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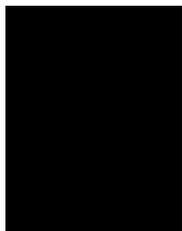
Using ESPCs to Finance Federal Investments in Energy-Efficient Equipment



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Note

Numbers in the text and tables may not add up to totals because of rounding.



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Using ESPCs to Finance Federal Investments in Energy-Efficient Equipment

Summary

A variety of laws and executive orders require federal agencies to improve the energy efficiency of their facilities and to pursue a range of other energy-related goals. Because the availability of annual appropriations is limited, the Administration encourages federal agencies to use other types of financing—such as energy savings performance contracts (ESPCs)—to fund investments related to energy efficiency.

Under an ESPC, a private party agrees to pay to design, acquire, install, and, in some cases, operate and maintain energy-conservation equipment—such as new windows, lighting, or heating, ventilation, and air conditioning (HVAC) systems—in a federal facility. In return, the federal agency agrees to pay for those services and equipment over time, as well as for the vendor's financing costs, on the basis of anticipated and realized reductions in the agency's energy costs.

Such contracts are examples of third-party financing, in which vendors privately fund investments for federal agencies. In the case of an ESPC, the vendor is usually an energy service company (a business that focuses on projects and technologies to reduce energy use).¹ Similar arrangements exist, called utility energy service contracts (also known as UESCs), in which the services and equipment are provided by a utility. Although data about the characteristics and results of utility energy service contracts are less readily available than similar data about ESPCs, the discussion of ESPCs in this report generally applies to those other contracts as well.

1. Those companies are sometimes called ESCOs for short or referred to as energy savings companies.

How Large Are the Energy Reductions Associated With Energy Savings Performance Contracts?

Investments in more efficient equipment generally reduce federal agencies' energy-related costs. According to analysts in the Department of Energy's (DOE's) Federal Energy Management Program, measurements of actual energy consumption and calculations from engineering models suggest that energy-efficiency equipment recently installed for federal agencies through ESPCs is reducing energy consumption by an average of about 20 percent, relative to estimates of what energy use would have been without such investments. (Those reductions result from the equipment that is acquired rather than from the particular type of financing involved.) The results of individual projects vary considerably, and savings can be much larger or smaller than that average.

What Are the Cost Implications of Using ESPCs?

A vendor participating in an ESPC generally receives annual payments from the federal government—which are based on the government's anticipated energy savings—until the vendor's up-front and financing costs have been covered and the contract expires. During that payment period, a federal agency typically retains only a small portion of the projected savings in energy costs, but once the contract ends, all further savings accrue to the federal government. That contractual arrangement means that most of the cost savings that the government realizes from ESPC-funded equipment do not occur until the contract expires, often 15 years or more after it was initiated. However, ESPCs are designed so that—if the installed equipment is effective and is used at anticipated levels, and if energy prices remain close to projections—the value of the energy saved over the life of the equipment will more than cover the costs of the contract.

Given constraints on discretionary appropriations, the use of such contracts may make it easier for agencies

to invest in energy efficiency and thus may lead to reductions in agencies' energy costs that might not otherwise occur. However, compared with paying for energy-saving equipment and services up front with appropriated funds, relying on ESPCs to finance those investments results in greater financing costs to the government.²

In the Congressional Budget Office's assessment, the government's financing costs are higher under ESPCs because of three main factors: The energy service companies assume some financial risk that would otherwise be borne by the government; those companies face more difficulties raising funds in the markets for capital than the federal government does; and even within the capital markets to which those companies have access, they may not be obtaining financing at the lowest possible cost. The first of those factors provides economic value to the government, but the other two do not.

How Are the Budgetary Effects of ESPCs Shown in CBO's Cost Estimates?

When a federal agency enters into an ESPC, it promises to make a stream of payments to a private contractor over a period of years to cover the costs of the equipment or services acquired through the contract. In the agency's budget, those payments typically come from annual appropriations and are recorded as discretionary outlays over the full duration of the contract. The payments to the vendor are offset, at least in part, by whatever annual savings the investment produces.

In CBO's judgment, however, when an agency enters into an ESPC, it is making an obligation on behalf of the government—a commitment of government resources—for the full costs of the equipment to be acquired, but without the appropriations needed to pay those costs. In CBO's view, therefore, legislation authorizing ESPCs creates the authority to make such obligations, and in the absence of appropriations sufficient to cover the contractual costs, that authority is a form of mandatory rather than discretionary spending.

Thus, in order to accurately reflect both the timing and the size of the government's obligations when they are

made—and to be consistent with the principles underlying federal budgeting and with CBO's long-standing practice—CBO's cost estimates for legislation that would affect agencies' use of ESPCs show those effects as mandatory budget authority in the years when the contractual commitments are expected to be made. The outlays estimated to result from that budget authority are shown as mandatory spending. Projected savings in energy costs and related costs are shown as potential future reductions in agencies' discretionary appropriations.

CBO's cost estimates for legislative proposals related to ESPCs are thus complicated by two factors:

- The additional spending required for an ESPC falls into one budget category, mandatory spending, whereas potential future savings from the contract fall into a different category, discretionary spending. In the Congressional budget process, budgetary effects in those two categories are not combined because they are subject to different budget enforcement rules.
- Much or all of the additional spending for an ESPC occurs during the 10-year period covered by CBO's cost estimates, whereas much of the savings occur later.

Those factors—along with the fact that the federal budget generally records spending year by year on a cash basis—make it difficult to assess, in a comprehensive way, the budgetary impact of federal investments carried out using ESPCs. That difficulty is not unique to ESPCs; many investments authorized and funded through federal legislation may affect the government's need for funding in future years, but such effects do not always fall within the scope of CBO's cost estimates for legislation.

The Use of ESPCs to Finance Energy-Related Investments

Under current law, federal agencies are authorized to enter into various arrangements with private vendors for the purpose of making investments in equipment that reduce energy consumption. One of those arrangements is an energy savings performance contract, a long-term contract of up to 25 years. (Those arrangements can also be used to finance projects that would save water or reduce greenhouse gas emissions. The focus of this

2. In general, an energy service company's financing costs, which are passed through to the government under ESPCs, comprise both interest costs on funds that the energy service company borrows and the forgone return on other investments that it might have made with any of its own funds used to finance the project.

report, however, is on projects that yield energy savings, the purpose for which ESPCs have received the most use.)

ESPCs are an example of third-party financing, in which the government does not pay for new equipment at the time it is acquired.³ Instead, with an ESPC, the energy service company finances an investment on behalf of a federal agency. Upon entering into an ESPC, the government effectively commits to make payments to the vendor in future years to cover the costs of equipment and services provided by the vendor, as well as to provide a return on the funds that the vendor used to pay for the investment up front. From 2003 through 2011, the federal government spent a total of about \$13 billion on investments in equipment to increase the energy efficiency of federal buildings.⁴ Roughly 70 percent of that amount was paid for directly through the annual appropriations provided to federal agencies. The other 30 percent was funded using third-party financing, primarily ESPCs and utility energy service contracts.

With such private financing, agencies can pay for energy-conservation measures and their related financing costs over time, on the basis of anticipated reductions in the agencies' energy costs (and, in some cases, reductions in energy-related operations and maintenance costs). In other words, instead of getting additional appropriations to pay for those measures up front—followed by reductions in appropriations in later years as energy savings are realized—agencies can align the payments with the savings, thereby obtaining the desired equipment with little or no change in energy-related spending for the duration of the ESPC.

Specific contractual arrangements vary, but in general under an ESPC, the energy service company develops a baseline estimate of how much energy a federal facility would be expected to use in the absence of a proposed

improvement; it estimates the reduction in energy use that would result from that improvement; and it projects the future cost savings for the federal agency. The government's payments under such a contract include fees for measuring and verifying the energy savings being achieved and, in some cases, for operating and maintaining equipment.

As part of the contract, the government typically receives a guarantee that certain reductions in energy consumption will be achieved. Because reductions in energy use depend on several factors not under the vendor's control, the contract usually specifies how changes in those factors are to be accounted for when estimating the savings. For example, the amount of energy used by equipment in a federal building would change if the agency altered the building's operating hours, occupancy, or temperature settings. ESPCs may stipulate values for those factors so that such changes would not count toward or against the guarantee provided by the vendor. In some instances, the government may receive a guarantee of energy-cost savings, and the contract may also specify how to adjust estimates of cost savings for changes in factors that neither party controls, such as energy prices and weather. Finally, ESPCs typically specify whether the energy service company or the agency is responsible for operating and maintaining the equipment. Increasingly, energy service companies have taken on that responsibility because of the potential difficulty of proving that unsatisfactory results stemmed from an agency's failure to properly maintain the installed equipment.

Once the new energy-saving equipment is in place, the vendor provides periodic reports on the project's performance. The reports can involve a mix of measured results and contractually stipulated performance indicators. As long as the estimated reductions in energy consumption meet or exceed the savings guaranteed by the contractor, the federal agency makes annual payments to the contractor to cover the costs of equipment and services as well as financing costs. Provided that the conditions of the contract are met, such payments continue until the vendor's costs have been covered. (If the estimated reductions in energy consumption are less than the guaranteed amount, the agency's payments need not fully cover the vendor's costs. That situation could be grounds to require the energy service company to renegotiate the contract.)

3. Other examples of third-party financing arrangements include utility energy service contracts, power purchase agreements, enhanced-use leases, and share-in-savings agreements. For more information about such arrangements, see Congressional Budget Office, *Third-Party Financing of Federal Projects* (June 2005), www.cbo.gov/publication/16554.

4. See Department of Energy, *Annual Report on Federal Government Energy Management and Conservation Programs, Fiscal Year 2011* (March 2014), <http://tinyurl.com/kwev2u5> (PDF, 725 KB).

The Effects of ESPCs on Energy Consumption

Reviews of ESPCs used by the federal government have found that many of the projects financed with those contracts have measurably reduced energy consumption. (Those reductions result from the equipment that is acquired rather than from the particular type of financing involved.) On the basis of direct measurements and calculations from engineering models, DOE estimates that energy-efficiency equipment installed for federal agencies over the past few years is reducing energy consumption by about 20 percent, on average.⁵

An earlier, systematic assessment by DOE of roughly 150 federal ESPC projects dating from 1996 through 2008 found that energy savings varied depending on the kind of equipment installed.⁶ Median reductions in energy use ranged from about 20 percent for minor HVAC improvements to roughly 40 percent for some water-related and other kinds of improvements. In some cases, energy consumption fell by far more than those amounts, whereas in others, the savings were considerably smaller. (With some projects, new equipment produced minimal energy savings because facilities were closed not long after the equipment was installed under an ESPC. However, the same outcome could occur with equipment that an agency paid for up front using appropriated funds.) Projects undertaken through ESPCs have also been shown to save energy in other public settings and for private companies.⁷

Conclusions about the energy savings attributable to equipment financed with an ESPC depend on estimates of what energy consumption would have been otherwise, which in turn reflects factors such as the weather and changes in how a facility is operated. In estimating the reductions in energy use from a project, such factors are typically specified in ESPCs in order to distinguish their effects on equipment use and energy consumption from the effects attributable to the project. However, audits by the Inspectors General of DOE and the Department of Defense found instances in which the savings estimates produced by energy service companies were based solely on assumptions, with no account made of actual energy use. Those audits found other instances in which the estimates were cursory in nature.⁸

If the baseline estimates of energy use in the absence of the ESPC are too high, energy savings will appear to be greater than they actually are. However, energy service companies appear, on average, to err slightly on the low side when formulating their baseline estimates in order to increase the likelihood that they can deliver more than the amount of energy savings guaranteed in the contract.⁹

The Effects of ESPCs on the Government's Costs

The value of the energy saved through an ESPC project provides the basis for any cost savings that the contract produces for the federal government.¹⁰ The energy service company fulfilling the contract assumes the risk that the reductions in energy consumption may fall short of

5. Staff of the Federal Energy Management Program, Department of Energy, information provided to CBO (December 2014).

Also see John Shonder, *Energy Savings from GSA's National Deep Energy Retrofit Program*, ORNL/TM-2014/401 (Oak Ridge National Laboratory, September 2014), <http://go.usa.gov/h49T> (PDF, 642 KB).

6. See Department of Energy, Office of Energy Efficiency and Renewable Energy, *Federal Government Project Performance Benchmarks (All ASHRAE Zones)* (June 2014), <http://tinyurl.com/ka4nn3j> (PDF, 2.1 MB). Federal projects were identified from a database of ESPC projects maintained by the Lawrence Berkeley National Laboratory and the National Association of Energy Service Companies (NAESCO). About three-quarters of the data came from NAESCO's voluntary accreditation program; the remainder came from state and federal agencies.

7. See Peter H. Larsen, Charles A. Goldman, and Andrew Satchwell, "Evolution of the U.S. Energy Service Company Industry: Market Size and Project Performance From 1990–2008," *Energy Policy*, vol. 50 (November 2012), pp. 802–820, <http://dx.doi.org/10.1016/j.enpol.2012.08.035>.

8. See Department of Energy, Office of Inspector General, *Audit Report: Management of Energy Savings Performance Contract Delivery Orders at the Department of Energy*, DOE/IG-0822 (September 2009), <http://tinyurl.com/lorcadr> (PDF, 2.0 MB); and Department of Defense, Office of Inspector General, *Fort Knox and the Army Need to Improve Internal Controls for Utility Energy Services Contracts*, DODIG-2014-107 (September 2014), www.dodig.mil/pubs/documents/DODIG-2014-107.pdf (2.7 MB).

9. For instance, they may assume that the energy efficiency of the equipment to be replaced would not decline as the equipment aged. See John Shonder, *Beyond Guaranteed Savings: Additional Cost Savings Associated With ESPC Projects*, ORNL/TM-2013/108 (Oak Ridge National Laboratory, March 2013), <http://tinyurl.com/mkwjf8z> (PDF, 722 KB).

10. Aside from the cost savings discussed in this report, reductions in energy use also create public benefits from reductions in emissions associated with energy production and consumption.

the amount guaranteed in the contract (assuming the equipment is used as agreed upon). If the equipment fails to perform as expected and the specified reductions are not achieved, the company bears responsibility for the difference; in some instances, contracts may be renegotiated to reflect the smaller savings.¹¹ The government, however, typically retains the risk that the value of the energy savings may not cover the project's costs, either because of a decline in energy prices or because the government's use of the equipment causes savings to fall below the amount specified in the contract.

The government's annual payments under an ESPC continue until the total amount specified in the contract is reached. Once the ESPC has been fulfilled, the value of all further energy saved by the installed equipment accrues to the government. Consequently, most of the net savings realized by the government from ESPCs occur only after the contracts are fulfilled. DOE has estimated that the government typically receives 25 percent or more of the savings produced by such new equipment over its useful life.¹² However, even with verified energy savings, not all ESPCs are successful: A 2005 report by the Government Accountability Office identified some projects that called into question how often the savings from ESPCs exceed their costs.¹³

The amount and timing of the savings that the government realizes from a particular ESPC depend on the terms of the contract—including the cost of financing, the price of the equipment and services provided by the energy service company, and the length of the contract. The rest of the savings go to the energy service company as payment for its costs (for the equipment, services,

and financing) and as profits, although DOE has not estimated what share typically represents profits. Some kinds of equipment have more years of useful life remaining after the contract than others do, which can affect the savings achieved. For example, equipment such as that used in data centers often has a shorter expected lifetime, whereas equipment such as boilers and HVAC systems is usually longer lived.

Cost of Financing

The government's financing costs are higher when it relies on ESPCs to finance purchases of energy-saving equipment than when it pays for such investments directly with appropriated funds, because of three main factors:

- Energy service companies assume some of the financial risk that otherwise would be borne by the government;
- Those companies face more difficulties raising funds in the markets for capital than the federal government does; and
- Even within the capital markets to which those companies have access, they may not be obtaining financing at the lowest possible cost.

The first of those reasons for differences in financing costs reflects value received by the government as a result of the ESPC, whereas the other two do not. CBO could not assess the relative importance of the three factors.

The risks that an energy service company assumes when it takes on an energy savings project raise the financing costs of an ESPC. The cost at which the company can raise funds will reflect investors' assessment of the technological risks of implementing the project. It will also reflect investors' view of the likelihood that the company will be able to deliver the guaranteed reductions in energy use and their associated costs. In particular, if those energy savings fall short, the government can reduce payments that the company will be relying on to repay its loan.¹⁴

11. See Government Accountability Office, *Capital Financing: Partnerships and Energy Savings Performance Contracts Raise Budgeting and Monitoring Concerns*, GAO-05-55 (December 2004), www.gao.gov/products/GAO-05-55.

12. See Department of Energy, Office of Energy Efficiency and Renewable Energy, "Energy Savings Performance Contracts," DOE/GO-102011-3308 (July 2011), www.nrel.gov/docs/fy11osti/51667.pdf (636 KB). Information provided to CBO by staff members of the Federal Energy Management Program in December 2014 suggests that the share received by the government under the most recent ESPCs may be higher than 25 percent.

13. See Government Accountability Office, *Energy Savings: Performance Contracts Offer Benefits, but Vigilance Is Needed to Protect Government Interests*, GAO-05-340 (June 2005), www.gao.gov/products/GAO-05-340.

14. See answers to questions for the record by Kathleen Hogan, Deputy Secretary for Energy Efficiency, Office of Energy Efficiency and Renewable Energy, Department of Energy, after testimony before the Subcommittee on Oversight and the Subcommittee on Energy of the House Committee on Science, Space, and Technology (August 20, 2013), <http://go.usa.gov/h4AA>.

If the Treasury borrowed money directly in order to finance a project with up-front appropriations, the interest rate it paid would be lower—but that rate would not be a comprehensive measure of the government's financing costs. The government's low borrowing rate reflects the fact that a project's risks are borne not by the investors who purchase Treasury securities but by current or future taxpayers and other people with a stake in the government's finances (such as the beneficiaries of federal spending programs). If those taxpayers and stakeholders were investors in the project, they would view those risks as having a cost.¹⁵ A more comprehensive measure of costs would incorporate the value that the government receives when an energy service company takes on some of the financial risk of a project. Incorporating that value would narrow the difference in costs between ESPCs and direct appropriations, compared with the difference based on looking at interest costs alone.

Financing costs are also higher under ESPCs than under direct appropriations because energy service companies face more difficulties raising funds in the markets for capital than the federal government does. For instance, the market for debt issued by energy service companies is less liquid than the market for Treasury securities, and those companies face higher transaction costs (such as the fees and commissions paid to financial intermediaries) when raising capital.¹⁶ Furthermore, an energy service company may need to incur additional legal costs to insulate lenders from the risk that it might enter bankruptcy for reasons unrelated to the performance of a particular ESPC.

In addition, some energy service companies may consider obtaining financing from only a small number of sources. Coupled with a lack of transparency in their terms of financing, that practice may raise the financing costs of ESPCs. Changes to the procurement process over the past

decade have boosted the number of firms bidding to provide financing, increased transparency in financing, and thus reduced financing costs; but considering an even larger number of financing options would probably lower financing costs further.¹⁷

Pricing of Equipment and Services

The prices that the government pays for equipment and services under ESPCs also reflect, to some extent, the amount of competition that exists among energy service companies. The less competition there is for any particular ESPC, the higher the prices the government is likely to have to pay for the equipment and services provided under that contract. One study suggests that with some ESPCs in the mid-1990s, the prices paid by the government were about the same as those for similar projects financed through up-front appropriations.¹⁸ More recently, however, the prices paid under ESPCs may have increased somewhat because of consolidation among energy service companies.¹⁹ To reduce the chance that the government would forgo more of the value of its energy savings by agreeing to higher-than-necessary prices in its ESPCs, the Department of Energy has developed a tool, eProject Builder, to help agencies compare the prices of federal ESPCs.²⁰

Length of Contract

According to DOE, the average payback period under an ESPC is 17 years—the amount of time it takes, on average, for accumulated savings in energy costs to cover

15. For more information about the role of risk in accounting for the costs of government programs, see the testimony of Douglas W. Elmendorf, Director, Congressional Budget Office, before the House Committee on Financial Services, *Estimates of the Cost of the Credit Programs of the Export-Import Bank* (June 25, 2014), www.cbo.gov/publication/45468.

16. Some researchers estimate that, between 1926 and 2008, the greater liquidity of Treasury securities caused their average annual rate of return to be as much as 0.5 percentage points lower than those of corporate bonds with Aaa (highest-grade) ratings from Moody's; see Arvind Krishnamurthy and Annette Vissing-Jorgensen, "The Aggregate Demand for Treasury Debt," *Journal of Political Economy*, vol. 120, no. 2 (April 2012), pp. 233–267, www.jstor.org/stable/10.1086/666526.

17. For a discussion of historical practices in the ESPC financing market, see Department of Energy, Federal Energy Management Program, *Reducing Financing Costs for Federal ESPCs* (December 7, 2004), <http://tinyurl.com/oj83vhw> (PDF, 1.4 MB). For more recent trends in financing costs, see Department of Energy, Federal Energy Management Program, Agency ESCO Forum, presentation by Doug Culbreth (March 11, 2009), <http://tinyurl.com/lh84j7q> (PDF, 0.6 MB).

18. See Patrick J. Hughes and others, *Evaluation of Federal Energy Savings Performance Contracting—Methodology for Comparing Processes and Costs of ESPC and Appropriations-Funded Energy Projects*, ORNL/TM-2002/150 (Oak Ridge National Laboratory, March 2003), <http://tinyurl.com/p8ga9q8> (PDF, 1.2 MB).

19. See Andrew Satchwell and others, *A Survey of the U.S. ESCO Industry: Market Growth and Development From 2008 to 2011*, LBNL-3479E (Lawrence Berkeley National Laboratory, June 2010), <http://tinyurl.com/q5ltubc>.

20. For more information, see Department of Energy, Office of Energy Efficiency and Renewable Energy, "eProject Builder" (accessed January 15, 2015), <http://energy.gov/eere/femp/project-builder>.

the contractual payments that are due to the vendor.²¹ That period represents the average amount of time that elapses before the government realizes significant net savings under the contract. In some cases, agencies may decide to reduce the length of a contract by making larger payments and retaining less of the value of the energy savings while the contract is being fulfilled. Research indicates that the average payback period for ESPCs has lengthened over time as the mix of projects financed through such contracts has changed, gradually evolving to include a greater share of investments that can produce large energy savings but that are also costly.²² Indeed, agencies often bundle multiple energy-conservation measures into a single contract, combining relatively simple upgrades involving short payback periods with other conservation measures that may not be as attractive on their own.²³

The payback period, however, is not a reliable indicator of the economic value of the savings associated with an ESPC because, by itself, it does not measure the government's net budgetary savings, most of which occur after that period. Moreover, because the typical payback period is longer than 10 years, most of the net savings to agencies occur beyond the 10-year window covered by CBO's cost estimates.

Illustrations of the Financial Implications of Using ESPCs

The government's cash flows are very different under an ESPC than they would be if the same investment was made through an up-front expenditure of appropriated funds. Because an ESPC spreads out the government's costs of purchasing energy-efficient equipment over the many years of the contract, it usually has little net effect on an agency's budget until it expires—at which time the agency may begin to realize significant net savings. By

contrast, if the government paid for the same equipment up front, it would need sufficient appropriations initially to pay the full cost but would then immediately begin to realize the full annual net savings in energy costs.

To illustrate the timing of the government's cash flows under ESPCs, this section presents a hypothetical energy-conservation investment made through a single contract, focusing on the size and duration of the cash payments and the value of the energy saved. In addition, because agencies generally have the authority to enter into many ESPCs over a multiyear period, this section examines the total cost savings over time and the repayments of borrowed funds for a series of identical illustrative investments. If a series of similar ESPCs were put in place at regular intervals, the resulting portfolio of ESPCs would produce increasing amounts of savings as the number of contracts already fulfilled gradually increased. Eventually, the equipment installed under those contracts would be expected to produce substantial energy savings each year.

Cash Flows for a Single Investment

An example of cash flows from an illustrative investment in energy-conservation measures using an ESPC shows the differences in the timing of the government's spending for and savings from the investment (see Table 1). In the example, a federal agency enters into an ESPC with an energy service company for a \$10 million investment, which includes the cost of equipment and installation. The installed equipment lasts 25 years, saves \$1.1 million in energy costs (or 11 percent of the value of the investment) each year, and costs \$250,000 a year for such things as operating and maintaining the equipment and measuring and verifying the reduction in energy use. Those energy-cost savings and other costs are assumed to increase by 2 percent each year because of inflation. The example has been constructed so that the payback period matches the average ESPC length of about 17 years once the equipment is installed and operating. For simplicity, the energy-conservation measures in this example are assumed to be fully installed immediately, as a change in lighting might be; however, the amount of time required to install a conservation measure can vary considerably, depending on the complexity of the project.

The energy service company is assumed to finance the investment with a loan on which it pays 4.5 percent

21. Staff of the Federal Energy Management Program, Department of Energy, information provided to CBO (September 2014).

22. See Peter H. Larsen, Charles A. Goldman, and Andrew Satchwell, "Evolution of the U.S. Energy Service Company Industry: Market Size and Project Performance From 1990–2008," *Energy Policy*, vol. 50 (November 2012), pp. 802–820, <http://dx.doi.org/10.1016/j.enpol.2012.08.035>.

23. See Department of Energy, Federal Energy Management Program, "Energy Savings Performance Contracts: Frequently Asked Questions," DOE/EE-0771 (November 2012), https://www1.eere.energy.gov/femp/pdfs/espc_faqs.pdf (1.4 MB).

Table 1.**Illustrative Cash Flows From Using a Single \$10 Million Energy Savings Performance Contract to Purchase Energy-Conservation Measures**

Thousands of Dollars

Year	Annual Contract Expenses With Financing Arranged Through an Energy Service Company at 4.5 Percent Annual Interest				
	Savings in Energy Costs ^a	Principal Payment	Principal Plus Interest Payments	Other Payments ^b	Savings Retained by the Government ^c
1	1,100	300	750	250	100
2	1,122	331	767	255	100
3	1,144	363	784	260	100
4	1,167	397	802	265	100
5	1,191	433	820	271	100
6	1,214	470	838	276	100
7	1,239	510	857	282	100
8	1,264	553	876	287	100
9	1,289	597	896	293	100
10	1,315	644	916	299	100
11	1,341	693	936	305	100
12	1,368	745	957	311	100
13	1,395	800	978	317	100
14	1,423	857	1,000	323	100
15	1,451	918	1,022	330	100
16	1,480	981	1,044	336	100
17	1,510	410	428	343	739
18	1,540	0	0	350	1,190
19	1,571	0	0	357	1,214
20	1,602	0	0	364	1,238
21	1,635	0	0	371	1,263
22	1,667	0	0	379	1,288
23	1,701	0	0	386	1,314
24	1,735	0	0	394	1,340
25	1,769	0	0	402	1,367
Total	35,233	10,000	14,672	8,008	12,554
Total in Present- Value Terms^d	23,326	7,552	11,578	5,301	6,447

Source: Congressional Budget Office.

- Savings in energy costs represent the difference between baseline estimates of what energy costs would be in the absence of the contract and actual energy costs under the contract.
- Other payments cover the costs of performing scheduled maintenance on equipment, repairing or replacing associated equipment not installed as part of the contract, measuring and verifying energy savings, and managing and administering the contract. Some annual contract expenses may be incurred after the payback period if a contractor continues to operate and maintain the equipment for the government.
- Savings retained by the government are savings in energy costs minus the government's payments to the energy service company under the contract. With energy savings performance contracts (ESPCs), federal agencies typically retain minimal savings to shorten the payback period and limit the amount of interest they pay. After the costs of the contract have been paid, further savings are retained by the government. Because ESPCs have an average payback period of about 17 years, most of the savings to the government occur outside the five-year period covered by CBO's estimates of spending subject to appropriation.
- A present value is a single number that expresses a flow of current and future income or payments in terms of a lump sum received or paid today. For these present values, cash flows were translated into current dollars (discounted) using CBO's projections of interest rates on Treasury securities with comparable maturities.

interest, compounded annually.²⁴ The financing cost can have a sizable effect on the savings that are realized by the agency. In this example, the government's total costs for the ESPC are \$22.7 million over the 25-year life of the equipment: \$10.0 million in principal, \$4.7 million in interest, and \$8.0 million in other payments. The energy-cost savings from the investment total \$35.2 million. Thus, the government's net savings amount to \$12.6 million over that 25-year period.

While payments are due to the energy service company, the government agency retains the difference between the projected savings in energy costs under the ESPC and the annual contract payments. But agencies typically retain only a minimal portion of the projected energy savings during that time so that they can limit the number of annual contract payments and the amount of interest they pay. To reflect that, in this example the agency keeps only \$100,000 of the energy-related savings each year until the contract is fulfilled. After that, it retains all further savings. Thus, the government receives almost all of its \$12.6 million in net savings in years 17 through 25. Whether the savings in those years would lead to a reduction in government spending would depend on future appropriations: Lawmakers could use the project's savings to reduce total spending, or they could use the savings to increase spending for other purposes.

If, instead, the government paid for that investment up front through an appropriation, the agency would not be responsible for any financing costs, although the Treasury might incur such costs in order to borrow the needed funds.²⁵ If it did, those financing costs would be lower than the interest charged by the energy service company—although the government might assume additional risk by financing the investment through a direct appropriation.

24. In 2014, private borrowing costs under federal ESPCs ranged between 4 percent and 5 percent, according to information provided to the Congressional Budget Office by staff members of the Federal Energy Management Program, Department of Energy, in December 2014.

25. Government spending is funded by a mix of taxes, other receipts, and borrowing. For the purposes of this report, CBO analyzed the government's cash flows from buying energy-saving equipment using appropriations as if the government borrowed the money. However, CBO does not link the funds for any particular spending decision to either taxes or borrowing.

Using calculations comparable to those used for the illustrative ESPC but assuming direct government borrowing, CBO estimates that the project would have a payback period of 14 years instead of 17 years.²⁶ Total savings to the government over the 25-year life of the equipment (energy-cost savings net of project costs) would amount to \$15.2 million instead of \$12.6 million.

Because most of the expenses in either case are incurred before most of the savings accrue to the government—and because the government receives some of the savings sooner when it uses appropriated funds up front than it does under an ESPC—the implications of the two financing alternatives are clearer when those amounts are expressed in present-value terms. A present value is a single number that expresses a flow of current and future income or payments in terms of a lump sum received or paid today. A present value depends on the rate of interest (or discount rate) used to translate future cash flows into current dollars. In this example, CBO discounted future amounts using its projections of interest rates on Treasury securities with comparable maturities (for instance, using the projected interest rate on 10-year Treasury notes to discount cash flows occurring in year 10). In such present-value terms, the government's net savings would total \$6.4 million with financing by an energy service company under an ESPC versus \$8.0 million with appropriated funds. Thus, in this example, the government's total savings would be 25 percent greater, on a present-value basis, if lawmakers appropriated funds to pay for the investment directly rather than authorizing an agency to enter into an ESPC.

Cash Flows for a Series of ESPCs

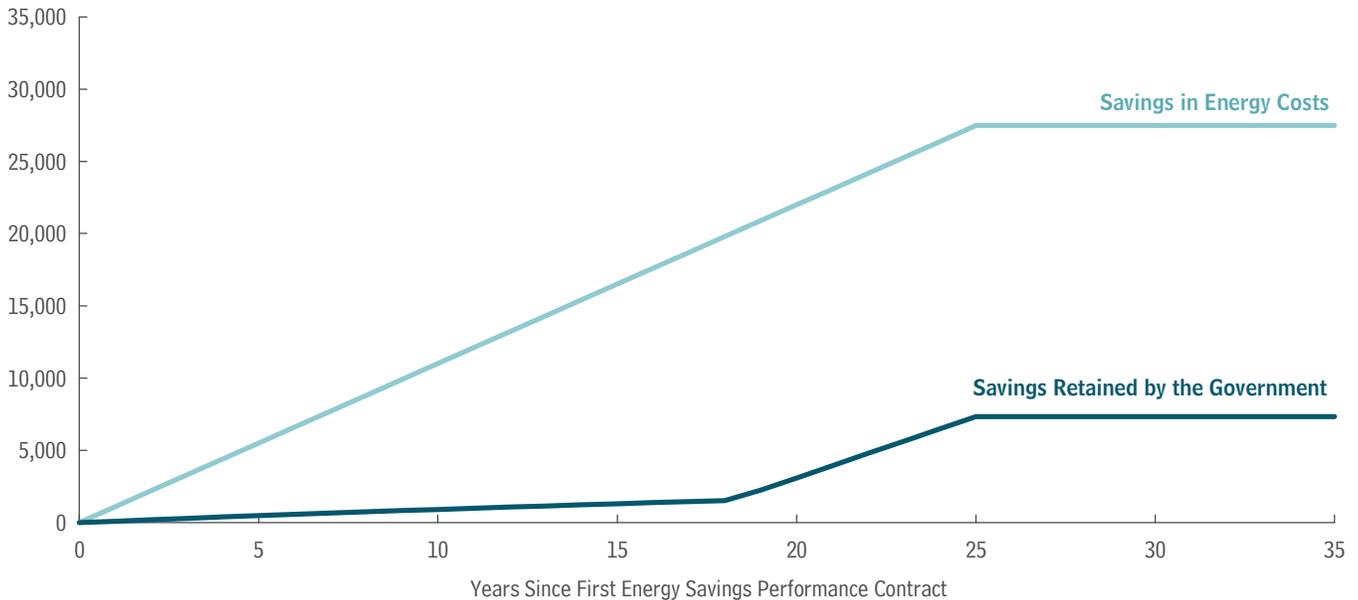
The example above illustrates the cash flows associated with a single contract. However, legislation typically gives agencies the authority to enter into multiple ESPCs over a period of years. Thus, this report presents a second

26. For the sake of comparison, in this case the government is assumed to purchase a performance guarantee from the equipment vendor that is equivalent to the guarantee an energy service company would provide under an ESPC. Thus, the government's investment equals \$10 million in the appropriation-funded case as well. Other costs are assumed to be the same despite the different means of financing, although in practice other costs might depend on the financing method used.

Figure 1.

Illustrative Cash Flows From Using a Series of Identical \$10 Million Energy Savings Performance Contracts to Purchase Energy-Conservation Measures

Thousands of Dollars, Adjusted to Remove the Effects of Inflation After the First Year



Source: Congressional Budget Office.

Notes: Savings in energy costs represent the difference between baseline estimates of what energy costs would be in the absence of the contracts and actual energy costs under all of the contracts in force during a given year.

Savings retained by the government are savings in energy costs minus the government's payments to energy service companies under all of the contracts in force during a given year.

In this illustrative example, dollar amounts are presented in real terms; that is, they are adjusted to remove the effects of inflation after the first year. Each contract requires an initial real investment of \$10 million and produces \$1.1 million in real energy-cost savings per year. The initial investments are financed by energy service companies with money borrowed at nominal interest rates of 5.5 percent a year, equal to real interest rates of 3.5 percent a year.

illustrative example, in which an agency initiates a series of identical \$10 million contracts, one each year. If the agency sustains that pace of energy-efficiency investments indefinitely, always installing equipment with a 25-year service life, the amount of equipment installed will increase only for the first 25 years. After that, the oldest equipment from those investments will start to be taken out of service, and until the investments are ended, they will just be sufficient to keep the amount of installed equipment constant.

To reflect the increases in borrowing costs that CBO projects over time, the multiyear example uses an interest rate of 5.5 percent for private financing under ESPCs.²⁷ With those higher borrowing costs, a \$10 million ESPC would be fulfilled after 19 years rather than after 17 years, as was the case in the previous example. The present value of the government's net savings from the first contract in

the series of ESPCs would be \$5.4 million, instead of \$6.4 million with 4.5 percent financing.

In this multiyear example, the savings are presented in real terms; that is, they are adjusted to remove the effects of inflation after the first year. The total savings in energy costs grow steadily for the first 25 years of the program because of the annual increase in the number of energy-conservation measures installed (see Figure 1). After 25 years, total annual energy savings remain the same each

27. CBO projects interest rates on 10-year Treasury notes to be 4.6 percent from 2020 to 2025; see Congressional Budget Office, *The Budget and Economic Outlook: 2015 to 2025* (January 2015), Table 2-1, p. 30, www.cbo.gov/publication/49892. The 5.5 percent interest rate in this multiyear example is based on that projection plus a premium of about 1 percent to reflect the higher borrowing costs of energy service companies.

year because, at that point, the amount of installed equipment stops increasing as older equipment is retired. In this example, those total real savings amount to \$27.5 million (\$1.1 million times 25) annually from year 25 on.

However, most of the government's savings associated with a particular ESPC would be realized 19 to 25 years after the equipment was installed—the last several years of the equipment's assumed service life. Thus, in this series of hypothetical ESPCs, the government's savings rise very slowly for the first 18 years and then accelerate in years 19 through 25, as the first several contracts reach the years of large government savings; the government's real net annual savings amount to \$1.5 million in year 18 and then rise to \$7.3 million by year 25 (on a non-discounted basis). Starting at that point, the government's real net savings remain the same each year, as the equipment installed under the first ESPCs reaches the end of its useful life and is replaced by equipment provided under new contracts.

A number of factors could affect how the flow of government savings from a series of ESPCs would be realized over time. The value of energy savings could be less than expected if older equipment declined in efficiency, if energy-saving opportunities become harder to find after many years of investing, or if energy prices rose less than projected. Conversely, energy savings could be greater than expected if energy-conservation measures improved because of technological innovation or if energy prices rose above projected levels.

The Treatment of ESPCs in CBO's Cost Estimates and Agencies' Budgets

The cost estimates that CBO prepares for proposed legislation reflect its application of the principles underlying federal budgeting. The federal budget is split into three broad categories: spending for programs and activities, revenues, and net interest costs. Budget authority for programs and activities—that is, the authority to incur financial obligations that will result in immediate or future outlays of federal funds—is classified as discretionary or mandatory depending on the type of legislation that creates the budget authority: appropriation acts in the case of discretionary funding, and authorization acts in the case of mandatory funding. Outlays are generally classified in the same way as the budget authority from which they result. Congressional procedures for enforcing the budgetary rules that govern discretionary

and mandatory programs differ. Consequently, CBO's cost estimates, which are designed to provide information for the Congressional budget process, identify and report discretionary and mandatory amounts separately.

How ESPCs Affect Mandatory and Discretionary Spending in CBO's Cost Estimates

A federal agency entering into an ESPC commits government resources by promising to make a stream of payments to a private contractor over a period of years to cover the costs of the acquired equipment or services. Allowing agencies to enter into such obligations in advance of the appropriations needed to make the payments required under the contract is a form of budget authority.²⁸ Thus, CBO's cost estimates for legislative proposals that would authorize or modify federal agencies' use of ESPCs show such estimated acquisition costs as mandatory budget authority and outlays—because that budget authority would be provided in a law other than an appropriation act.

To reflect the fact that under an ESPC, the government is entering into an obligation to ultimately pay the full cost of the equipment or services, and to be consistent with CBO's long-standing practices, the agency's cost estimates for such legislation show mandatory budget authority and outlays as if the government were purchasing and paying for the equipment up front and borrowing the funds to do so from the energy service company.²⁹ Thus, cost estimates show mandatory budget authority for the years when the energy service company is expected to make commitments to purchase the energy-conservation equipment and in amounts that reflect the equipment's

28. The Government Accountability Office defines an obligation as follows: "A definite commitment that creates a legal liability of the government for the payment of goods and services ordered or received, or a legal duty on the part of the United States that could mature into a legal liability by virtue of actions on the part of the other party beyond the control of the United States. Payment may be made immediately or in the future. An agency incurs an obligation, for example, when it places an order, signs a contract, awards a grant, purchases a service, or takes other actions that require the government to make payments to the public or from one government account to another." See Government Accountability Office, *A Glossary of Terms Used in the Federal Budget Process*, GAO-05-734SP (September 2005), www.gao.gov/products/GAO-05-734SP.

29. That treatment is consistent with the budgetary conventions pertaining to the way in which cost estimates treat capital leases. Like ESPCs, capital leases involve up-front commitments to pay for capital assets over time.

estimated cost as installed—plus the estimated net present value of the portion of the energy service company’s borrowing costs that results from the company’s having to pay higher interest rates than the Treasury does. (Borrowing costs equivalent to the amount of interest that would be paid if the equipment was financed with appropriated funds up front are not included in those estimates because, for the enforcement of Congressional budget rules, changes in the Treasury’s interest costs are not counted as a cost or savings related to any particular legislation.) In CBO’s estimates, the outlays expected to stem from such commitments are spread across the period during which the contractor is expected to construct or pay for the acquisition of the equipment on behalf of the federal government.³⁰

Entering into ESPCs also affects discretionary spending. As part of those contracts, agencies pay energy service companies for the costs they incur to measure and verify reductions in energy use and sometimes agree to pay them for optional services related to the operation and maintenance of the newly installed equipment. Such costs are considered discretionary, primarily because the government can opt out of those services at any time. In addition, as described in the two previous sections, investments in more efficient equipment are expected to reduce agencies’ energy-related costs, which are generally paid from annual appropriations. The amount and duration of such reductions in energy costs depend on various factors, but in general, CBO expects that they would occur gradually over the useful life of the new equipment. If the budget recorded the purchase of equipment under ESPCs as mandatory spending (as shown in CBO’s cost estimates), all of those reductions in energy costs and related costs could be used to reduce discretionary spending by the affected agencies.³¹

30. The methodology that CBO follows in preparing cost estimates for proposals involving ESPCs is consistent with scorekeeping guidelines set forth in the joint statement of managers that accompanied the conference report on the Balanced Budget Act of 1997. See House Committee on the Budget, *Conference Report to Accompany H.R. 2015*, House Report 105-217 (July 30, 1997), pp. 1007–1014, <http://go.usa.gov/hb8Q> (PDF, 3.1 MB). In particular, Rule 11 specifies scoring treatments for legislation that authorizes agencies to enter into capital leases and other third-party financing arrangements.

31. See, for example, Congressional Budget Office, cost estimate for H.R. 2689, the Energy Savings Through Public-Private Partnerships Act of 2014 (September 24, 2014), www.cbo.gov/publication/45748.

Why the Two Spending Categories Are Treated Separately

In the Congressional budget process, when lawmakers consider legislation other than appropriation bills, the legislation’s projected effects on mandatory and discretionary spending are considered separately—because the mandatory spending stems directly from the legislation at hand, whereas discretionary spending will ultimately be determined by other legislation (annual appropriation acts). Those effects are also subject to separate types of Congressional budget enforcement rules:

- Estimates of mandatory spending—such as the projected costs of investments made through ESPCs—are used, for example, in the enforcement of rules that are intended to ensure that laws affecting mandatory spending or revenues do not increase budget deficits over a given period. Those rules usually apply to legislation authorizing the use of ESPCs. Estimates of mandatory spending are also used to help committees stay within their allocations under budget resolutions.
- Possible future effects on discretionary spending—including the potential savings from energy-efficiency investments—are treated differently; limits on discretionary spending are currently enforced through annual caps on discretionary budget authority (which apply separately to defense and nondefense funding).

Assessing the budgetary impact of ESPCs is thus complicated by the fact that, according to CBO’s estimates, most of the costs of such contracts fall in one budget category and the savings in another. Moreover, much or all of the spending for a newly authorized ESPC would occur during the 10-year period covered by CBO’s cost estimates, whereas much of the resulting savings would occur later.

An Illustrative Example of CBO’s Budgetary Treatment

If CBO produced a cost estimate for the first illustrative example described above—the single \$10 million investment funded through an ESPC—it would show the following effects on mandatory and discretionary spending (see Table 2):

- The legislation authorizing the contract would be estimated to result in \$11.6 million in mandatory budget authority in the year when the ESPC was signed: \$10 million in investment costs (for energy-conservation measures as installed and related performance guarantees) and \$1.6 million for the discounted present value of the added cost of private financing compared with Treasury rates. Estimated mandatory outlays would also total \$11.6 million; those outlays would be spread across the years in which the vendor was expected to install the equipment.³² (For simplicity, the energy-conservation measures in this example are assumed to be fully installed immediately.)
- Estimated reductions in energy consumption and costs because of the ESPC would reduce the need for discretionary appropriations by \$1.1 million in the first year and by slowly increasing amounts thereafter.³³ Because the Congressional budget process considers estimated changes in spending and revenues for the current year and the following 10 years, the savings shown in detail in a CBO cost estimate do not necessarily encompass all of the expected savings from an ESPC, which typically accrue over a longer period.
- Partly offsetting those reductions, contract-related services would have estimated discretionary costs of about \$250,000 to \$300,000 per year.

In all, that example would be estimated as potentially saving \$10.3 million in discretionary costs, on net, over the first 10 years. More savings would be anticipated in later years because the equipment is assumed to have a useful life of 25 years.

Differences in Federal Agencies' Budgetary Treatment

The Office of Management and Budget and other agencies, however, generally do not follow procedures that

capture the scope of the government's obligations under ESPCs when those commitments are made, as is the norm in federal budgeting and as the procedures that form the basis for CBO's cost estimates do. In agencies' budgets, the initial commitment of government resources for all of the payments required under an ESPC is not shown as an obligation requiring up-front budget authority. Rather, agencies usually record payments to the vendors as coming from annual appropriations spread out over many years. Under that approach, appropriations to make those payments are offset, at least in part, by whatever reductions in annual energy costs the investments produce.

That practice is allowed by the law governing ESPCs, which is unusual in that it allows agencies to enter into contracts without an appropriation to cover the full cost of the government's legal obligation. Instead, upon signing the contract, an agency is required to obligate only the amount needed to cover the first year of the contract's cost. Nevertheless, in providing guidance related to the use of ESPCs, the Office of Management and Budget cautions agencies to consider the binding nature of such contractual commitments and how they might constrain agencies' flexibility in managing funds provided in future years.³⁴

Moreover, agencies' practice of recording contract payments as ongoing annual expenses effectively requires them to devote a portion of their discretionary appropriations to cover vendors' financing costs for investments acquired through ESPCs. In contrast, the interest costs associated with federal projects that are paid for directly with appropriations are not charged to agencies' budgets as a cost. By long-standing practice, the government's interest costs on amounts that the Treasury borrows to pay for federal activities are considered a means of financing, and such costs are not included in estimates of the budgetary effects of legislation that provides funding for those activities.

32. That \$11.6 million is the same as the present-value amount shown at the bottom of the middle column of numbers in Table 1.

33. Those savings are the amounts shown for the first 10 years in the first column of numbers in Table 1.

34. See Office of Management and Budget, *Federal Use of Energy Savings Performance Contracting*, M-98-13 (July 1998), <http://go.usa.gov/hPg5> (PDF, 581 KB).

Table 2.

Illustrative Cost Estimate Showing the Budgetary Effects for a Federal Agency of Using an Energy Savings Performance Contract

Thousands of Dollars, by Fiscal Year

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total		
												2015-2020	2015-2025	
Changes in Direct Spending^a														
Federal Obligations Under Illustrative ESPC														
Estimated budget authority	11,578	0	0	0	0	0	0	0	0	0	0	0	11,578	11,578
Estimated outlays	11,578	0	0	0	0	0	0	0	0	0	0	0	11,578	11,578
Changes in Spending Subject to Appropriation														
Savings in Energy Costs														
Attributable to the ESPC														
Estimated authorization level	-1,100	-1,122	-1,144	-1,167	-1,191	-1,214	-1,239	-1,264	-1,289	-1,315	-1,341	-1,341	-6,939	-13,386
Estimated outlays	-1,100	-1,122	-1,144	-1,167	-1,191	-1,214	-1,239	-1,264	-1,289	-1,315	-1,341	-1,341	-6,939	-13,386
Appropriations for ESPC-Related Services ^b														
Estimated authorization level	250	255	260	265	271	276	282	287	293	299	305	305	1,577	3,042
Estimated outlays	250	255	260	265	271	276	282	287	293	299	305	305	1,577	3,042

Source: Congressional Budget Office.

Note: This table shows the estimated budgetary effects of the notional \$10 million energy savings performance contract (ESPC) described in Table 1. The estimates reflect procedures that CBO views as appropriate for recording ESPCs in the federal budget. However, since 1998, when ESPCs were first implemented, the Administration has not recorded the full extent of federal obligations under ESPCs up front when the contracts are signed. Instead, the Administration records agencies' ongoing contract payments to vendors under ESPCs on a year-by-year basis as appropriations for such payments are provided. (That practice is allowed by the law governing ESPCs.) If the Administration continued to follow that practice for this illustrative ESPC, agencies' savings in energy costs would be largely unchanged during the contract period, when savings from reduced energy costs would go toward making contractual payments to vendors. As a result, CBO estimates that there would be no significant reduction in appropriations from executing this contract in the 10-year period covered by this estimate. If expected reductions in energy use continued beyond the contract period, budgetary savings would accrue to the federal government if annual appropriations for agencies' energy-related spending were reduced accordingly.

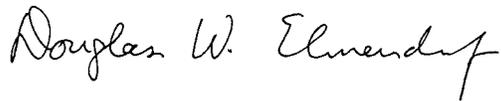
- a. Estimated budget authority is shown in the years when commitments are expected to be made and in amounts that reflect the estimated cost of the energy-conservation measures as installed—plus the estimated net present value of the portion of the energy service company's borrowing costs that results from the company's having to pay interest rates higher than the Treasury does. (Borrowing costs equivalent to the amount of interest that would be paid if the equipment was financed with appropriated funds are not included here because, for the enforcement of Congressional budget rules, changes in the Treasury's interest costs are not counted as a cost or savings related to any particular legislation.) Estimated outlays stemming from such commitments are spread across the period during which the contractor is expected to construct or purchase the equipment on behalf of the federal government. For simplicity, the energy-conservation measures in this example are assumed to be fully installed immediately.
- b. ESPC-related services cover the costs of performing scheduled maintenance on equipment, repairing or replacing associated equipment not installed as part of the contract, measuring and verifying energy savings, and managing and administering the contract. Some annual contract expenses may be incurred after the payback period if a contractor continues to operate and maintain the equipment for the government.

About This Document

This Congressional Budget Office report was prepared at the request of the former Chairwoman of the Legislative Branch Subcommittee of the Senate Committee on Appropriations and as required by Senate Report 113-196, *Legislative Branch Appropriations, 2015*. In keeping with CBO's mandate to provide objective, impartial analysis, this report makes no recommendations.

David Austin and Megan Carroll wrote the report with contributions from Gabriel Ehrlich and Jeffrey Perry and guidance from Kim Cawley, Theresa Gullo, Joseph Kile, and Chad Shirley. Jason Levine, Damien Moore, David Newman, Mitchell Remy, and David Torregrosa of CBO provided helpful comments.

Jeffrey Kling and Robert Sunshine reviewed the report, Christian Howlett edited it, and Jeanine Rees prepared it for publication. An electronic version is available on CBO's website (www.cbo.gov/publication/49869).



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Director

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