First National Technology Center

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Lead Property Manager, First National Buildings, Inc.
First National Technology Center

- First National of Nebraska, Inc.
  - $12 Billion Assets
  - 5,400 employees
  - 6.6 million customers in 50 states
  - 60 banking locations
    - Nebraska, Colorado, Kansas, South Dakota, Texas, Illinois
  - Largest in house merchant processor in United States
    - Top ten VISA® and MasterCard® processor
    - Top twenty automated clearing house processor
    - Strong Regional cash management services
Data Flow

- 1,000,000 average daily credit card transactions
- 1,296,000 average daily banking transactions
- 43,500 average daily ATM transactions
- Transactions flow 24 hours a day
- Uptime is key to revenues: FNNI and customers
- Estimated cost of downtime $6,000,000 per hour
The Nature of the Grid – Industrial Age Power

- Normal Course Voltage Interruptions: 2-3 seconds
  - Lights and motors don’t care
- Grid Fluctuations
  - Transmission and distribution system problems (age, deterioration etc.
  - Weather
  - Accidents (including squirrels)
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- Electronic Equipment - manufactured to withstand 8 milliseconds of voltage disruption [CBEMA Curve]
  - Chips becoming more dense, faster, less tolerant of voltage fluctuations
- Challenge
  - Grid normal operations 2–3 second fluctuations
  - Electronic equipment takes 8 millisecond fluctuations
  - The gap is the problem
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Business Wants

- No Downtime
  - Availability to Match Computers
- Low Maintenance
  - Less Human Error
- No Unconditioned Grid Power
- Environmentally Clean
- Economic Value
- Low Risk
ONSI Fuel Cell

Natural Gas

Fuel Processor

Steam

Power Section

Hydrogen-Rich Gas

DC Power

Power Conditioner

Clean Exhaust

Clean Exhaust

Clean Exhaust

Clean Exhaust

Fuel Processor Power Section Conditioner

Usable Heat & Clean Water

Air

Usable Heat & Clean Water
Natural gas + Air = Power + Water + Heat + CO₂
Fuel Cells: Pros and Cons

Pros

- Independent Power Source
- 2000+ Hour MTBF
- Low M & R: Do While Operating
- Chemical Process = No Emissions
- High Quality Power
- Remote Monitoring
Fuel Cells: Pros and Cons

Cons

- No Fault Clearing Current in Grid Independent Mode
- Only 80kw Step Load in Grid Independent Mode
- Flees Unstable Grid in 15 Microseconds
- Protects Self Above Load
- Three to Five Seconds to Configure to Grid Independent
UNIBLECK™ w/ POWERBRIDGE™ - one line diagram

UNIBLECK™

POWERBRIDGE™

START MOTOR

INVERTER

RECTIFIER

D.C. LINK

MAINTENANCE BYPASS

AUTO. BYPASS

UTILITY 1

480/277 V

UTILITY 2

ATS

TO CRITICAL LOADS

GENERATOR OUTPUT

PARTNERS FOR PREMIUM POWER

PILLER
System Performance Specifications

- Fault Clearing Without Grid: 10-15 X Rated Current
- Overload: 150% Rated Capacity - 2 Minutes
- Grid Independent Operation - Unlimited
- Ambient Operating Temp. -40°C to + 40°C
- Voltage Regulation: +/- 1% Steady State
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Does it Work?

- Accepted April 30, 1999
- Usual Infantile Component Failures
- Several utility grid outages
- Several voltage events
- Load has never seen any fluctuation
- System operates as advertised
- Final MTI and MIT Report: .99999995 availability