Campus Transformation using Performance-Based Solutions

Mississippi Energy Coordinators Association

Where People, Process, and Technology Converge to Create an Adaptable Environment
Challenges for Campuses of all Kinds

Resource Constraints

- Prioritizing infrastructure needs with population/enrollment/missions growth, energy and water reliability and efficiency goals, and a growing list of needed facility improvements.
- Rising bond costs require structured finance solutions that enable capital asset acquisition with minimized risks.

Aging Infrastructure

- An increasing percentage of the world’s population lives in cities and colleges and universities continue to grow
- This growth creates unprecedented demands on aging infrastructures and extensive deferred maintenance backlogs, with limited financial resources.
Challenges for Campuses of all Kinds

Sustainability & Resilience

How can you cost-effectively modernize and develop an infrastructure that reduces the carbon footprint and meets green building goals and mandates?

Digitalization

Billions of connected devices are changing the way people live and work. The emergence of new technology and data requires leveraging current technology investment with innovation in data and analytics drives greater outcomes.
Challenges for Campuses of all Kinds

Economic Development

Cities and institutions of higher learning are engines for growth, employment, and prosperity, and account for roughly 80% of global economic output. Leveraging infrastructure challenges can amplify local economic development.

Workforce Development

Preparing the workforce for tomorrow’s jobs, including investments in STEM education, staff development, and community outreach protects a community’s vitality.
A Comprehensive Approach to Reaching Your Goals

Identify your Key Challenges

- Budget Allocation
- In-House Resources
- Lack of Transparency
- Expertise & Training
- Defining & Achieving Sustainability Targets

Develop & Implement the Solution

Total Energy Management
A complete suite of services and technologies designed to cohesively manage energy and increase business performance

Ensure your Continuous Success

- Lifecycle approach
- Advanced IoT technology
- Innovative financial solutions
- Global reach and local touch
Opportunities for Improving Infrastructure

**Water**
- Water Conservation
- Water Metering
- Wastewater Treatment

**Buildings**
- Public Safety
- Building Automation
- Data-Driven Analytics & Optimization

**Energy**
- Demand Side
- Supply Side
- Smart Grid Management

**Strategy**
- Energy and Sustainability
- Performance-Based Solutions
- Grants and Incentives
Performance Based Solutions

Operating Budget Savings Fund the Project

- Make facility and infrastructure improvements
- Reduce energy use and associated expenses
- Energy, water and maintenance savings finance the improvements
- Contractor guarantees savings

Success Guaranteed

Improvements
Modernization
Optimization
Energy Management

Savings
Energy Usage
Operation
Energy Supply
From Transactional to Transformational

Scope

<table>
<thead>
<tr>
<th>Demand Side and Energy Conservation</th>
<th>Infrastructure Improvements</th>
<th>Energy Conversion</th>
<th>Distributed Energy Generation</th>
<th>Sustainability Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-10 year payback</td>
<td>10-20 year payback</td>
<td>3-5 year payback</td>
<td>10-15 year payback</td>
<td>1-5 year payback</td>
</tr>
</tbody>
</table>

**Transactional** (current program)
- Lighting retrofit
- Steam Traps, Insulation
- Electrical Demand reduction
- Building Controls upgrades
- HVAC modifications

**Transformational** (strategic partnership)
- HVAC Upgrades
- Electrical Infrastructure
- Boilers
- Chillers
- Steam Distribution
- Central Plant Upgrades
- Building Conversions to NG
- Eliminate Fuel Oil Usage
- Steam to Hot Water
- Fuel Management
- Cogeneration
- Solar PV
- Solar Thermal
- Emergency Power
- MicroGrid Controls
- Culture Change
- Non-technical Measures
- Communication Program
- Branding Strategy
- Create Excitement!
## From Transactional to Transformational

### Impact

<table>
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<tr>
<th>Transactional (current program)</th>
<th>Transformational (strategic partnership)</th>
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<tr>
<td><strong>Demand Side and Energy Conservation</strong></td>
<td><strong>Infrastructure Improvements</strong></td>
</tr>
<tr>
<td>5-10 year payback</td>
<td>10-20 year payback</td>
</tr>
<tr>
<td>Reduces Operating Cost</td>
<td>Pay for improvements with energy savings</td>
</tr>
<tr>
<td>Small team focused on gradual improvements</td>
<td>Improve efficiency and reliability</td>
</tr>
<tr>
<td>Reduced consumption; lower GHGs</td>
<td>More sustainable GHG reductions</td>
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</table>
## From Transactional to Transformational

### Savings

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<td><strong>Demand Side and Energy Conservation</strong></td>
<td><strong>Infrastructure Improvements</strong></td>
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<tr>
<td>5-10 year payback</td>
<td>8-15 year payback</td>
</tr>
<tr>
<td>20%</td>
<td>5%</td>
</tr>
<tr>
<td>$1,000,000</td>
<td>$250,000</td>
</tr>
</tbody>
</table>

- **Current Annual Energy Spend**: $5,000,000
- **Total Cost Reduction**: 38%

<table>
<thead>
<tr>
<th>Annual Cost Reduction</th>
<th>$1,900,000</th>
</tr>
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<tbody>
<tr>
<td>Target Program Duration (Years)</td>
<td>15</td>
</tr>
<tr>
<td>Available Capital from Savings</td>
<td>$28,500,000</td>
</tr>
</tbody>
</table>
Distributed Energy Capabilities:
Solutions that deliver value to campus environments

Cogeneration / Combined Heat & Power

Description
Combined generation of electricity behind the meter and heat near the point of use

Value
- Delivers lower cost electricity and thermal energy, independently from utilities
- Increased energy efficiency

Small-Scale Power Generation

Description
Generation assets connected to the MV/HV grid for flexibility of supply delivery

Value
- Power supply where grid may be unreliable unavailable or expensive
- Reduced cost of electricity

Microgrids

Description
Grid operating independently or in conjunction with the main utility grid

Value
- Integrates various generation components; manages energy demand
- Enables low cost, independent supply

Energy Storage

Description
Storage of energy, producing electricity on demand, connected to grid, microgrid or generation source

Value
- Reduces peak generation needs, enables load shifting
- Reduces cost and increases reliability of electricity supply
Siemens Offers Direct Investment in Campus Energy Infrastructure

- Campus has no payment obligations until cogen is operational
- Campus can prioritize its capital towards educational priorities

Asset Ownership & Operations is Siemens’ Responsibility

- Campus avoids long-term responsibility for O&M risk, resources and expertise—Siemens will implement and operate

Significantly Reduce and Offset Existing Utility Costs

- Cogen offsets Campus’ existing energy bill for electricity, while providing the greatest NPV outcome

Siemens Seamless Solution and Lifecycle Alignment

- Siemens provides a complete turnkey technical and service lifecycle solution (Development, Technical, Financial, Performance)

Potential to Monetize & Upgrade Aging Utility Supply Infrastructure

- Siemens has ability to monetize and upgrade Campus’ existing utility supply infrastructure (e.g. existing boilers/steam)
SCOPE OF SERVICES & RESULTS

- Campus-wide energy and water reduction
- Cogeneration plant, solar PV, power storage, EV charging, and micro-grid management.
- Energy supply and data management
- $3.7M annual cost savings / $24M addressed deferred maintenance
- Siemens secured over $5M incentives

PARTNERSHIP

- Creation of Innovation Center “Living Lab”
- Sustainability Education Program
- Algonquin College Sustainability Modules
- Energy Management Grad Certification Program
- Siemens Mechatronics courses
- Reference Based Marketing Program
Siemens delivered a multi-phase performance contract offering campus wide improvements and savings, as well as:

- Alternative energy demonstration labs with wind turbine and solar PV installations
- Green Touch Screen for campus/community education and interaction
- Living Lab for students in central boiler room
- Expansion of Energy Management curriculum in partnership with Lane CC (EEI), Eugene, Oregon
- Green Globes certification for Fine Arts Building
- Train staff to be “energy observant” and develop plans to reduce energy consumption
Siemens Provides Fuel Flexibility and Low Emissions from Landfill Gas-to-Energy Project

**Challenge** | **Solution**
--- | ---
Process landfill gas as optional cost-effective renewable fuel | SGT-300 turbine can use natural gas, liquids and landfill gas fuels
Reduced emissions at university power gen site and at landfill | Fuel flexibility allows use of low emissions fuel options with landfill gas
CHP project delivers more than electric power | Up to 12MW of heating and cooling

7.8MW electrical power output  
99.02% average availability achieved
Campus Transformation and Goal Achievement

- Living Labs, Research
- Academic Programs
- Communications, Legacy

Sustainability Programs
- Behavioral / Culture Change
- Student / Staff Engagement

DES, Cogeneration
- Renewable Energy Systems
- Storage, EV, Microgrid

Infrastructure Improvements
- Central Plant, Fuel Conversions
- Replace HVAC, Cooling Towers

Energy Conservation Measures
- BAS, Fire & Security Systems
- Strategic Planning

Achieve full campus potential across Economic, Social & Environmental Objectives

"Lowest hanging fruit";
Operational needs;
Initial GHG targets

Transactional ➔ Transformational
Next Steps

1. **Letter of Understanding (LOU)**
2. **RFQ/RFP**
3. **Letter of Intent (LOI)**
4. **Contract**
5. **Change of Usage, Consumption, Accounting**

- **Preliminary Analysis**
  - Conceptual Presentation
  - Feasibility Study
  - Preliminary Audit
  - RFP Response
- **Detailed Analysis**
  - Investment Grade Audit (IGA)
- **Implementation**
  - Planning, Installation, Project Management
- **Guarantee Phase**
  - Measurement and Verification (M&V)
Thank You!

Matthew Ridley
Building Performance and Sustainability
Siemens Smart Infrastructure
Mobile: 504.812-5150
matthew.ridley@siemens.com