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Energy Retrofit Projects: The Cost of Waiting

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Congress and Administrations have challenged Feds to lead the world in energy management

- 30% energy intensity reduction by 2015, compared with 2003 (EISA)
- Reduce water use intensity by 26% by 2020, relative to 2010 (EO 13514)
- Increase the use of renewable energy to at least 5% in fiscal years 2010-2012 and 7.5% in 2013 and thereafter (EPAct)
- In addition to metering, benchmarking, fleet fuel reductions, …, etc.

EISA 433 contains the most difficult goals

All new construction and major renovations of existing federal buildings must meet the following targets for reduction in use of fossil fuel

Fiscal Year	Fossil Fuel Reduction Target
2010	55%
2015	65%
2020	80%
2025	90%
2030	100%

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Where is the money coming from?

- Congress has not provided agencies with the funding necessary to meet these requirements
- ARRA helped a great deal, but another round of stimulus funding is unlikely given the current economic climate
- Alternative finance will continue to play a large role in meeting our goals

Many factors cited for reluctance to begin large energy retrofit projects

- The equipment we have now may not be as efficient as it could be, but it's still functional
- We've applied for some appropriated funding, and expect to receive it at some date in the future
- We've never done an alternative finance project before

But waiting has real costs that are often not considered

- Inefficient equipment remains in service, consuming more energy than new equipment
- Dated equipment requires more maintenance
- Cost of replacement increases over time with general price inflation
- Energy efficiency requirements increase – projects tomorrow will have more stringent targets and be more expensive

To quantify the cost of waiting, consider a representative project

- Investment price: $10 million
- One-time payment from savings: $1 million
- Finance procurement price (capitalized interest during construction period): $1 million
- Project interest rate: 5%
- Year-1 guaranteed cost savings: $800k (simple payback of 12.5 years)
- ESCO performs O&M on equipment. Year one price:$100,000
- Year one M&V price: $13k
- Cycle time: 24 month project development, 24 month construction period

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Other assumptions

- Energy, O&M, M&V prices inflate at 3% per year
- Nominal discount rate: 4% (official NIST rate for LCC studies, 2011)
- ESCO receives 99.2% of guaranteed cost savings
- Study period of 30 years

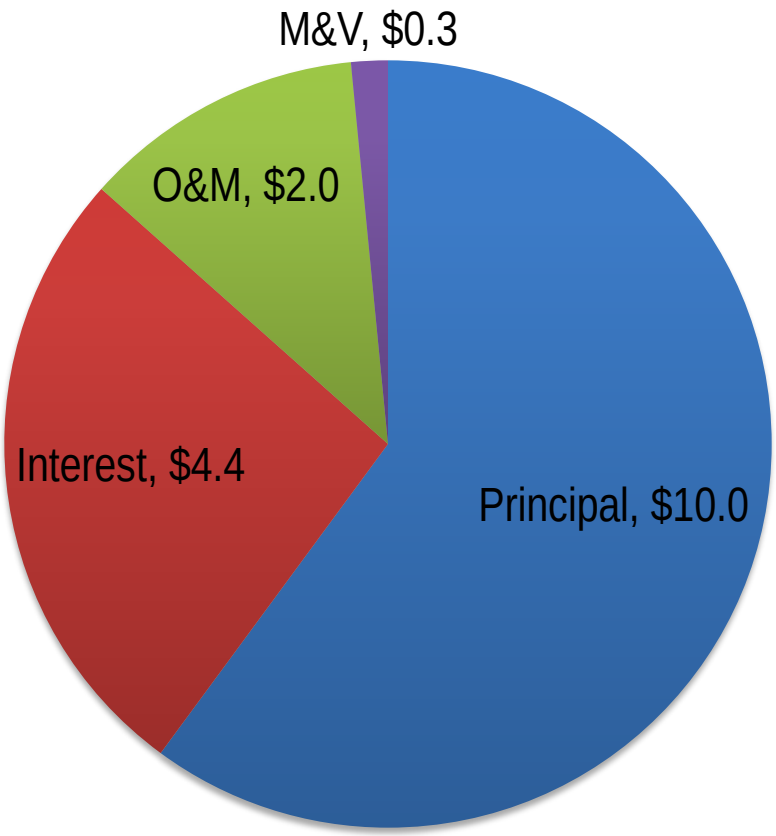
How the cost model was set up

- Before project is completed, site incurs guaranteed savings (energy and O&M on the old equipment)
- At project acceptance, site makes the one-time payment from savings to the ESCO
- During project, site pays 99.2% of guaranteed savings to the ESCO, which performs O&M and M&V, and pays debt service on the loan at 5% per year
- After project close-out, site incurs the O&M costs on the equipment
- All costs increase by 3% annually

Results if project begins now

- ESPC project term is 16 years
- $16.6 million total payments made to ESCO
- $21.3 million total cost to government over the 30 year study period
  - Beginning of study period to construction acceptance: Energy and O&M costs on old equipment
  - End of ESPC term to end of study period: O&M costs on new equipment from
- Total life cycle cost of $14.0 million

Breakdown of payments to ESCO (in millions) over term



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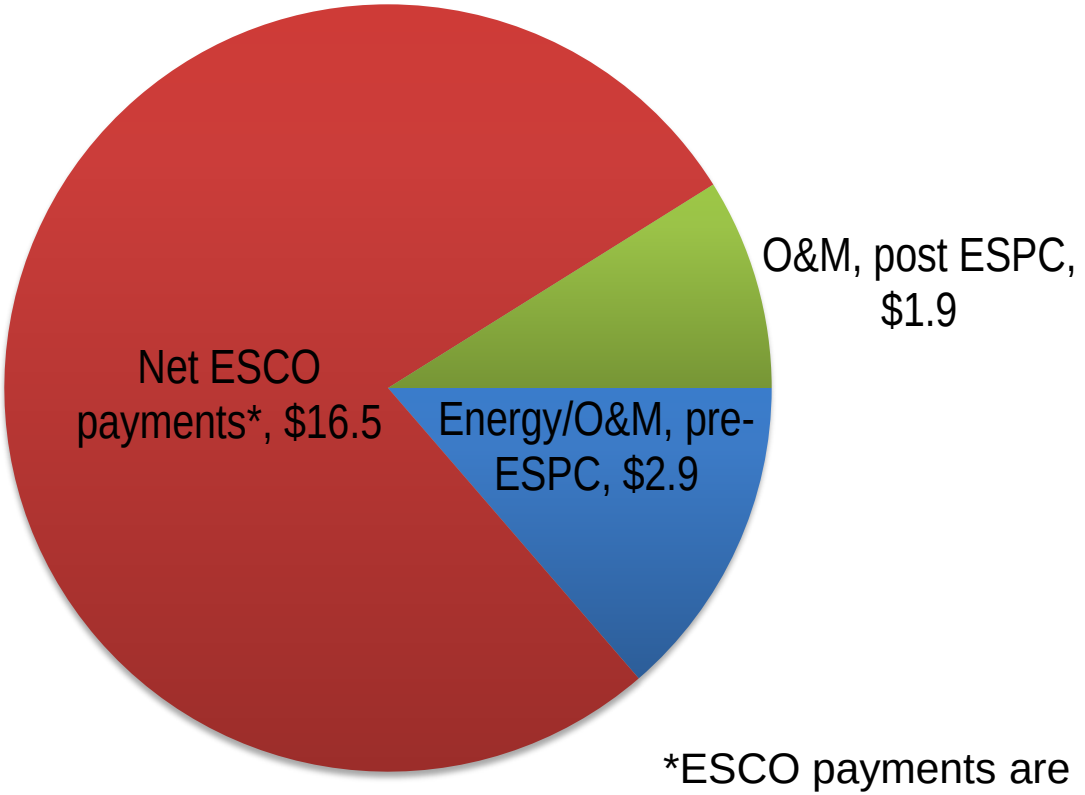
Breakdown of payments (in millions)over 30 year study term



*ESCO payments are net of the 0.8% of guaranteed savings retained by site

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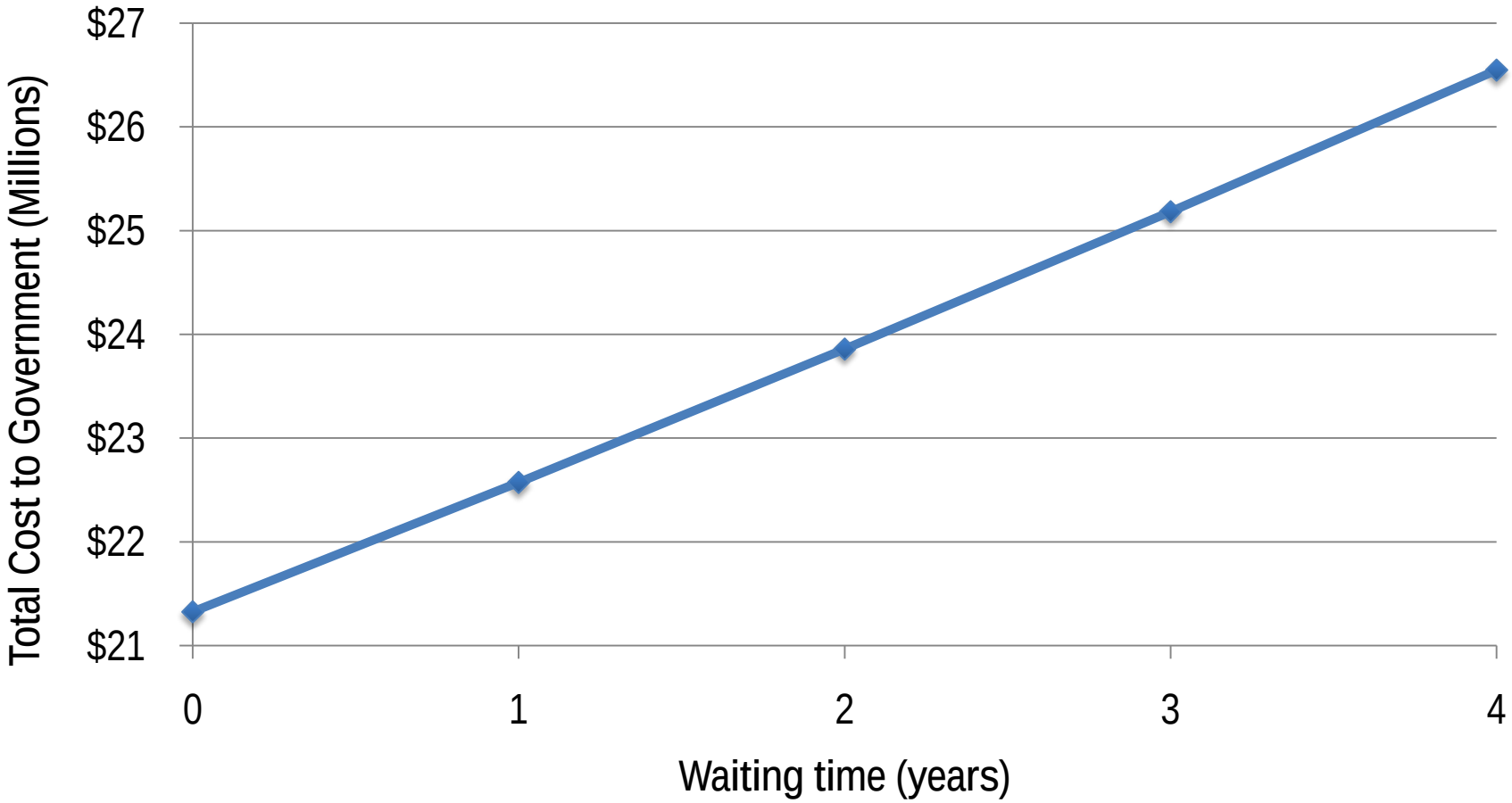
What happens when the project is delayed?

- Price of construction project increases by 3% per year
- Year-1 guaranteed savings increase by 3% per year
- Year-1 M&V and O&M costs increase by 3% per year
- One-time payment from savings does not increase (funds in government accounts generally do not accrue interest)
- Additional energy, O&M costs are incurred on the old equipment before the new equipment is installed
- These effects were included in the cost model

Waiting to begin this project costs the government about $1.3 million per year (6%)



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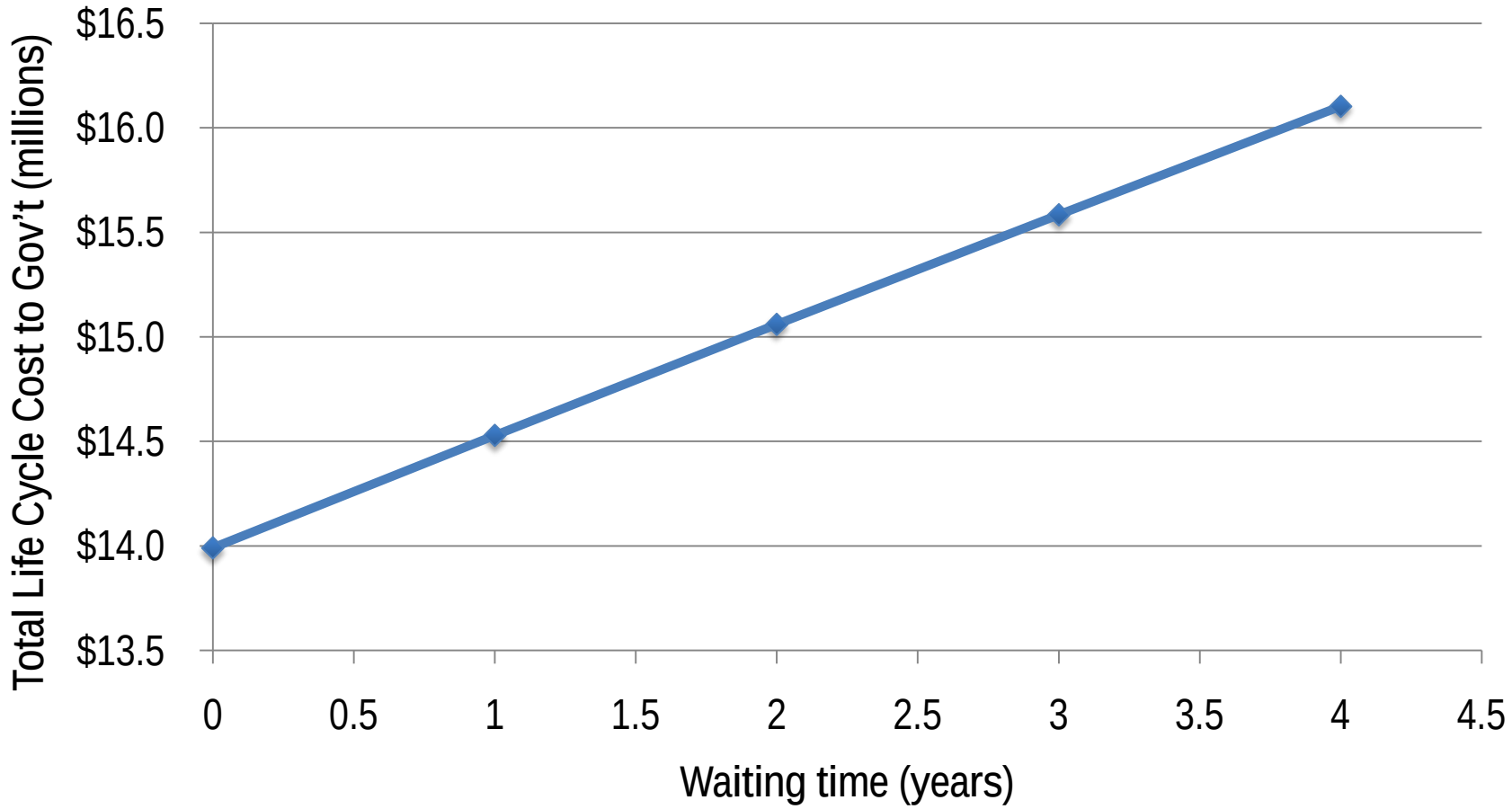
Total life cycle cost to government goes up by about $530k for every year of delay (4%)



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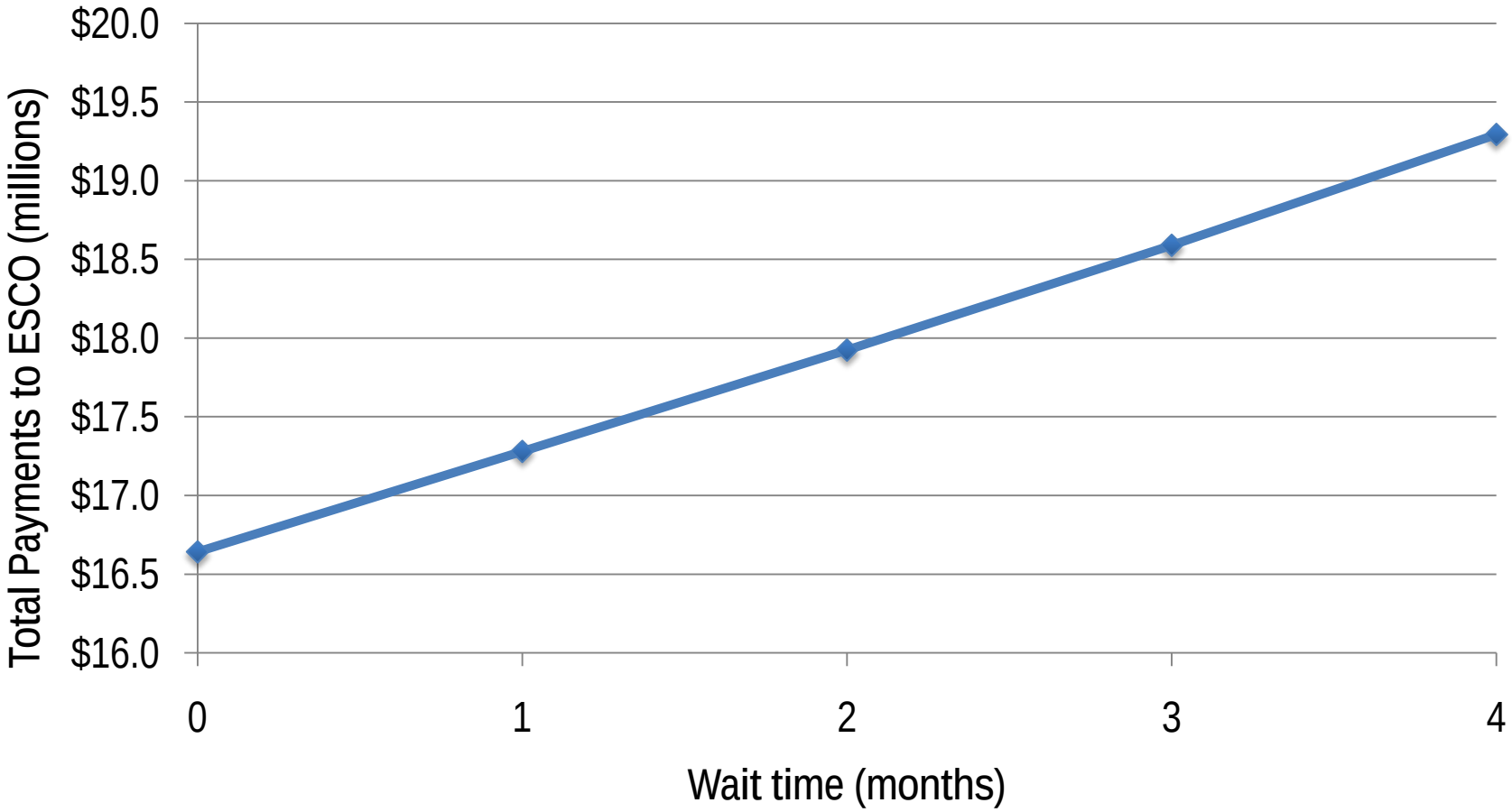
Each year the project is delayed increases total ESCO payments by about $660k



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What explains the increase

- Energy cost for the old equipment is expensive, and maintenance cost on new equipment is cheap
  - Delaying the start of the project causes government to operate the old equipment more, and the new equipment less (after end of ESPC term)
- Although price of ECMs increases at same rate as guaranteed savings, the one time payment from savings does not
  - The buydown becomes less effective the longer the delay

Limitations of the study

- Salvage costs not included
- Replacement costs not included
  - Equipment might have to be replaced after completion of ESPC, and before end of 30-year study period
- Equipment assumed to maintain the same performance over the 30-year study period
  - There would likely be some degradation, at a rate that depends on the equipment type

Waiting for appropriations

- In a previous study* we showed that a project done using ESPC had lower LCC than the same project done with appropriations, given typical delays and typical survey/study costs
- Interest rates are now very low, making the comparison even more favorable to ESPC
- The 2006 study concluded that if appropriations are available now, they should be used. But in reality, the size of projects being performed today using ESPC are much larger than appropriations-funded projects performed in the past
- If appropriations are available, a better decision might be to use them to leverage larger ESPC projects

*Shonder, Hughes and Atkin, Comparing Life Cycle Costs of ESPCs and Appropriations-Funded Energy Projects. ORNL/TM-2006/138, September 2006.

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Conclusions

- Waiting to begin ESPC projects has real costs
  - Total costs to the government increase by 6% for every year of delay
  - Total payments to the ESCO increase by 4% for every year of delay
  - Total life cycle cost to government increases by 3.8% for every year of delay
  - All of these increases are at a higher rate than inflation
- Waiting for appropriations also increases LCC as compared with using ESPC, given typical parameters

For Further Information

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ESPC-Appropriations study available at:
http://www.ornl.gov/sci/ees/etsd/btric/pdfs/com_espc_lcc_2006update.pdf

Cost models for this presentation available on request

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