

Alaska Energy Authority

Switchgear Advances



www.aidea.org



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AEA Mission:

Reduce the cost of energy in Alaska

AEA's Rural Power System Upgrade Program (RPSU) supports this mission by:

- 1) Providing technical assistance to rural Alaskan electric utilities
- 2) Coordinating both on-site and off-site training in the operation and maintenance of rural electric utilities
- 3) Assisting in power system upgrades throughout rural Alaska for safer, more reliable, and efficient energy systems which are sustainable and environmentally sound
- 4) Responding quickly and effectively to electrical emergencies.

Energy Saving from Switchgear Advances

- Fuel savings through electronically controlled governors and fuel injection
- Fuel savings through automatic dispatch of the most efficient engine for the existing loads
- Lower O & M costs with more convenient monitoring of powerhouse systems

Automatic Load-sensing Switchgear

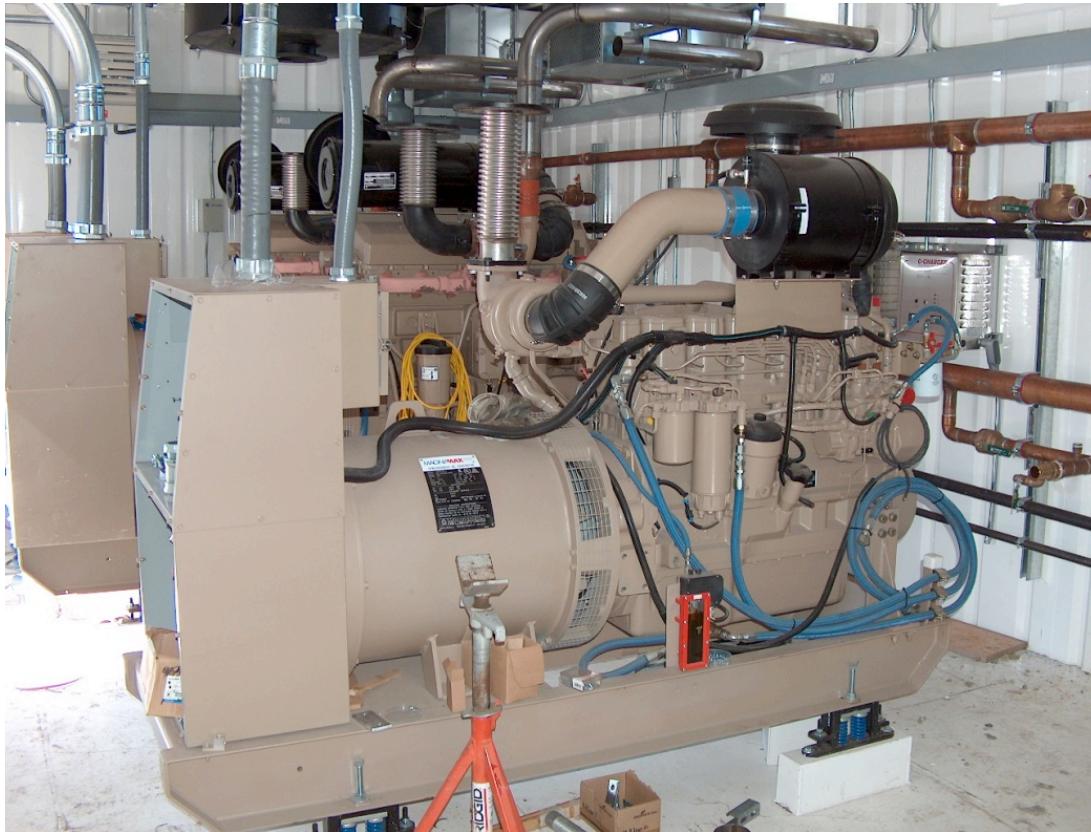


Automatic Load-sensing Switchgear



Electronically Controlled Engines

- Electronic Governors, Fuel Injection



Electronic Engine Control

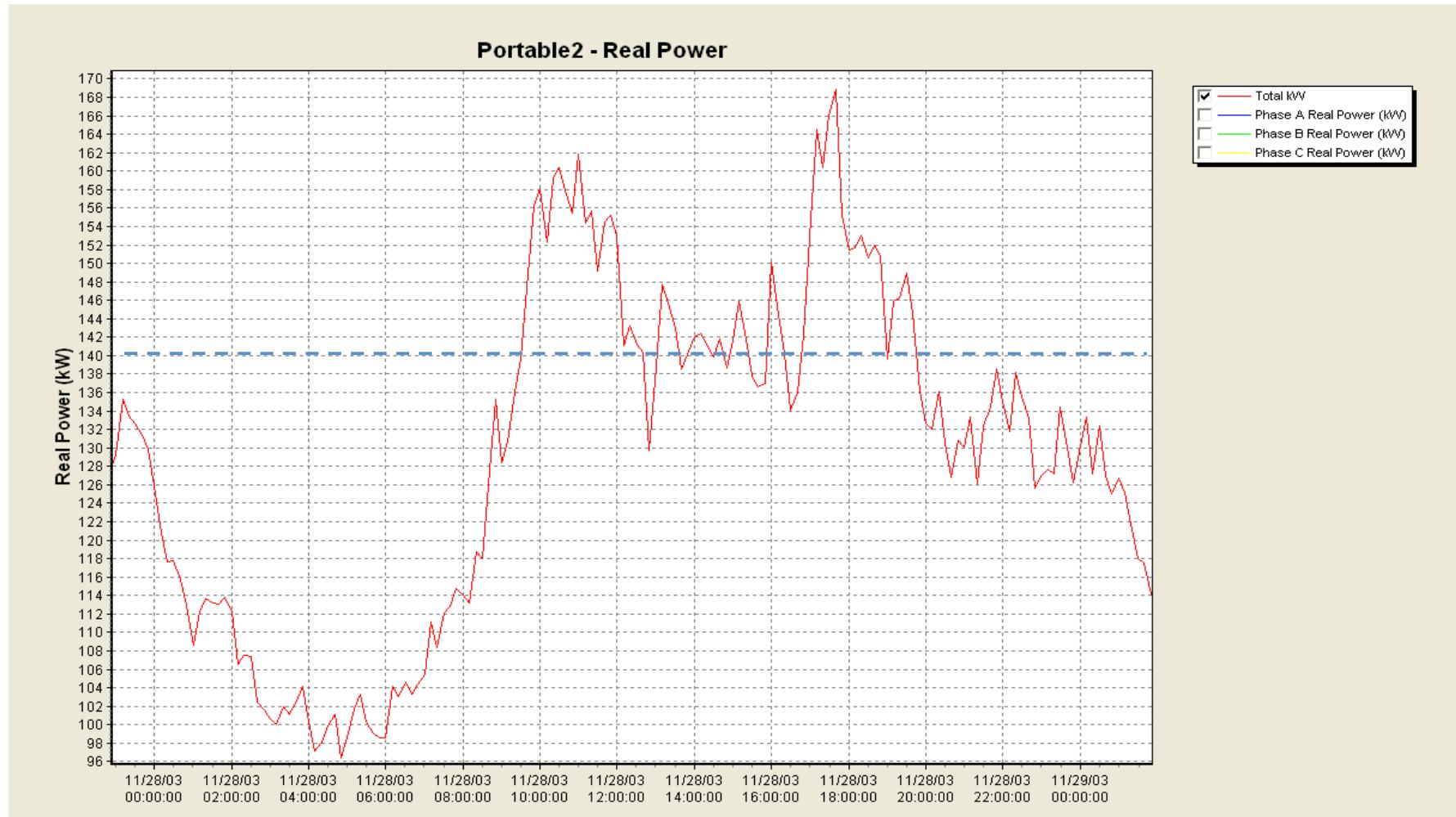




PLC Functions

- 1) Monitors and generates graphic of powerhouse and generators status, alarm, and shutdown conditions
- 2) Monitors village power demand and automatically dispatches generators according to pre-programmed selection of most efficient unit or units for existing demand levels
- 3) Monitors engine fuel efficiency and run time, automatically puts replacement engine on line, shuts down and locks out overdue engine
- 4) Collects powerhouse and engine data and allows remote access to real-time monitoring and historical data trends

Fuel savings due to automatic dispatch

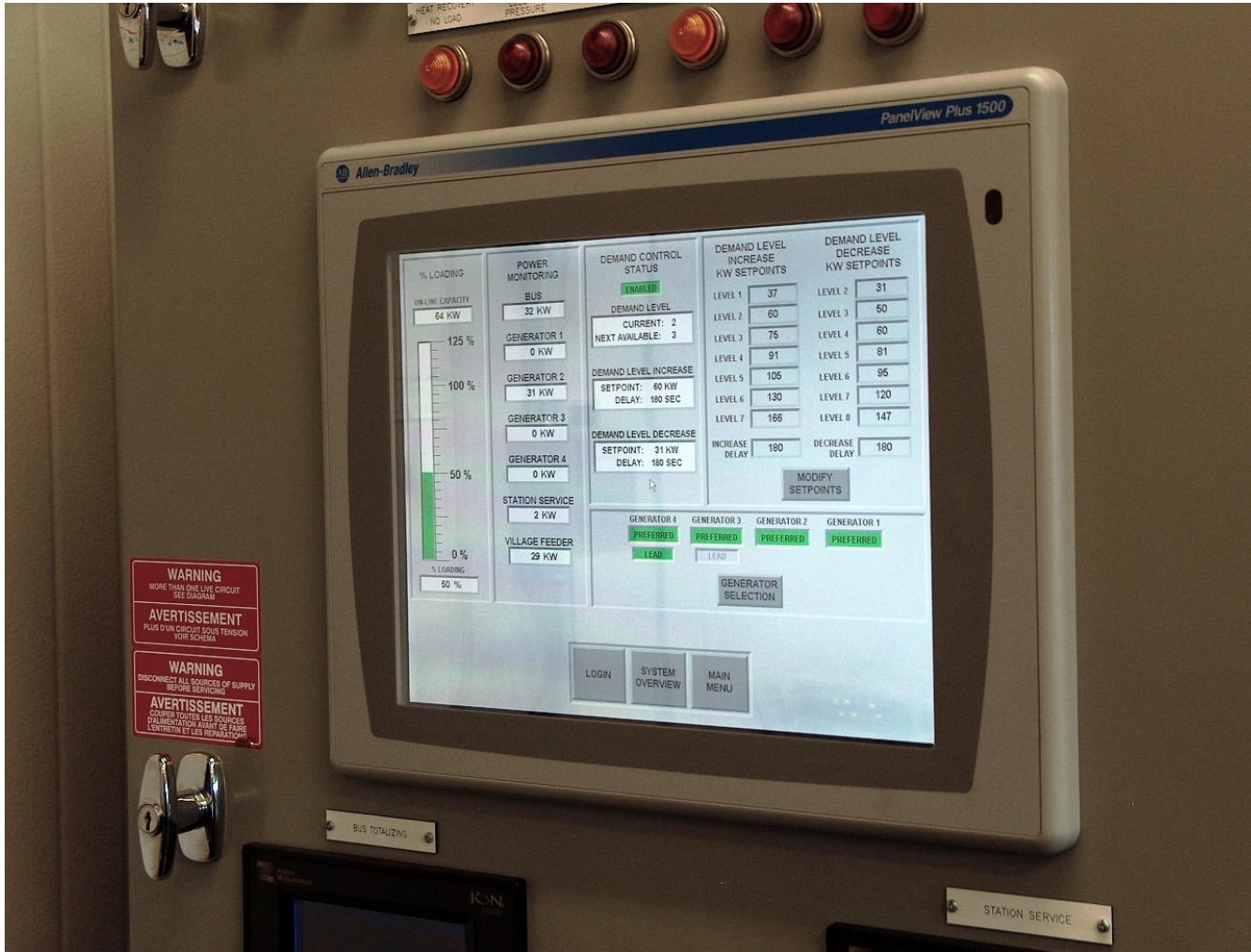


Operator Interface

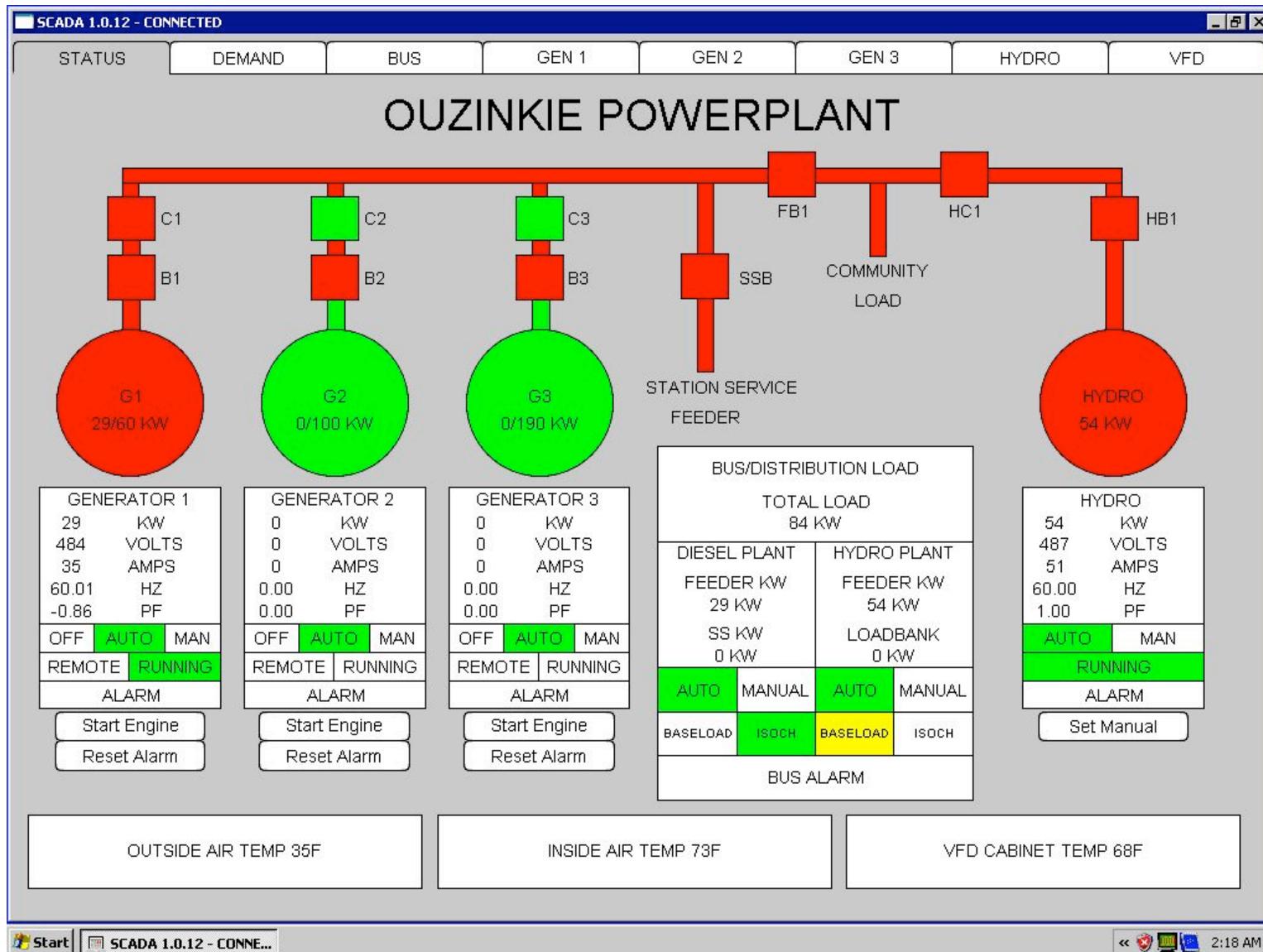
- Touch screen for real-time monitoring and adjustment of operator-accessible set points



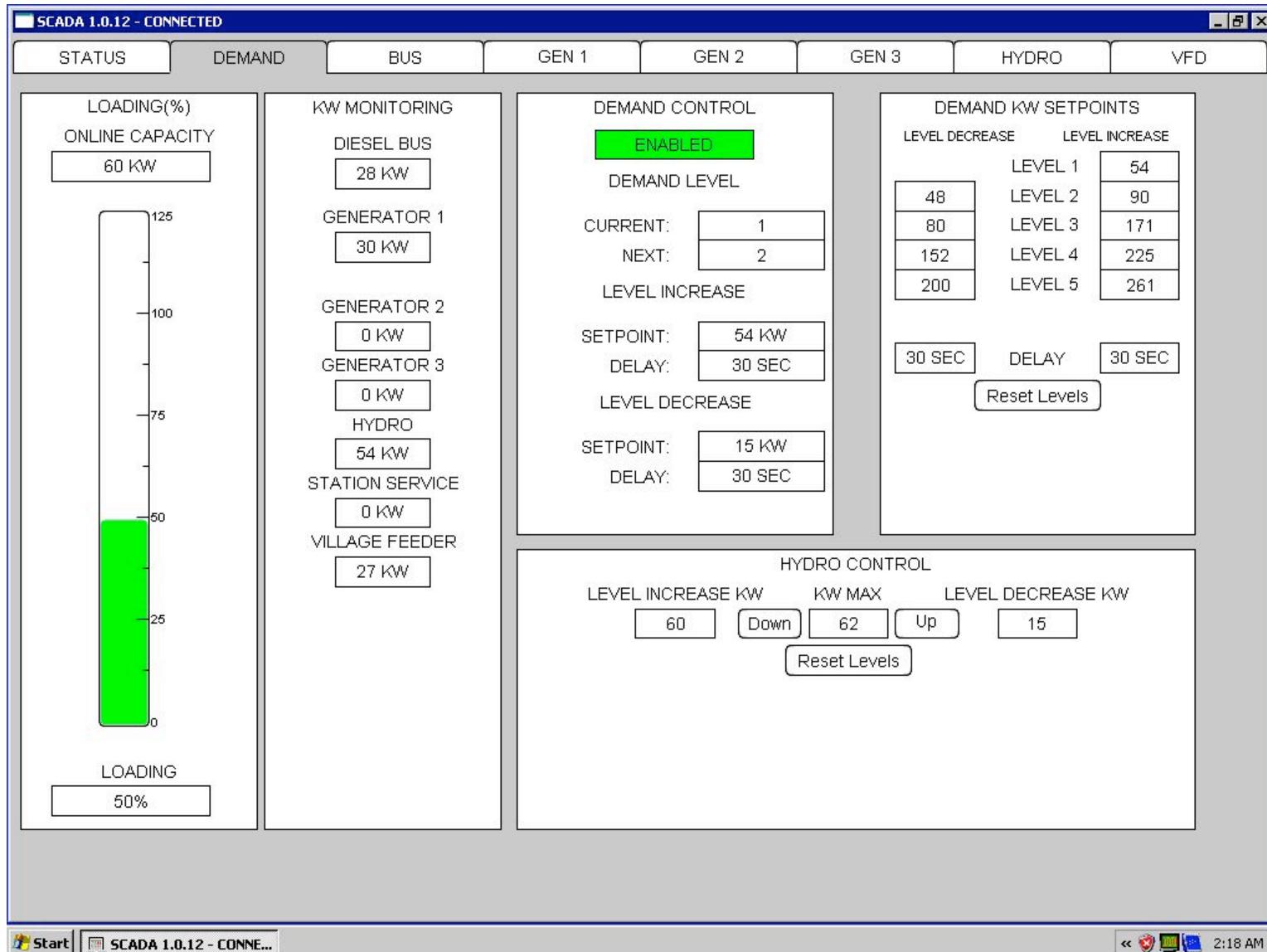
Powerhouse Monitoring On-site or Remote



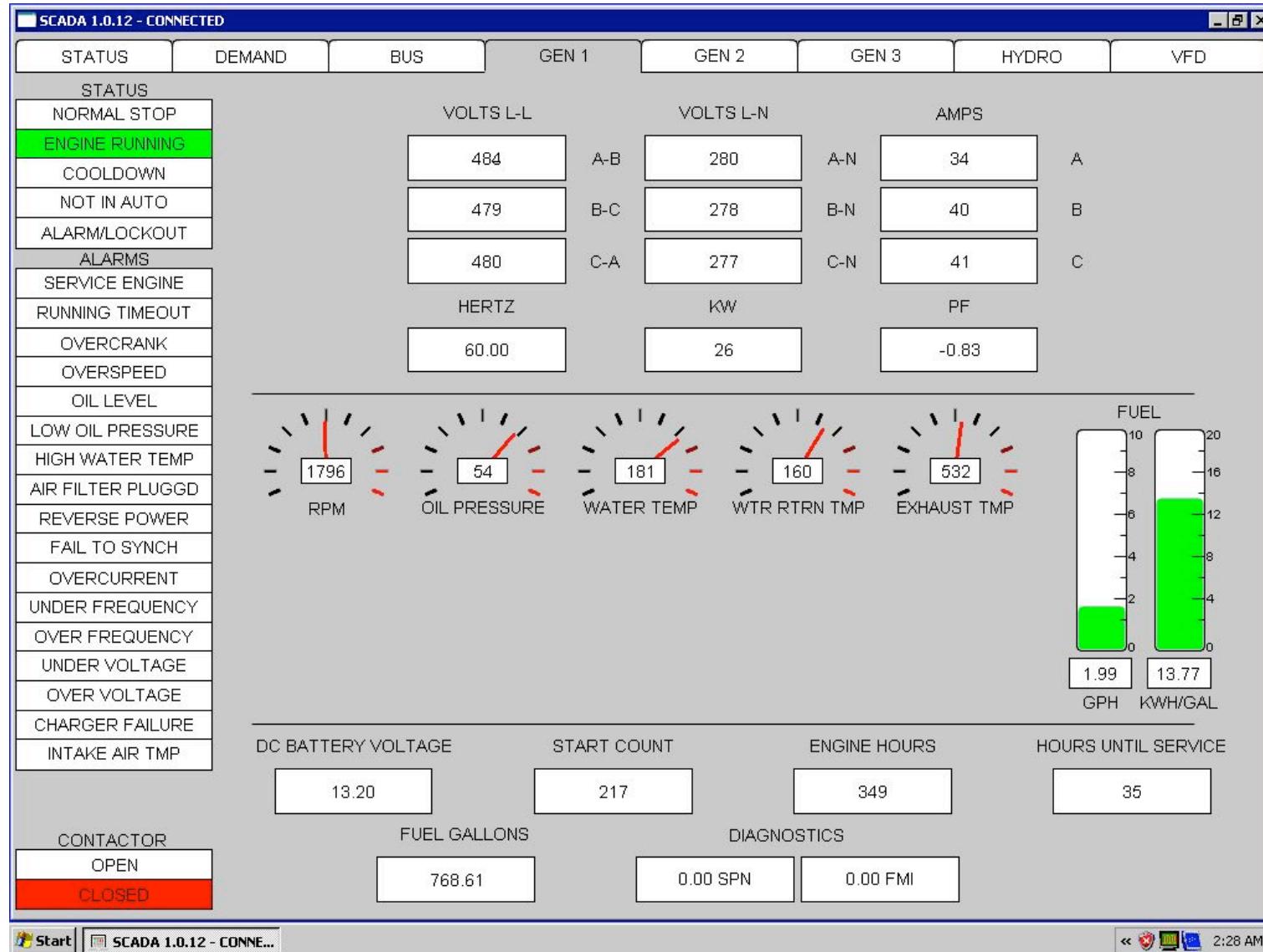
Powerhouse Status Overview



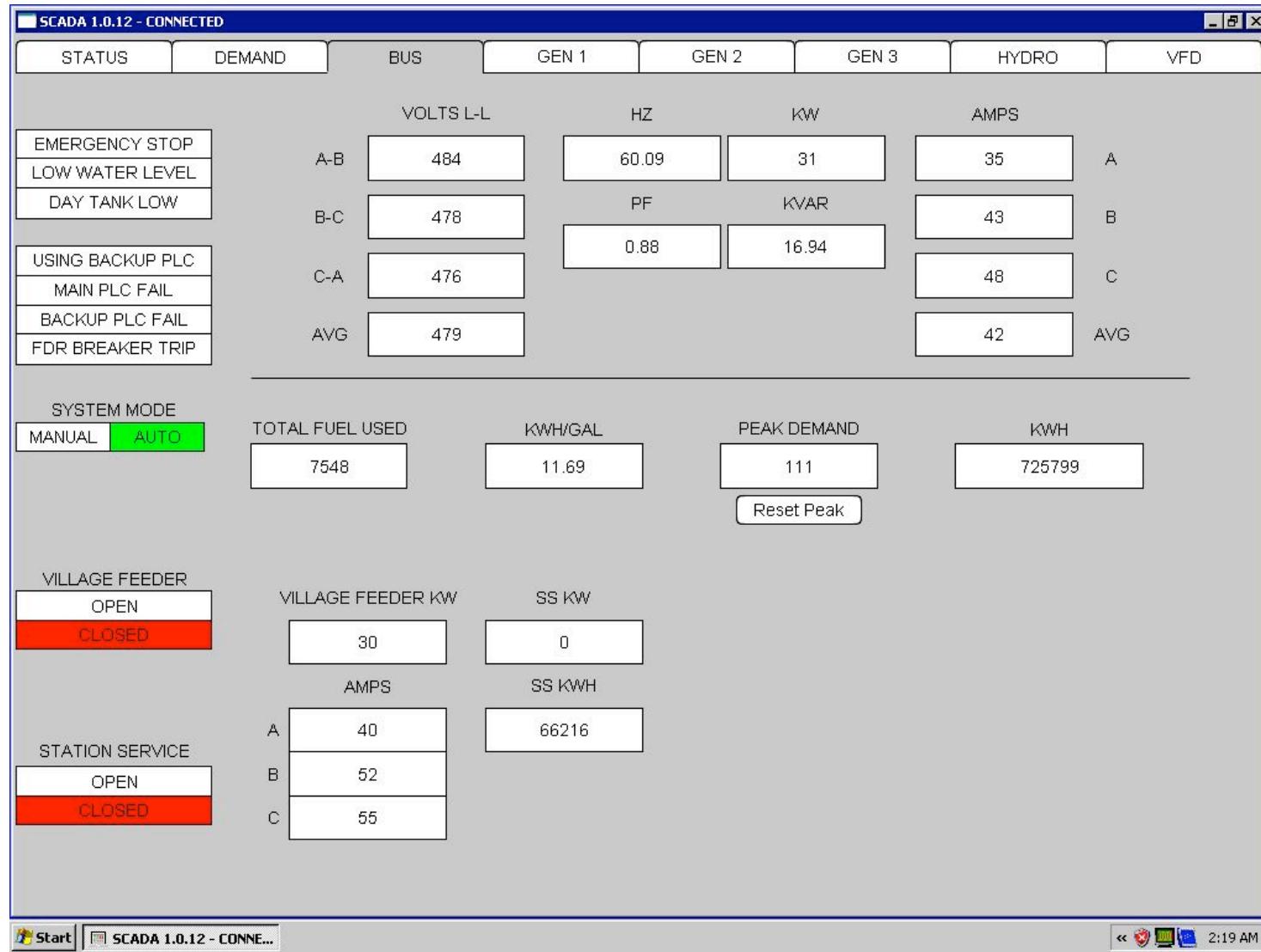
Demand Setpoints



Engine Monitoring



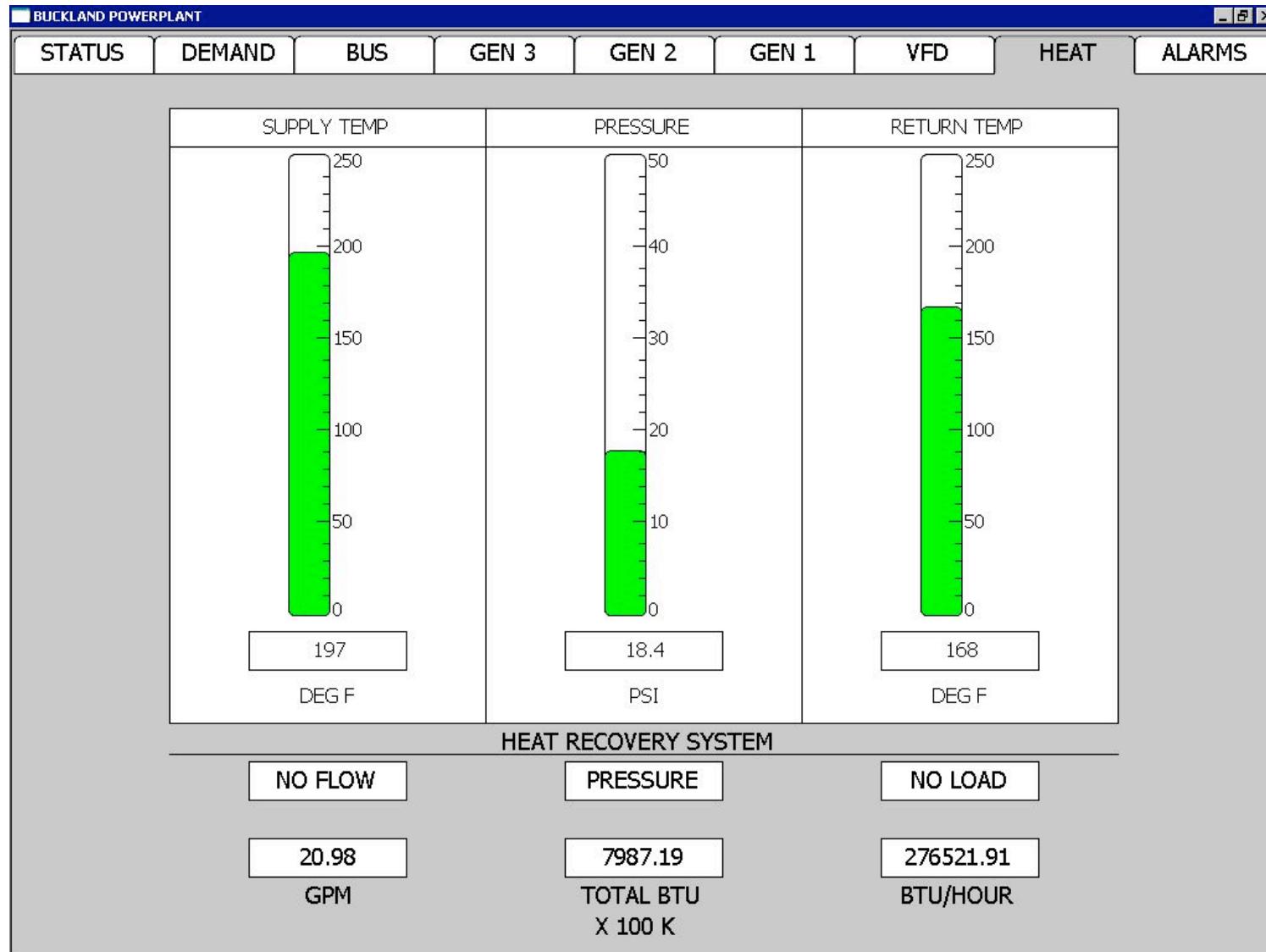
System Monitoring



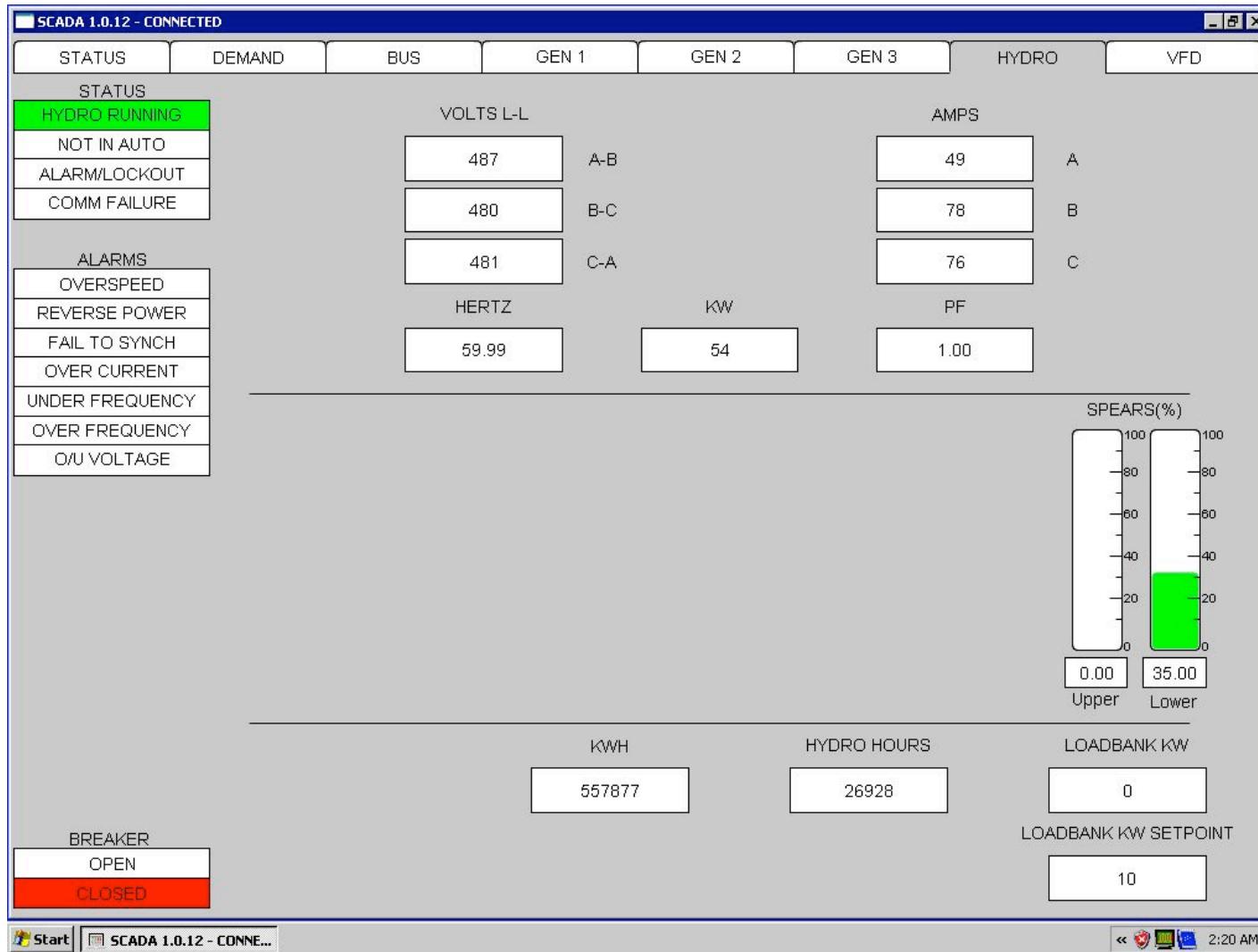
Alarm History

| BUCKLAND POWERPLANT | | | | | | | | |
|-----------------------------------|--------|-----|-------|-------|----------------------------|-----|------|--------|
| STATUS | DEMAND | BUS | GEN 3 | GEN 2 | GEN 1 | VFD | HEAT | ALARMS |
| ALARM TIME | | | | | ALARM DESCRIPTION | | | |
| 4/13/2008 23:47 - 4/17/2008 2:34 | | | | | Generator 1/Lockout | | | |
| 3/28/2008 16:12 - 3/28/2008 16:12 | | | | | Bus/Peak Reset | | | |
| 3/28/2008 16:12 - 3/28/2008 16:12 | | | | | Bus/Peak Reset | | | |
| 3/29/2008 0:32 - 3/29/2008 0:32 | | | | | Bus/Peak Reset | | | |
| 3/29/2008 0:32 - 3/29/2008 0:32 | | | | | Bus/Peak Reset | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 2/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 3/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 2/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 3/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Cooldown | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Cooldown | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Bus/Dead | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Bus/Dead | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 1/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 2/Service Engine | | | |
| 3/31/2008 12:55 - 3/31/2008 12:55 | | | | | Generator 3/Service Engine | | | |

Heat Recovery System



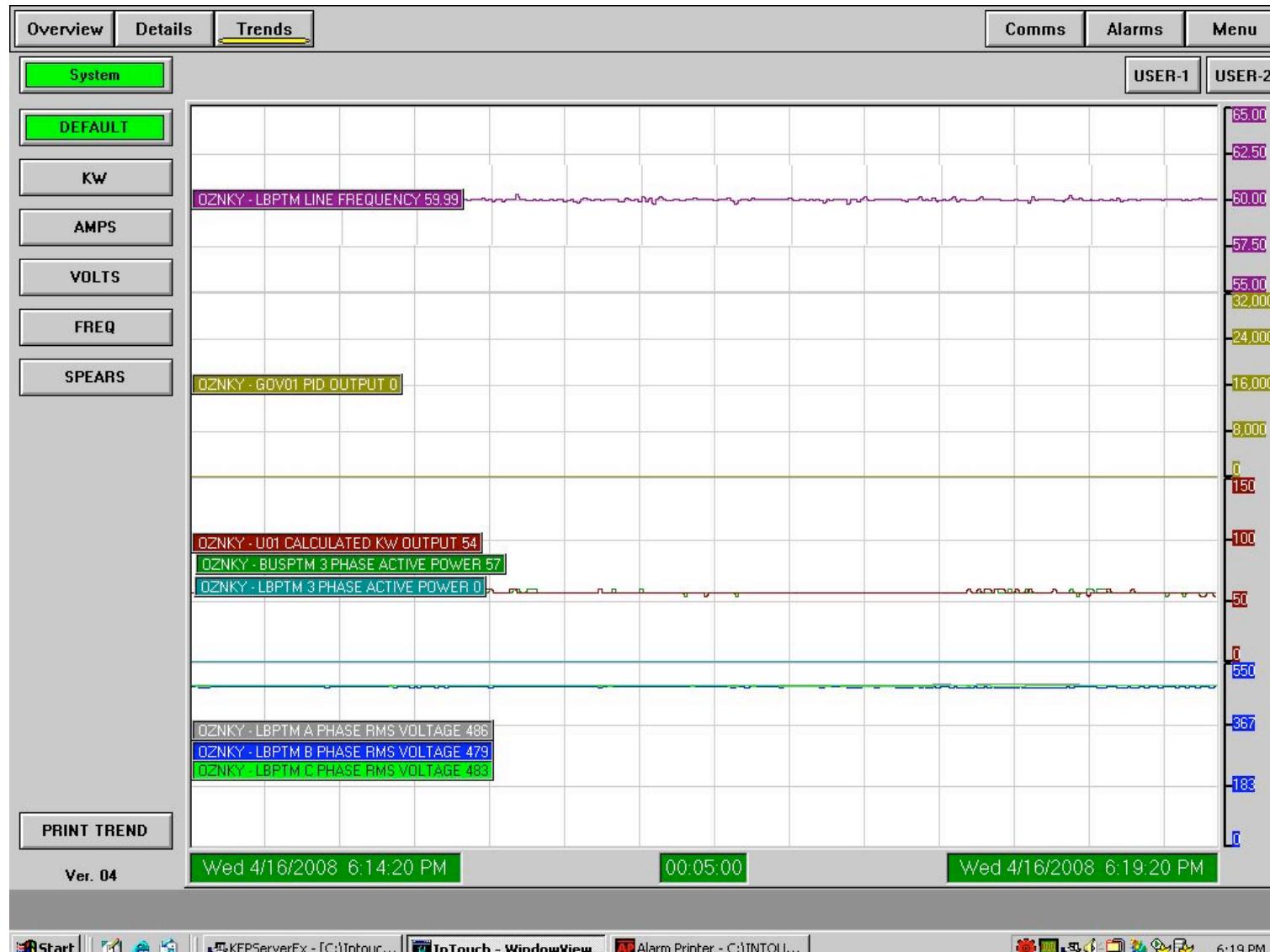
Remote Hydro Facility



Ouzinkie Hydro Facility - 120 kW



Real-Time Trending Chart



Additional Benefits of New Switchgear

- Automatic recovery from power outages
- Automatic dispatch of available Alternative Energy Sources
- Data acquisition, historical data downloads for utility planning, energy engineering and research
- Remote Monitoring for faster, more efficient troubleshooting