

# Better Buildings Case Competition: Houston

The Rosenfelds

March 2, 2012

Manufacturer limitations

Ineffective installation and limited commissioning

Limited compliance with codes and standards

Competing uses for capital from a constrained budget

Research, procurement, preparation, and disruption

Limited understanding

ESCOs reluctant to contract because of business failure risk

Short expected payback (3.6 years, 28% effective discount rate)

Owners have no incentive to pursue efficiency where tenants pay bills

Managers possess limited knowledge of consumption or efficiency measures

Real or perceived lack of capital for upfront investment in efficiency measures

Improper installation and use

Restricted procurement decisions

Limited accountability for energy managers

Reluctance to change

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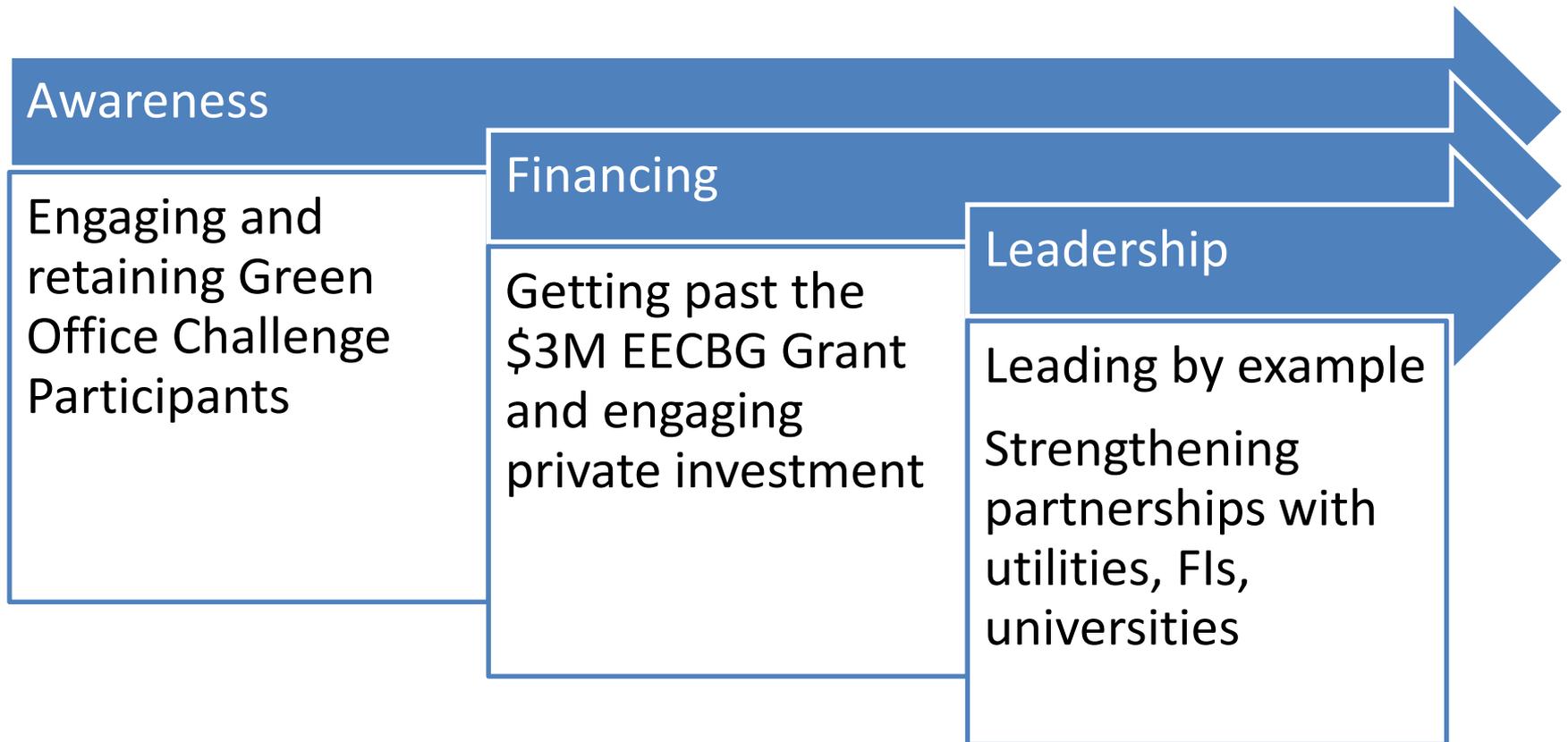
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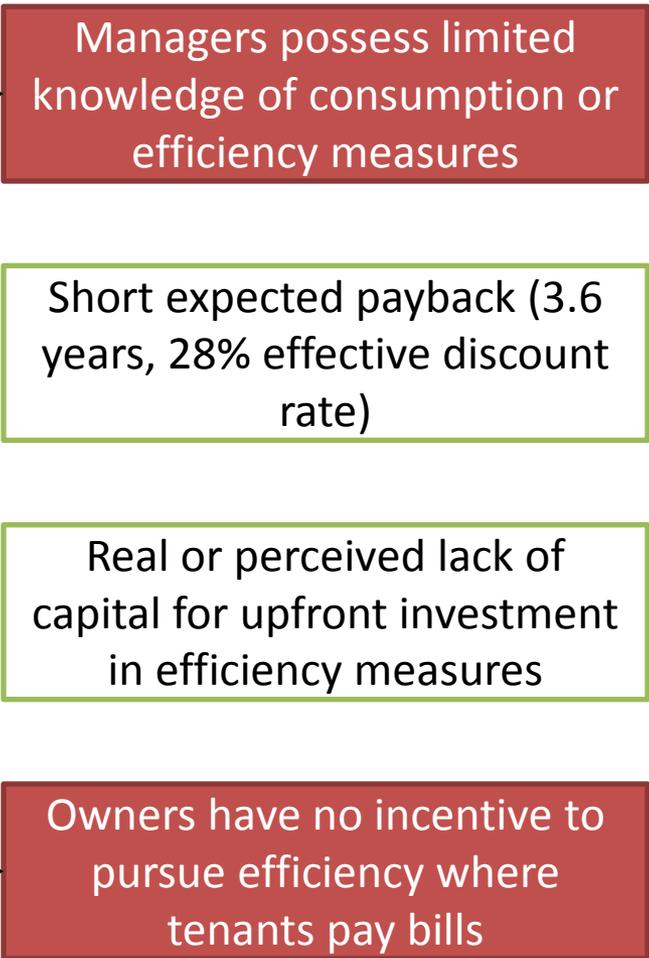
# Break barriers and build a foundation to achieve lasting success



## Solutions



## Barriers



## Solutions

Green Office  
Challenge

Municipal  
retrofits

## Barriers

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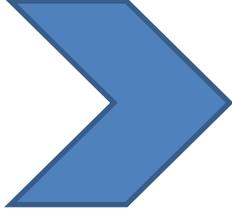
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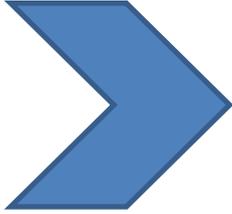
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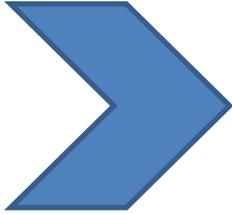
## Solutions



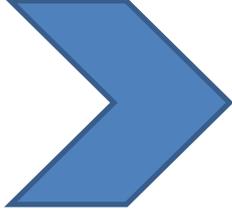
**Pilot and Scale Monitoring-Based Commissioning (MBCx)**



**Provide Access to Affordable Capital**



**Passing a Building Disclosure Ordinance**



**Coordinate Resources and Reporting**

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# Solutions

# Barriers

Monitoring-based commissioning

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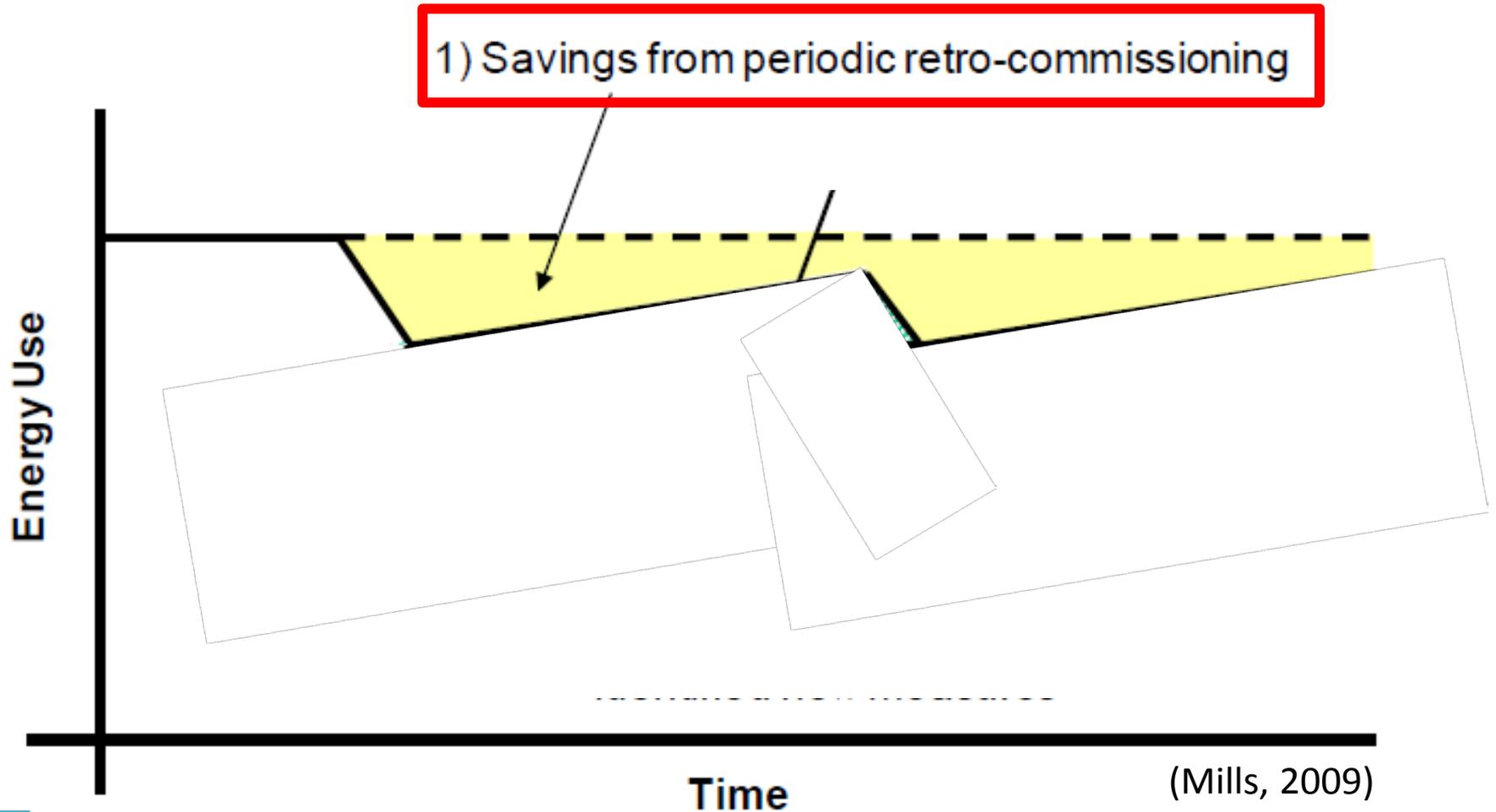
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# Retrocommissioning offers savings...

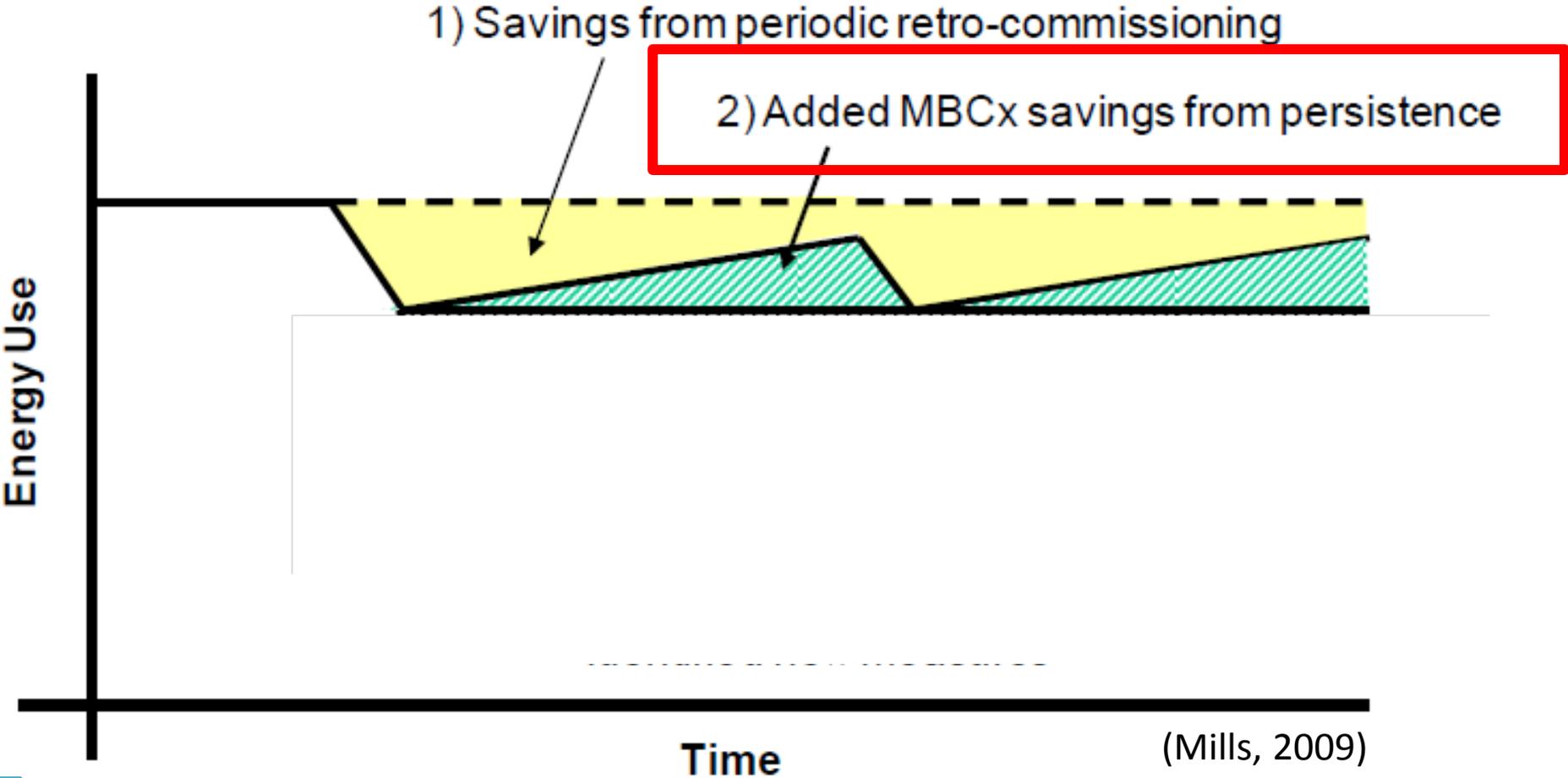


Time

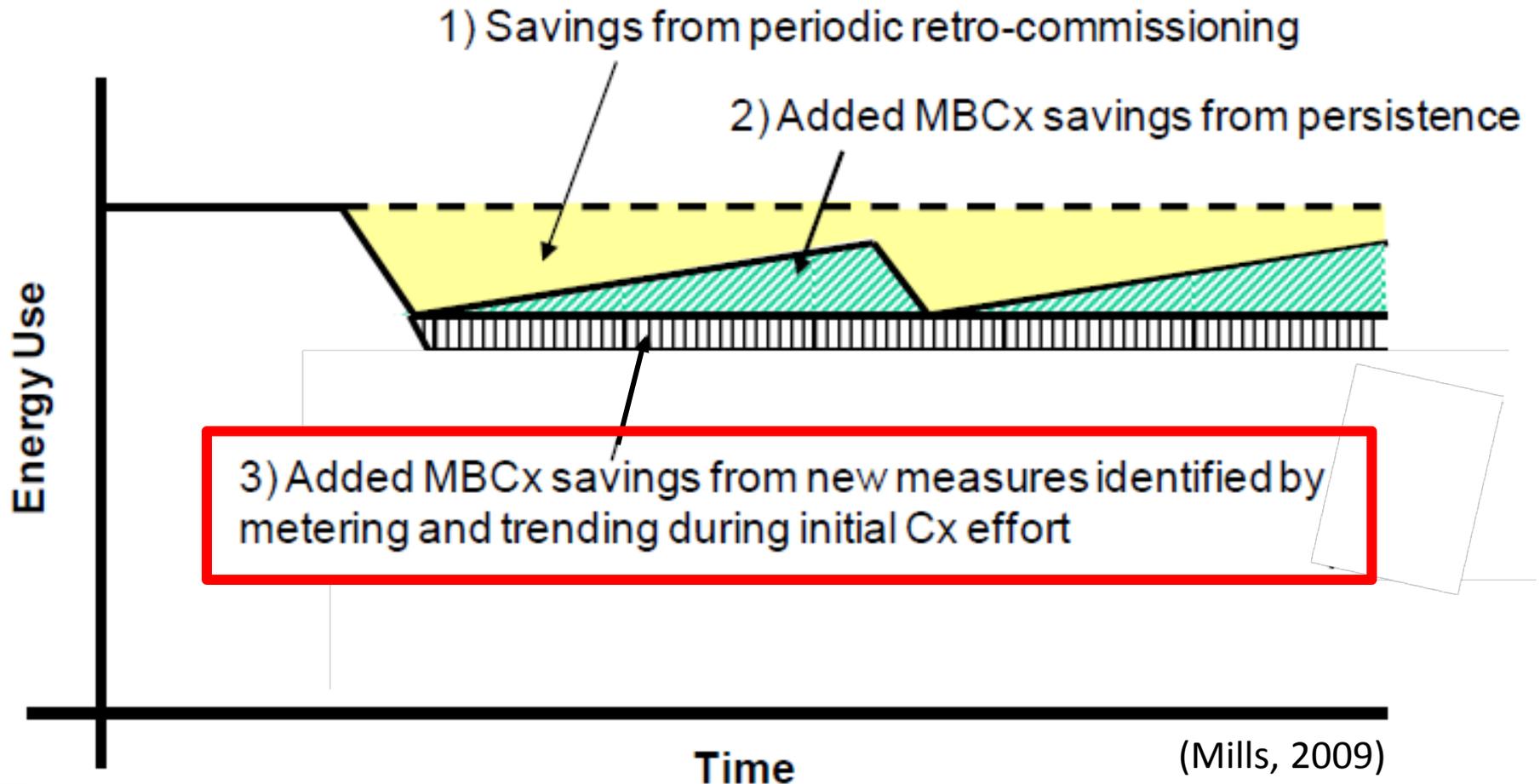
(Mills, 2009)

Monitoring

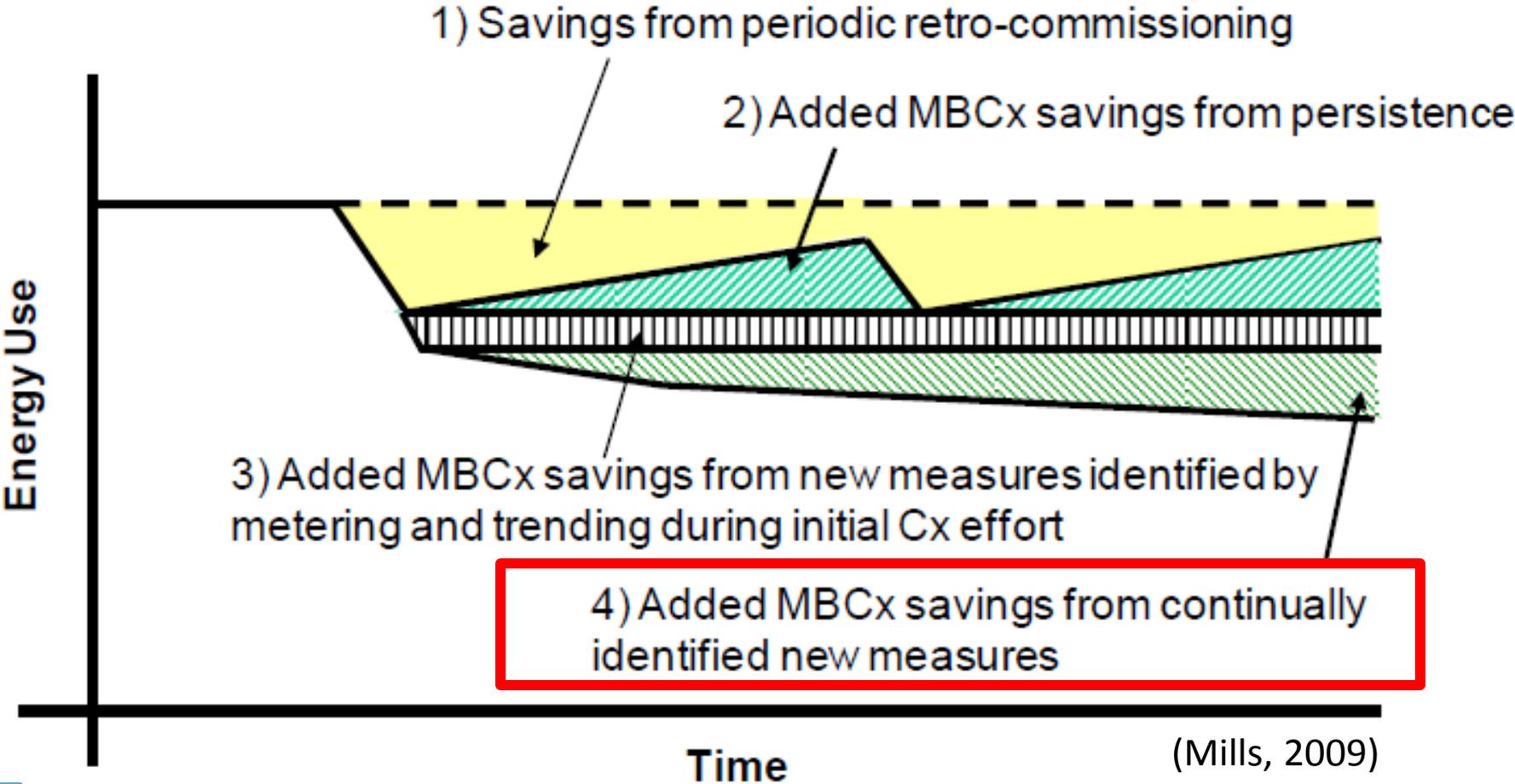
# Continuous Cx/MBCx maximizes the opportunity



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# Energy reduction is broken down into components

Energy Reduction is the product of these terms:

$$\sum_{i=1}^n \sum_{j=1}^m \text{Number of buildings}_{n,m} \times \frac{\text{sq. ft.}}{\text{building}_{n,m}} \times \frac{\text{energy used}}{\text{sq. ft.}} \times \frac{\% \text{ energy reduction}}{\text{energy upgrade}}$$

Building type  
(e.g., office, retail?)  
(e.g., built before 1990?)

floorspace

energy intensity

% energy reduction



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# Municipal sector

Low-interest  
capital in  
addition to  
Texas LoanSTAR  
program

Deeper energy  
savings in  
municipal  
buildings  
Shorter payback  
periods

Stewardship of  
taxpayer dollars  
Paving the way  
for the private  
sector



# Private Sector

Access to  
affordable capital

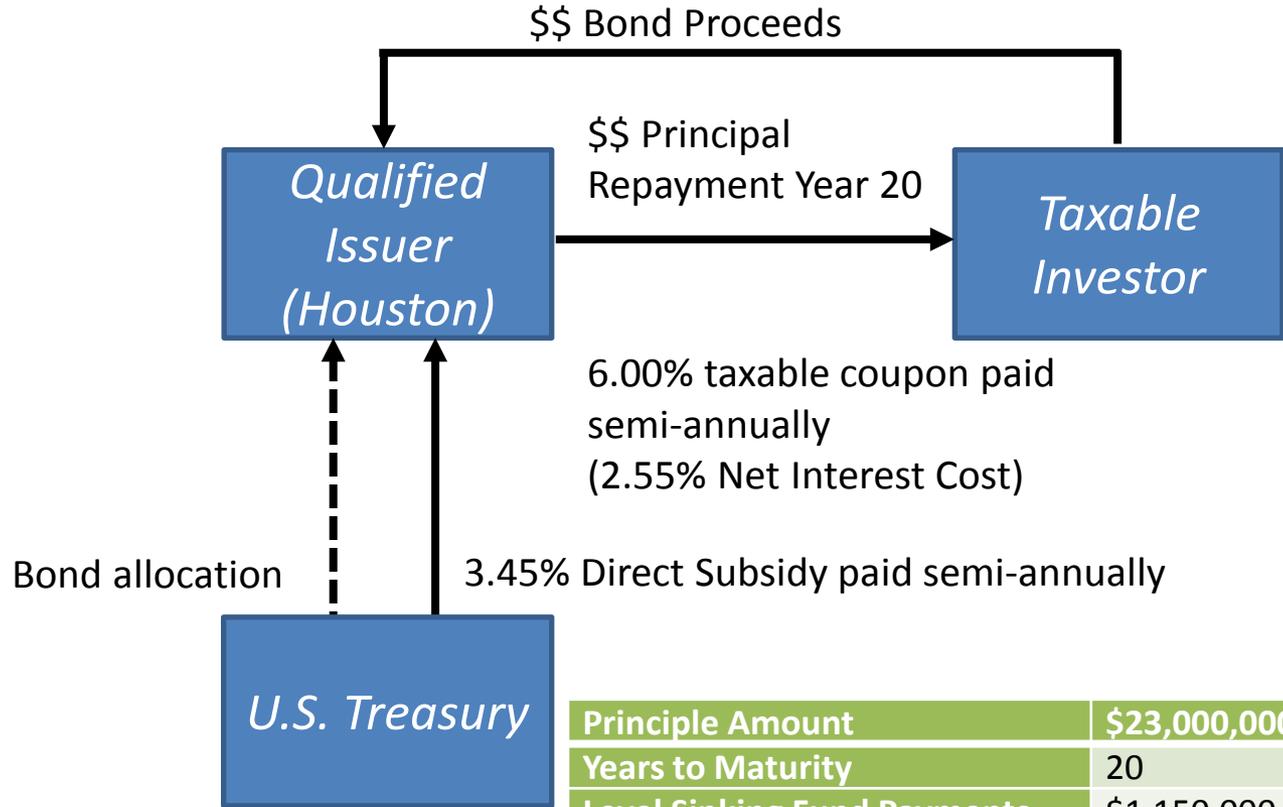
Credit  
enhancements

Customized  
approaches for  
target sectors:  
large commercial,  
small  
commercial, and  
ESCO projects

Greater building  
uptake

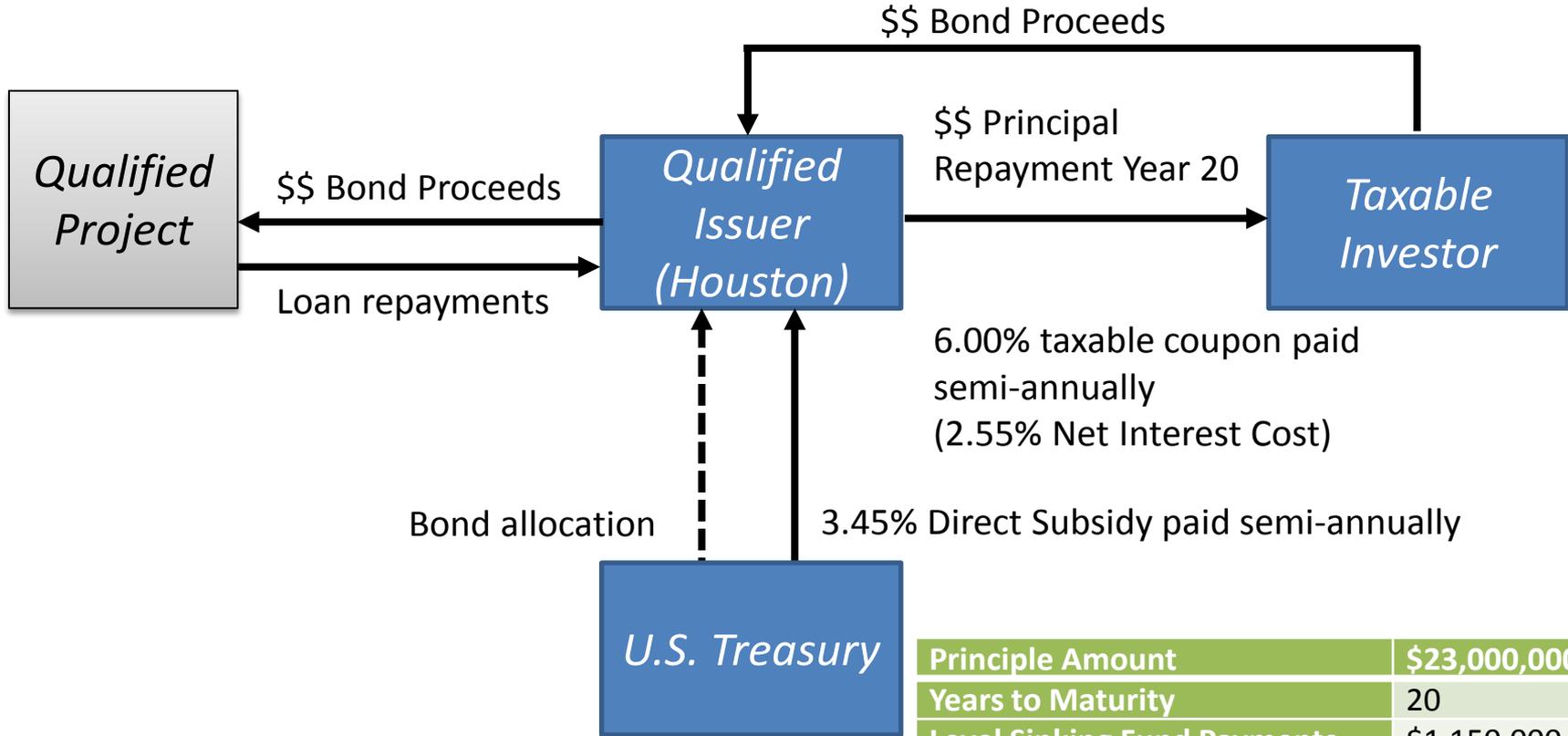
Confidence in  
energy efficiency  
as a sound  
investment





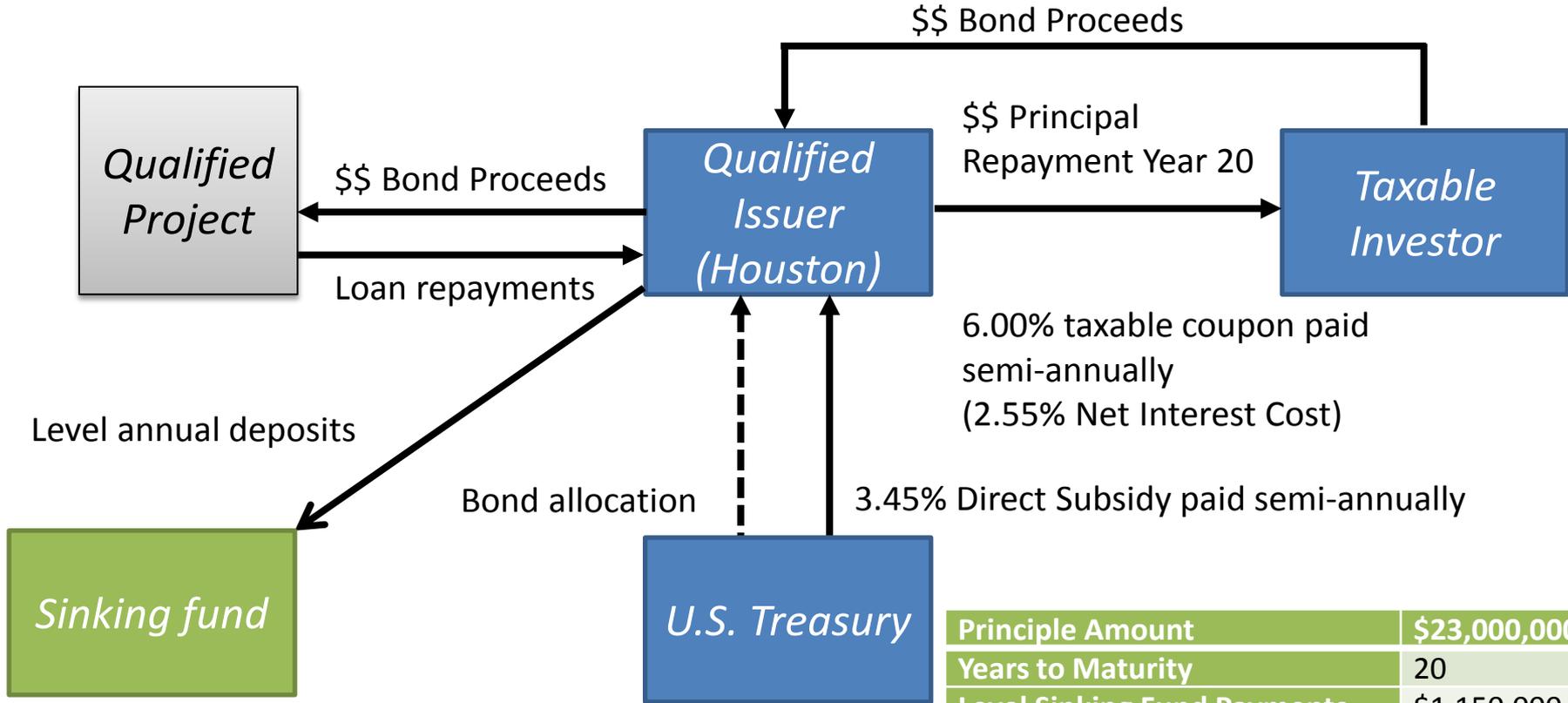
Principle Amount	\$23,000,000
Years to Maturity	20
Level Sinking Fund Payments	\$1,150,000
Max Sinking Fund Investment Rate	3.55%
Taxable Rate	6.00%
Tax Credit Rate*	4.93%
Direct Subsidy (70% of TCR)	3.45%
Net Coupon Payment	2.55%
As of February 17, 2012	





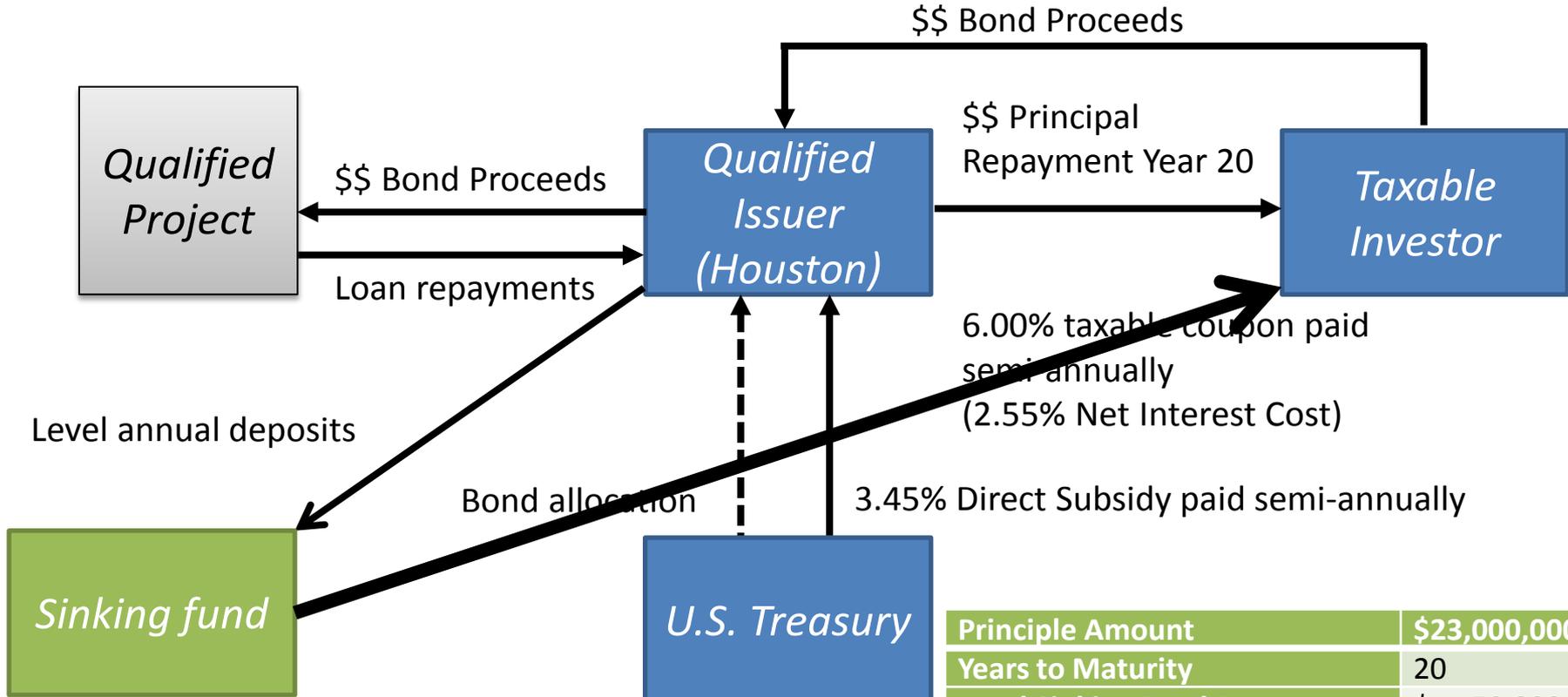
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Year	Principle	Interest Earnings	Level Annual Deposit	Net coupon payment	Total effective debt service
0					
1	\$ 1,150,000		\$ 1,150,000	586,270	\$ 1,736,270
2	\$ 1,109,175	\$ 40,825	\$ 1,150,000	586,270	
3	\$ 1,068,350	\$ 81,650	\$ 1,150,000	586,270	
4	\$			586,270	
5	\$			586,270	\$ 1,572,970
6	\$ 945,875	\$ 204,125	\$ 1,150,000	586,270	\$ 1,532,145
7	\$ 905,050	\$ 244,950	\$ 1,150,000	586,270	\$ 1,491,320
8	\$ 864,225	\$ 285,775	\$ 1,150,000	586,270	\$ 1,450,495
9	\$ 823,400	\$ 326,600	\$ 1,150,000	586,270	\$ 1,409,670
10	\$ 782,575	\$ 367,425	\$ 1,150,000	586,270	\$ 1,368,845
11	\$ 741,750	\$ 408,250	\$ 1,150,000	586,270	\$ 1,328,020
12	\$ 700,925	\$ 449,075	\$ 1,150,000	586,270	\$ 1,287,195
13	\$ 660,100	\$ 489,900	\$ 1,150,000	586,270	\$ 1,246,370
14	\$ 619,275	\$ 530,725	\$ 1,150,000	586,270	\$ 1,205,545
15	\$ 578,450	\$ 571,550	\$ 1,150,000	586,270	
16	\$ 537,625	\$ 612,375	\$ 1,150,000	586,270	
17	\$ 496,800	\$ 653,200	\$ 1,150,000	586,270	
18	\$ 455,975	\$ 694,025	\$ 1,150,000	586,270	\$ 1,042,245
19	\$ 415,150	\$ 734,850	\$ 1,150,000	586,270	\$ 1,001,420
20	\$ 374,325	\$ 775,675	\$ 1,150,000	586,270	\$ 960,595
<b>Total</b>	<b>\$ 15,243,250</b>	<b>\$ 7,756,750</b>	<b>\$ 23,000,000</b>	<b>\$ 11,725,400</b>	<b>\$ 26,968,650</b>

Sinking Fund Payments, accrue at 3.55%

Subsidized coupon payment

Effective interest rate of 1.7%

Pays back principle in 20 years



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# Houston can pass a city ordinance to raise energy efficiency awareness

- **Affected Property Types:** Non-residential public and private buildings larger than 10,000 ft<sup>2</sup>.
- **Key Requirements:** Requires owners to annually file a benchmark report that includes an ENERGY STAR energy performance score, a California-specific energy rating, and energy intensity. **Requires owners to complete an energy audit every 5 years, and file an audit report with the city, showing all retrofit and retro-commissioning opportunities with a simple payback of less than 3 years.** Directs the city to disclose annual benchmarking results and audit compliance confirmation to the public after the second annual report. **Requires owners to make annual benchmarking summary available to tenants.** Requires tenants who are directly metered to make energy use data available to building owners solely for the purpose of compliance. Phases into effect:
  - 2011: Buildings larger than 50,000 ft<sup>2</sup>
  - 2012: Buildings 25,000 to 49,999 ft<sup>2</sup>
  - 2013: Buildings 10,000 to 24,999 ft<sup>2</sup>.

SEE Action



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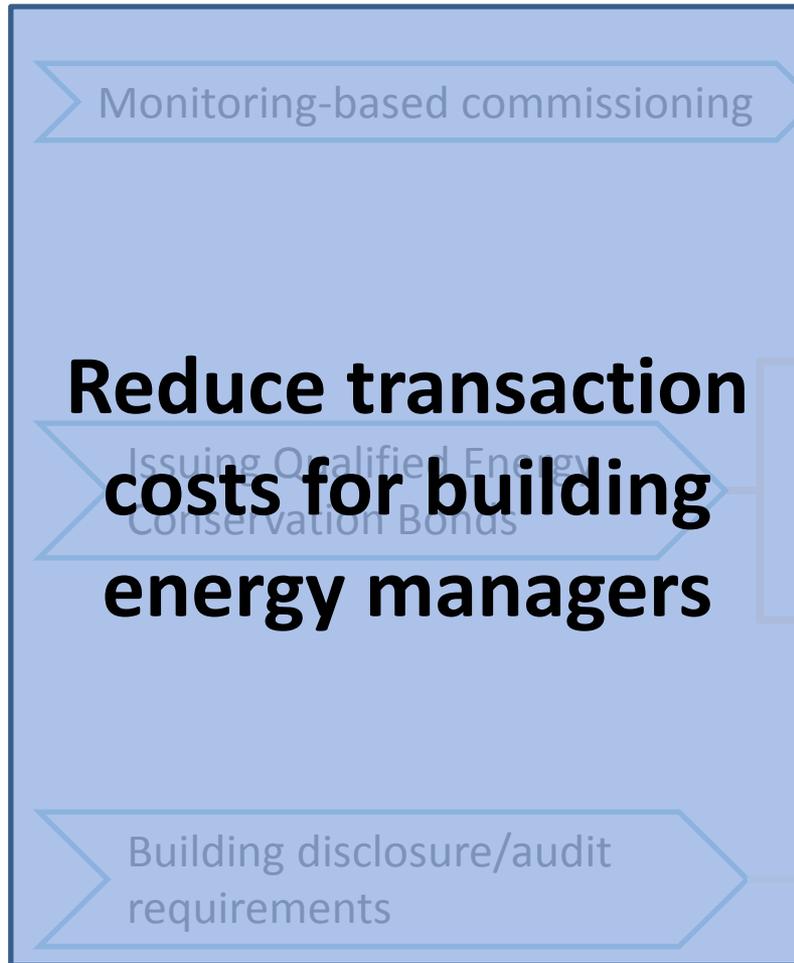
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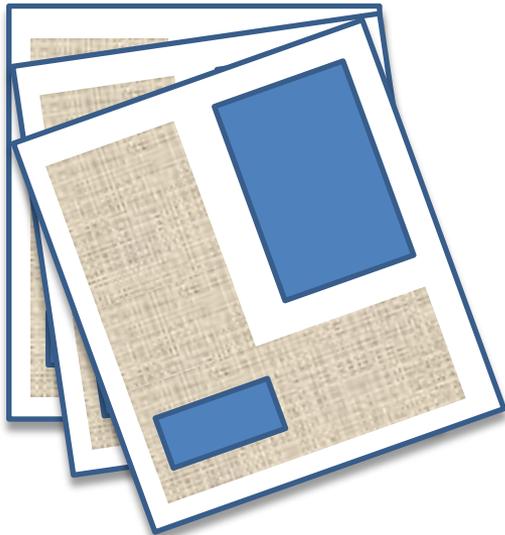
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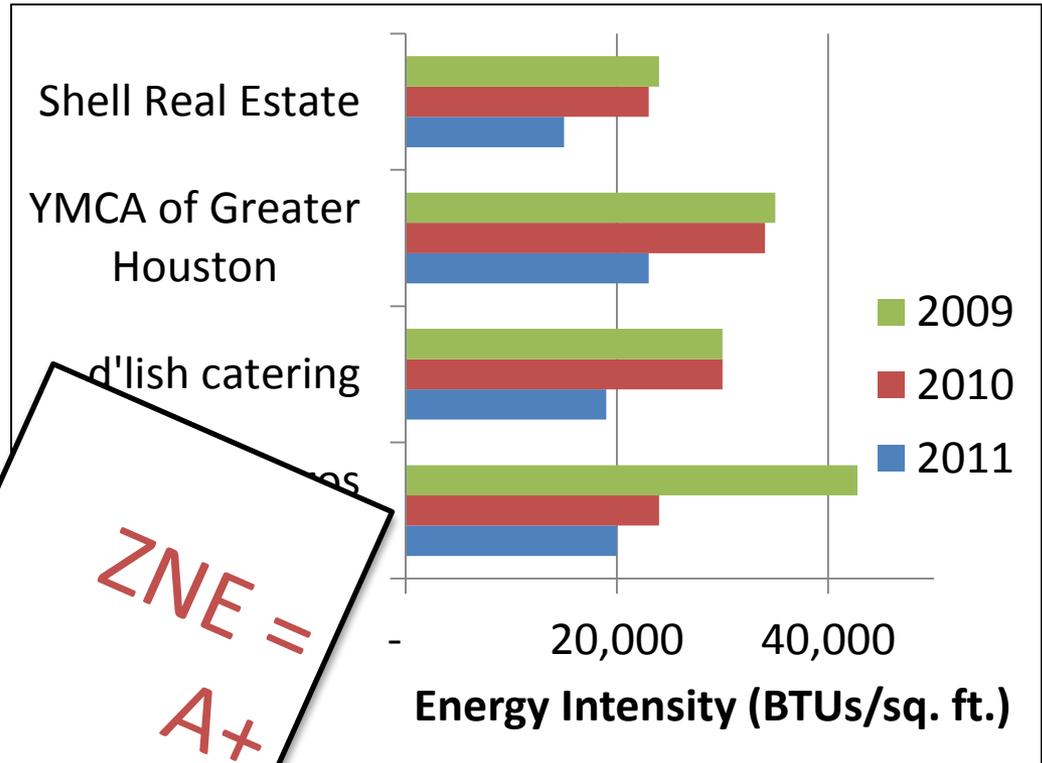


**RESOURCES:** Check out case studies

**REPORTING:** Click here to verify your report and have your utility send data to the PUC



**BUILDING ENERGY REPORT CARDS:** Find out how buildings similar to yours are performing.



ZNE =  
A+



**REPORTING:** Use this tool to report Davis Bacon Requirements and ARRA reporting metrics. Tell your subcontractors to report hours and wages here.



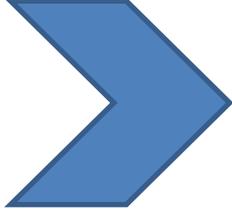
**SERVICES:** Find out which ESCOs have serviced which buildings and how they're performing. Attend our ESCO fair next week at the convention center on March 9<sup>th</sup>!



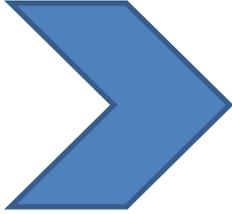
**FINANCING:** Apply for financing here: check out the city loan program, the EEIP rebate program, and utility incentives!



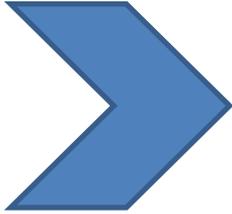
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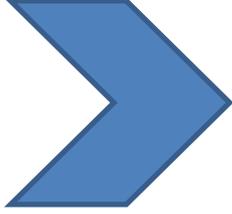
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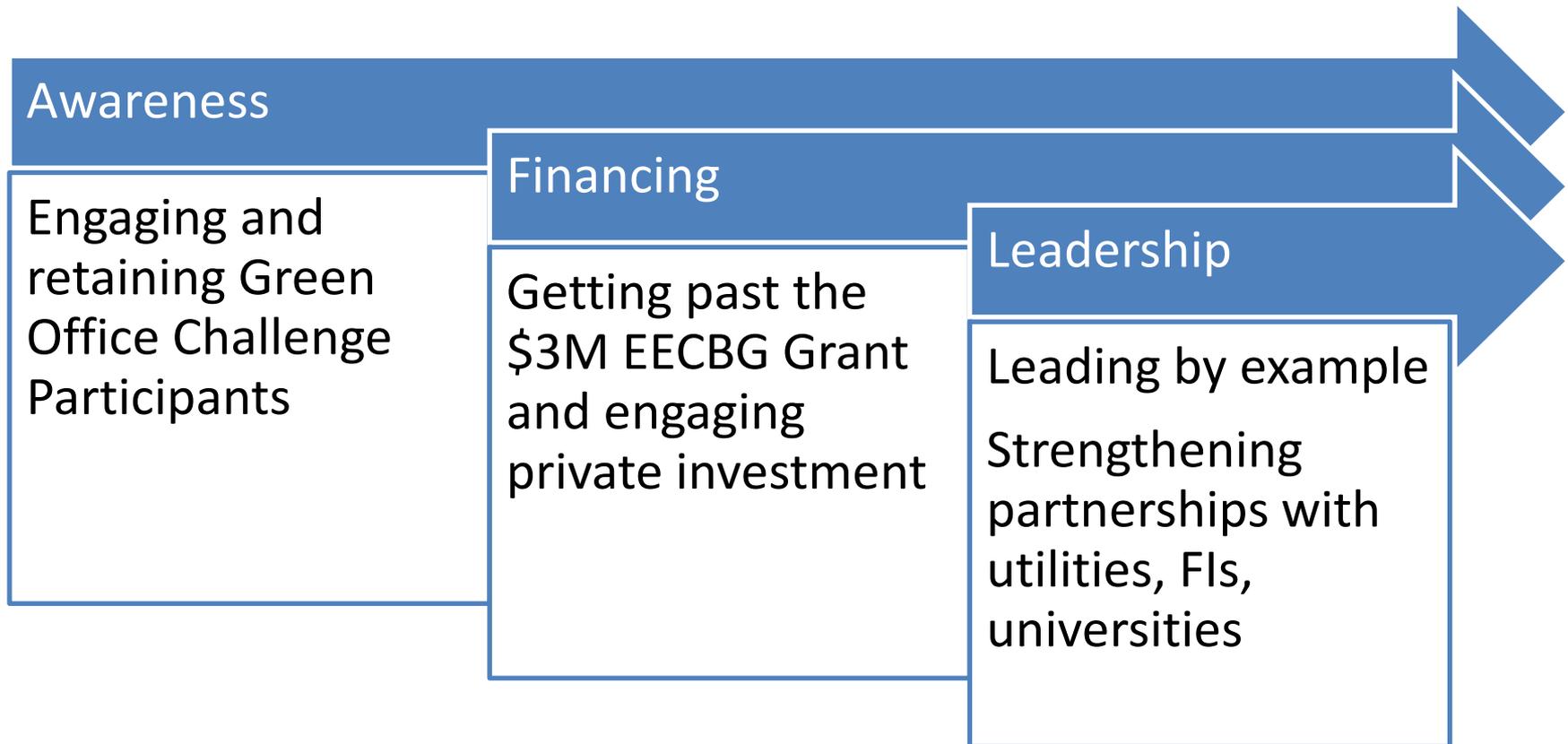
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