Rethinking Satisfying the Appetite for Energy from Buildings
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My Story
A simple message designed to change opinion.

• Born into deep south and grew up in the civil rights movement (reluctant activist)
• Energy background – blue ribbon in Al state science fair 1965 photovoltaic
• A Climate Refugee

Why should I care – the way we do heating ignores physics –
• import it from the earth, but it can never be destroyed, just moved, or converted. So, it just keeps adding.
• Mankind is pulling our billions of years of stored energy and converting it to carbon – and heat.
• We are literally still hauling firewood and building a fire when we need heat, or cool

There is a completely natural way to do this.
A.I. Driven Building Energy Manager

Uncontrollable Energy Sources
- Solar
- Weather
- Body Heat

Predictable Energy Sources
- Day/Night
- Seasonal
- Ground/Water Source
- Recycled Waste Heat
- Utility Companies

The GeoModule™
Predictive, A.I. for HVAC Optimization

Smart Grid

HVAC System
Thermal Energy Microgrid Manager

Uncontrollable Energy Sources and Sinks
- Solar
- Weather
- Body Heat

Predictable Energy Sources and Sinks
- Day/Night
- Seasonal
- Ground/Water Source
- Recycled Waste Heat
- Utility Companies

Smart Grid
- The GeoModule™
- Geothermal & Energy Storage
ASHRAE Global
First Place
Technology Award
for
Educational Buildings
2014

Reduced:
• Energy costs 57%
• Maintenance costs 35%
• CO₂ 800 T/yr.

Savings of:
• $83,000 /yr. energy
• $7,500 maintenance

Using:
• Self-learning, predictive Controls
• Geothermal energy storage and natural cooling
Motivation/Background

Opportunities/Challenges for Intelligent Operations

• Potential for 30% energy and cost savings through intelligent building operations
  – optimal control of setpoints
  – automated fault detection and diagnostics
  – optimal maintenance scheduling
  – increased occupant awareness

• Marketplace slow to adopt intelligent features
  – high implementation costs for site-specific solutions relative to savings potential → additional sensor requirements and labor to engineer and program site-specific solutions
  – perceived risk that optimal strategies won’t work or will disrupt operations
Lessons: Destructive Market Forces

1. Overhanging tech and lack of market understanding
2. Mass market solutions
3. Energy Transportation Inefficiency
4. Subsidized energy costs
Lessons: Effective and Economic Clean Buildings

1. Community solar and geo co-ops
2. Low hanging fruit: conservation, lighting
3. Solar & wind economic – regulatory & utility barriers
4. Storage is a critical
5. New tech fights existing solutions
Next Act: Building Energy Efficiency with Microgrid Control

• “Intelligent Home”
• HRM™ to reduce TCO and Energy Upgrade Cost

By optimizing energy supply and demand - all forms
The Tower of Babble: Man’s Technological Ability Outstripping His Ability to Control Himself

Either We Master Our Technological Power, or We will Be Mastered by It