



U.S. Department of Energy
Energy Efficiency and Renewable Energy

What is an Energy Project?

Energy Efficient Project Planning Seminar

March 2, 2004, Albuquerque, NM.

Sponsored by

The City of Albuquerque-Energy Conservation Council, State of New Mexico,
Public Service Company of NM and Rebuild America

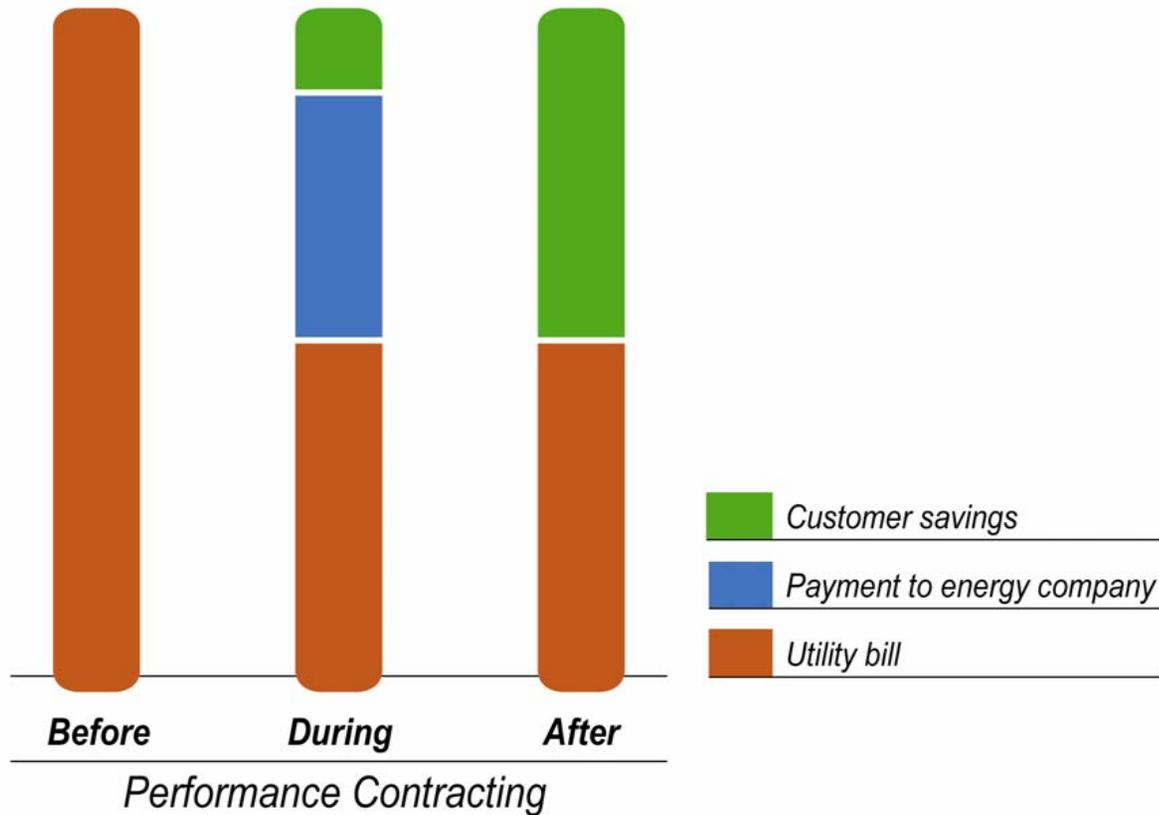


Agenda

- Performance Contracting Concepts & Overview
- What It Means to You
- Typical Water and Energy Conservation Measures
- Renewable Energy Opportunities
- Project Phases
- Risk Matrix
- Common Financing Methods
- Steps Forward
- Case Study – Albuquerque Housing Authority



Performance Contracting Concept





Performance Contracting Overview

- Completely turn key
- Project financing
- Savings cover all project design, implementation and financing costs
- Savings are guaranteed
- Savings are measured and verified



What It Means to You

- No upfront cost
- Replace old capital items such as boilers, chillers, air handling units, HVAC controls, etc.
- Lower energy and water bills (typically 20 to 30%)
- Generate positive cash flow in operating budget
- Use of new equipment now
- Improve interior environment
- Avoid asking taxpayers for additional tax dollars
- Be environmentally friendly



Typical Energy and Water Conservation Measures

- Lighting upgrades
- Low flow plumbing fixtures
- Sewer credits for cooling towers and irrigation systems
- Chiller and boiler replacements
 - Centralize chillers
 - Replace central steam systems with distributed hot water systems
- Steam trap repair & replacement
- HVAC controls upgrades
 - Occupied & unoccupied modes
 - Seasonal temperature resets
- Convert constant flow water and air systems to variable flow
- Upgrade economizer cycles



Renewable Energy Opportunities

- Landfill gas recovery
- Sewer gas recovery
- Ground source heat pumps
- Geothermal heating and cooling
- Solar heating
- Photovoltaic
- Wind



Project Phases

- Preliminary audit
 - ESCO will do for free to showcase their skills
- Owner selects one ESCO using either an RFQ or RFP
- Detailed audit
 - Cost \$0.08 to \$0.20 / sq. ft.
 - Cost is rolled into project
 - Owner pays for detailed audit if ESCo develops self-funding project but project does not go forward
 - Final scope
 - Final cost



Risk Matrix

– ESCO accepts risk for

- Design
- Construction
- System performance
- Guarantees energy and water reduction in units

– Owner accepts risk for

- Future electricity, gas and water tariffs
- Facility operating hours



Common Financing Methods

- **Owner issued bonds (cost effective for large projects only)**
- **Tax exempt lease (most common)**
- **Operating lease or service contract**
- **ESCO financing**



M&V Options

Option A

Verifying savings by engineering calculations (possibly including spot measurements) with agreed-to values. **Common examples: High-efficiency motors, lighting retrofits**

Option B

Verifying actual performance by end-use engineering calculations with long term metering and measuring of end-use energy consumption. **Common examples: Chillers, VFDs**

Option C

Verifying performance by whole building approach. Utility meter billing analysis using techniques from simple comparison to multivariable regression analysis. **Common examples: Boiler replacements (gas utility bills)**

Option D

Verifying actual performance and savings through simulation of facility components and/or the whole facility. Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering. **Common examples: window tinting**



Path Forward

- Put a team together (facilities, purchasing, financial, legal)
- Have a preliminary audit done (ESCOs will do for free)
- Issue a Request for Qualifications or Proposals
- Select an ESCO
- ESCO performs a detailed audit
- Secure financing (ESCO will arrange)
- Negotiate and sign contract
- ESCO installs retrofits
- Enjoy the savings



Case Study

Albuquerque Housing Authority

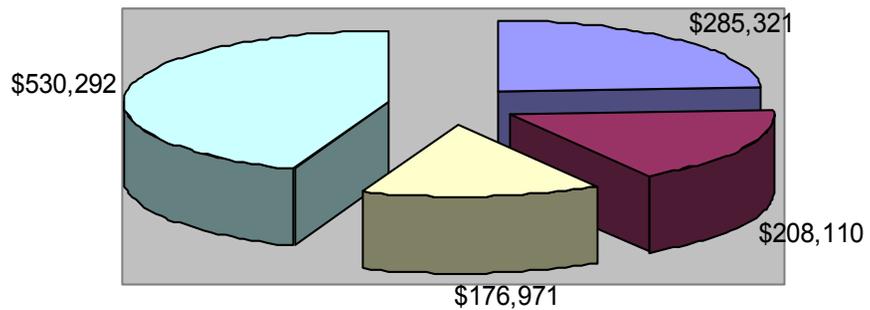


AHS Stakeholders

- Acting Director Lori Grimm
- City Attorney Carolyn Fudge
- Modernization Director: Fernie Martinez
- State Energy Office
- State Engineers Office
- HUD Albuquerque
- City Council
- City Energy Director



Albuquerque Housing Authority Total Utility Cost Profile



Total Annual Utility Cost = **\$1,200,694**

- AHS Water & Sewer
- AHS Electric
- AHS Gas
- Total Tenant Paid Utilities



Project Summary

Annual Electrical Savings 15%	\$ 112,000
Annual Water Savings 30%	\$ 41,000
Total Annual Savings	\$153,000
Financing Term	12 years
Customer Contribution	\$640,000
Interest Rate	5.2%
INVESTMENT	\$1.60 M



Summary of Energy Conservation Opportunities For Albuquerque Housing Services Administration Facility

- Improve Comfort and Health Conditions by Providing Adequate Fresh Air to the HVAC Systems.
- Extend Existing Equipment Life by Preventing the Short Cycling of Refrigeration Compressors and Improved Maintenance Procedures.
- Replace Lighting System With High Efficiency Lamps, Ballasts and Controls.
- Replace the Problematic Pneumatic Controls With a Microprocessor Based Controls System.
- Evaluate the Non-functional Existing Evaporative Cooling System and Associated Controls for Rehab or Removal.
- Minimize Domestic Hot Water System Energy Losses by Adding Insulation, Controls and Improving Maintenance Procedures.



Summary of Energy Conservation Opportunities For Wainright Manor

- Evaluate Comfort and Energy Advantages of Adding an Evaporative “Free Cooling” System to the Existing Refrigerated Air Fan Coils.
- Decrease Heating and Cooling Water Flow rates to the Minimum Required to Maintain Comfort and Save Energy.
- Add Microprocessor Based Controls to Improve Comfort, Save Energy and Prevent Mixing of Evaporative and Refrigerated Cooling Air.
- Replace Lighting System With High Efficiency Lamps, Ballasts and Controls.
- Add Insulation and Controls to Minimize Air Infiltration and Hot and Cold Water Waste.
- Start and Maintain an Energy Awareness Program to Educate Tenants How to Properly Operate Room Temperature Controllers, Windows and Water Use.



Summary of Energy Conservation Opportunities For Embudo Towers

- Improve Comfort and Reduce Energy Use in the Common Sunroom Areas by Reducing Thermal Losses and Improving HVAC Controls.
- Provide a Routine Maintenance Schedule and Checklist for Contracted Maintenance Staff to Complete and Report Maintenance Activities.
- Decrease Heating and Cooling Water Flow rates to the Minimum Required to Maintain Comfort and Save Energy.
- Add Microprocessor Based Controls to Improve Comfort and Save Energy.
- Replace Lighting System With High Efficiency Lamps, Ballasts and Controls.
- Add Insulation and Controls to Minimize Air Infiltration and Hot and Cold Water Waste.
- Start and Maintain an Energy Awareness Program to Educate Tenants How to Properly Operate Room Temperature Controllers, Windows and Water Use.



Potential for Water Savings

- Scattered Sites
 - New Low-Flow Plumbing Fixtures
 - New Showerheads & Faucet Aerators
 - Comprehensive Leak Detection & Repair



Electric Salient Points

- AHS Pays Common Electric Use Only
- Utility Allowances Must be Applied for Savings from Apartment Electricity
- Physical Needs and Savings Potential Important Considerations in both Common and Apartment Areas



Importance of Comprehensiveness

- Comprehensive Packages, Less Costly Solutions
- More and Better HVAC – Boilers, Controls
- PHA EPC Window Replacement Experience
- Sub-metering, Fuel Conversion Experience
- Comprehensive Water-efficiency Measures Including Leak Detection
- More and Better Multifamily Lighting



Designs Maximize Results

- Comprehensive Design Approach >> Fewer Missed Opportunities
- Custom Design Program >> Maximizes Benefit
- Conventional Design Procedures >> Facilitates Communication
- AHS Reviews all Designs and Equipment Selections >> Maximizes Satisfaction
- Uniform Equipment/ System Selection, Maximizes Financial Benefit



New Mexico Challenges: State Statute and City Ordinances

- Requires 10 Year term; not 12 years allowed by HUD
- Savings Insurance Requirement not consistent with Industry Product Offerings
- City Council won't permit pledging of non-HUD funds for collateral
- Certification by State Energy and State Engineers Office Required



Current Status

- Measures, Fees Negotiated
- Energy Services Agreement Issues down to one: material changes
- Financing at 5.2% offered
- Customer Cost share of \$600,000
- HUD reviewing for approval
- HUD Washington waiver for tenant-paid utilities required
- March 15 City Council approval sought
- 10 month construction period



Questions?

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