National Renewable Energy Laboratory
Innovation for Our Energy Future

Introduction to Performance Contracting

FEMP Technical Assistance Program (TAP) Webinar

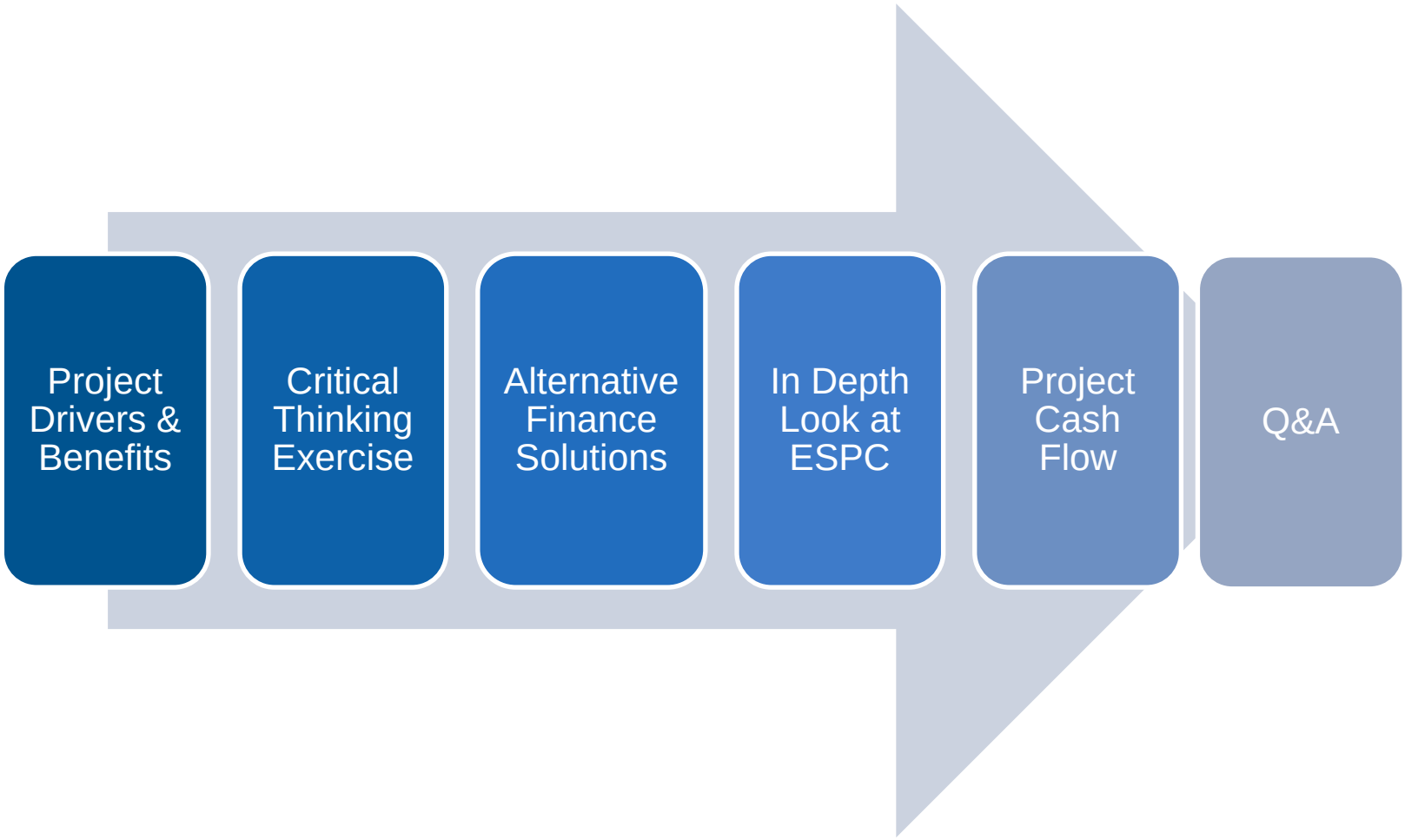
Dustin J. Knutson, BEP, LEED AP

Wednesday, December 16, 2009

Purpose

To gain insight into the decision-making process and the financial mechanisms available for implementation of energy efficiency and renewable energy projects in the public and private sectors **with the goal to enhance** national **energy security**, **economic prosperity**, and **stewardship** of both fiscal and natural resources.

Agenda


Project Drivers & Benefits
Critical Thinking Exercise
Alternative Finance Solutions
In Depth Look at ESPC
Project Cash Flow
Q&A

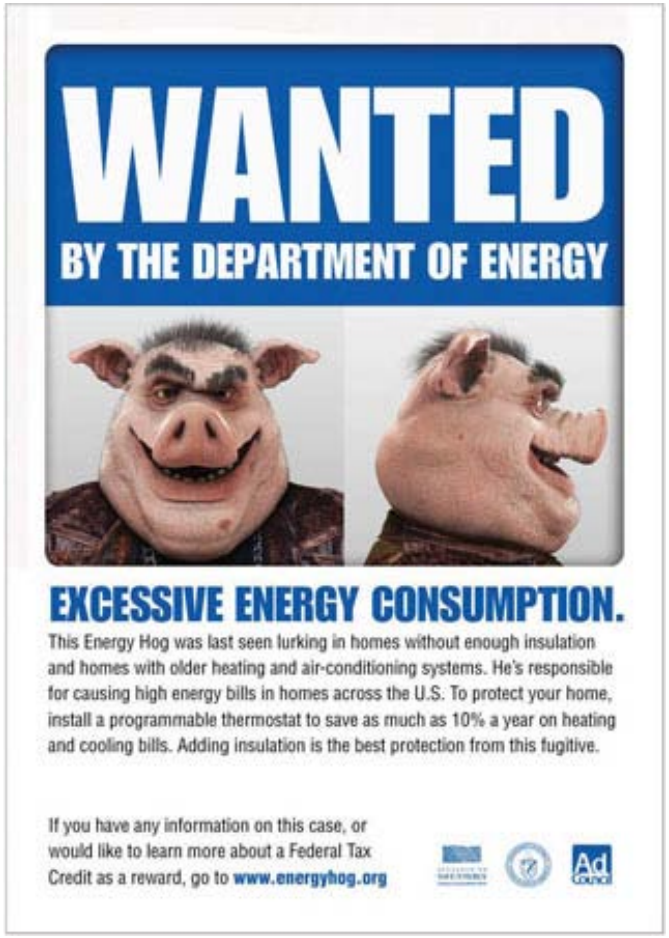
Project Drivers

- Good Stewardship of Resources
  - Financial (positive cash flow)
  - Environmental
  - Eliminate Waste
  - Efficient & Effective Use of Tax $
- Meet Legislative Requirements
  - Energy Intensity (Reduce Btu/sq. ft.)
  - Use of Renewable Energy
- Increased Comfort & Productivity
  - Better Work Environment
  - Manageable Systems
  - Minimize Complaints

Benefits

- Reduced energy and water consumption
- Greater energy price stability
- Minimized peak demand
- Decreased O&M costs
- Reduced need for imported fuels
- Enhanced energy security with reliable, distributed power supplies and fuel diversification
- Potential for decreased utility bills and new income streams
- Conserved natural resources and reduced emissions
- Meet Federal & State legislative requirements
- Meet State and/or Agency goals

Scope



Applicable Areas

Public Agencies	School Districts	Municipalities
Universities	State	Cities
Counties	Prisons	Colleges

Critical Thinking Challenge

Think. What do you believe?

"Do you really believe…

that what you believe…

is really real?"

If you did, what would you do differently?

The Learning Principle

"Conservation is a learned behavior, a manifestation of beliefs.

Learning is a change in behavior. To change behavior, affect values because values affect beliefs. Therefore, develop an energy conservation ethic."

-Ralph Bozella, WESS, Inc

Critical Thinking Exercise (cont.)

Common Thinking:

- Behavioral Philosophy: “If it’s not required, I’m not doing it.”
- Maintenance Philosophy: “If it ain’t broke, don’t fix it.”
- Fiscal Philosophy: “Finance only as a last resort.”

➡ RESULTS: Lazy people, frequent “emergencies,” and unfinished projects… leading to usury, bad business practices & wasted taxpayer money.

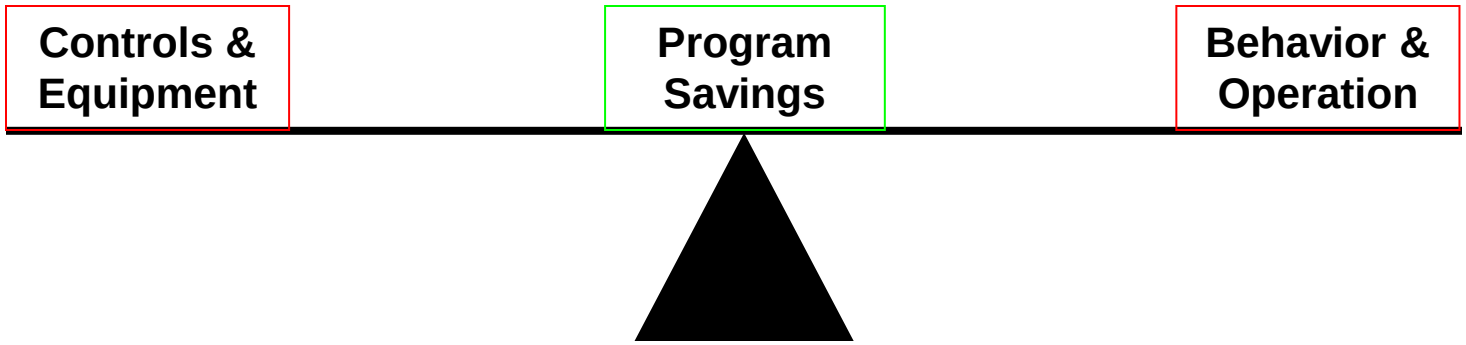
Critical Thinking:

- Behavioral Philosophy: “What is permissible is not always beneficial.”
- Maintenance Philosophy: “Maintenance is measurable and improvable.”
- Fiscal Philosophy: “How can I leverage resources to create value?”

➡ RESULTS: Effective people, organized operations, and world-class projects… leading to trusted relationships, building integrity & efficiency.

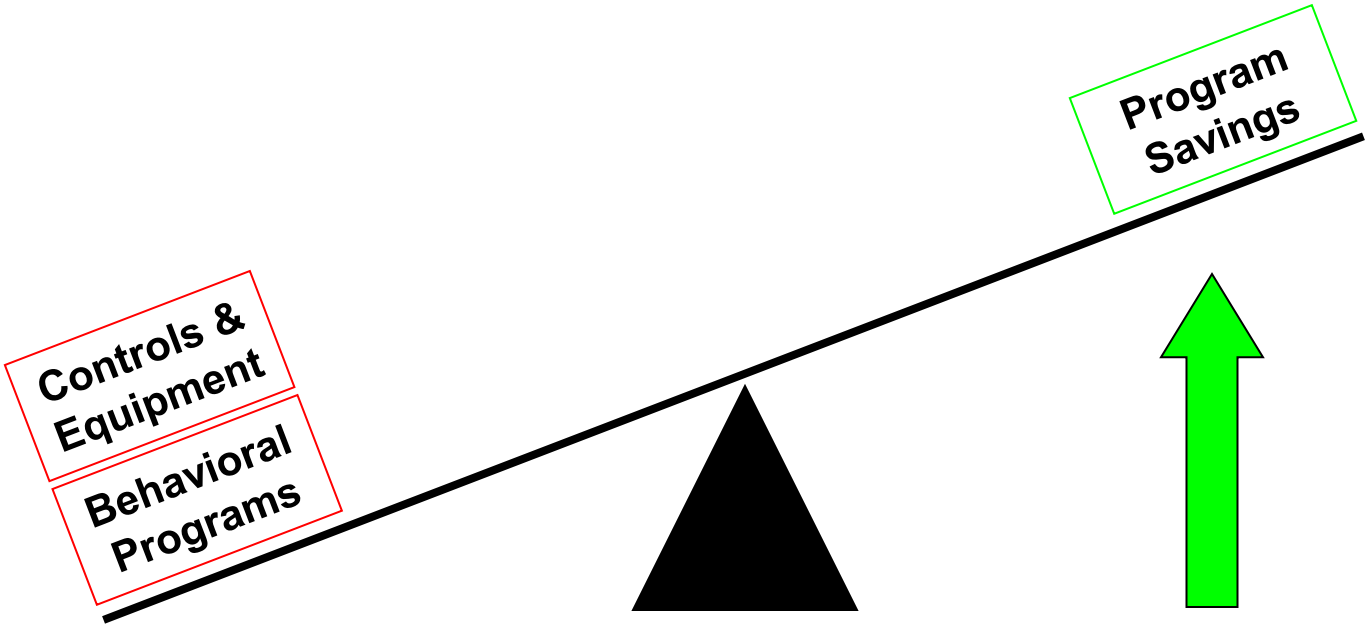
The Traditional Approach

SAVINGS created by efficient controls & equipment
OFFSET by poor operational and behavioral habits.



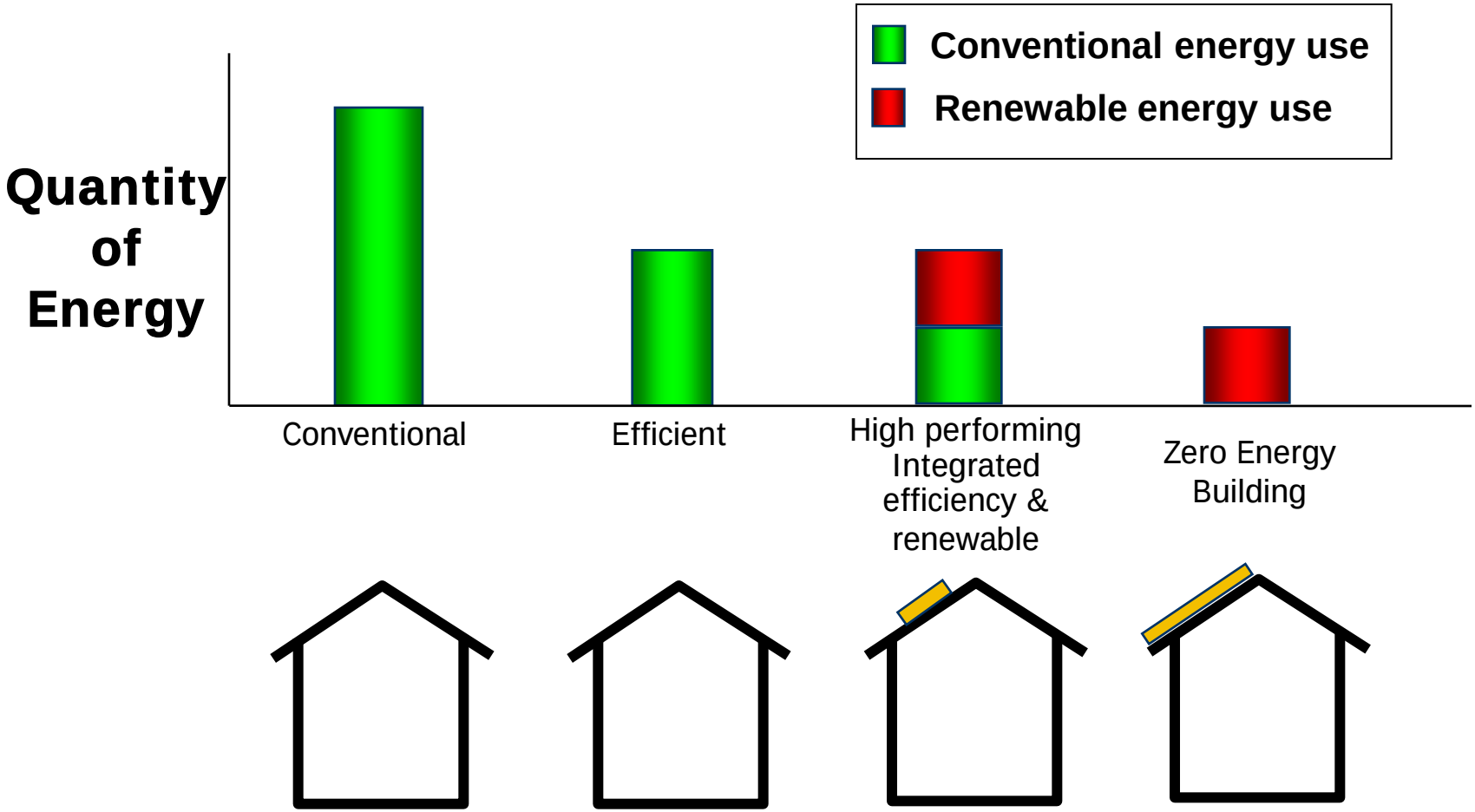
The Combined Approach

SAVINGS INCREASE when combining efficient controls & equipment with efficient behavioral and operational programs.

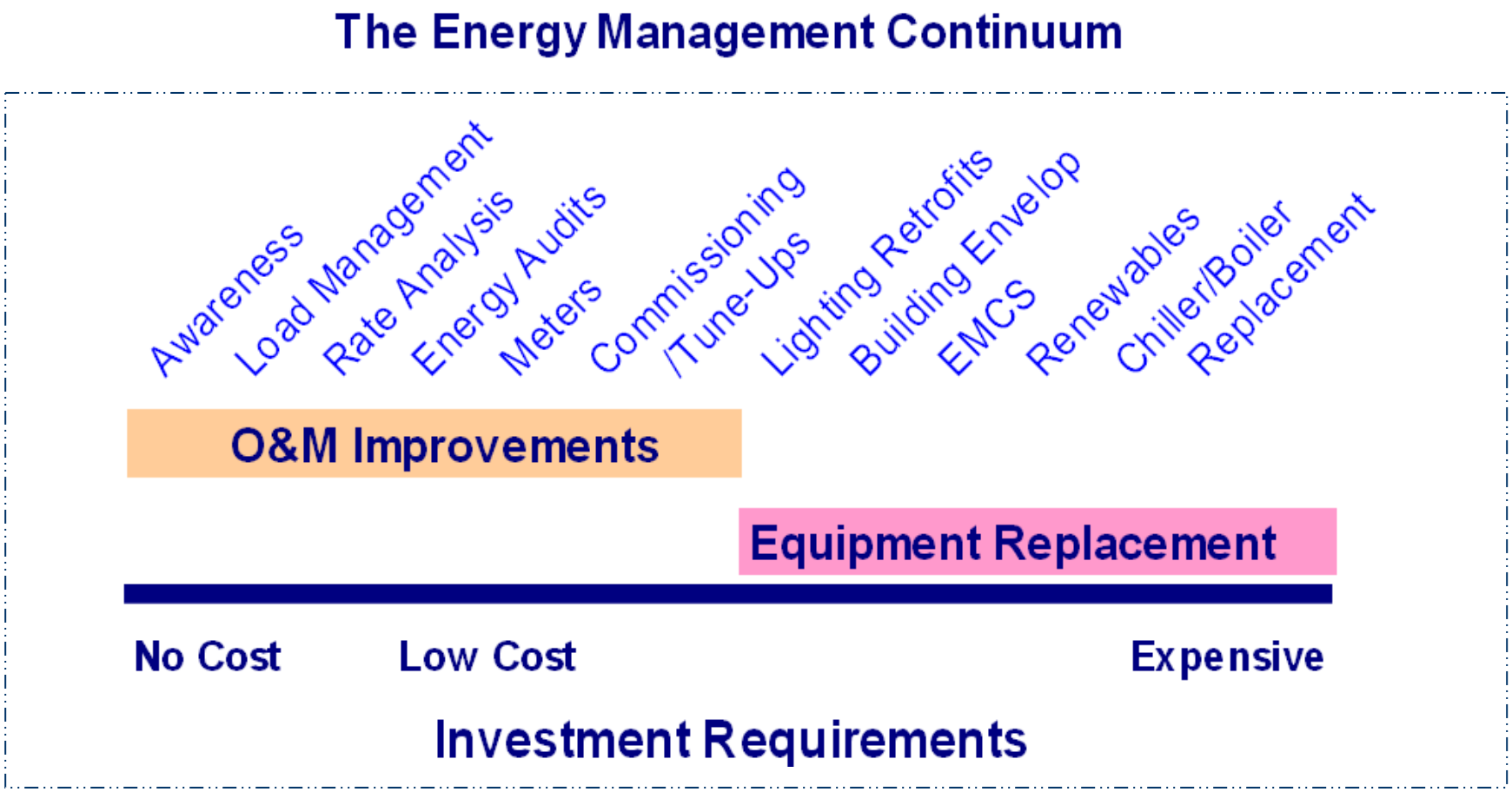


Integrated Solutions:

Renewables Go Hand-in-Hand with Energy Efficiency



The Bigger Picture



Introduction to Alternative Finance

Definition

- Methods to implement capital-intensive projects with little to no appropriations or available up-front capital

Why use it?

- High cost of delaying a project until funding is available
- Paid through savings, in some cases guaranteed
- Processes are established

When should it be used?

- When capital is unavailable and/or to leverage resources to create value
- When it enables accomplishment of goals and requirements

Alternative Finance Solutions

Why finance?

The private sector perspective:

What's the NPV?

What's the ROI?

What's the IRR?

What's the SIR?

What's…

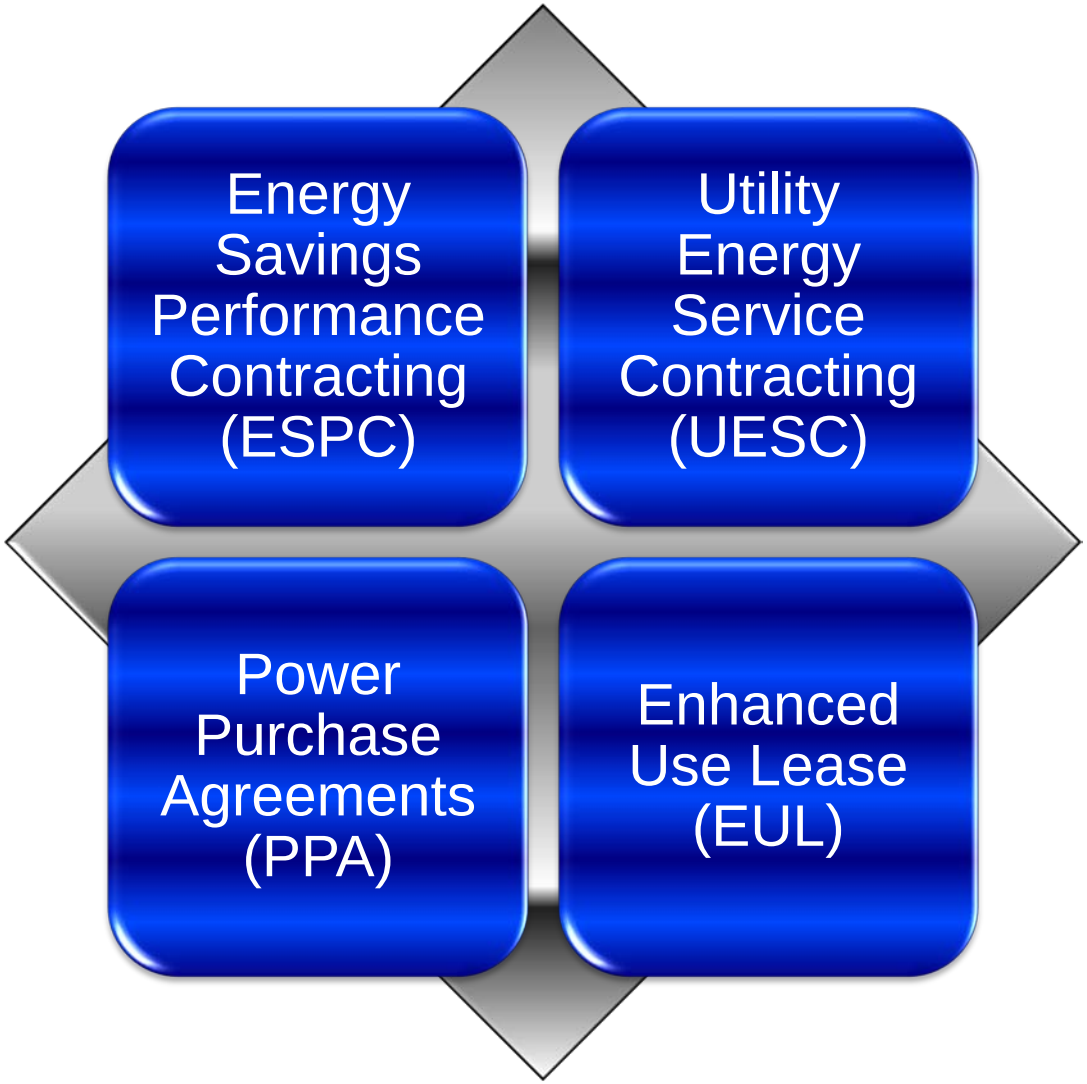
What legacy will we leave?

…the Bottom Line?

"Saving $100,000 in energy costs has the **same net effect** as increasing revenue by **$2,000,000!"**

Source: Mark LaRouche, Business Energy Professional (BEP) Certification Instructor, Association of Energy Engineers (AEE), 2009

Alternative Finance Solutions (cont.)



Common Types of Alternative Finance

Power Purchase Agreements (PPA)

- Partnership
  - Utility
  - 3rd Party Renewable Developer
  - Agency
- Exchange of RECs
- Power Purchase

Utility Energy Service Contracts (UESC)

- Partnership
  - Utility
  - Agency
- On-bill Financing Mechanism
- Similar to ESPC but no guarantee req'd

Enhanced Use Lease (EUL)

- Use of land for cash or other in-kind consideration
  - Used to implement EE/RE projects

Energy Savings Performance Contracting (ESPC)

- See next slide

Photovoltaic array in Alamosa, Colorado

Definition of ESPC

ESPC is a no-upfront-cost contracting method. The contractor incurs the cost of implementing energy conservation measures (ECMs) and is paid from the energy, water, and operations savings resulting from the ECMs.

An ESPC is a Partnership

An energy service company (ESCO)

- Incurs the cost of developing and implementing the energy project
- Guarantees a specified level of cost savings

The customer (agency/site)

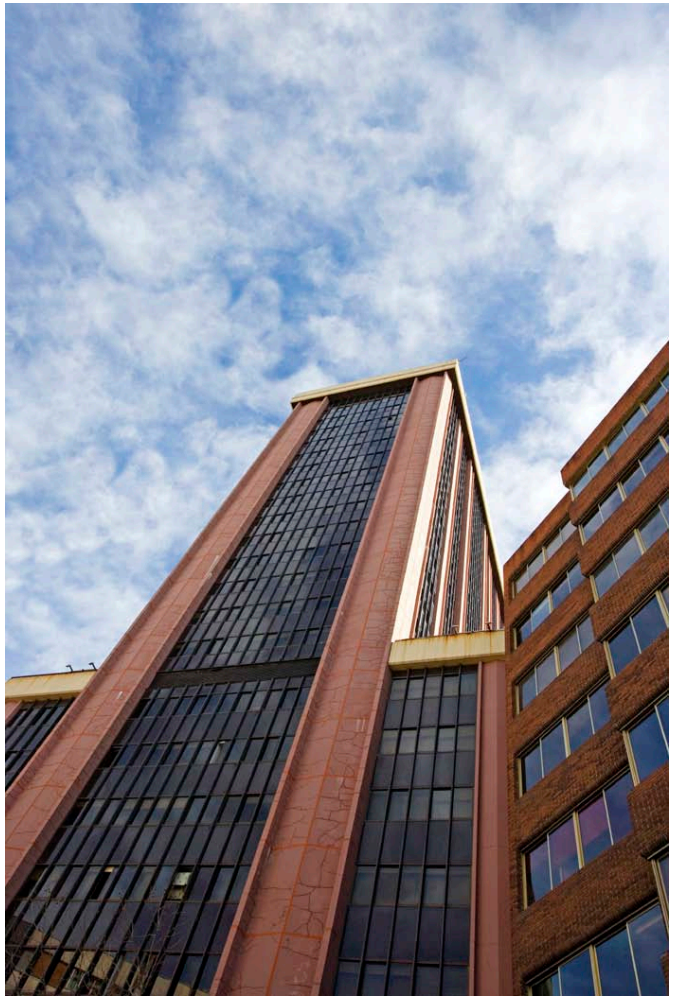
- Pays the ESCO over the term of the contract out of the energy and energy-related savings resulting from the project

Energy Conservation Measures

Everything from exit signs to industrial boilers

Must save money from energy or water bills, or energy-related O&M

- Demand (kW) only measures (e.g., thermal storage) acceptable and encouraged



Contract Scope — Technologies

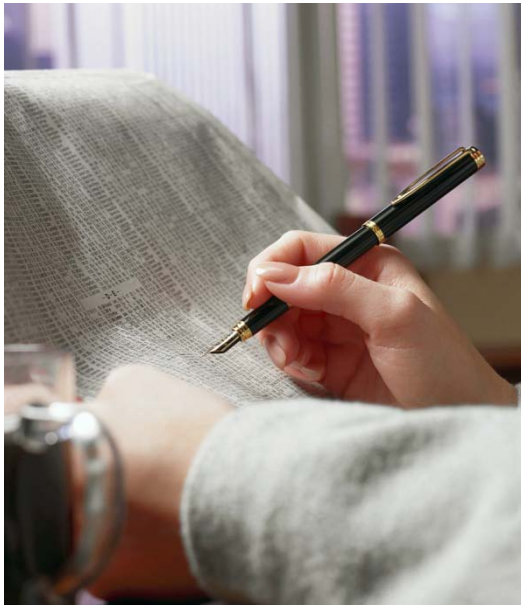
- Boiler Plant Improvements
- Chiller Plant Improvements
- Building Automation Systems/ Energy Management Control Systems
- Heating, Ventilation & Air Conditioning
- Lighting Improvements
- Building Envelope Improvements (windows)
- Chilled Water, Hot Water & Steam Distribution Systems
- Electric Motors & Drives
- Refrigeration
- Distributed Generation
- Renewable Energy Systems
- Energy/ Utility Distribution Systems
- Water & Sewer Conservation Systems
- Electric Peak Shaving & Load Shifting
- Energy Cost Reduction through Rate Adjustments
- Energy-related Process Improvements
- Commissioning Systems
- Advanced Metering Systems
- Appliance Plug Load Reductions
- Non-building applications (e.g., hydro-dams, fleet)

Source: http://www1.eere.energy.gov/femp/pdfs/generic_idiq_espc_contract.pdf

ESPCs Re-allocate Current Spending

Reduce spending on:

- Wasted Energy
- Maintenance of old, inefficient equipment

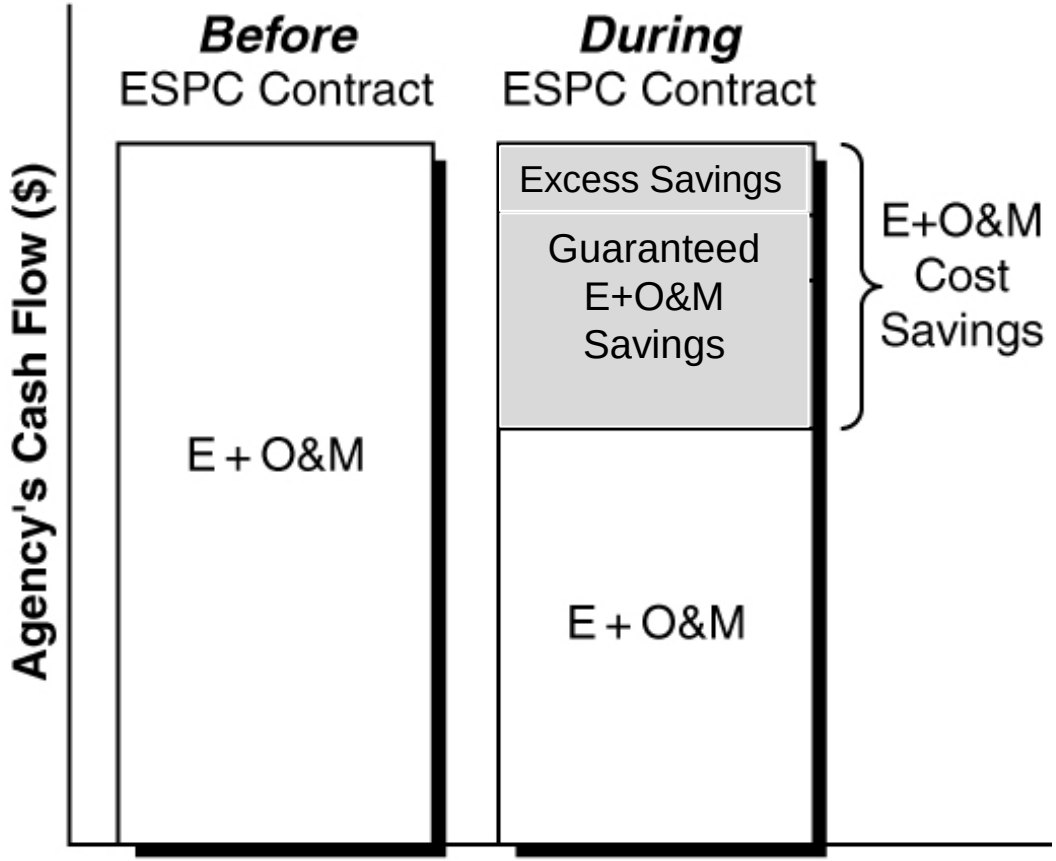


And re-allocate the same spending to:

- New energy-efficient infrastructure
- Project financing costs (mostly interest)
- Payment for services

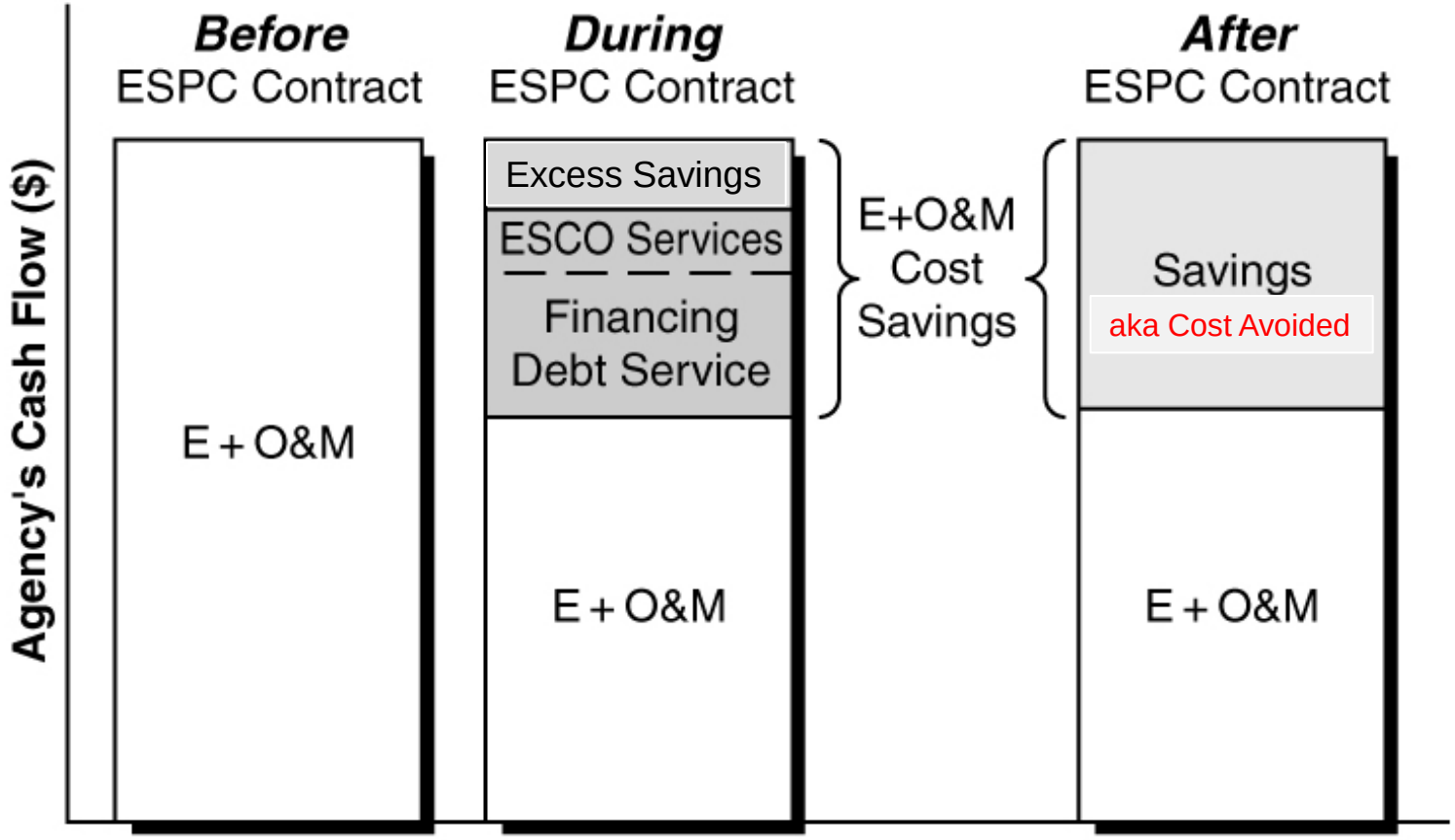
Project Cash Flow in ESPC

ESPC: Where's my MONEY?!!

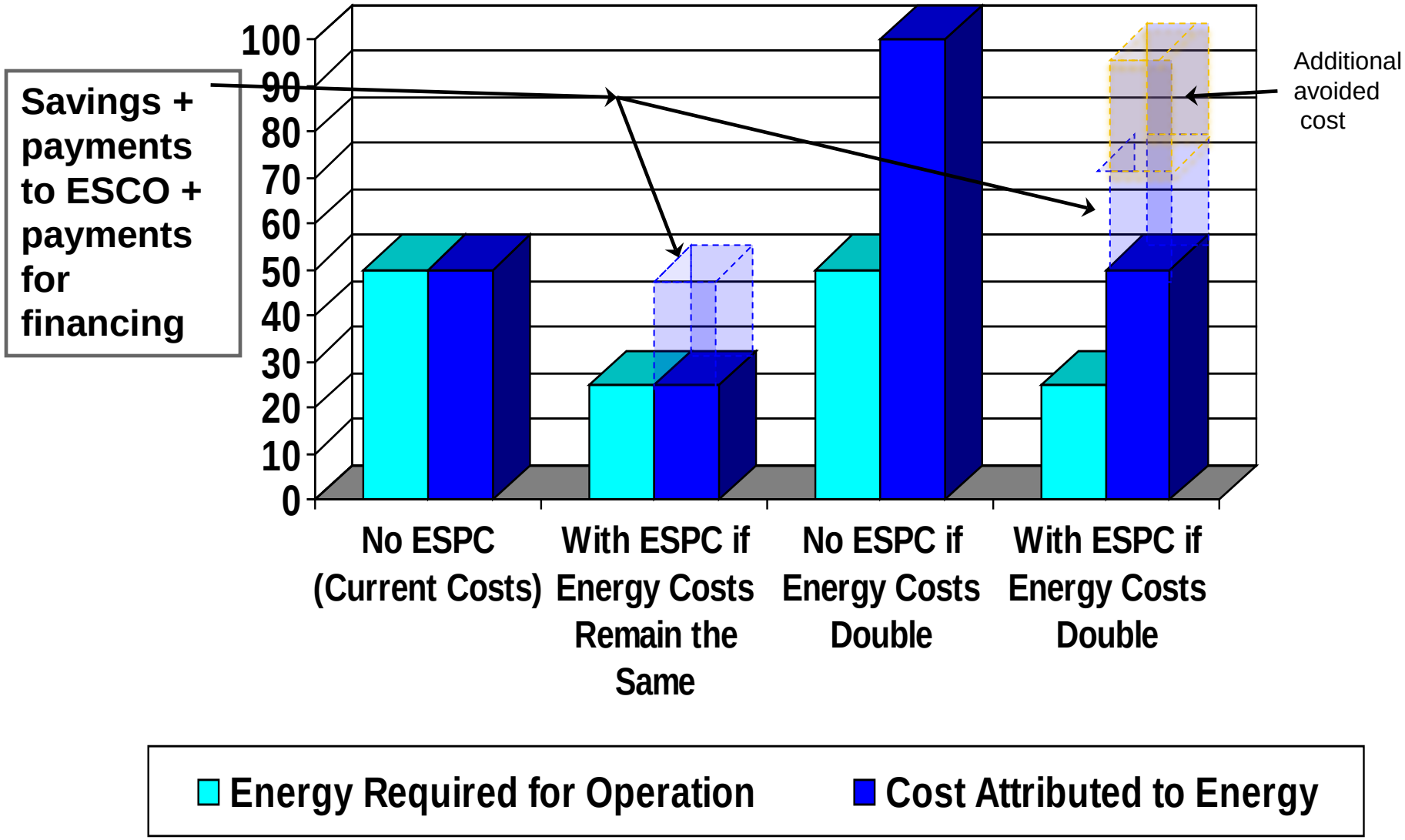


Project Cash Flow in ESPC

ESPC: Where's my MONEY?!!



What if energy prices increase?



Energy Prices and ESPC

- When energy prices go up, “savings” appear to evaporate
- What we usually call savings is better referred to as “cost avoidance”
- What is the actual effect of energy price increases on ECMs’ savings (cost avoidance)?
  - A: They go up, not down. (remember the “additional cost avoided” from the last chart.)

- ESPC can be seen as a hedge against higher energy prices

The ESPC Process

Phase 1: Project Planning → Phase 2: Preliminary Assessment → Phase 3: Investment-Grade Audit to Award → Phase 4: Design, Construction, and Acceptance → Phase 5: Performance Period

ESPC Players – The Acquisition Team

Should represent those affected by project, or who could have impact on progress

- Contracting Officer & Site Technical Representative
- Facility manager, facility maintenance
- Energy, design, and construction engineers
- Procurement and legal staff
- Budget/comptroller
- Administrative services
- Security
- Union reps, labor relations
- Agency customers and tenants
- Environment, health, safety
- Information Technology

The Acquisition Team's Roles

- Steer agency's efforts
- Build support for project in the agency
- Identify agency decision makers who have authority to approve the project
- Educate other staff about the project
- Ensure that decision makers have all the information they need
- Obtain necessary management approvals

Agency Effort Required

- Level of effort varies by project
  - ESPC Experience, Complexity, Size, Agency Approval Process, etc.
- Primarily Energy/Facility Manager and Contracting Office
  - Other Acquisition team members engaged as needed, when needed

…just kidding!

Agency Effort Required

To award

- ~2/3 Energy Manager, 2-5 FTE mos.
- ~1/3 Contracting, 1-3 FTE mos.

Construction, Cx, and Post-Installation M&V

- Mostly EM, varies widely with project complexity and/or site requirements
- Typical agency construction/acceptance process

Administer contract through resolution of first-year M&V

- ~1 FTE mos.

The Savings Guarantee

- Long-term partnership
- Agree on the baseline
- Typically ~90% of total estimated savings are guaranteed by the ESCO
  - Typically ~16-18% excess savings realized above guarantee
- ESCO pays in the event of shortfall
  - Corrects the underperforming measures or adds additional measures by agreement
  - Reduction in payment
- Cancellation schedule
  - Rare: Termination for default or convenience

How is the guarantee met?

Savings must exceed payments

Savings that may be used to pay the ESCO are categorized as:

- Energy and water cost savings
- Energy- (and water-) related cost savings

There are two components to energy use and energy savings:

Performance (rate of energy use)

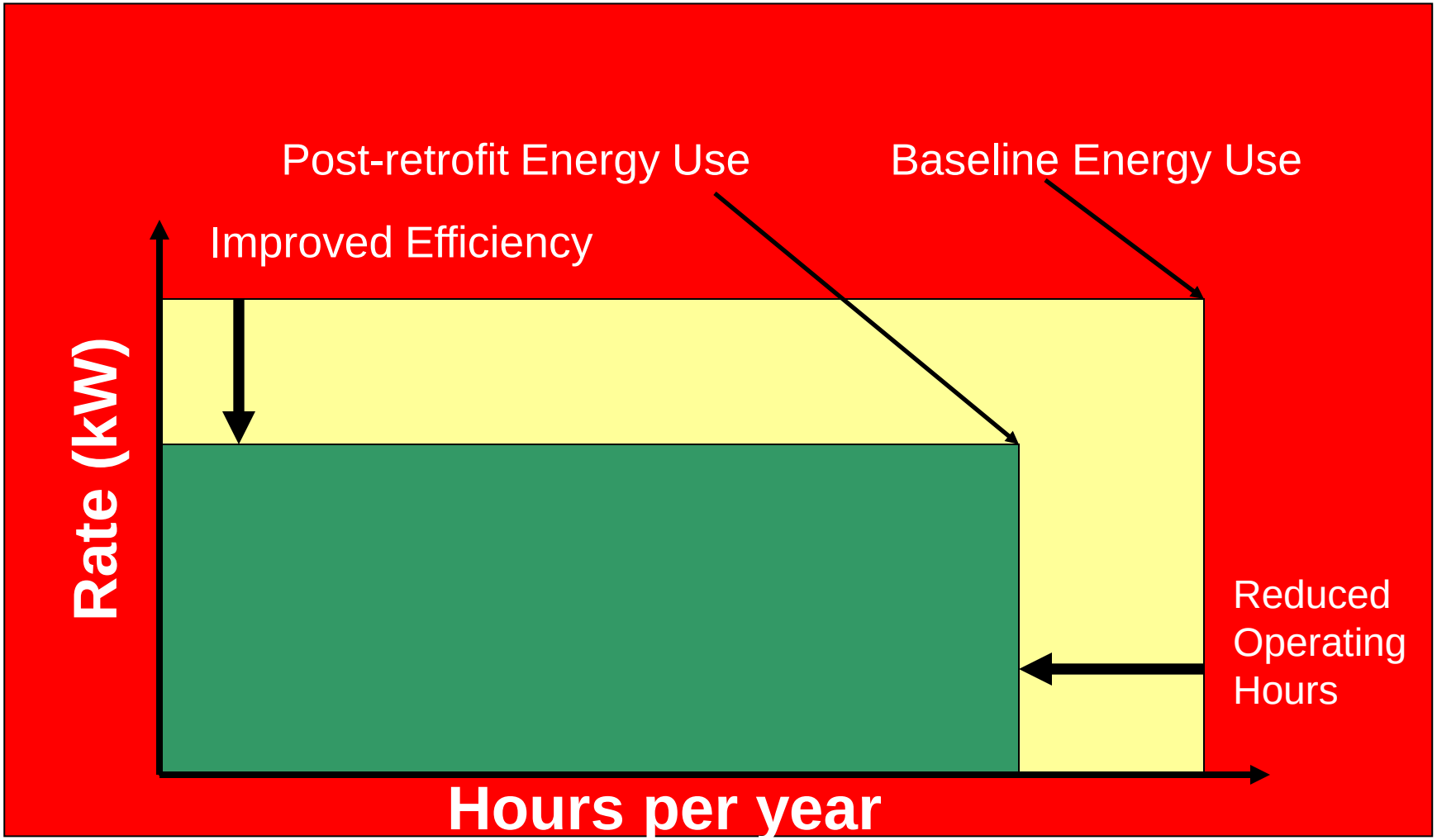
Usage (hours of use)

Energy use is the product of the two

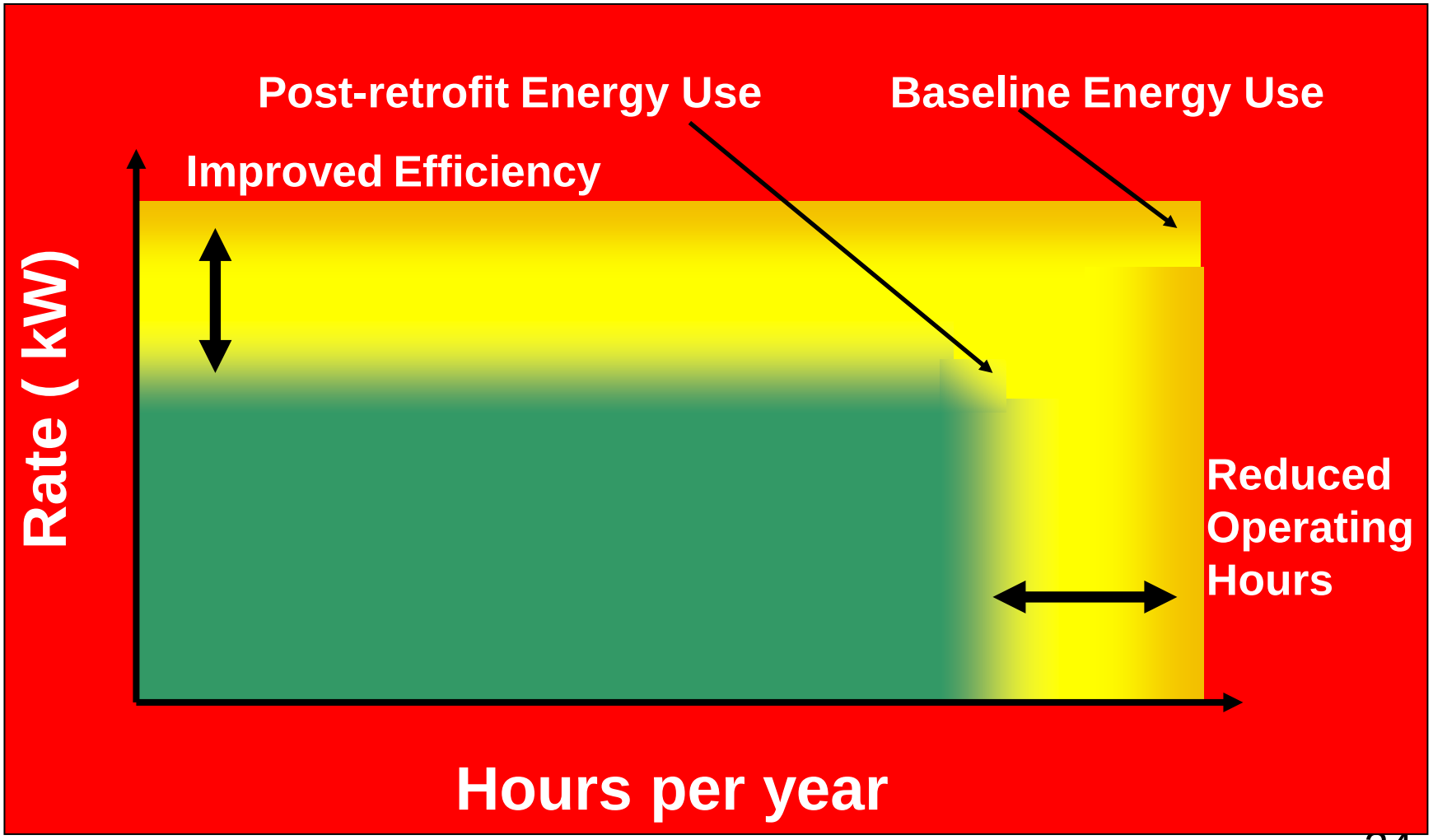
Example: kW (rate) × hours = kWh (total energy)

Reducing the rate of energy use and/or the number of hours reduces the total energy use

Performance and Usage: Ideal

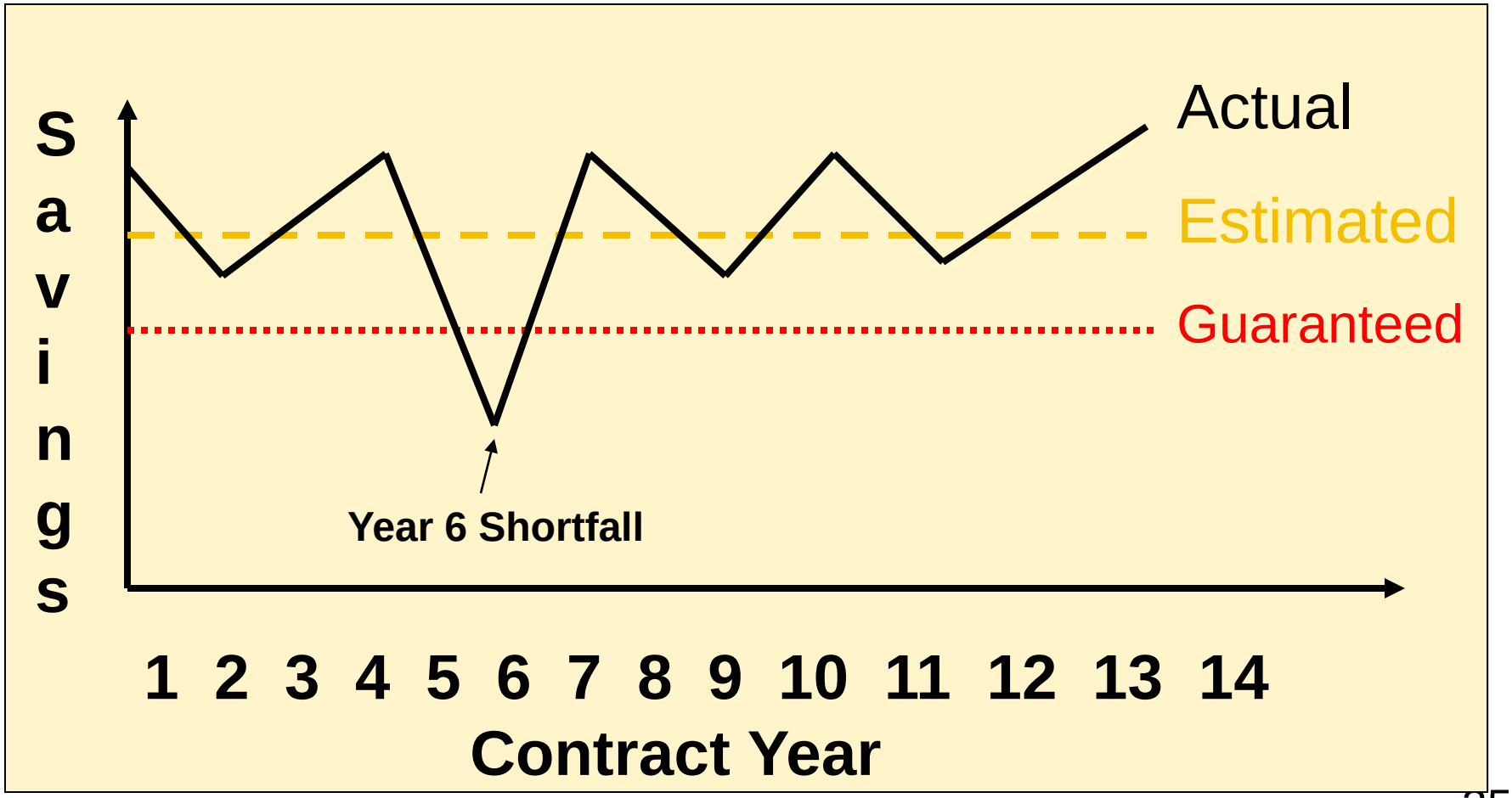


Performance and Usage: Real



Performance and Usage: Real (cont.)

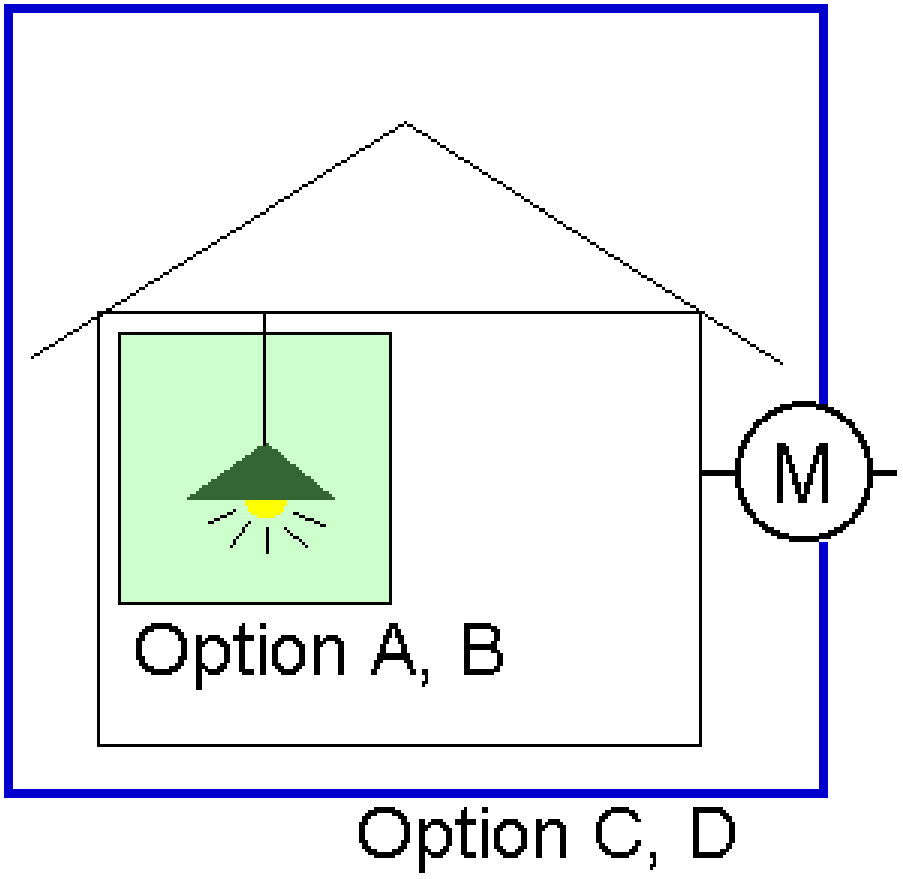
Actual saving will fluctuate, but should always exceed guaranteed amount



The IPMVP M&V Options

M&V Option	How savings are calculated
Option A: "Retrofit Isolation, Key Parameter" – Based on *measured* equipment performance, measured or *estimated* operational factors, and annual verification of "*potential to perform.*"	Engineering calculations using measured and estimated data
Option B: "Retrofit Isolation, All Parameters" – Based on *measurements* (usually *periodic or continuous*) taken of all relevant parameters.	Engineering calculations using measured data
Option C: Based on *whole-building* or facility-level utility meter data adjusted for weather and/or other factors.	Analysis of utility meter data
Option D: Based on *computer simulation* of building or process; simulation is calibrated with measured data.	Comparing different models

Options A and B vs. Options C and D



Options A&B are retrofit-isolation methods.

Options C&D are whole-facility methods.

The difference is where the boundary lines are drawn.

What is “Risk” in ESPC Context?

$$$$

ESCO – chance that guarantee will not be met and agency will have to be paid the difference

Agency/Customer – chance that savings you are paying for are not realized

Risk is addressed in the Risk, Responsibility, and Performance Matrix (RRPM)

Topics of RRPM

Financial

- Interest rates
- Construction costs
- M&V costs/confidence
- One-time savings (energy-related)
- Delays
- Major changes in facility

Operational

- Operating hours
- Loads
- Weather
- User participation

Performance

- Equipment performance
- Operations & maintenance (O&M)
- Repair & replacement (R&R)

Repair & Replacement

R&R for generation ECMs best done by the ESCO

- Usually unfamiliar to agency/customer, and a failure does not result in loss of mission performance
- If ESCO is doing R&R, they will ensure O&M is completed

Key Points of the Matrix

- Ensures important risks are addressed early and responsibilities assigned
- Dialogue fosters mutual understanding of the deal
- Investors use Matrix when assessing project interest rate in the Investor's Deal Summary

Construction Period Savings & Payments

- Construction period savings result from installed retrofits during the construction period before final acceptance
  - Partial acceptance on an ECM by ECM basis
    - E.g., Install lights first, then boilers and chillers
  - Beneficial to both the ESCO and the Customer
    - Contractor receives partial payment
    - Customer pays down the principal, thereby reducing the contract term (the debt service)
    - Additional pre-performance period payments may potentially be made by the customer if appropriations are available

Stimulus Funds and ESPC

- Stimulus funds could potentially be used in ESPCs
  - Similar net effect as buy-down with appropriations
  - Potentially creates **positive cash flow**
  - Allows for implementation of **renewables**
  - Helps **decrease energy intensity**
  - Potentially **reduces contract term**
  - Potentially allows for an **increased scope** of contract
  - **Life-cycle cost effective** use of funds

NREL Scenario Builder Tool

Applying Available Funding as Advance ESPC Contract Payment

Summary of Analysis

To **demonstrate the financial impacts and benefits to the ESPC Customer**, a sample actual conventionally financed federal ESPC contract (same principles apply) using a scenario analysis tool.

Sample Project:

Energy Measures include:

- DDC Controls for Office Building Energy Management
- Chiller Efficiency Improvements
- Boiler Efficiency Improvements
- Piping Insulation of Central Plant Distribution System

Total Investment: $4,043,970 (including Indirects and Profit)

Financing Procurement Price: $322,896 (construction period interest and arranging financing)

Total Financed Price: $4,366,866

Interest Rate: 8%

Contract Term: 20 years

Scenarios

Baseline per information on previous slide.

1. Apply **25%** of Financed Price as **advanced payment**: $1,100,000 – **minimum debt service term**

2. Apply **50%** of Financed Price as **advanced payment**: $2,200,000 – **minimum debt service term**

3. Apply **25%** of Financed Price as **advance payment**: $1,100,000 – **increase** Government **share of savings** thru contract term

4. Apply **50%** of Financed Price as advance Payment: $2,200,000 – **increase** Government **share of savings** thru contract term

5. **Apply $1,000,000 for PV** system that can cash flow in 20 year term

Baseline Scenario

PROJECT SUMMARY: Any Building with Stimulus **(BASELINE)**

Installation Costs (DO-2 & DO-3)

Installation Price		$ 3,422,557
Overall Markup	Markup	$ 621,414
TOTAL INVESTMENT		$ 4,043,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 4,366,866

Cost Savings (DO-1)

	First Year	Total
Estimated Savings	$ 425,034	$ 11,656,028
Guaranteed Savings	$ 413,312	$ 11,334,567
Contractor Payments	$ 413,311	$ 10,936,276

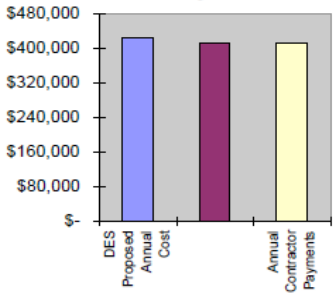
Contractor Share of Guarantee	96.49%
Gov't Share of Guarantee	3.51%

Savings %

Performance Period Expenses (DO-3)

Total Expenses		Markup
$ 115,381	Management/Admin	
$ -	Operation	24.0%
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	First Year
$ -	Other	M&V Cost %
$ 1,771,942	SUB-TOTAL	of Inst. Price
$ 425,266	Markup	1%
$ 2,197,208	TOTAL	

Annual Cost Savings & Contractor Payments



Source of $ Savings

Energy	66%
O & M	34%

Financing

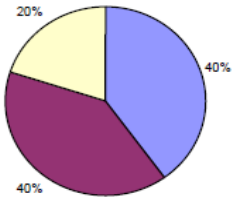
Term (yrs)	20
Equipment Life	

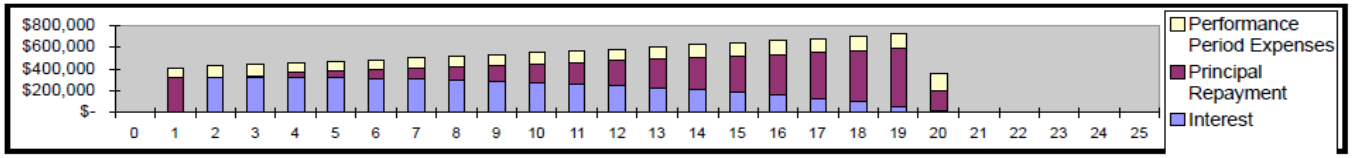
Interest			
T-Bill Rate	6.00%	$	3,279,152
Added Premium	2.00%	$	1,093,051
Project Interest Rate	8.00%	$	4,372,202

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 4,366,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 4,372,202	40%
Principal	$ 4,366,866	40%
Performance Period Expenses	$ 2,197,208	20%
Total	$ 10,936,276	

Distribution of Payments %





25% Buy Down on Investment

PROJECT SUMMARY: Any Building with Stimulus **(25% OF INVESMENT USING STIMULUS)**

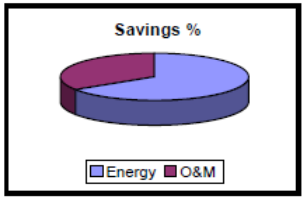
Installation Costs (DO-2 & DO-3)

Installation Price		$ 3,422,557
Overall Markup	Net Investment	$ (378,586)
TOTAL INVESTMENT		$ 3,043,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 3,366,866

Cost Savings (DO-1)

	First Year	Total
Estimated Savings	$ 425,034	$ 11,656,028
Guaranteed Savings	$ 413,312	$ 11,334,567
Contractor Payments	$ 413,311	$ 7,571,628

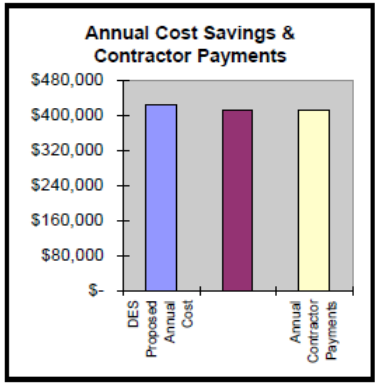
Contractor Share of Guarantee	66.80%
Gov't Share of Guarantee	33.20%



Performance Period Expenses (DO-3)

Total Expenses

$ 115,381	Management/Admin	Markup
$ -	Operation	24.0%
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	First Year
$ -	Other	M&V Cost %
$ 1,771,942	SUB-TOTAL	of Inst. Price
$ 425,266	Markup	1%
$ 2,197,208	TOTAL	



Source of $ Savings

Energy	66%
O & M	34%

Financing

Term (yrs)	20
Equipment Life	

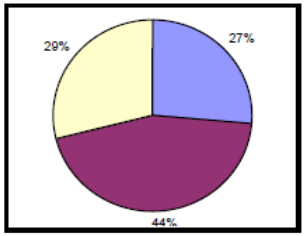
Interest

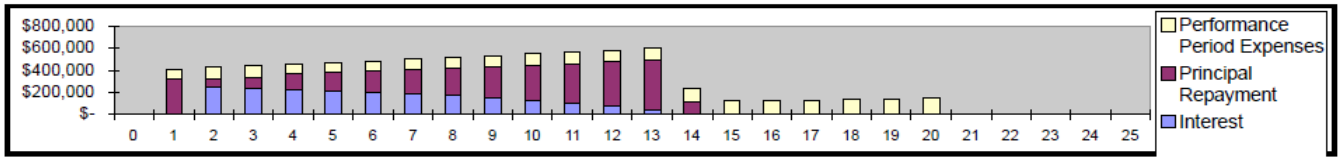
T-Bill Rate	6.00%	$ 1,505,665
Added Premium	2.00%	$ 501,888
Project Interest Rate	8.00%	$ 2,007,553

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 3,366,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 2,007,553	27%
Principal	$ 3,366,866	44%
Performance Period Expenses	$ 2,197,208	29%
Total	$ 7,571,628	

Distribution of Payments %





50% Buy Down on Investment

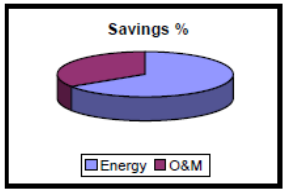
PROJECT SUMMARY: Any Building with Stimulus **(50% OF INVESMENT USING STIMULUS)**

Installation Costs (DO-2 & DO-3)

Installation Price		$ 3,422,557
Overall Markup	Net Investment	$ (1,578,586)
TOTAL INVESTMENT		$ 1,843,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 2,166,866

Cost Savings (DO-1)

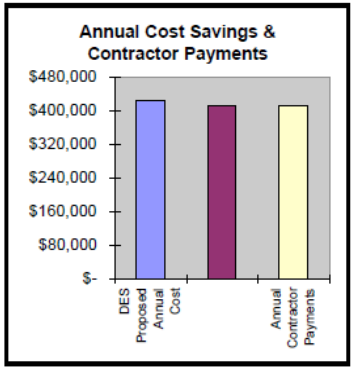
	First Year	Total
Estimated Savings	$ 425,034	$ 11,656,028
Guaranteed Savings	$ 413,312	$ 11,334,567
Contractor Payments	$ 413,311	$ 5,000,241
Contractor Share of Guarantee		44.11%
Gov't Share of Guarantee		55.89%



Performance Period Expenses (DO-3)

Total Expenses		Markup
$ 115,381	Management/Admin	
$ -	Operation	24.0%
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	
$ -	Other	
$ 1,771,942	SUB-TOTAL	
$ 425,266	Markup	
$ 2,197,208	TOTAL	

First Year M&V Cost % of Inst. Price: 1%



Source of $ Savings

Energy	66%
O & M	34%

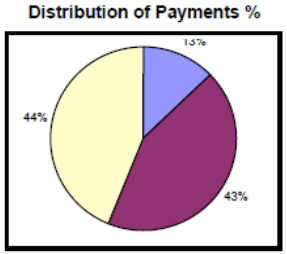
Financing

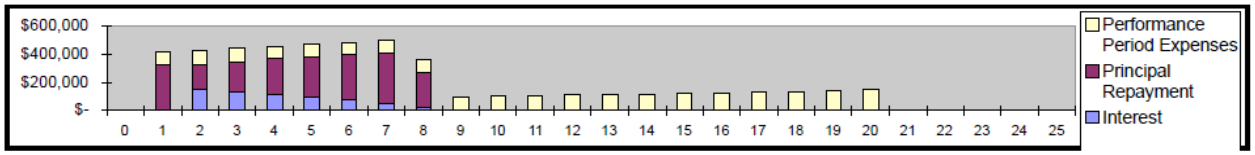
Term (yrs)	20
Equipment Life	

Interest			
T-Bill Rate	6.00%	$	477,125
Added Premium	2.00%	$	159,042
Project Interest Rate	8.00%	$	636,166

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 2,166,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 636,166	13%
Principal	$ 2,166,866	43%
Performance Period Expenses	$ 2,197,208	44%
Total	$ 5,000,241	





25% Buy Down, 20% Govt Retained Savings

PROJECT SUMMARY: Any Building with Stimulus

25% Stimulus 20% Govt Savings

Installation Costs (DO-2 & DO-3)

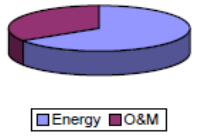
Installation Price		$ 3,422,557
Overall Markup	Net Investment	$ (478,586)
TOTAL INVESTMENT		$ 2,943,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 3,266,866

Cost Savings (DO-1)

	First Year	Total
Estimated Savings	$ 425,034	$ 11,656,028
Guaranteed Savings	$ 413,312	$ 11,334,567
Contractor Payments	$ 330,648	$ 8,715,470

Contractor Share of Guarantee	76.89%
Gov't Share of Guarantee	23.11%

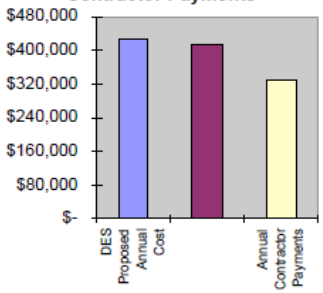
Savings %



Performance Period Expenses (DO-3)

Total Expenses		Markup
$ 115,381	Management/Admin	
$ -	Operation	24.0%
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	First Year
$ -	Other	M&V Cost %
$ 1,771,942	SUB-TOTAL	of Inst. Price
$ 425,266	Markup	1%
$ 2,197,208	TOTAL	

Annual Cost Savings & Contractor Payments



Source of $ Savings

Energy	66%
O & M	34%

Financing

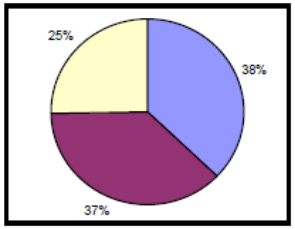
Term (yrs)	20
Equipment Life	

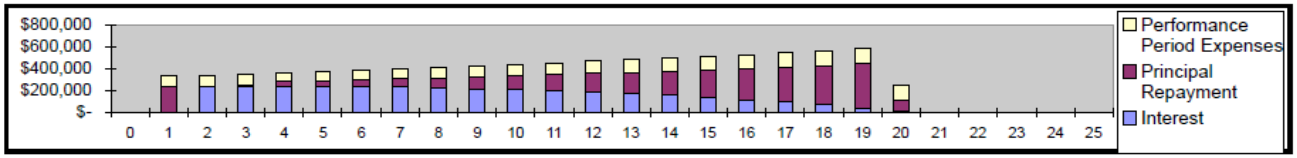
Interest		
T-Bill Rate	6.00%	$ 2,438,547
Added Premium	2.00%	$ 812,849
Project Interest Rate	8.00%	$ 3,251,396

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 3,266,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 3,251,396	37%
Principal	$ 3,266,866	37%
Performance Period Expenses	$ 2,197,208	25%
Total	$ 8,715,470	

Distribution of Payments %





50% Buy Down , 41% Govt Retained Savings

PROJECT SUMMARY: Any Building with Stimulus

50% Stimulus - 41% govt Savings

Installation Costs (DO-2 & DO-3)

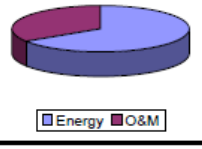
Installation Price		$ 3,422,557
Overall Markup	Net Investment	$ (1,578,586)
TOTAL INVESTMENT		$ 1,843,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 2,166,866

Cost Savings (DO-1)

	First Year	Total
Estimated Savings	$ 425,034	$ 11,656,028
Guaranteed Savings	$ 413,312	$ 11,334,567
Contractor Payments	$ 243,853	$ 6,620,987

Contractor Share of Guarantee	58.41%
Gov't Share of Guarantee	41.59%

Savings %

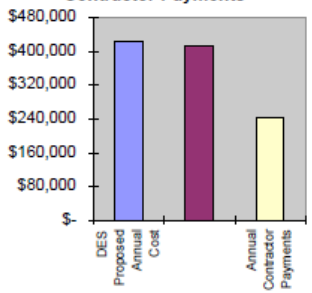


Performance Period Expenses (DO-3)

Total Expenses		Markup
$ 115,381	Management/Admin	24.0%
$ -	Operation	
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	
$ -	Other	
$ 1,771,942	SUB-TOTAL	
$ 425,266	Markup	
$ 2,197,208	TOTAL	

First Year M&V Cost % of Inst. Price: 1%

Annual Cost Savings & Contractor Payments



Source of $ Savings

Energy	66%
O & M	34%

Financing

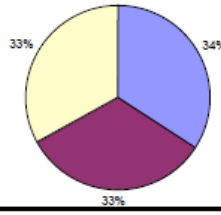
Term (yrs)	20
Equipment Life	

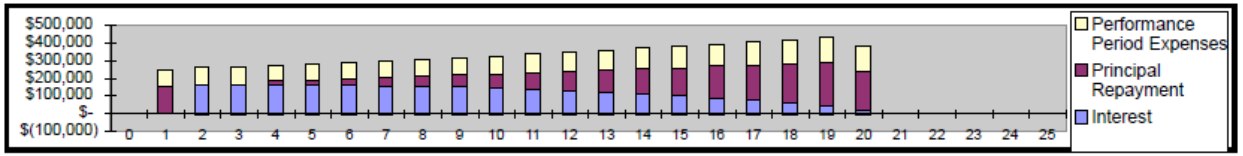
Interest		
T-Bill Rate	6.00%	$ 1,692,684
Added Premium	2.00%	$ 564,228
Project Interest Rate	8.00%	$ 2,256,913

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 2,166,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 2,256,913	34%
Principal	$ 2,166,866	33%
Performance Period Expenses	$ 2,197,208	33%
Total	$ 6,620,987	

Distribution of Payments %





25% Buy Down, Add $1M PV

PROJECT SUMMARY: Any Building with Stimulus **(25 % OF INVESMENT USING STIMULUS & Add $1M PV)**

Installation Costs (DO-2 & DO-3)

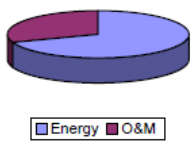
Installation Price		$ 4,422,557
Overall Markup	Net Investment	$ (138,586)
TOTAL INVESTMENT		$ 4,283,970
Financing Procurement Price		$ 322,896
TOTAL CAPITAL REQUIRED		$ 4,606,866

Cost Savings (DO-1)

	First Year	Total
Estimated Savings	$ 475,034	$ 13,027,217
Guaranteed Savings	$ 460,812	$ 12,637,196
Contractor Payments	$ 460,811	$ 10,673,643

Contractor Share of Guarantee	84.46%
Gov't Share of Guarantee	15.54%

Savings %

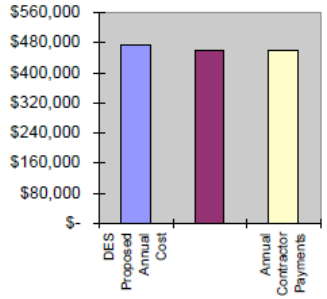


Performance Period Expenses (DO-3)

Total Expenses		Markup
$ 115,381	Management/Admin	24.0%
$ -	Operation	
$ 752,437	Maintenance	
$ 652,752	Repair & Replacement	
$ 251,372	Measurement & Verify	
$ -	Permits & Licenses	
$ -	Insurance & Tax	
$ -	Property Taxes	
$ -	Other	
$ 1,771,942	SUB-TOTAL	
$ 425,266	Markup	
$ 2,197,208	TOTAL	

First Year M&V Cost % of Inst. Price
0%

Annual Cost Savings & Contractor Payments



Source of $ Savings

Energy	69%
O & M	31%

Financing

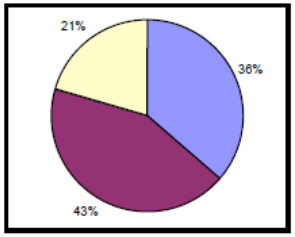
Term (yrs)	20
Equipment Life	

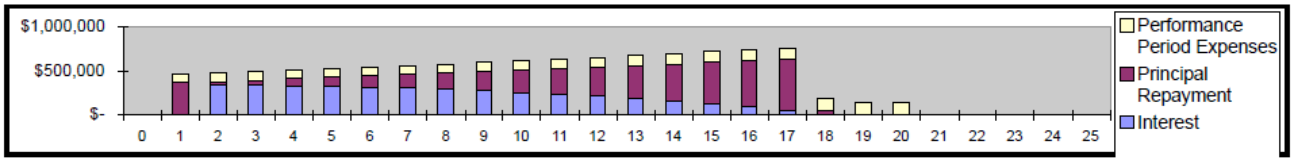
Interest		
T-Bill Rate	6.00%	$ 2,902,176
Added Premium	2.00%	$ 967,392
Project Interest Rate	8.00%	$ 3,869,569

DISTRIBUTION OF PAYMENTS (DO-3)

CAPITAL REQUIRED	$ 4,606,866	
PROJECT LIFETIME PAYMENTS		
Interest	$ 3,869,569	36%
Principal	$ 4,606,866	43%
Performance Period Expenses	$ 2,197,208	21%
Total	$ 10,673,643	

Distribution of Payments %





Scenario Comparison Summary

Scenario	Financed Price $M	Debt Service term (yrs)	% Govt Share of Savings	Sum of Annual Payments $M	Annual Govt Retained Savings $K
Baseline	4.366	20	3.5	10.94	.1 for 20 years
25% Buy down	3.267	13	35.5	7.33	.1 for 13 years/ 300 for years 14-20
50% Buy down	2.167	8	55.9	5.00	.1 for 8 years/ 300 for years 9-20
25% Buy down, 20% Govt. Savings	3.267	20	23.1	8.72	82.7 for 20 years
50% Buy down, 41% Govt. Savings	2.167	20	41.5	6.62	169.5 for 20 years
25% Buy down, add $1M Photovoltaic System	4.606	17	15.5	10.6	0 for 17 years/ 400 for years 18-20

Conclusions

1. **Think critically and know your reasoning for pursuing an ESPC or other alternative financing mechanisms.**

2. **ESPCs are best implemented alongside an energy management behavioral program. Think efficiency first, then renewables!**

3. **ESPCs can be a valuable tool to implement energy retrofits at no upfront cost to the customer and offer many additional benefits.**

Thank You for Your Attention!

Questions?

Contact:

Dustin J. Knutson, BEP, LEED AP
National Renewable Energy Laboratory

Project Development & Finance Section
Integrated Applications Office
Deployment & Industry Partnerships Center
303-384-7436 (office direct)
Dustin.Knutson@nrel.gov