

E1-B: Green Retrofits



Reducing the Impact Schools and Government Facilities have on the Environment through Building Retrofits with Associated Guaranteed Energy Savings

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One of the Most Effective Greening Initiatives...

It is calculated that building energy use accounts for approximately 40% of all green house gas emissions worldwide.

Buildings are responsible for almost 70% of green house gas emissions in large urban areas.

An average building uses between 20% 50% more energy than is required to maintain occupant comfort.



Guaranteed Energy Savings Project Overview

- A turnkey contracting method through Energy Service Company (ESCO)
 - Design, construction, commissioning and performance measurement
- One guaranteed fixed price
- Single provider accountable for all aspects of the project
- Alternative financing to capital budget
- Guarantees around the energy savings the project will achieve
 - ESCO pays the difference for unrealized amount

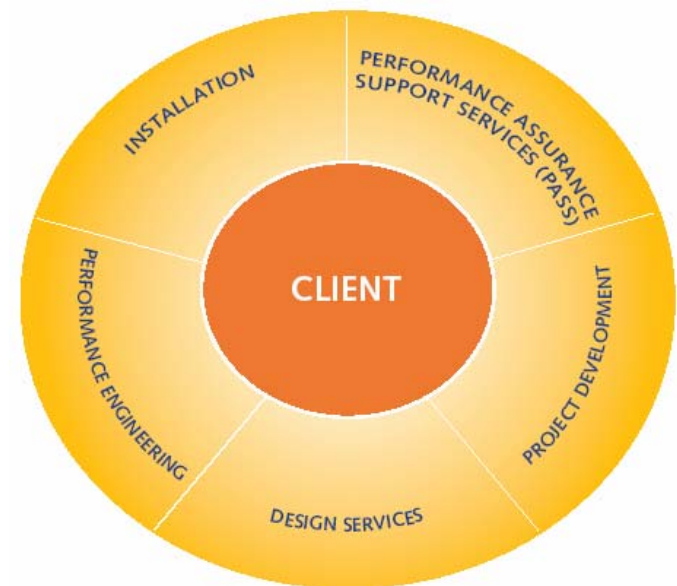
Typical Project Approach

- Preliminary Audit
 - Selected areas audited to determine energy savings potential and basic needs
- Detailed Audit Contract
 - Investment grade audit focused on agreed-to parameters culminating in a proposal for implementation
- Installation Contract
 - Final approval of project and any financing requirements
- Performance Assurance
 - Monitoring of the system throughout the contract term

Included In Guaranteed Energy Savings Project

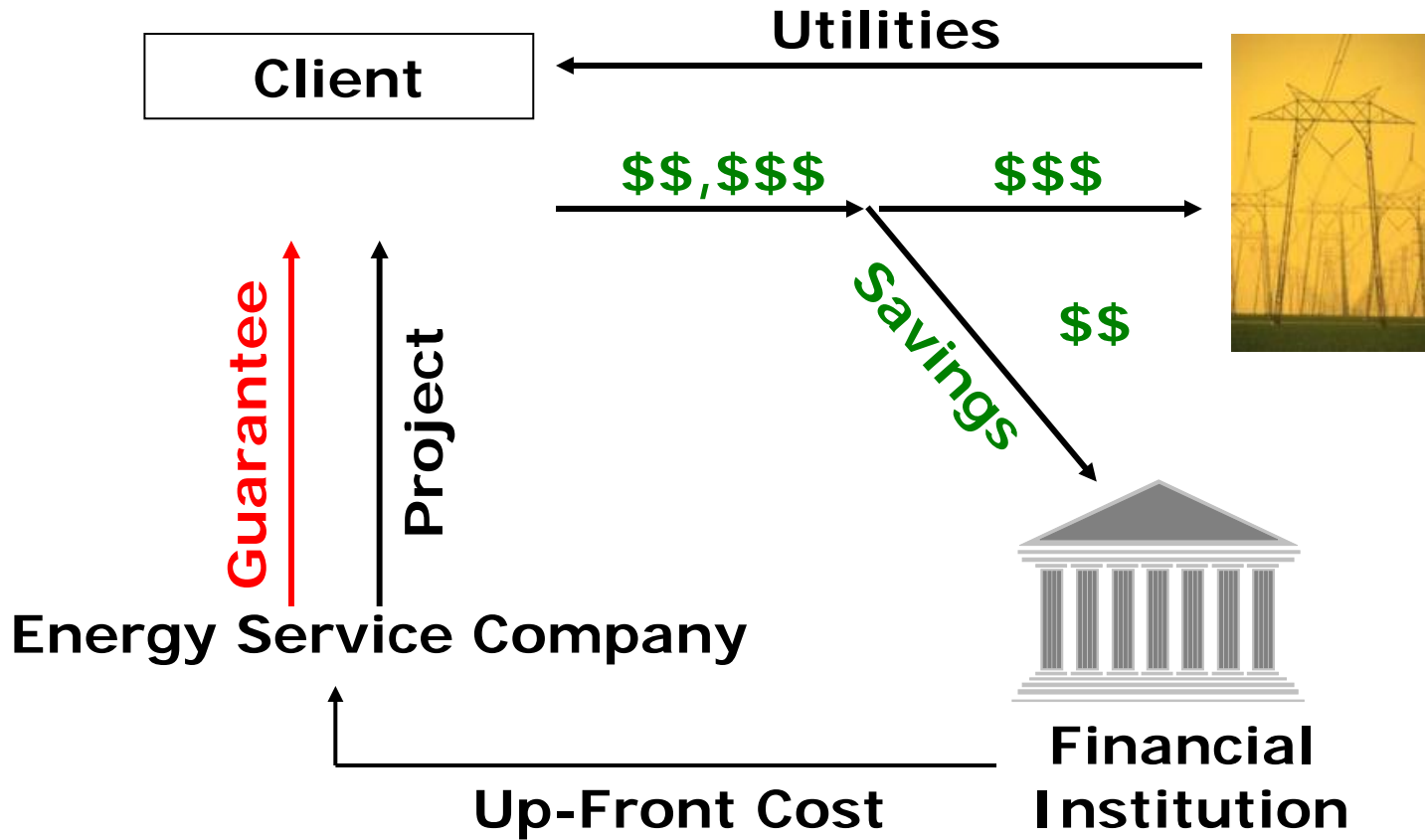
A good and complete performance contract should include upgrades to existing equipment, reductions in maintenance expenses, lower utility bills and improved building comfort. Services include:

- Capital needs assessments
- Energy/Utility auditing and master planning
- Comprehensive energy management strategy
- Project design, installation and financing
- Remote monitoring and control
- Performance contracting



Energy Solutions Core Competencies and Disciplines

Typical Guaranteed Energy Savings Project Chart





Guaranteed Energy Savings Projects Provide Business Value

- Lowers Capital Expenditure
- Reduces Operating Expense
- Improves Business Performance

Case Study

Facility: Chicago Public Schools - Third largest school system in the US with over 600 schools and an annual budget of over \$5 billion.

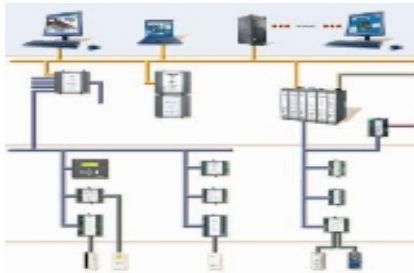
Problem: CPS had an administration building in downtown Chicago containing systems that were inefficient, deteriorating and past their useful life. The school did not want to spend tax dollars that are allotted to educate students to improve their own administration facilities.

Solution: TAC provided CPS with guaranteed utility savings to provide turnkey, comprehensive building renovations, including design, construction management, and measurement and verification of project savings. CPS is guaranteed to save more than \$1,250,000 in annual utility costs at their administration building alone from this project.

Project Scope and Improvements



- Replace All Wood Windows
- Reduce Air Drafts
- Historically Accurate Retrofit



- Install State of the Art BAS with Lighting Control
- Full DDC Operation
- Install Energy Management and Monitoring Equipment



- Update All T-12 Fixtures
- Less Flicker and Better Color Rendering
- Unified Maintenance Tasking

Project Scope and Improvements



- Install New Chilled Water System
- On-Site Generation of Chilled Water
- Provide Uninterruptible Cooling



- Replace All Steam Control Valves
- Install New Chilled Water Coil Valves
- Comprehensive Service of 22 Air-Handlers

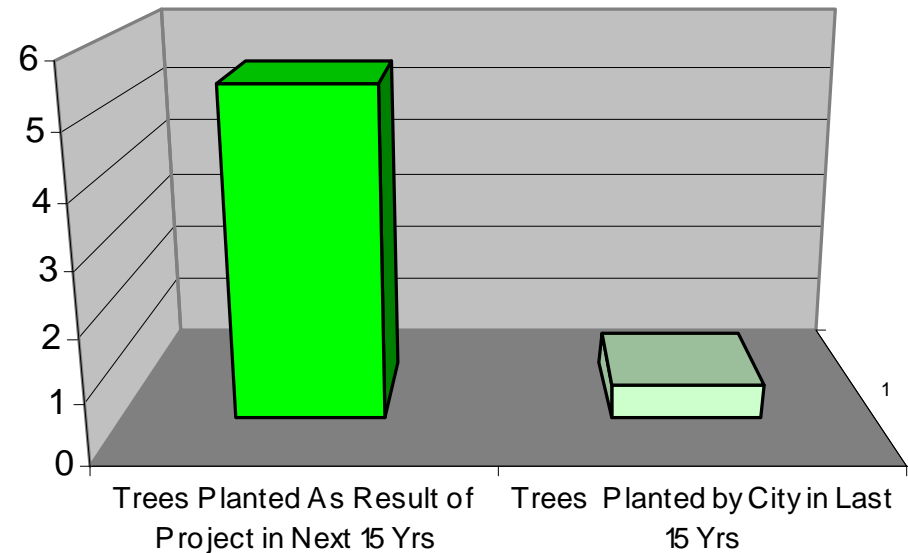


- Install New Boilers
- Remove and Abate Current Boilers
- Insulate Piping

What is important?

The Results

- ✓ Increased property value
- ✓ Improved working and building environment
- ✓ Annual utility savings of over \$1.25 M
- ✓ Huge Environmental impact

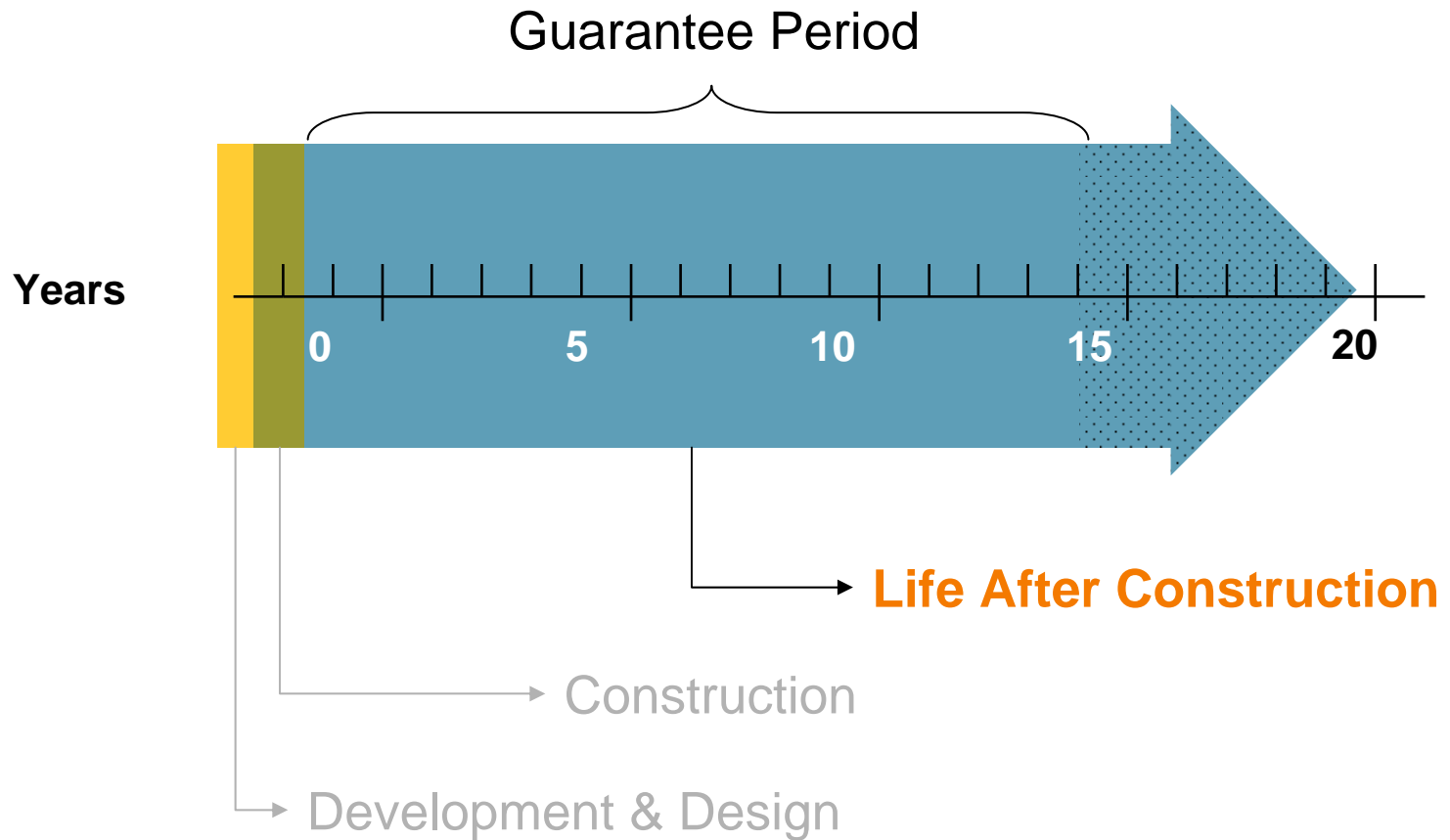




How do you insure success ?

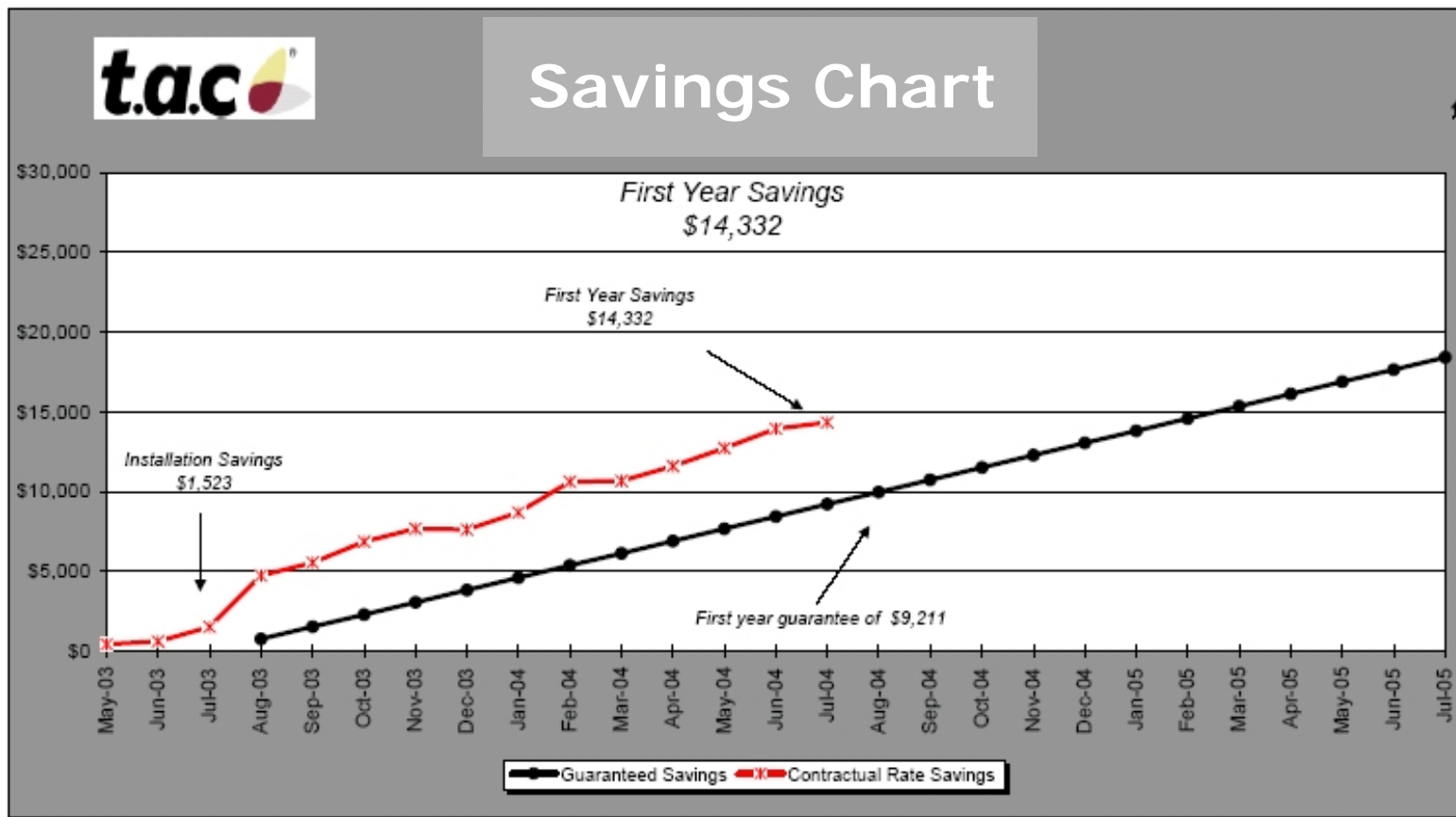
- Chose ESCO that fully understands your real energy, operational and capital needs, and has a plan to work with you to implement the best long term solution.
- The solution must be constructible, usable and sustainable.
- The savings must be real.

PC Delivery



Measured Results

Example



Risk Allocation

“Risk allocation refers to whether the contractor:

- (a) is responsible only for equipment performance (**efficiency**), or
- (b) also bears some risk related to operational factors... (**conservation**).”

- US Department of Energy

Energy Efficiency and Renewable Energy
www.eere.energy.gov

Risk Allocation

Savings =

~20%

Energy Efficiency

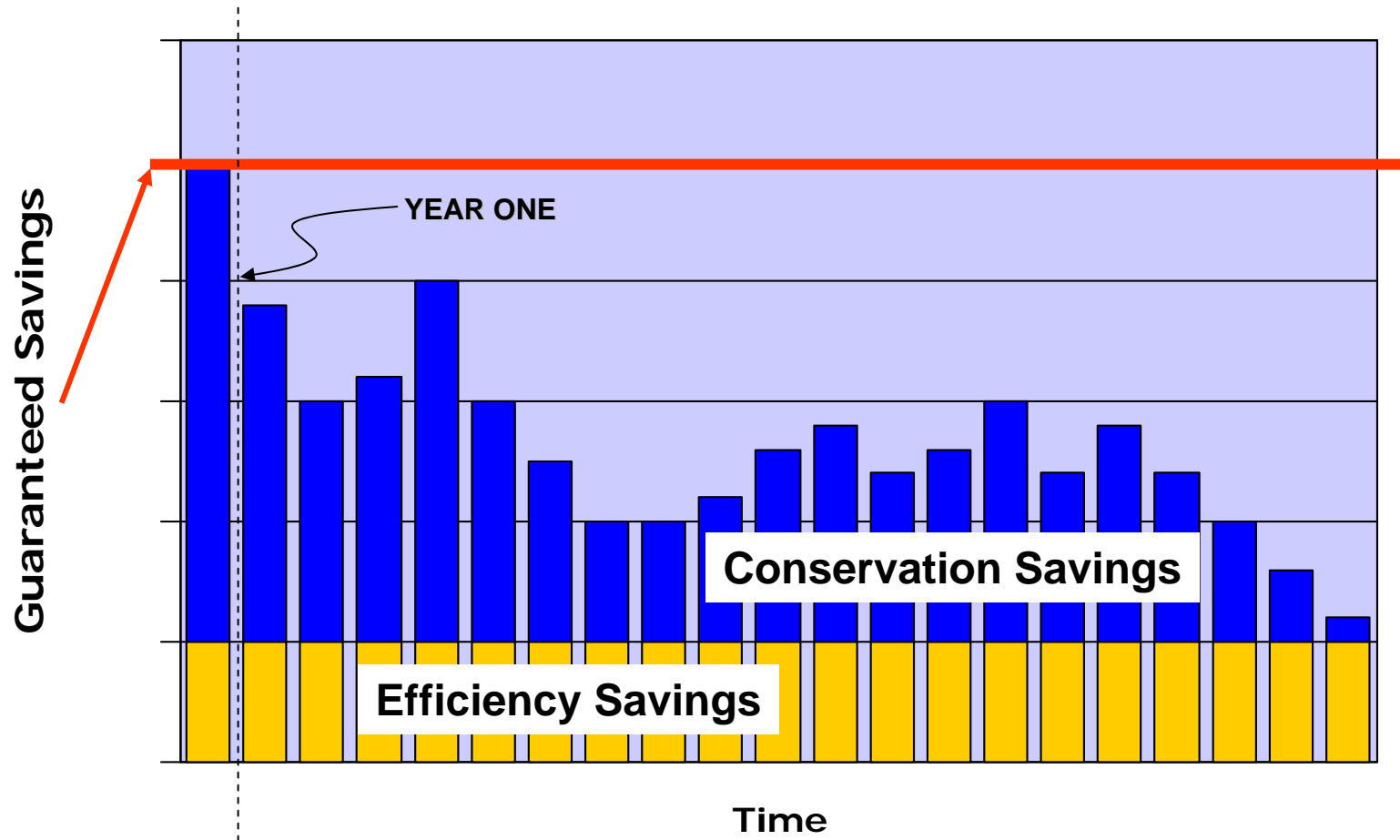
Design
Equipment Specs
Performance Data

~80%

Energy Conservation

Control Systems
Sequences
Schedules
Commitment / Training

Example: Efficiency Guarantee



M&V Methodology - Guarantee



Option A – Partially Measured Retrofit Isolation

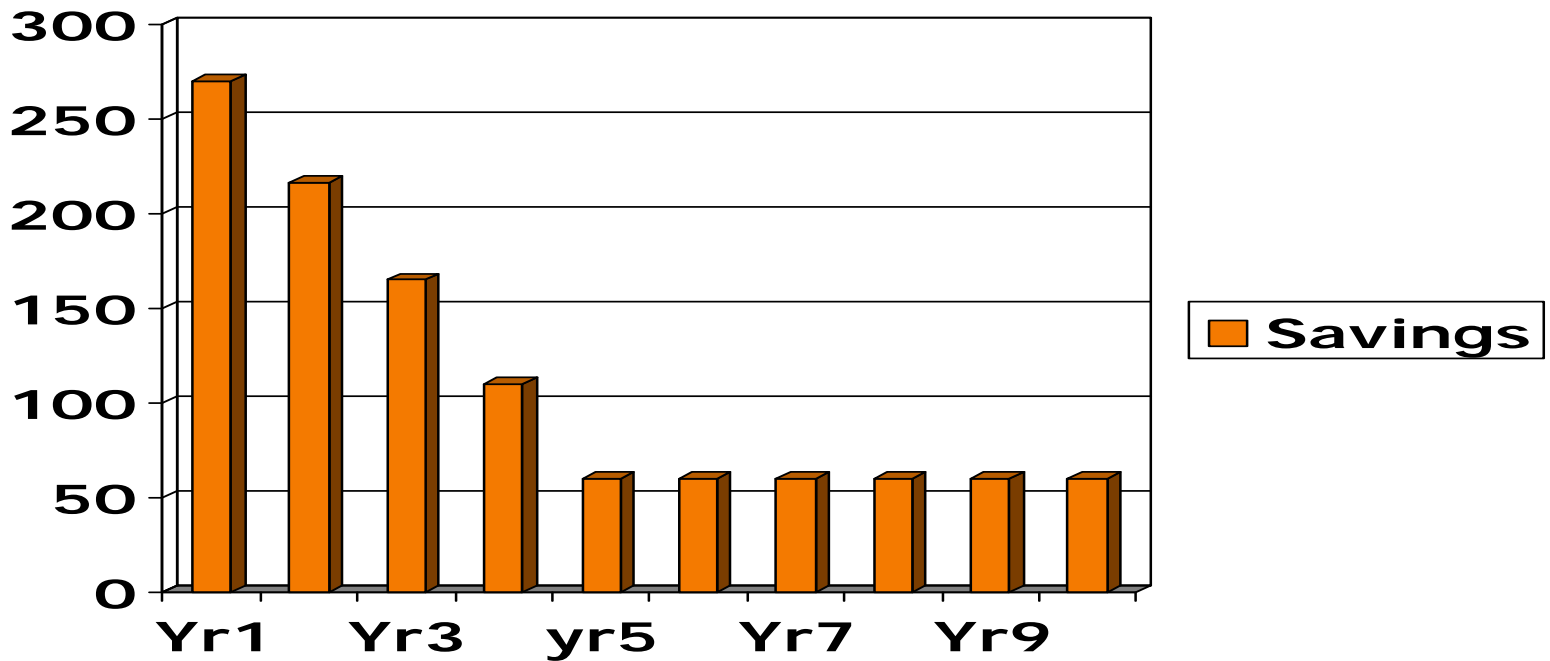
Option B – Retrofit Isolation

Option C – Main Meter / Whole Building

Option D – Building Modeling

Real Savings = Real Green

Savings that are not measured and verified continually under Option C decrease an average of 20% a year.



*Texas A&M System Energy Systems Lab Study

Risk Allocation

“The appropriate M&V strategy can be determined by assessing the project's complexity and **the way risk is allocated** between an energy service company and its customer.”

- US Department of Energy

Energy Efficiency and Renewable Energy

www.eere.energy.gov

Takeaways and Conclusion

Guaranteed energy savings contracts can be a great way to implement building retrofits that impact your bottom line while also having a positive impact on the environment.

Conservation is a very effective tool in reducing green house gases and with the appropriate commissioning and measurement and verification, these types of building retrofits will have a positive effect on both our indoor and outdoor environments.