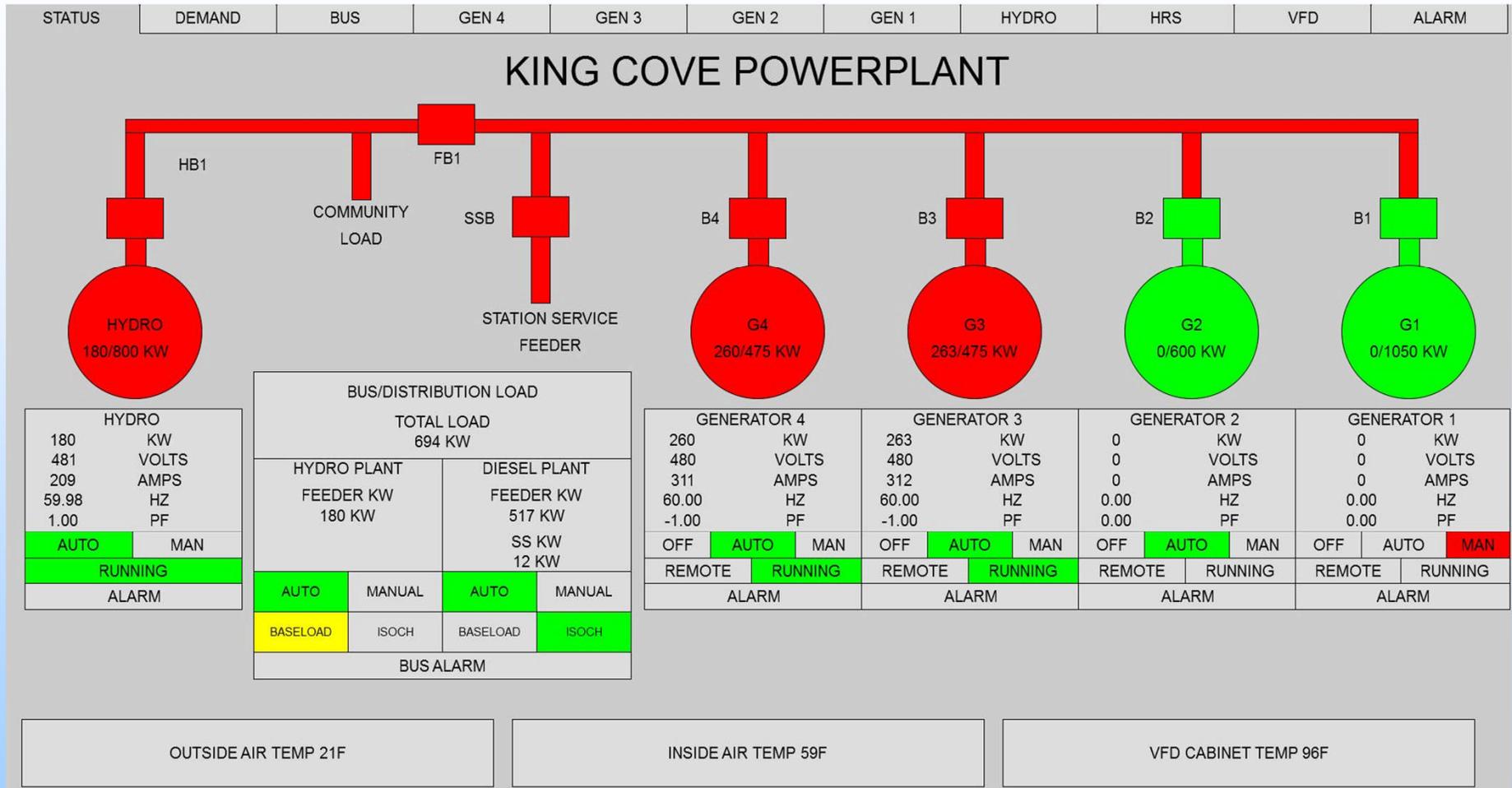
INSIDE TEMP 89F

OUTSIDE TEMP 42F

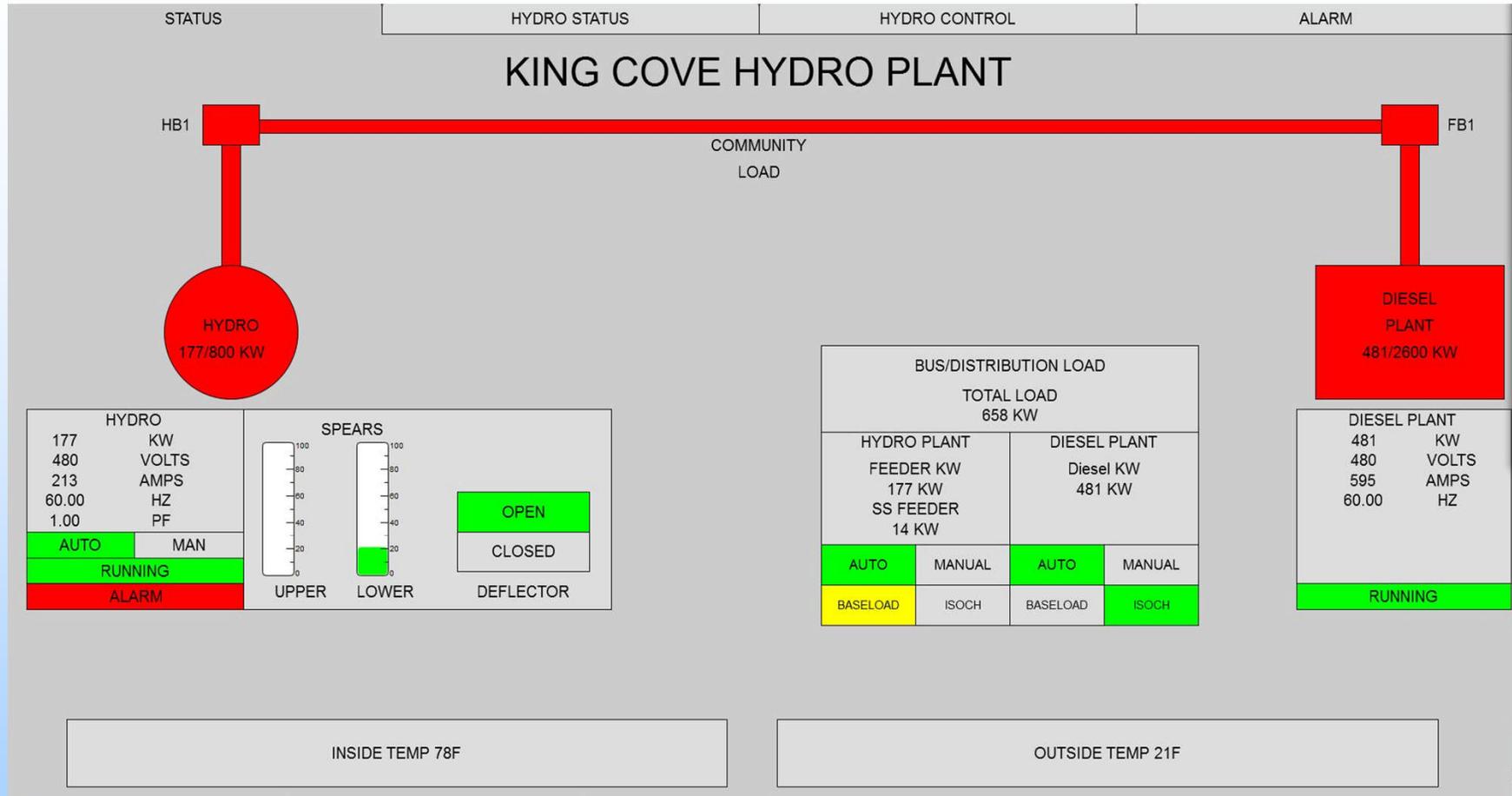




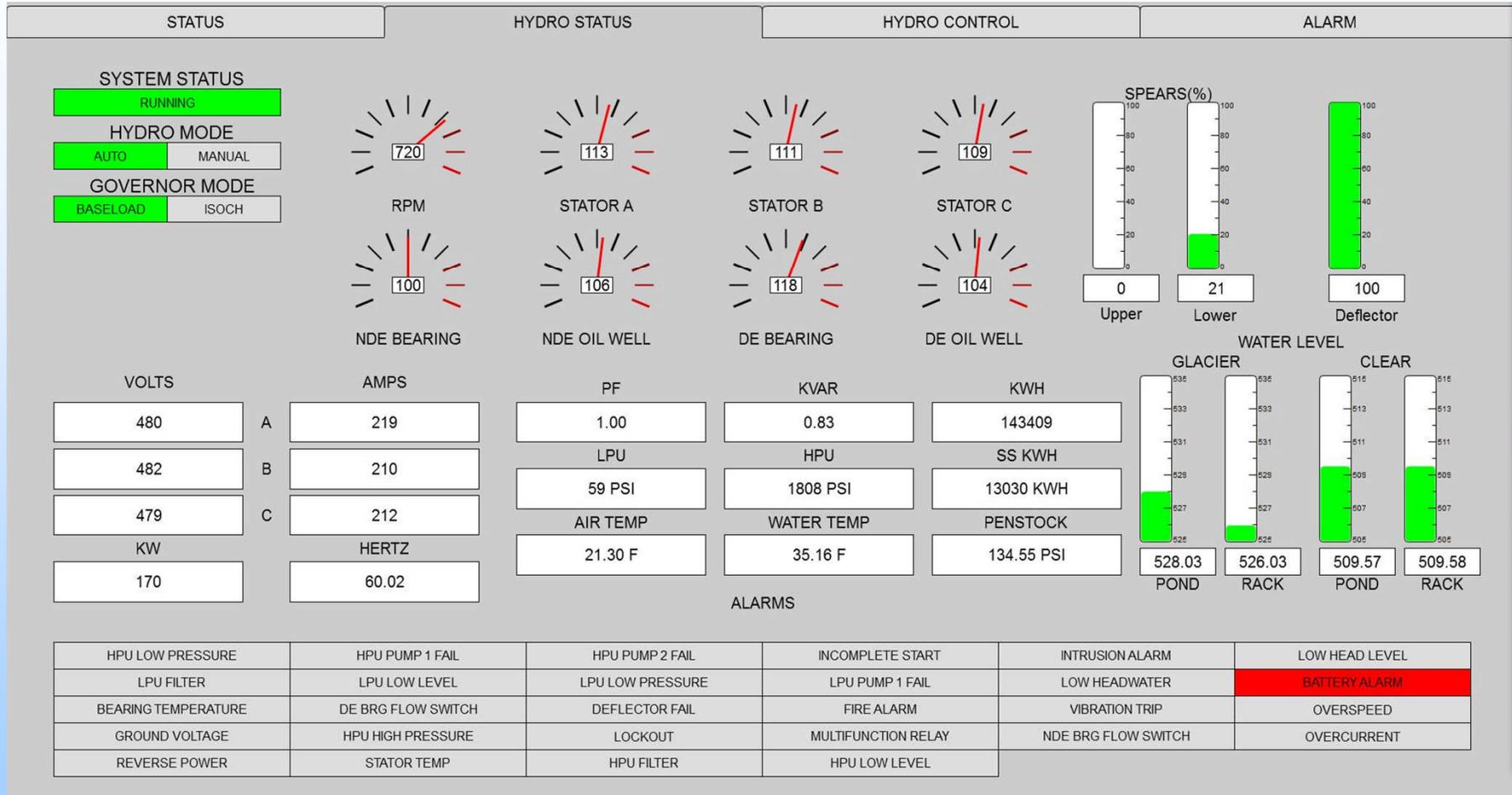
Small Hydro Control



Small Hydro Control

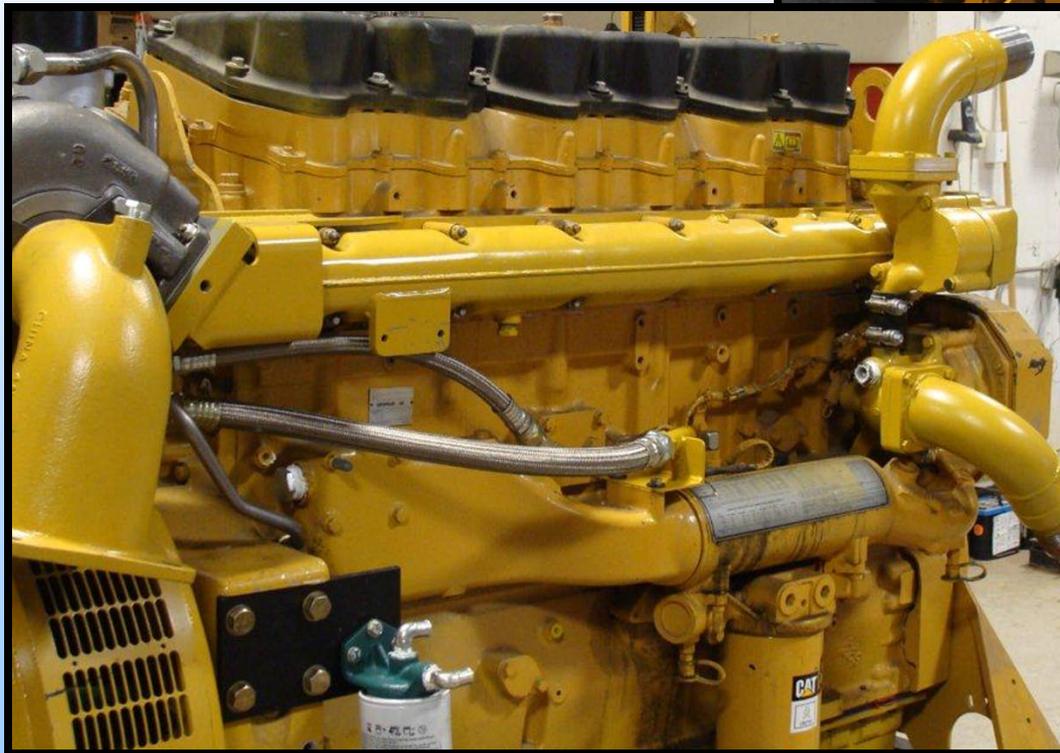
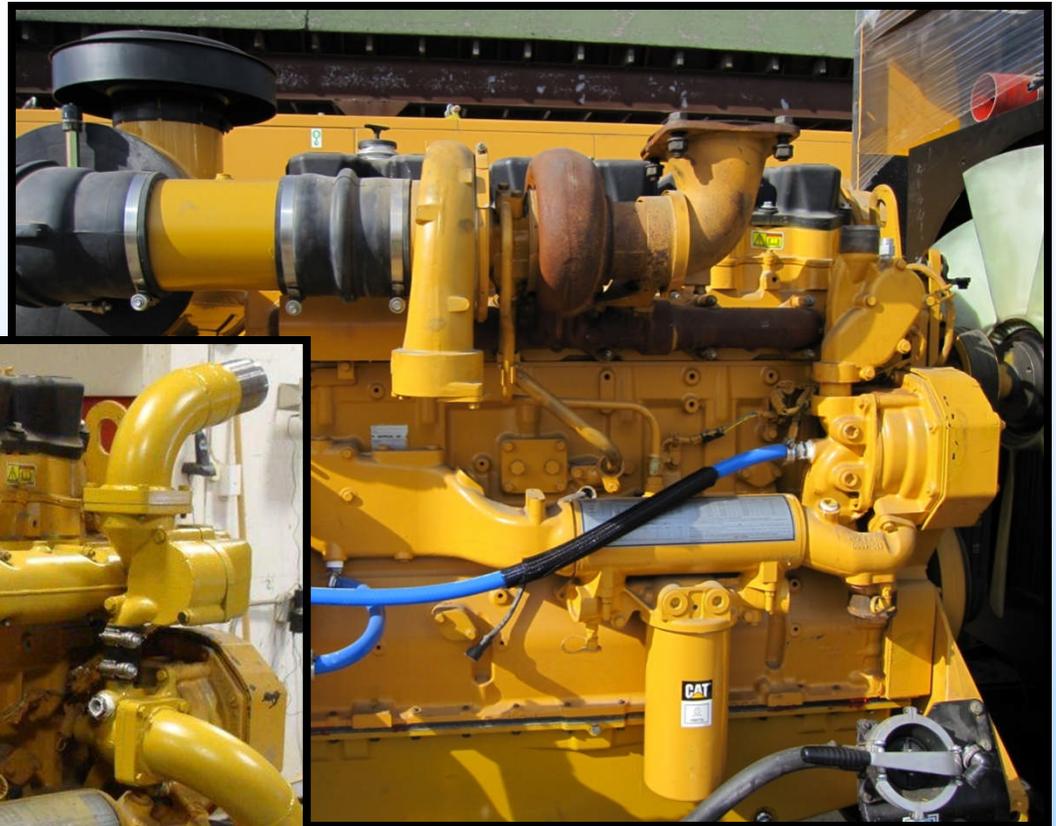


Small Hydro Control in King Cove



Heat Recovery

Normal exhaust manifold

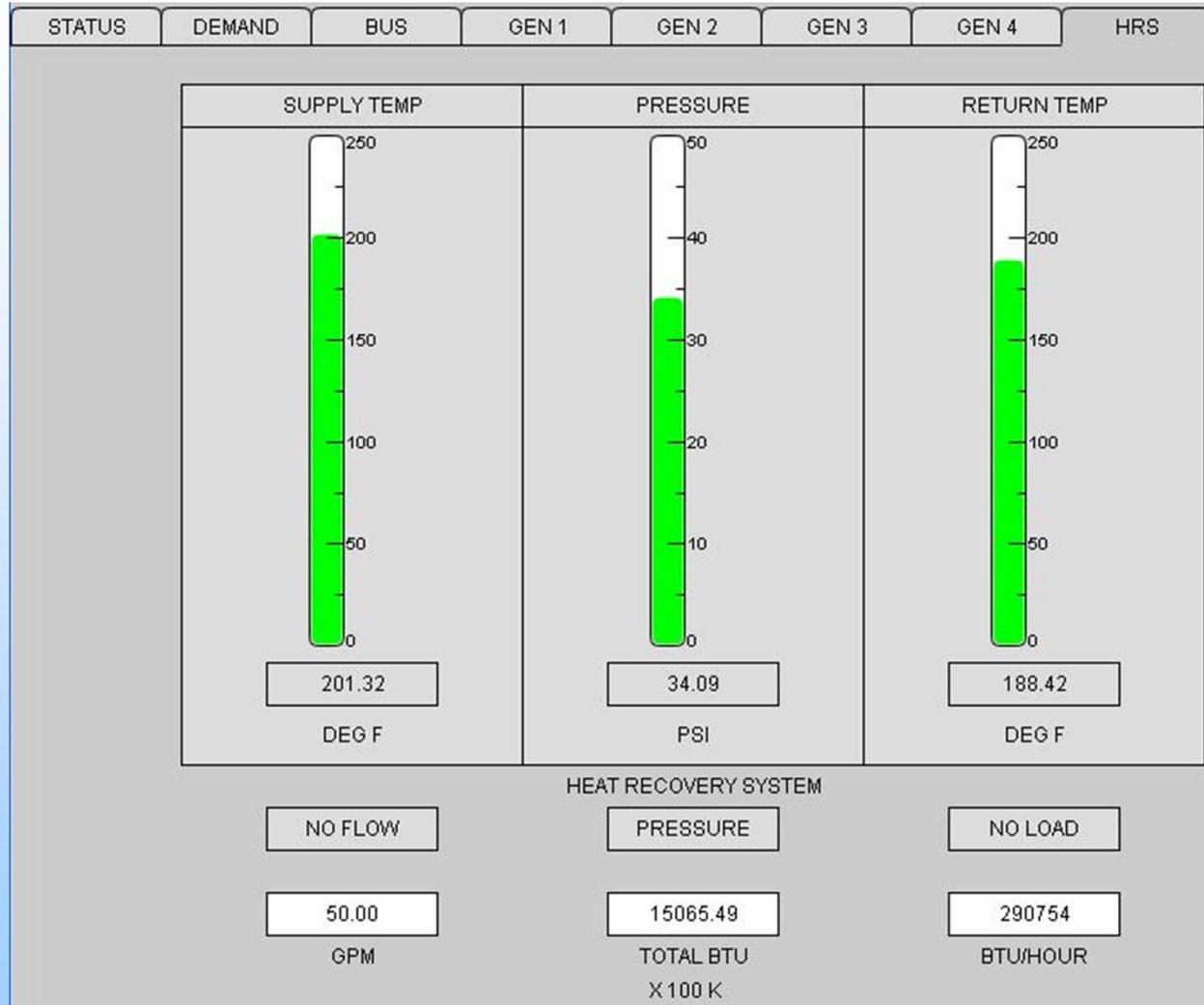


Wet exhaust manifold

Heat Recovery



Remote Monitoring of Heat Recovery



Heat recovery monitoring and metering to the municipal water system



Heat Recovery & Receptor Equipment



Heat recovered from the powerhouse is expected to meet all the clinics needs



BTU meter



Fuel tank with heat recovery loop to allow use of less expensive and higher BTU content #2 fuel in the winter months

Akiachak Heat Recovery

| | |
|----------|--|
| 15,000 | Equivalent gallons of fuel saved at the municipal water treatment system in FY2009 |
| \$57,900 | Estimated avoided cost of fuel in FY2009 at a current cost of \$3.86 per gallon |
| 165 | Estimated tons CO ₂ emission diverted in FY2009! |

The above information was gathered from the powerhouse SCADA system and PCE



Remote Connectivity



Satellite connectivity

Camera installation



Remote Monitoring Cameras

Top Single Multi Buffered Image Setup Internet Maintenance Support

Nov 18, 09 05:58:25 AM

Pan / Tilt

Scan

Pan/Tilt Range

Zoom

Focus

AF

Preset

Program

1 2 3 4

5 6 7 8

-Preset-

Brightness

- STD +

White Balance

Auto

Output

Open

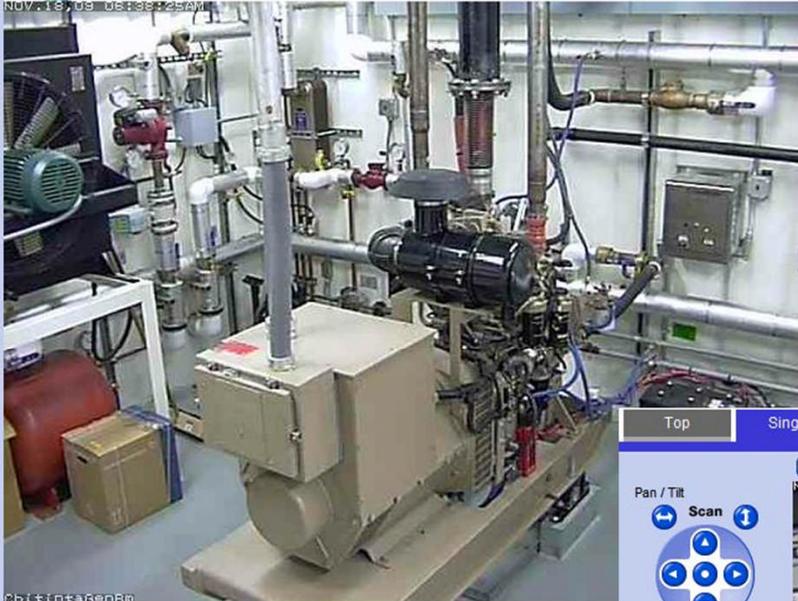
Short

Refresh Rate

MJPEG

Resolution

640x480



ChitinaGenRm

Running in IPv4 mode.

Top Single Multi Buffered Image Setup Internet Maintenance Support

Chitina

Nov 18, 09 05:38:11 AM

Pan / Tilt

Scan

Pan/Tilt Range

Zoom

Focus

AF

Preset

Program

1 2 3 4

5 6 7 8

-Preset-

Brightness

- STD +

White Balance

Auto

Output

OFF

ON

Refresh Rate

MJPEG

Resolution

640x480



ChitinaControlRoom

Running in IPv4 mode.



Alaska Energy Authority RPSU Program

