Effective Use of Appropriations and Alternative Finance to Fund Energy Efficiency Projects

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

The Parker Ranch installation in Hawaii

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Motivation for this study

- Federal agencies are required to meet numerous energy management goals
- Two main sources of funding to meet these goals
  - Energy management programs funded by Congressional appropriations
  - Private financing via UESC and ESPC (and others)
- Agencies must use these two funding sources in the most effective manner to:
  - Maximize energy savings (and investment per P-1 memo)
  - Minimize life cycle cost

Different philosophies exist as to use of appropriations in energy management

- Some Agencies/program offices use their appropriations to direct fund short payback* measures
- Appropriations could also be used to fund long payback measures – measures that don't fit in to UESC/ESPC
- Appropriations could also be used as one time payments in privately financed UESC/ESPC projects
- FEMP asked ORNL to develop a method to compare these options quantitatively

*Simple payback is defined as implementation cost divided by first year savings

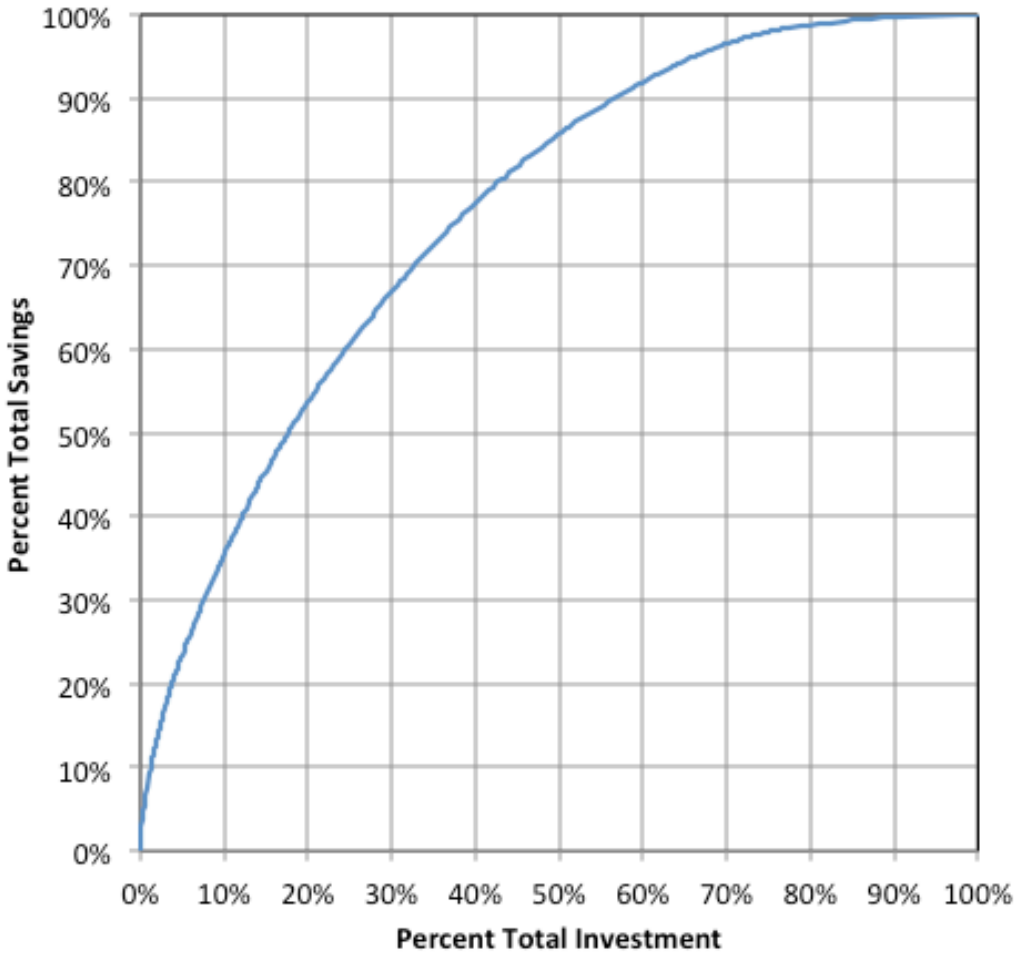
Approach to the problem

- Develop a representative project, i.e. a package of efficiency measures to study
- Develop a tool to allow us to select which measures to fund with appropriations and which to fund with private financing
- Then, for each strategy:
  - Construct “balance sheets” for privately financed and directly funded portions
  - Calculate life cycle cost
  - Vary the amount of appropriations

Representative package of efficiency measures

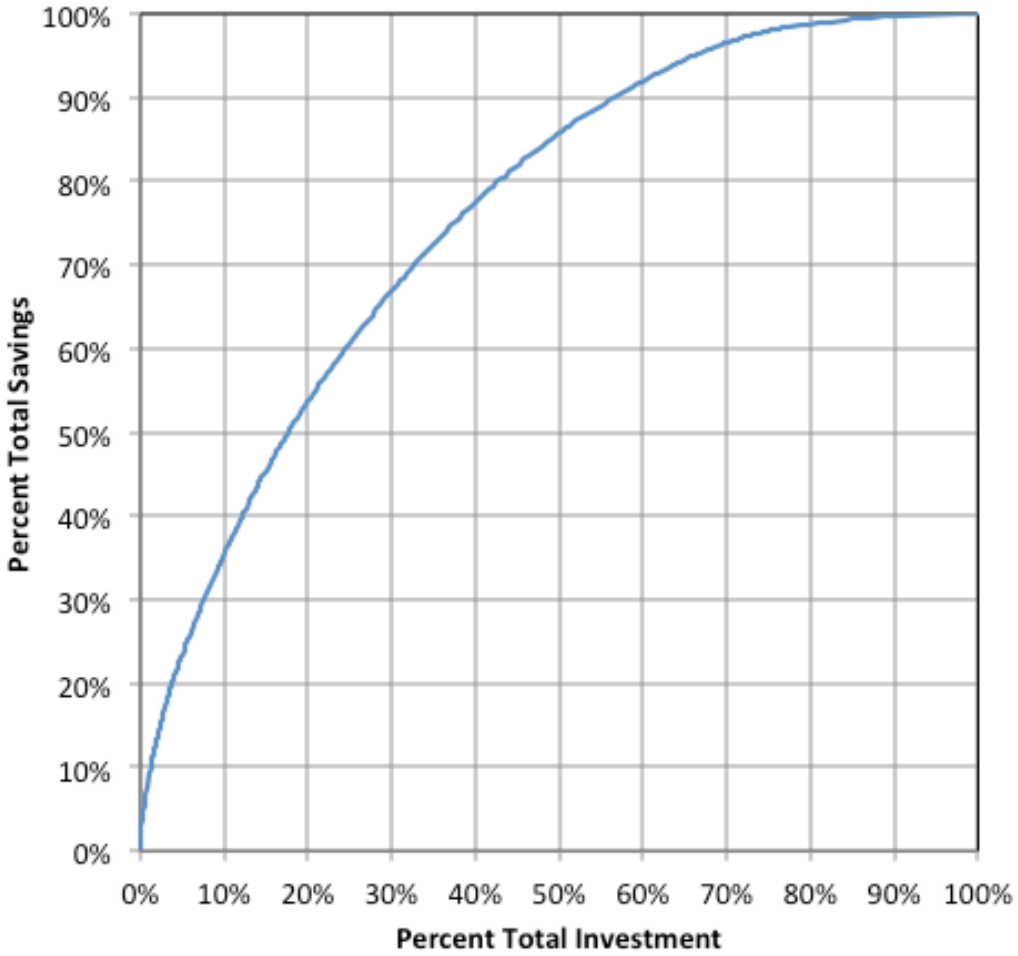
- EISA required federal agencies to identify all “covered facilities” that constitute at least 75% of the agency's facility energy use
- Facility managers were then responsible for completing comprehensive energy and water evaluations of 25% of covered facilities each year
- Results of audits – including estimated implementation costs and estimated savings – are tracked by FEMP in a a database
- This database allowed us to develop a mix of efficiency measures to represent an entire federal agency

EISA 432 Compliance Tracking System Database



- $8.9 billion in investment
- $818 million in savings
- >5,000 covered facilities
- Represents 72 Federal Agencies and sub-agencies

Some other things to notice about the data

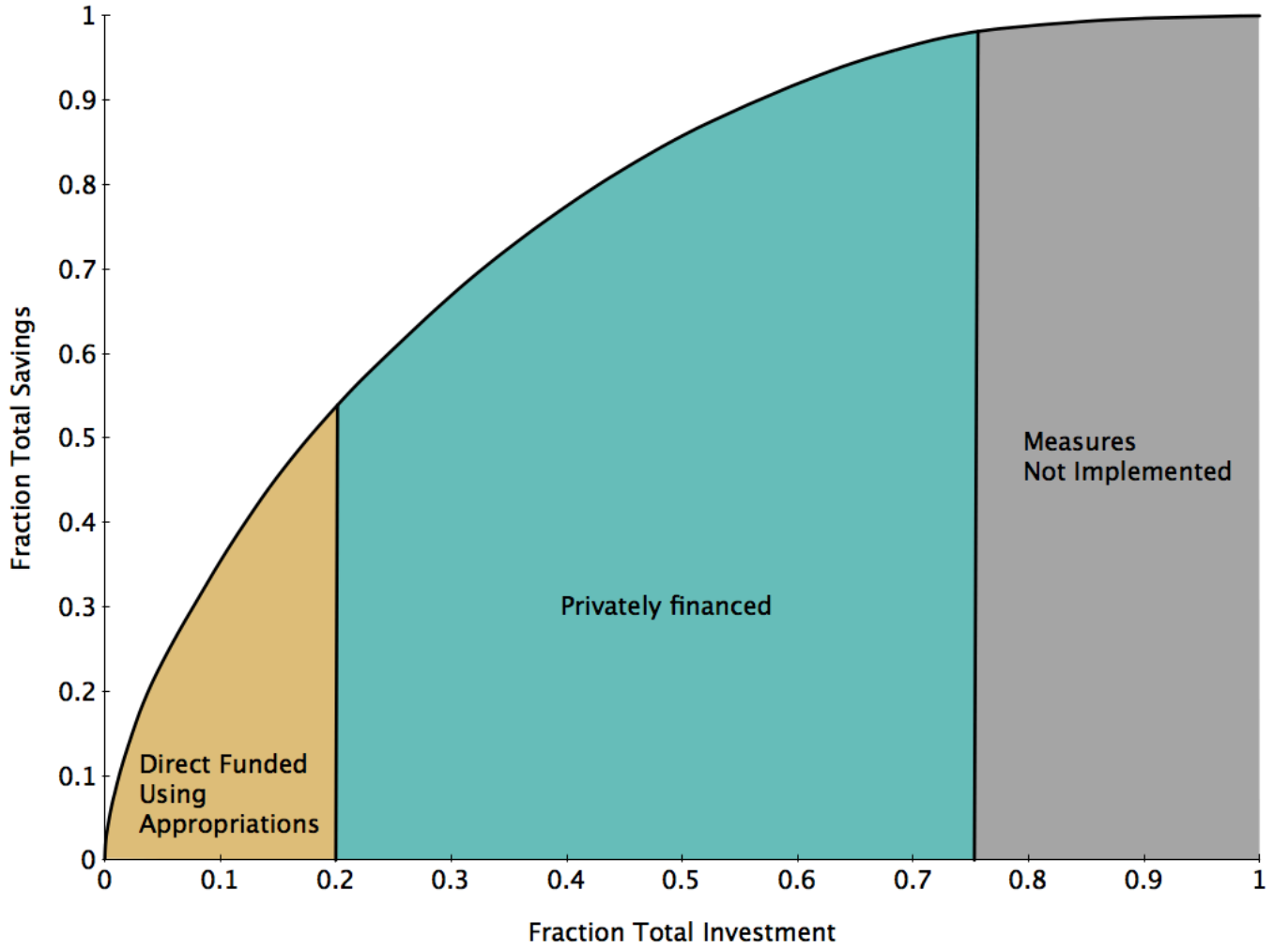


- 10% of investment delivers 35% of savings
- 30% of investment delivers 66% of savings
- 50% of investment delivers 85% of savings
- Aggregate SPB = 11

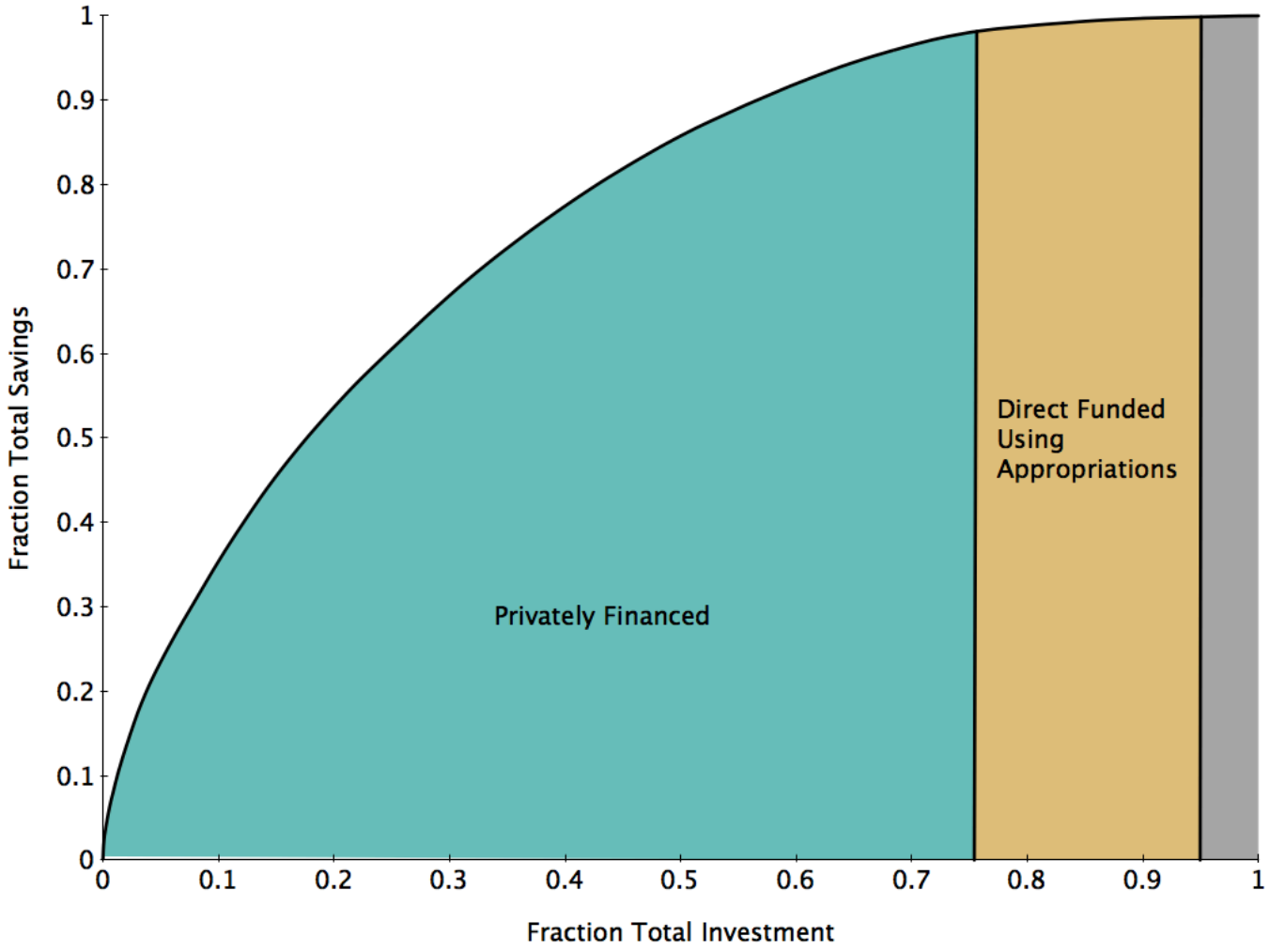
Assumptions about aggregate simple payback

- Given the aggregate SPB of 11, all of the measures in the database could be packaged up into a single $9 billion ESPC project that would have a term of 18 years
- Situation is different for individual agencies however; aggregate SPB ranges from 2 to well over 25
- Usual experience at the site level is that not all needed efficiency measures can be implemented
- We chose to analyze the case of a SPB of 17 which is half way between mean and median

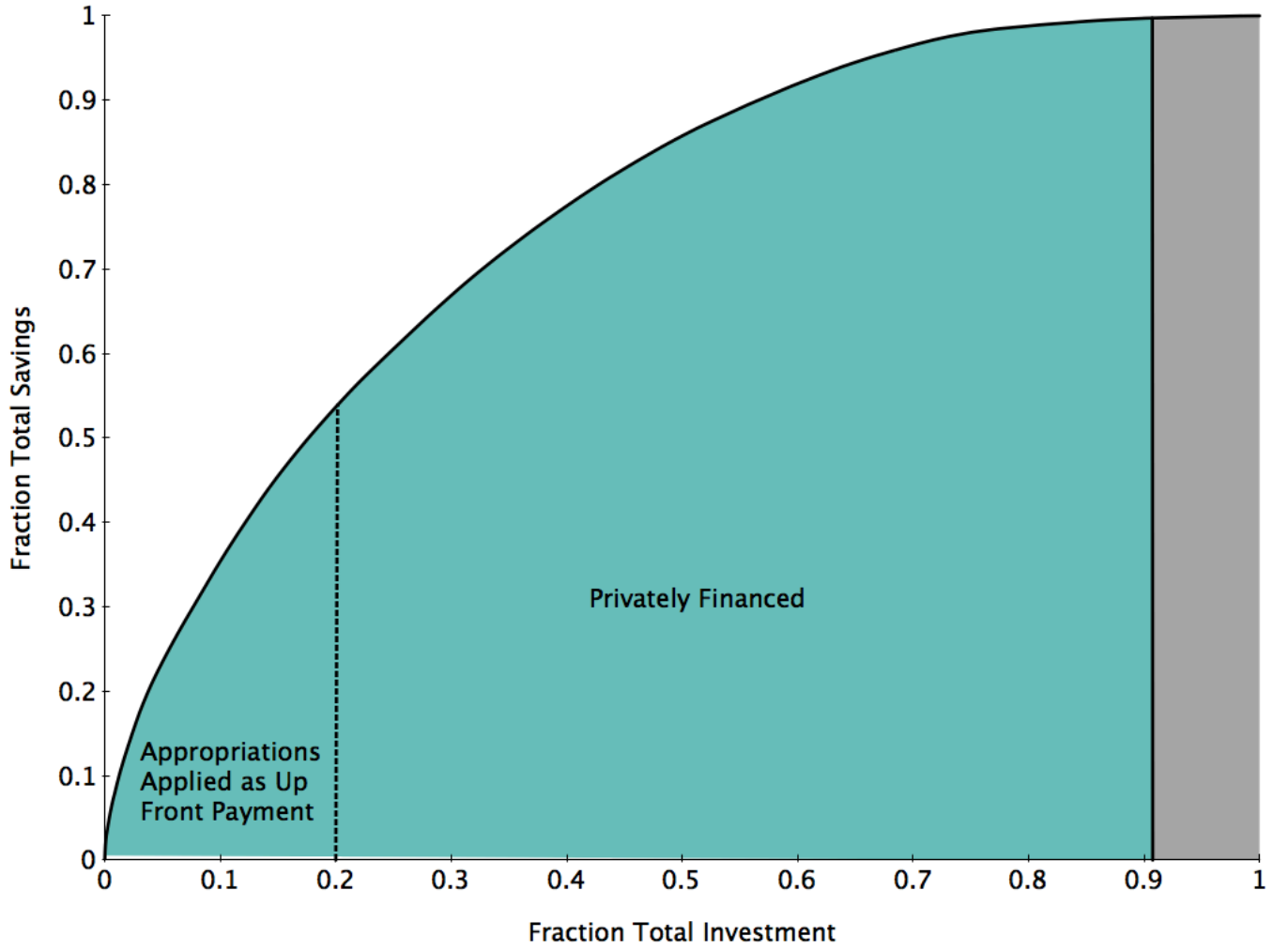
Strategy 1: Appropriations fund short payback measures, do rest with private financing



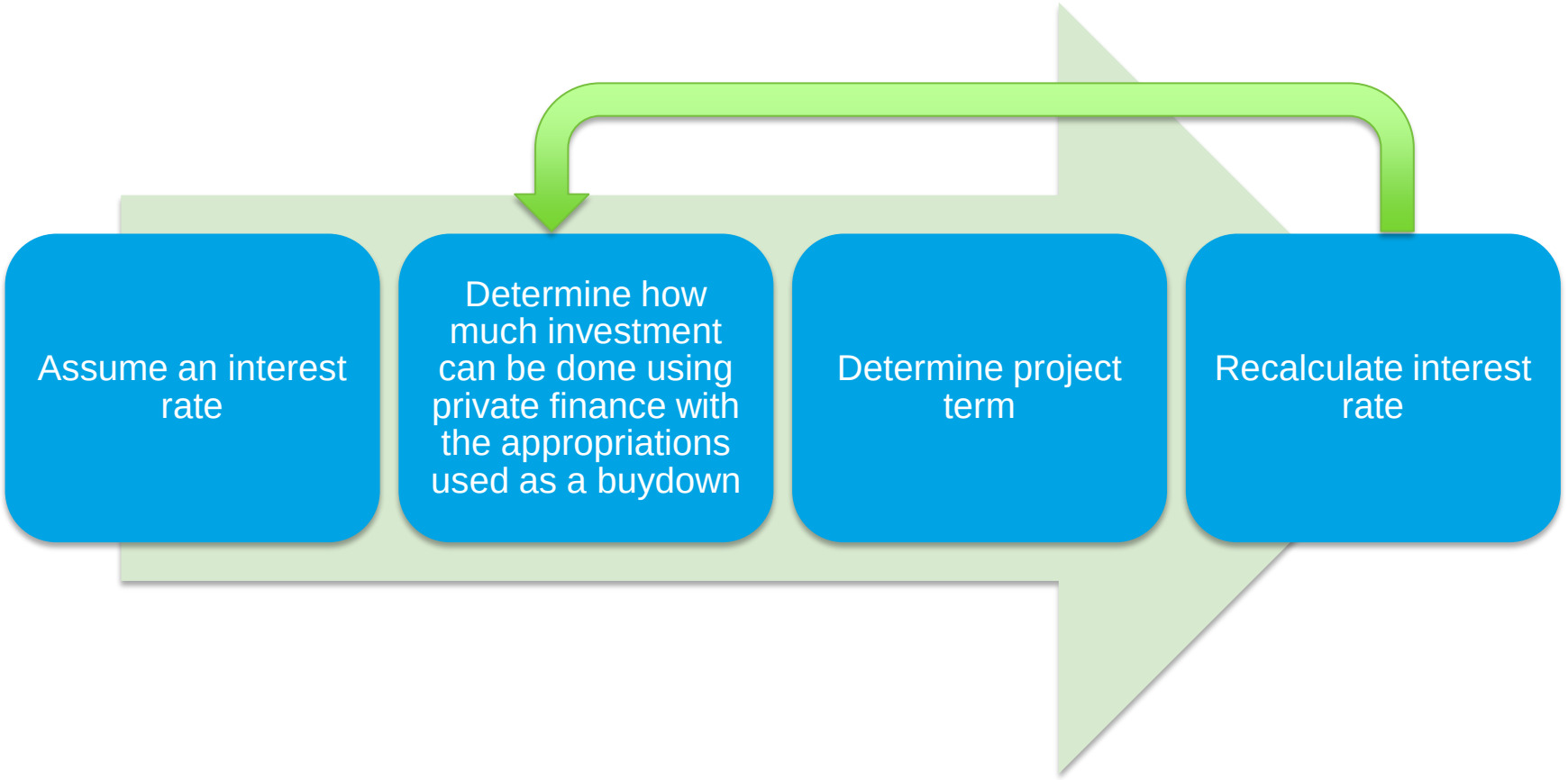
Strategy 2: Fund with private financing, use appropriations on long payback measures



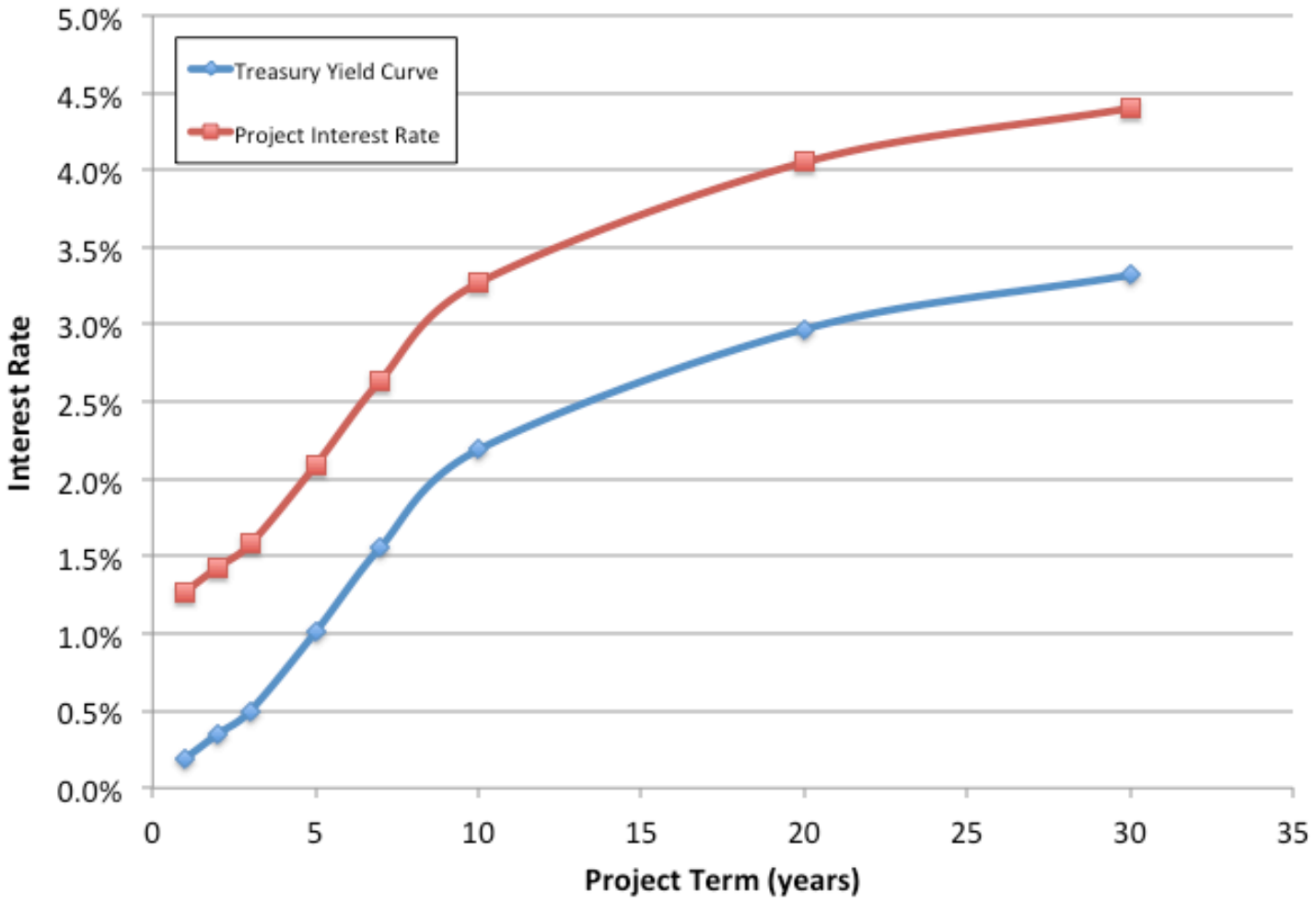
Strategy 3: Fund with private financing, use appropriations as “buydowns”



How the computer program works



Interest rate is 108 basis points above like term Treasury



Main Assumptions for Study

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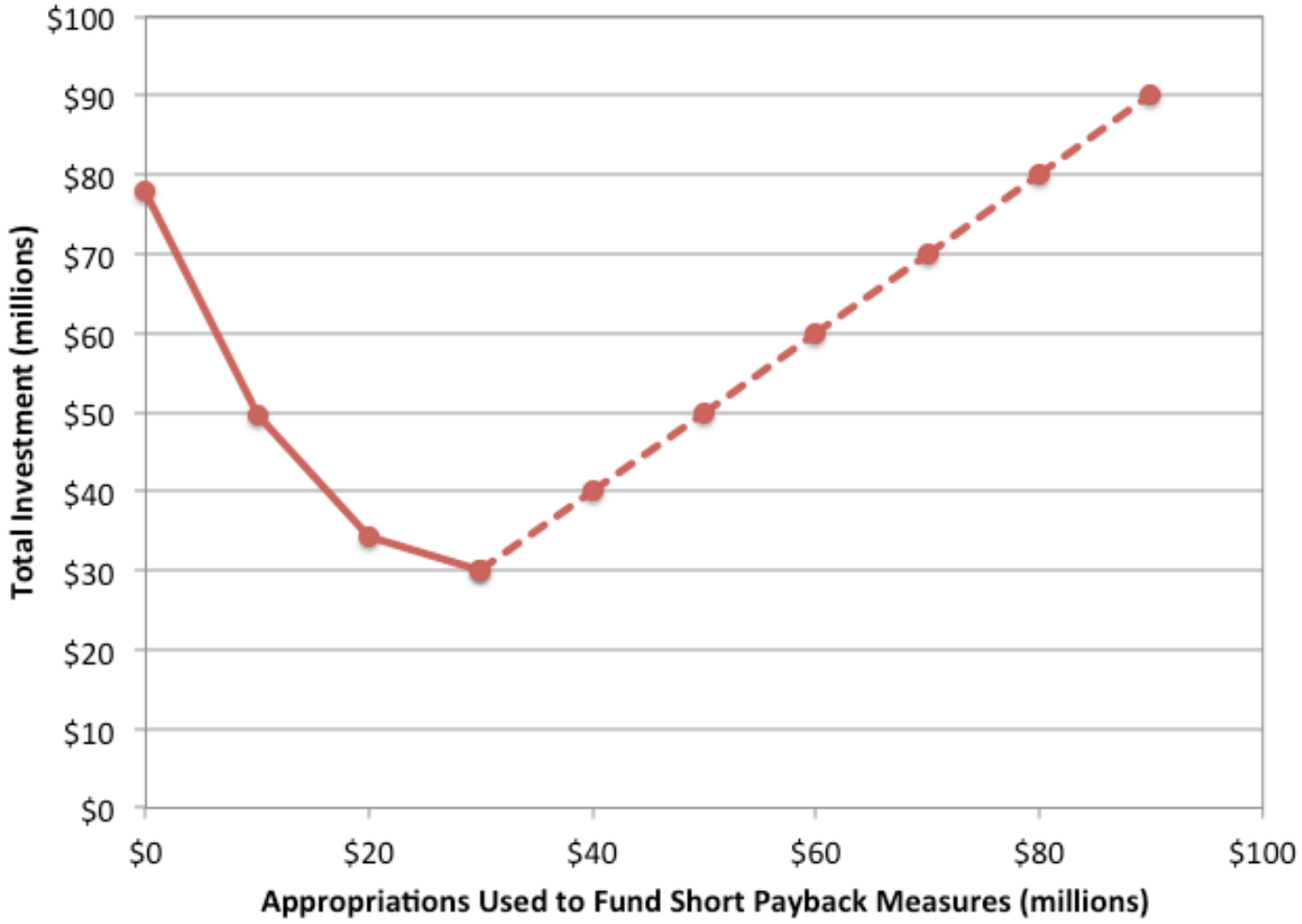
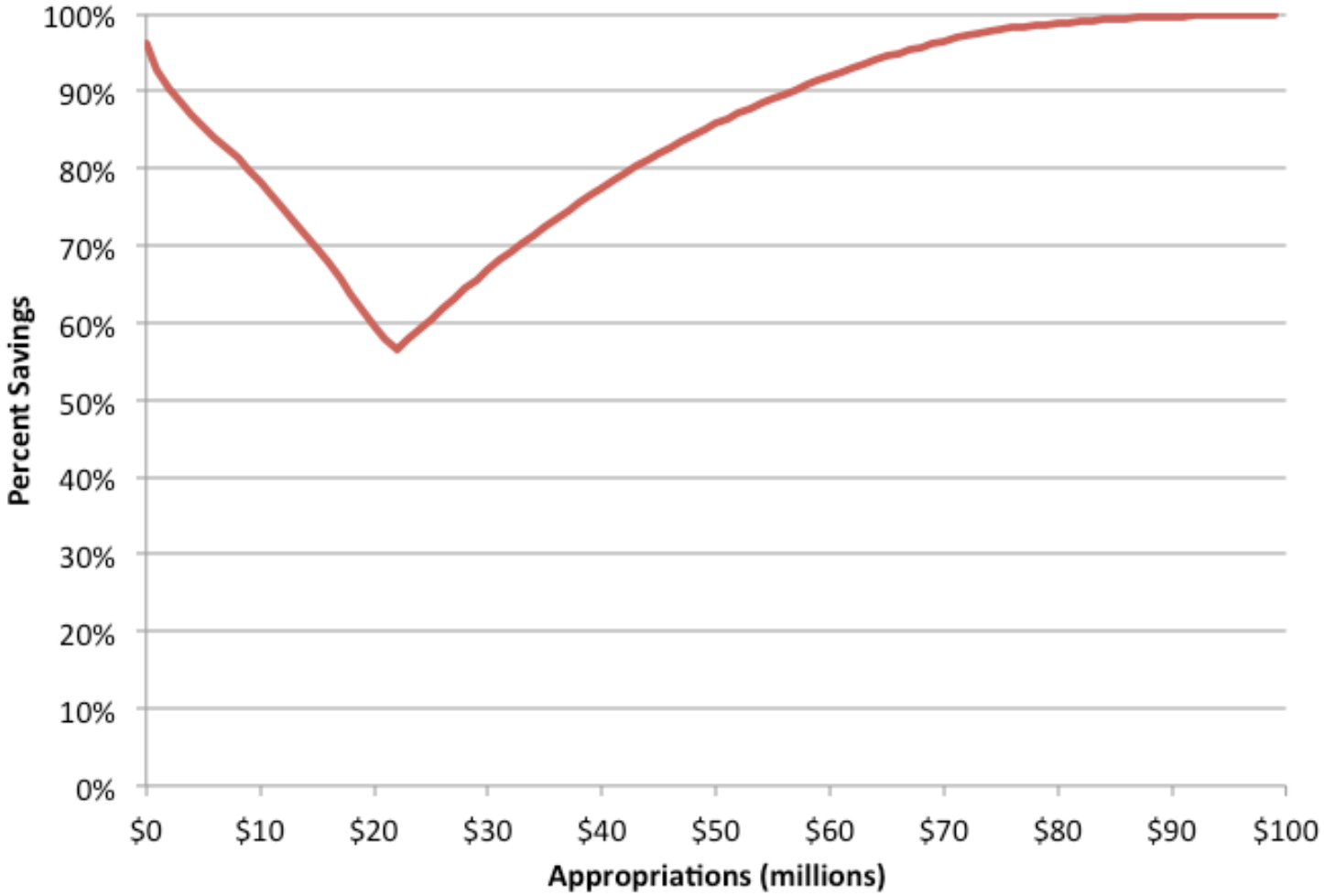
- $100 million in total investment, aggregate SPB of 17
- Privately financed project uses annual-in-advance payments
- Inflation rate of 2% for energy and labor
- Discount rate 3.5% per OMB Circular A-94
- First year O&M/M&V costs are 1.5% (privately financed) and 1.2% (directly funded) of investment value, increasing annually thereafter by inflation rate
- Site picks up O&M on ESCO-installed equipment at end of term for privately financed projects
- Finance procurement price equal to two years interest on financed amount
- Two year construction period
- 25 year study period
- No salvage value at end of study

Results

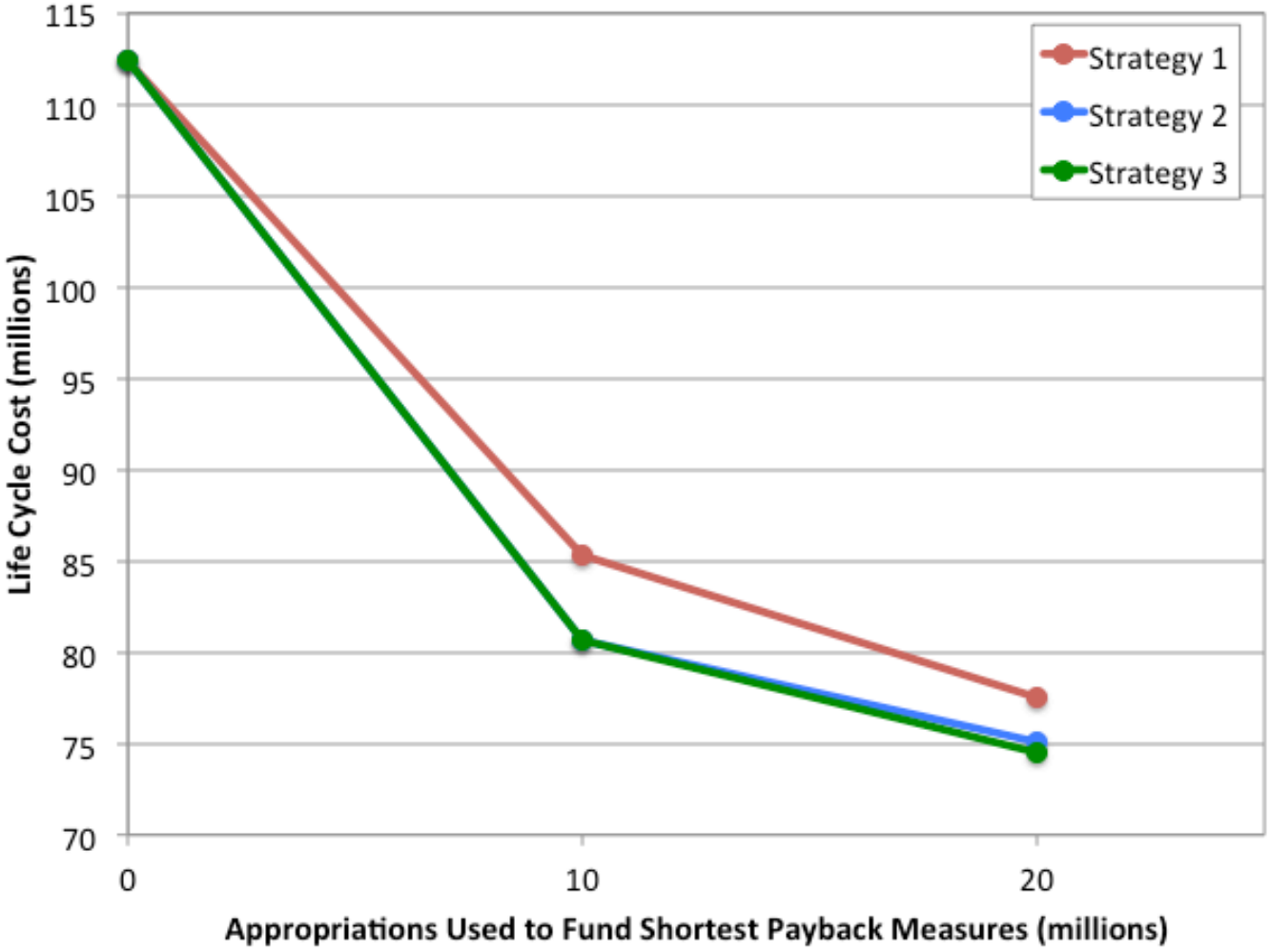
Using appropriations to fund short payback measures limits investment



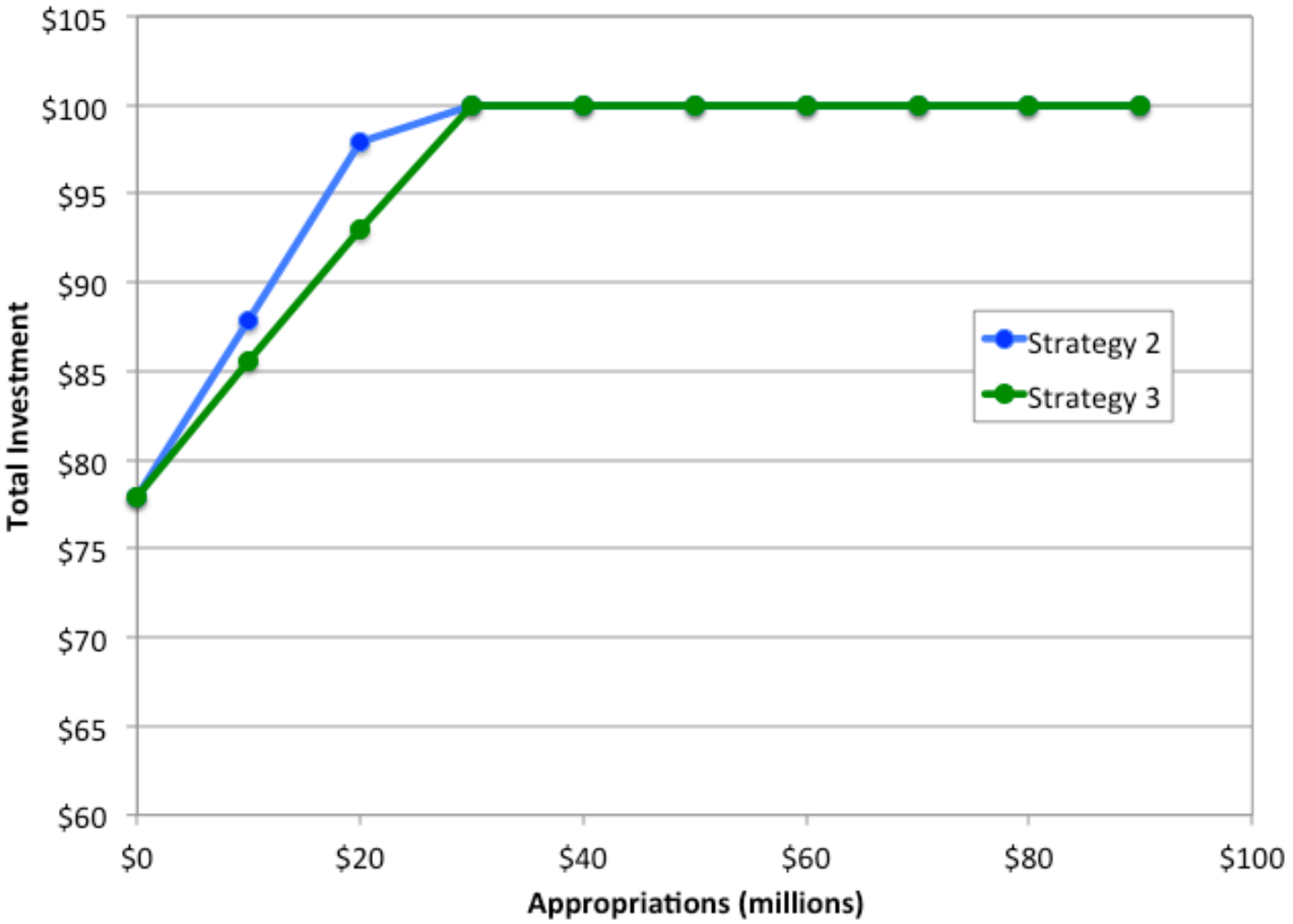
Using appropriations to fund short payback measures limits savings as well



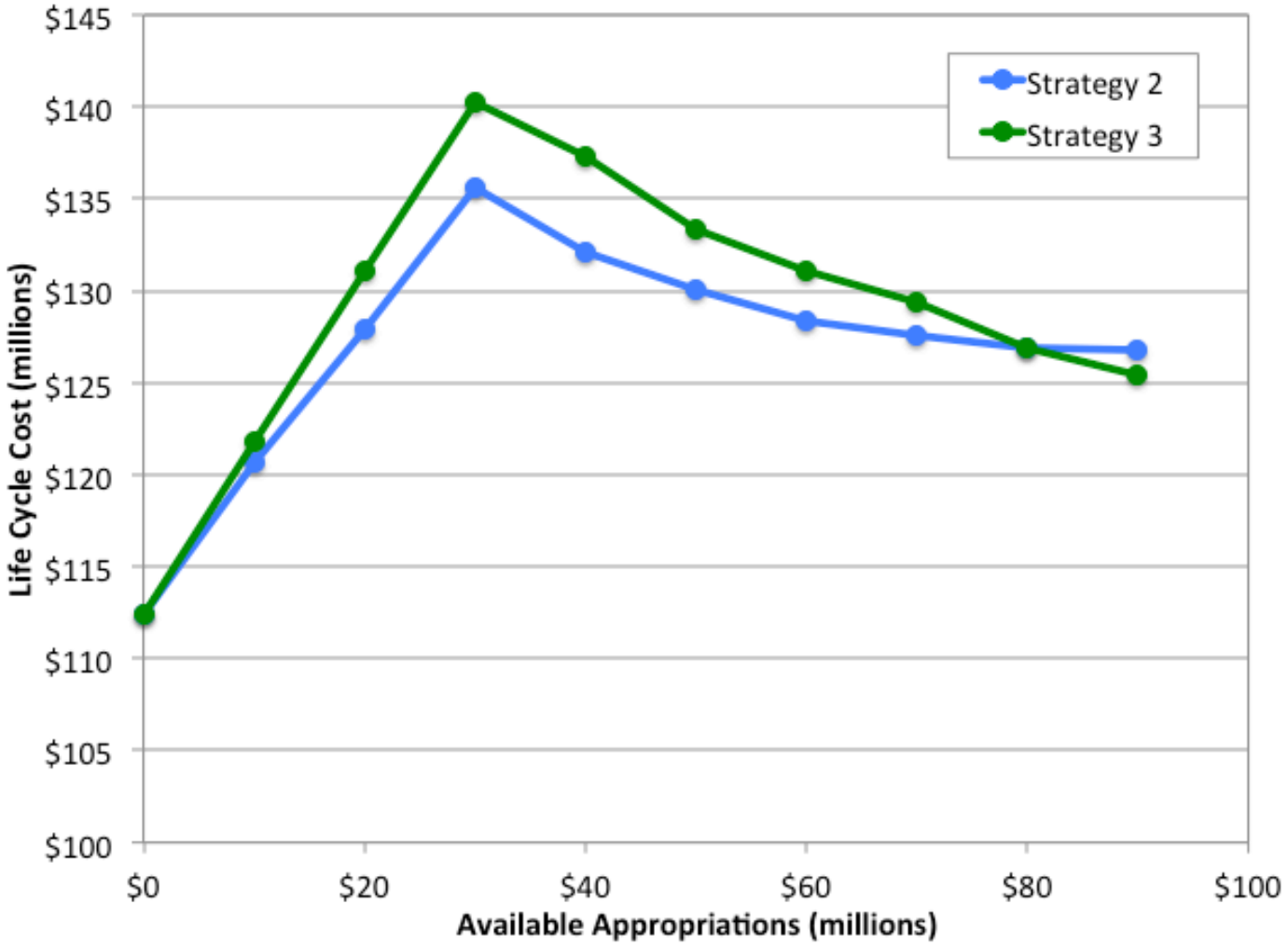
Using appropriations to fund short payback measures costs more



Strategy 2 maximizes investment and savings



Strategy 2 has lower life cycle cost for most levels of appropriations



But implementing two projects vs. one may have other costs

- Analysis did not include costs of mobilization, providing site access, etc.
- Cost of performing studies to justify appropriation funding may be higher than the 5% assumed
- Appropriations funding can involve lengthy delays, further increasing costs
- Ultimately there may not be a large difference in life cycle cost between strategies 2 and 3

Main Conclusions of Study

- Given that agencies must use a mix of appropriations and private financing, using appropriations to directly fund short payback efficiency measures is not a good strategy
  - Limits investment
  - Limits savings
  - Costs the agency more
  - Limits the agency's options
- Best strategy is to fund as many measures as possible, beginning with those with the shortest paybacks, using private financing
- Available appropriations should be used to fund long payback measures, or as up front payment in privately financed projects

Sensitivity Analysis

- Results depend on several factors
  - Interest rate premium of 108 basis points over Treasuries
  - Discount rate of 3.5%
  - Aggregate simple payback of 17 years
  - Shape of savings-investment curve
- Changing these factors did not affect any of the main conclusions
  - Some changes in life cycle cost
  - No relative changes between the three strategies

QUESTIONS?

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