



# Financial Engineering for Biomass Projects

## Making Wood Work – Missoula, MT



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# Who is McKinstry?

## Energy Services

Performance Contracting  
 Energy Audits  
 Life Cycle Cost Analysis  
 Savings Guarantees  
 Utility Rebate Capture Services  
 Measurement and Verification  
 Online Energy Monitoring  
 Warranty Services

## Facility Services

Facility Assessments  
 Facility Baselineing  
 Site Engineering  
 Critical Environment Management  
 Facility Planning  
 Site Staffing  
 Facility Maintenance  
 Online Digital Archiving  
 Internet Based Facility Tools  
 Training and Distance Learning

## Fire Sprinkler

Pre-Action System  
 Wet System  
 Dry System  
 Halon  
 Fm200  
 Co2  
 Residential Coverage  
 Detection Systems

## Low Voltage Building Systems

Fire Alarm  
 Security  
 CCTV  
 Lighting Control  
 Web Interface



Annie Pierre Hurd	Jeff Sloan, PE	Michael Frank
Brian Antonson	Jennifer Creighton	Mike Fuentes
Constance Adams, PE	Kristina Sing, PE	Mike James
David Jobs	Mark Gardner	Richard Himmel
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Erin Teyma, PE	Matt Nielson	Ryan Dickerson
James Miller	Matt Gregg, PE	Tom Konicko, PE
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## Electrical Services

Low Voltage Lighting  
 Power Wiring &  
 Systems  
 Electrical Service

## Design-Build & Construction Management Services

General Construction/Construction Management  
 Performance-Based Design-Build  
 Project Management  
 Sustainable Design  
 Integrated Design Services  
 Building Modeling  
 Systems Technology Integration  
 Technology Contractor  
 TSO / TCO

## Mechanical Service

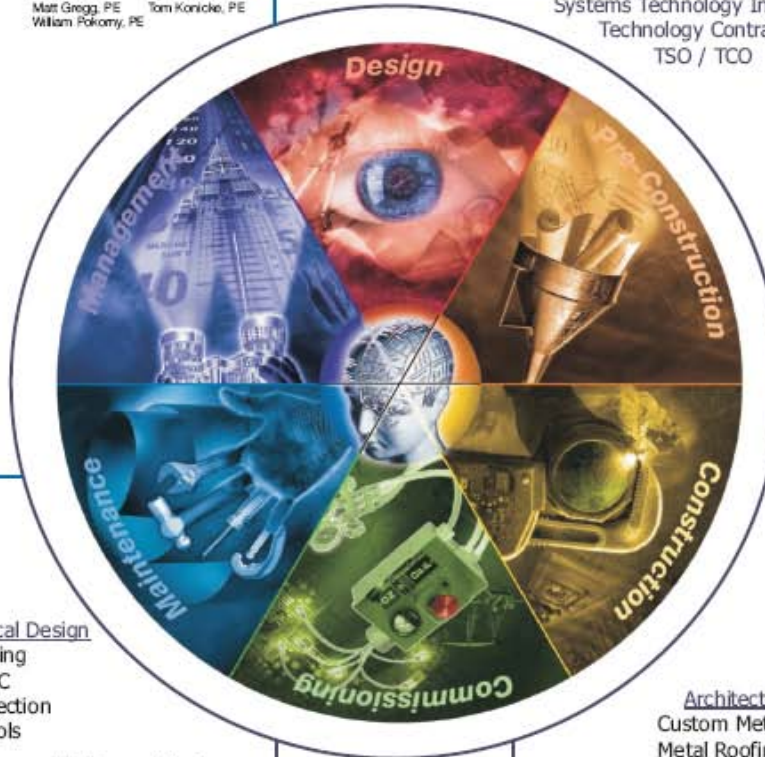
Predictive Maintenance  
 Preventive Maintenance  
 Service Help Desk  
 Remote Monitoring  
 Major Equipment Repair (chillers, boilers, etc.)  
 Emergency Response  
 Engineered Maintenance Plans  
 Low Voltage Electrical  
 Commissioning and Balancing

## Plumbing / Piping

Domestic Water  
 Waste/Vent  
 Rain Leader  
 Waste Treatment  
 High/Low Press Steam  
 Chilled Water  
 Condenser Water  
 Refrigeration  
 Natural Gas  
 Compressed Air  
 Hydraulics  
 Site Utility Piping  
 Plumbing/Piping Pre-Fabrication

## Project Pre-Construction Services

Budgeting & Estimating  
 Construction Management  
 Value Engineering  
 Long Lead Equipment Procurement  
 System Selection and Options



## Full Mechanical Design

Plumbing  
 HVAC  
 Fire Protection  
 Controls

## Renewable Energy Services

Biomass  
 Biofuel (Ethanol/Bio-Diesel)  
 Solar  
 Wind  
 Geothermal

## Architectural Metals

Custom Metal Fabrication  
 Metal Roofing & Cladding

## Sheet Metal Facility

Sheet Metal Installation  
 Sheet Metal Fabrication

## Process Piping

Lab Gases  
 Solvents  
 Viscous Fluids  
 Chemicals  
 High Purity Piping

# Committed to Sustainable Energy Solutions

- **\$2.5 Billion in Design-Build Construction since 1960**
- **\$325M in projects in 2007**
- **Branches: Seattle, Portland, Spokane, Boise, Denver & Minneapolis**
- **Committed to Renewable Energy**
  - Biomass & Bio-fuel
  - Solar
  - Wind
  - Geothermal
- **Over \$12M in grants, incentives and subsidies for our clients**
- **1400 employees (650 Professionals, 750 Trades)**
- **84 Engineers, 24 LEED Accredited Professionals**
- **Biomass heating projects in Enterprise & Wallowa (OR)**
- **Preliminary Biomass Co-Gen Feasibility Studies for Lemhi & Custer Counties, in addition to 3 other pending counties**
- **Design, Fuel, Vendor & Equipment Neutral**

# Biomass: Demand-side & Supply-side



## **Demand-side = Conservation**

Energy Services Performance Contracting  
Existing Buildings or New DB Construction  
Fuel Conversion to Biomass  
Municipal Lease-Purchase or Bonds



## **Supply-side = Power Generation & Revenue**

Public-Private Partnerships  
Performance-Based Design-Build  
Revenue Bonds (plus subsidies)  
DBOM & DBOOM

# Renewable Energy Solutions

- **Step One: Demand-side**
  - ✓ **Local alternative energy based ESPC for schools, hospitals or municipal buildings**
  - ✓ **Intensive public education campaign**
  - ✓ **Public support for project (may include general obligation bonds (if applicable))**
  
- **Step Two: Supply-side**
  - ✓ **Develop and implement alternative energy (biomass) generation and/or bio-fuels plant for community revenue enhancement, infrastructure improvements and economic development**

# Biomass & Renewable Energy Projects

## *Keys to Success...*

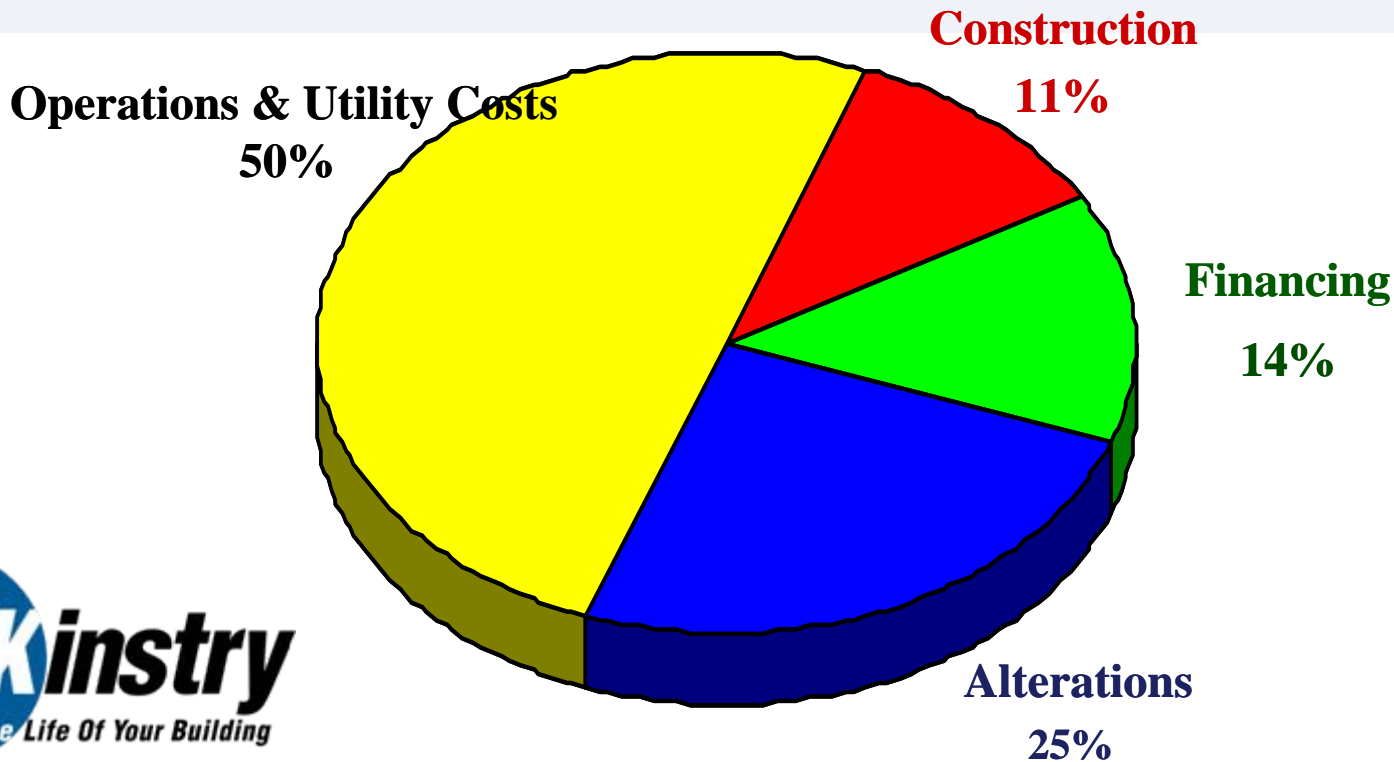
- ✓ **T**echnical & Operational
- ✓ **C**ontractual
- ✓ **E**conomic/Financial
- ✓ **P**olitical

# Technical Approach

**Total Cost of Ownership**  
**“Low Bid = Low Performance”**



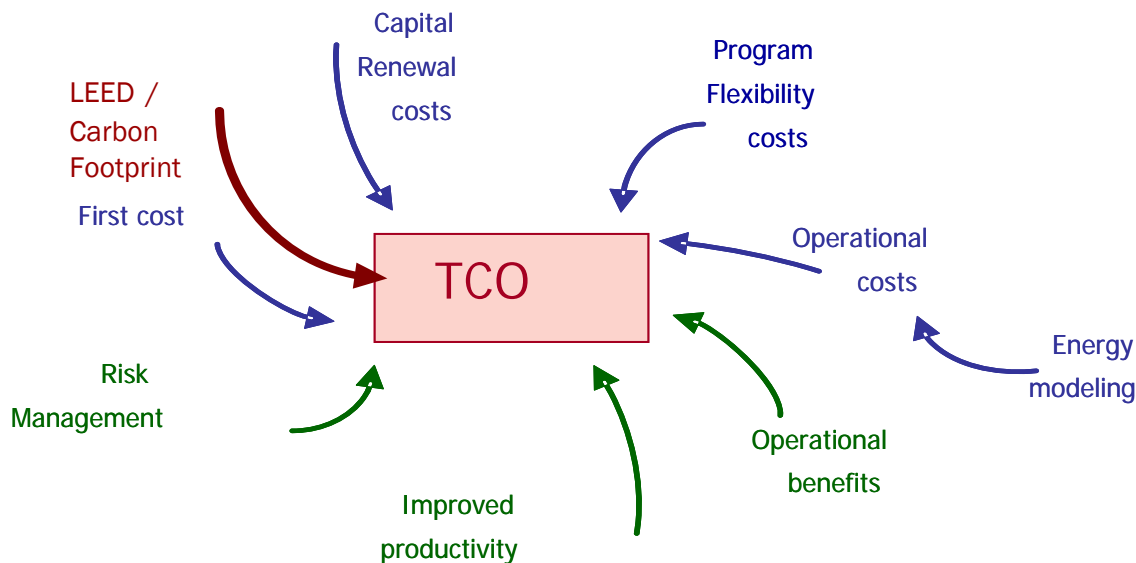
# Facility Economics – Building Costs Over 40 yrs.



\*ASHRAE - American Society for Heating, Refrigeration & Air Conditioning Engineers

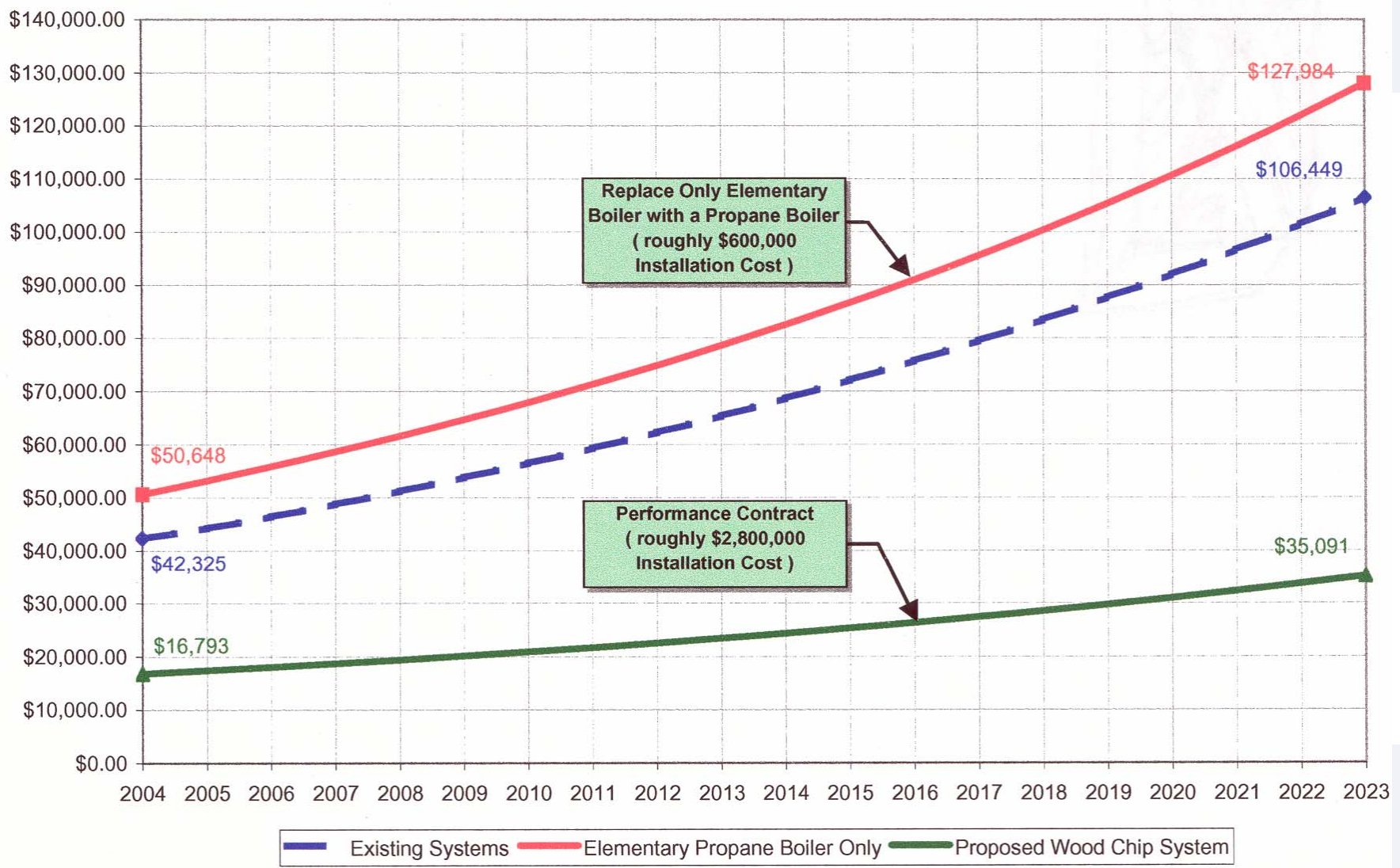
# Total Cost of Ownership (TCO)

- **Quantifiable Decision-Making Process**
- **Balance between real-world & theoretical facility operational processes**
- **Providing a bridge from construction to long-term operation**
- **Financial modeling used to inform sound design & construction decisions.**



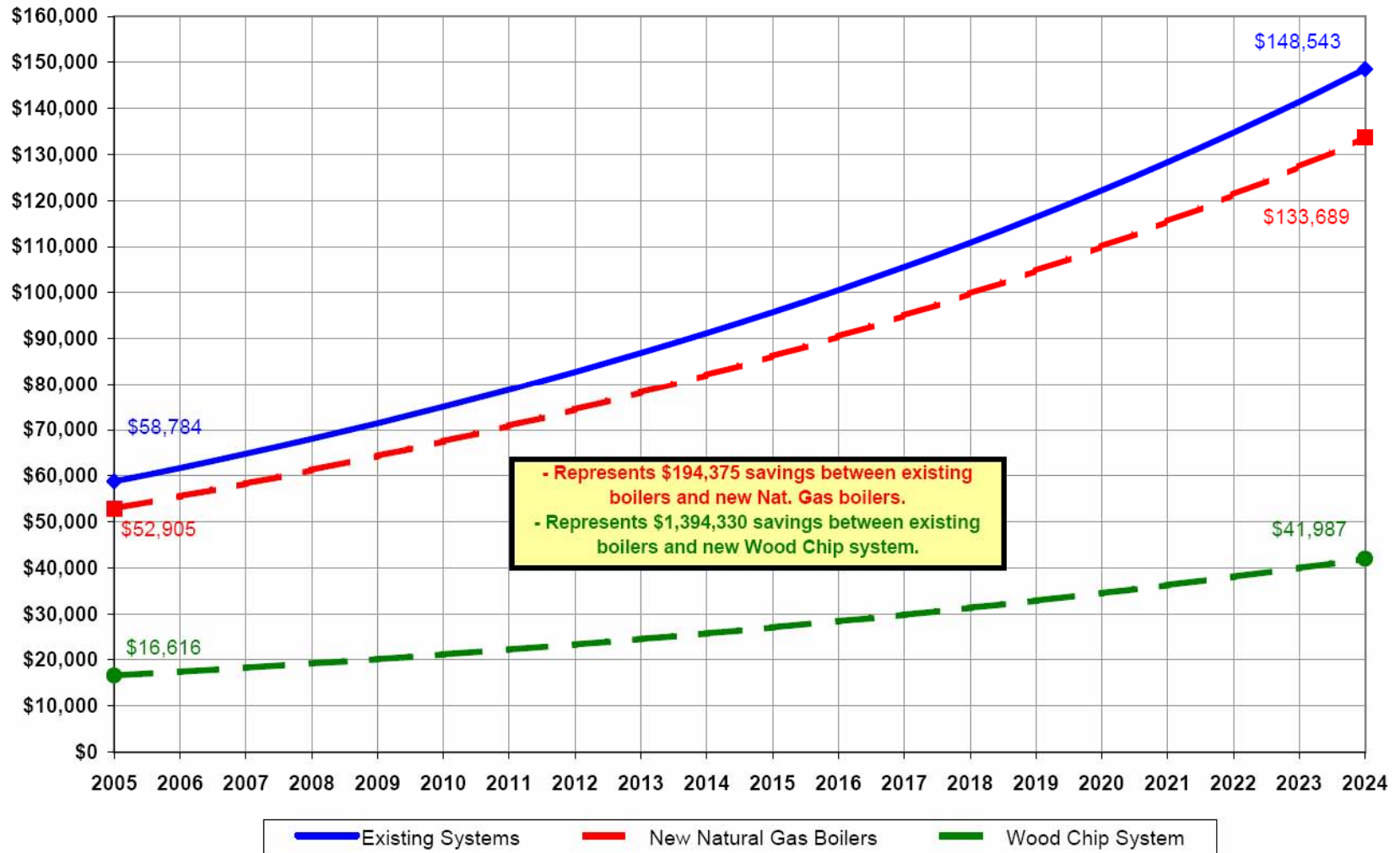
# Council's 20 yr. Biomass System Savings: \$1.1M+

20-Year Annual Energy Cost Projections



# Kellogg's 20 yr. Biomass System Savings: \$1.4M+

Kellogg Middle School - Twenty Year Energy Cost Projections



# Other Biomass Examples

## **Idaho Commercial Food Processing Client**

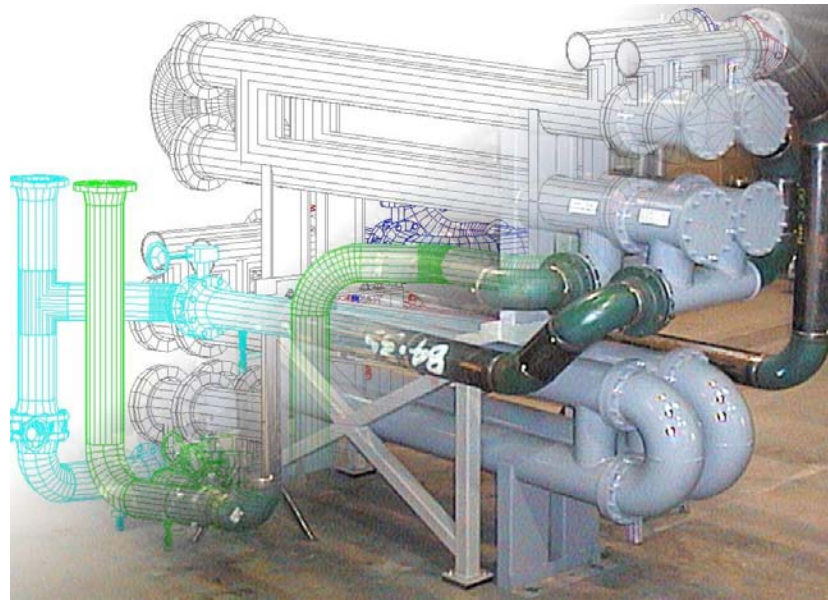
\$810K/yr N Gas to (est.) \$224K/year wood chips.

## **University of Idaho**

Saved \$40M over that past 20 years using wood chips vs. what NG would have cost

# Implementation Options & Methodologies

**Energy Services Performance Contracting (ESPC)**  
**Performance-Based Design-Build**  
**Integrated Design & High-Performance Facilities**



# Performance Contracting – What is it?

Performance Contracting provides a way for schools to leverage future cost-avoided energy savings to pay for improvements in the comfort, safety, and efficiency of their facilities **today**.

The financial and operational performance **is guaranteed** by the ESCO, eliminating the risks typically associated with the traditional “low-bid” approach to construction projects.

# Integrated Design: ECM & FIM Matrix

ECM/FIM Feasibility Matrix

● 0 - 10 Year Payback

● 10 - 15 Year Payback

● 15+ Year Payback

ENERGY CONSERVATION & FACILITY IMPROVEMENT MEASURE CATEGORY	Dist. Office	Lincoln	Elementary Lewis & Clark	Elementary Wilson	Elementary Washington	Elementary Van Buren	Elementary Sacajawea	Elementary Jefferson MS	Syringa MS	Caldwell HS	Canyon Springs Alter
	1	2	3	4	5	6	7	8	9	10	11
BUILDING ID											
CONSTRUCTION YEAR	1913	1945	2004	1950	1905	1903	1991	1974	1957	1997	1997
GROSS SQUARE FOOTAGE	13,867	39,600	65,870	72,782	59,501	61,514	46,509	103,891	73,379	227,202	13,506
Lighting Retrofit & Lighting Controls	●	●	●	●	●	●	●	●	●	●	●
VFD Installation	●	●	●	●	●	●	●	●	●	●	●
Water Conservation	●	●	●	●	●	●	●	●	●	●	●
Direct Digital Controls (DDC) Upgrade	●	●	●	●	●	●	●	●	●	●	●
Office Equipment & Load Controllers	●	●	●	●	●	●	●	●	●	●	●
HVAC Improvements or Replacement	●	●	●	●	●	●	●	●	●		●
Fuel Switching											
Heating System Insulation											
Building Envelope & Window Replacement	●			●	●						
Electrical Systems Repairs or Upgrades				●							
Vending Misers	●							●	●	●	●
Security System Improvements	●	●	●	●	●	●	●	●	●	●	●
Solid Waste Reduction Strategies											

**Notes:**

1. The simple payback ranges above are for discussion purposes only. Savings and construction costs are estimates based on McKinstry's knowledge of the Caldwell School District buildings, and our professional experience with similar K-12 facilities.

# Why Public Institutions Prefer ESPC

- ❑ Better alternative to “low-bid” process – **better designs, systems & equipment**
- ❑ Emphasizes **best life-cycle performance (TCO)**
- ❑ Operational & financial risks are burdened by ESCO
- ❑ Open-book cost-plus pricing mean full disclosure and transparency
- ❑ Eliminates any incentive “cut corners”
- ❑ Projects are properly commissioned
- ❑ **Single-point of accountability (no “blame game”)**
- ❑ **THREE GUARANTEES: Cost-Avoided Energy/O&M savings, GMAX price, Life-Cycle Performance**

# Financial Engineering & Options

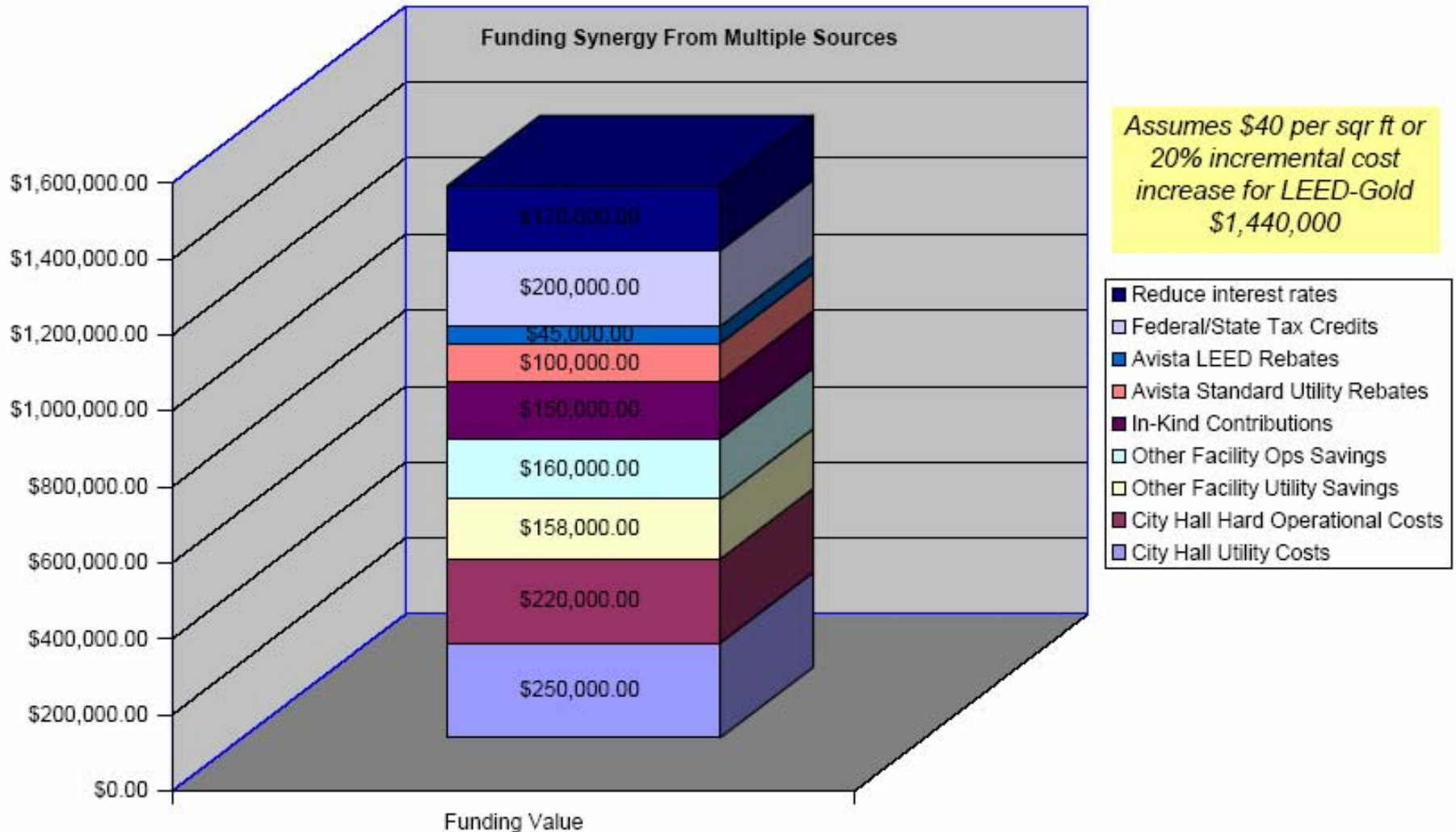
**Every Virtue Must Be Paid For**



# Sources of Funding & Financial Subsidies

- OPM – “Other People’s Money”
  - Grants (Private, State, Federal)
  - Interest & Financing Subsidies (QZAB, CREBs, etc.)
  - Utility Incentives
- Guaranteed Cost-Avoided Energy and O&M Savings
- General Obligation Bonds (ESPC)
- Tax Exempt Municipal Lease-Purchase
- Guaranteed Utility Purchase Agreements (Supply-side Projects)
- DBOM & DBOOM – McK Equity Stake (Supply-Side Projects)
- Revenue Bonds (Supply-side Projects)
- CREBs – Clean Renewable Energy Bonds (Supply-Side Projects)

# Integrated Financial Support



## PROJECTED BOND STATISTICS

The following chart compares the costs of the district's proposal compared to a traditional bond financing that would place the entire bond repayment burden on the property tax.

	<u>District's Bond Proposal</u>	<u>Typical Bond Proposal</u>
GMAX Implementation Cost (Siemens)	\$9,217,800	\$9,217,800
Less: USFS Biomass Grant	(381,000)	-0-
Less: Project Utility Incentives	<u>(358,000)</u>	<u>-0-</u>
 Net Project Cost to Borrow	 8,478,800	 9,217,800
Plus: Bond Fees (1.50%)	<u>127,182</u>	<u>138,267</u>

Bond Amount (Rounded):	8,610,000	9,360,000
Projected interest cost (includes ½% cushion):	<u>6,253,639</u>	<u>6,689,954</u>
 Total Projected Bond Repayment Cost:	 \$14,863,639	 \$16,049,954

Less: Expected Levy Equalization		
Subsidies payments from sale:	(3,716,000)	-0-
Less: Expected energy saving applied to Bond repayment	<u>(3,300,000)</u>	<u>-0-</u>

Equals: Total amount of bonds expected to be repaid through property tax levy:	\$7,847,639	\$16,049,954
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Existing bond tax rate (FY 2006)	\$1.67	\$1.67
Projected bond tax rate with new bond	\$2.14	\$3.27
Increase in tax rate from bond	\$0.47	\$1.60

## Example K-12 Financial Engineering

**Over \$8 Million in  
savings!**

**Value per \$1,000  
taxable home value**

# Final Points...

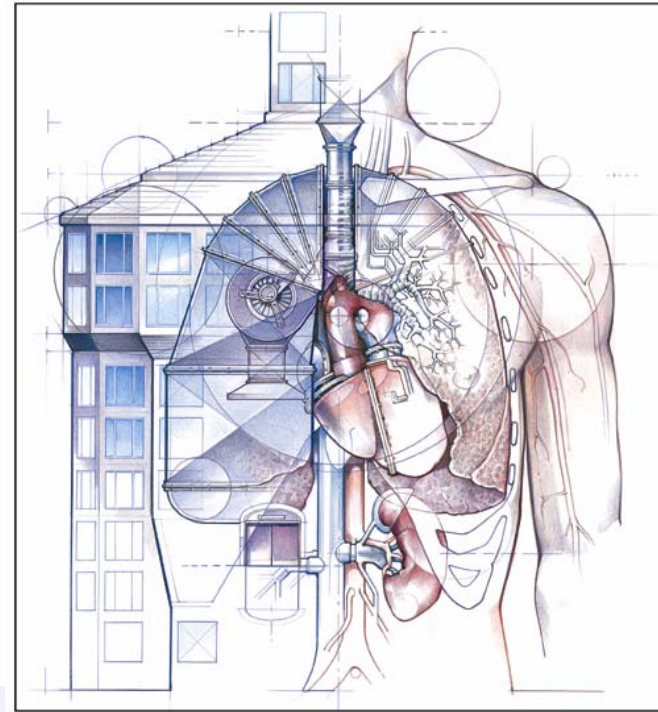
- Core biomass project must stand on its own legs
- Subsidies and Grants are “frosting”
- The biomass portion should not be burden with other deferred maintenance needs
- Must focus on performance and TCO – not just first costs
- Requires the will to succeed

# Questions?

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**FOR THE LIFE OF YOUR BUILDING.**