

U.S. And European Experience with Energy Savings Performance Contracts

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*IEA ECBCS Annex 46: Holistic Assessment Toolkit on Energy Efficient Retrofit Measures for Government Buildings

- Provide tools and guidelines to improve the working environment in government buildings through energy-efficient retrofit projects
- Promote energy-efficient, cost-effective retrofit measures by providing successful examples
- Support decision makers in evaluating the efficiency and acceptance of available concepts
- Find improved ways of using energy performance contracts for retrofit measures in government buildings

*International Energy Agency Energy Conservation in Buildings and Community Systems

Annex 46 includes four subtasks

- A: Develop an energy assessment guide for energy managers and energy service companies (ESCOs)
- B: Develop a database of energy saving technologies and measures for government building retrofits, with examples of best practices
- C: Develop best practice guidelines for innovative energy (savings) performance contracts (EPCs/ESPCs)
- D: Develop an electronic interactive sourcebook to make the results of the Annex available to target audiences

Objectives of Subtask C (Develop best practice guidelines for innovative energy performance contracts)

- Identify common goals and motivating factors in government use of ESPC
- Analyze ESPC contract structures and contract development processes to identify barriers and suggest potential improvements
- Compare technical/engineering practices in the areas of baseline development, estimation of energy and cost savings, and measurement and verification (M&V) of savings
- Develop best practice guidelines

Participants in Subtask C

- U.S. (ORNL) leads with DOE sponsorship
- Finland (VTT)
- Germany (Fraunhofer Institute of Building Physics, Ennovatis GmbH)
- Denmark (Cenergia)

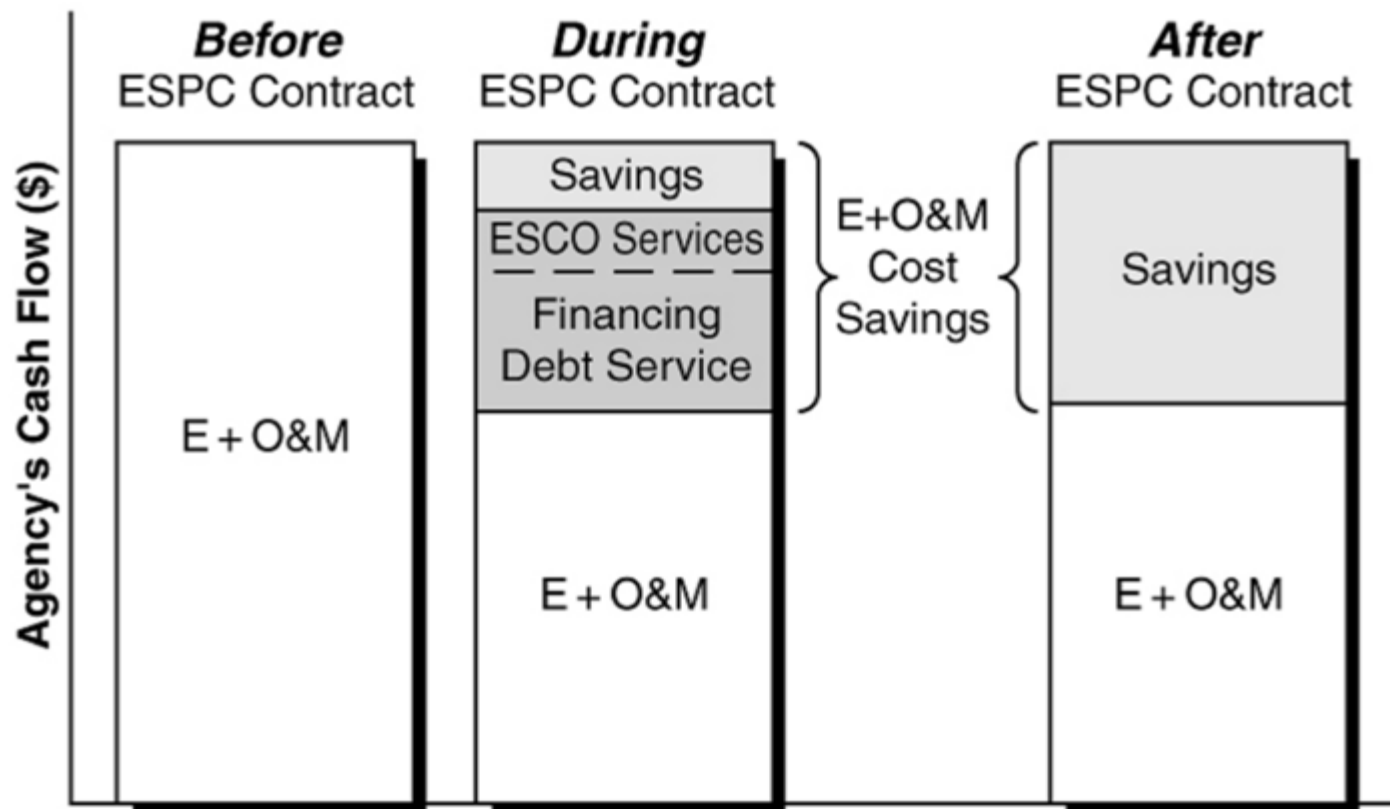
Country reports are being prepared by the participants

- Statistics on size of ESPC market
- Implementation procedures
- Common ECMs
- Case studies

What is an Energy Performance Contract?

- A partnership between a facility owner and a qualified services provider
- Together, they develop a financial, technical and operational solution that meets specific performance criteria
- The financial and technical risks are laid out up front and allocated between the two parties

ESPCs allow energy conservation goals to be met with no net budget increases



During performance period, ESCO guarantees savings

- ESCO performs periodic measurement and verification (M&V) of savings according to plan approved by customer
- ESCO issues report annually (or more often) detailing the level of savings achieved

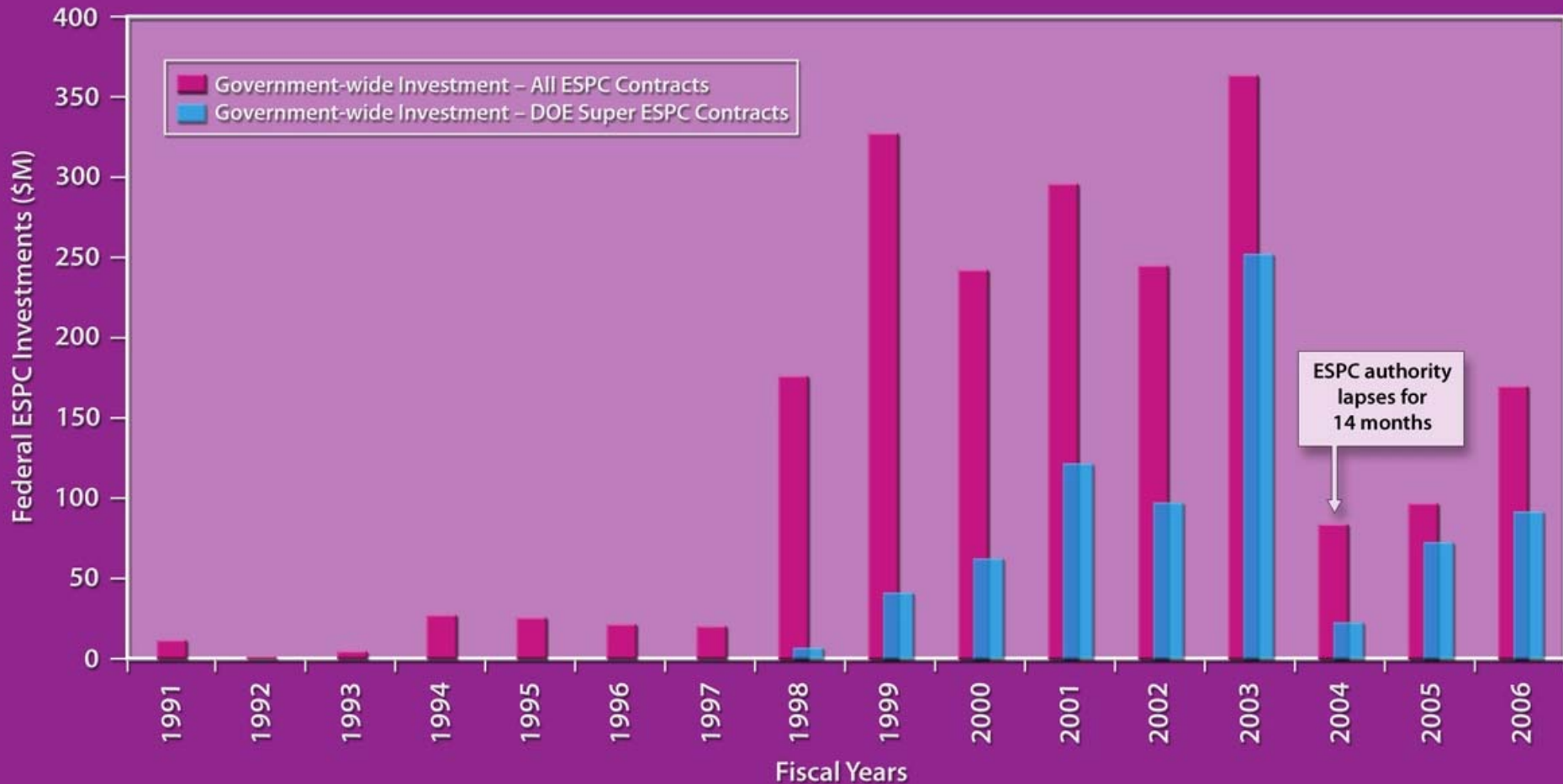
Market for ESPC in US public sector is very active

- ~US \$330 million per year in project investment at the federal level
 - \$230 million ESPC
 - \$100 million UESC
- Another US \$1 billion per year in project investment in public-sector/institutional projects
 - State, county, municipal government buildings
 - Universities
 - K-12 schools
 - Hospitals
- Less information is available about the private sector, though the market is known to be large and active

Numerous ESPC vehicles available to US federal agencies

- U.S. Department of Energy's Super ESPC contracts
- U.S. Army Corps of Engineers
- U.S. Air Force
- Site specific contracts
- Utility Energy Service Contracts (UESC) similar to ESPC, but implemented by utility

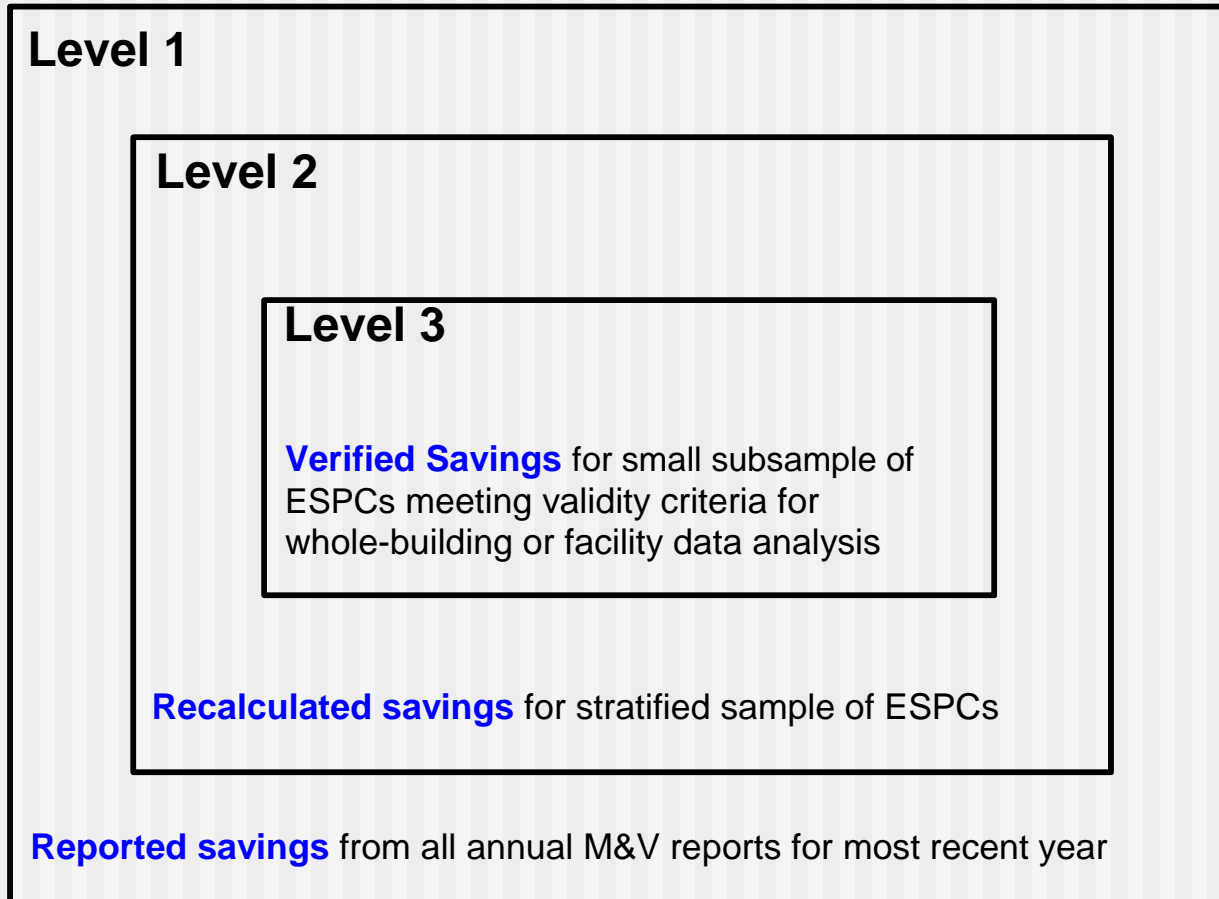
U.S. Government ESPC Investment, 1991 – 2006



US Federal ESPCs have used a decentralized model

- Broad “umbrella” type IDIQ contracts issued by central agency (such as DOE) to a group of qualified ESCOs
- DOE delegates contracting authority to outside agencies, which write delivery orders against DOE’s IDIQ
- DOE is involved in the process up to the time of award, after which agency administers contract
- This emphasis on pre-award led to several questions about the performance period
 - Are M&V techniques adequate?
 - Are the correct assumptions being made?
 - Are savings being realized?

Methodology for program-wide audit of DOE Super ESPC



Fundamental question: Are ESPCs delivering guaranteed savings?

Collect the latest annual M&V report for all ongoing projects

Extract reported cost savings

Compare with guaranteed cost savings

Recalculate cost savings for a random subsample of M&V reports

Compare cost savings based on “contract” vs. “actual” energy rates

Verify practical M&V actually used vs. independent metered data – are claimed energy savings there?

Level

1

2

3

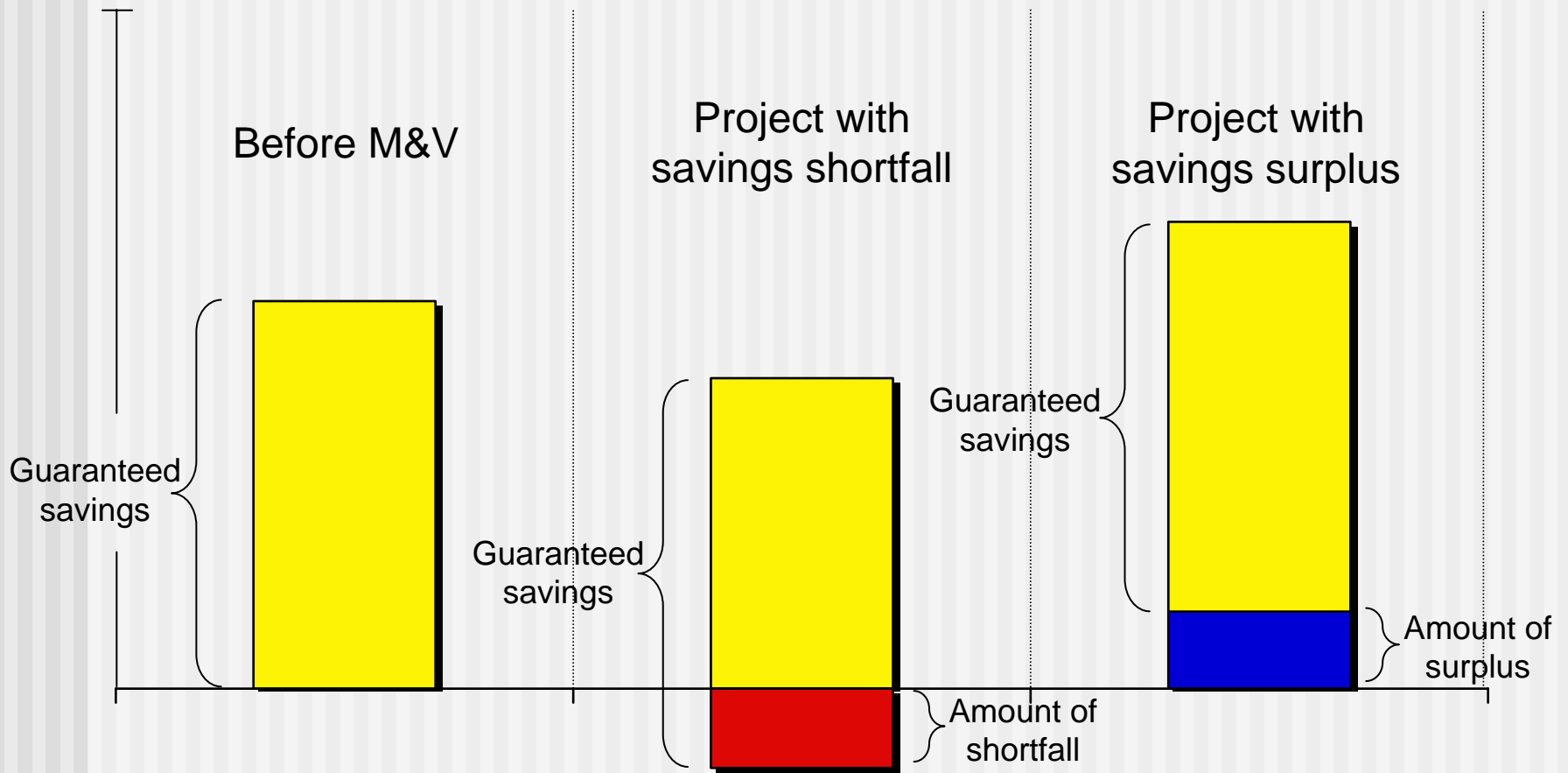
The audit methodology is keyed to how the ESPC process works

- ESCO estimates the energy savings from the project. This becomes the **Estimated Energy Savings**
- Site and ESCO negotiate **Contract Rates** for energy
 - Usually based on today's prices with constant escalation
- Given contract rates and energy savings, ESCO can estimate cost savings for each year. ESCO guarantees a portion of this (~91% on average). This is the **Guaranteed Cost Savings**.
- Each year, ESCO determines energy savings, applies agreed-upon contract rates, and calculates cost savings. This is the **Reported Annual Cost Savings**.
- If Reported > Guaranteed, guarantee is met. Otherwise, payment from site to ESCO is reduced by amount of shortfall.

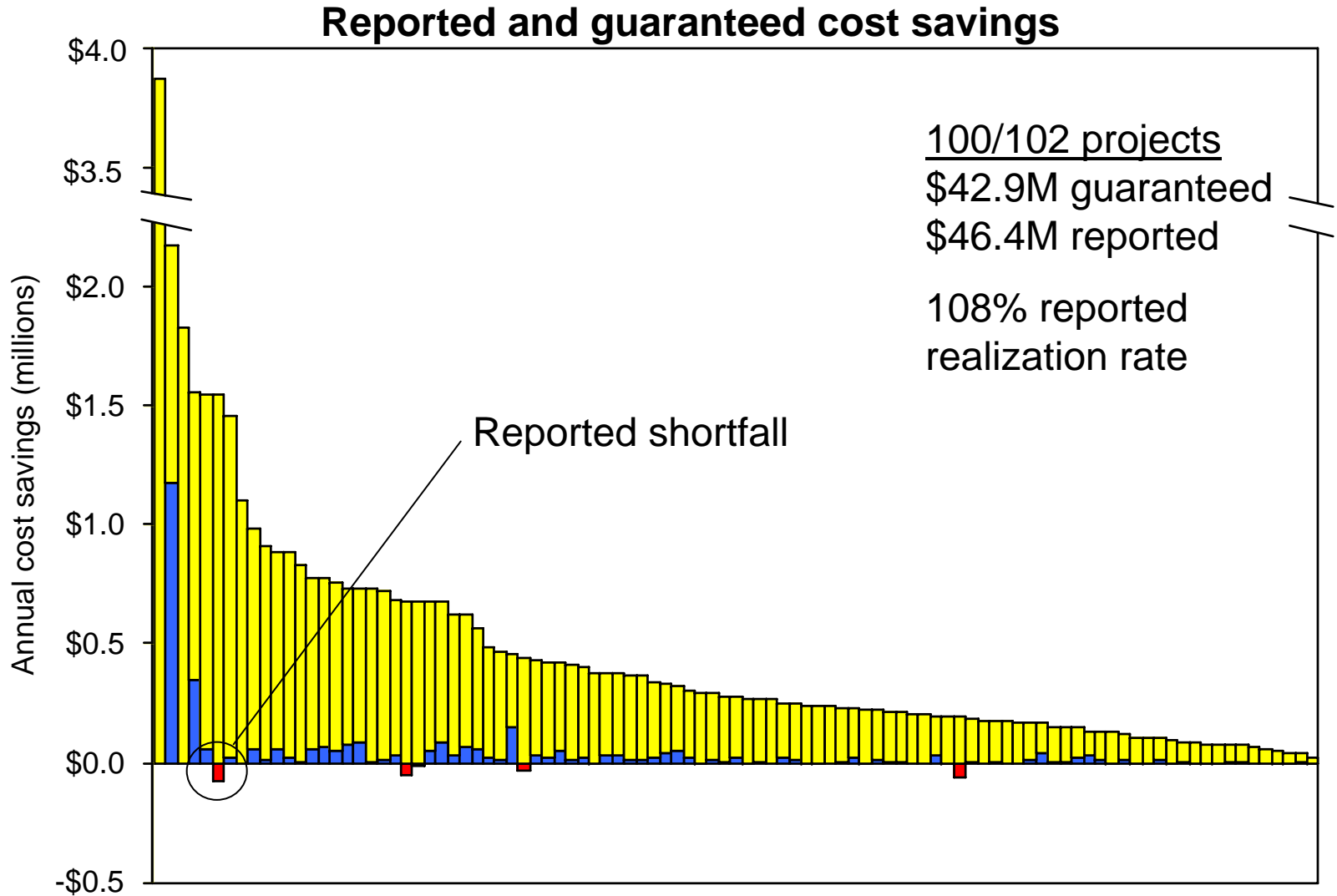
Bottom line from audit so far

- Level 1
 - Reported savings are 108% of guaranteed savings
- Level 2
 - Cost savings based on “actual” rather than “contract” rates are 110% of reported savings
- Level 3
 - In progress
- Bottom line
 - Actual cost savings (based on reported energy savings) are about $(1.08 \times 1.10) = 119\%$ of guaranteed savings on average, if Level 3 proves energy savings are there

In subsequent charts, projects with shortfalls or surpluses are represented as shown below

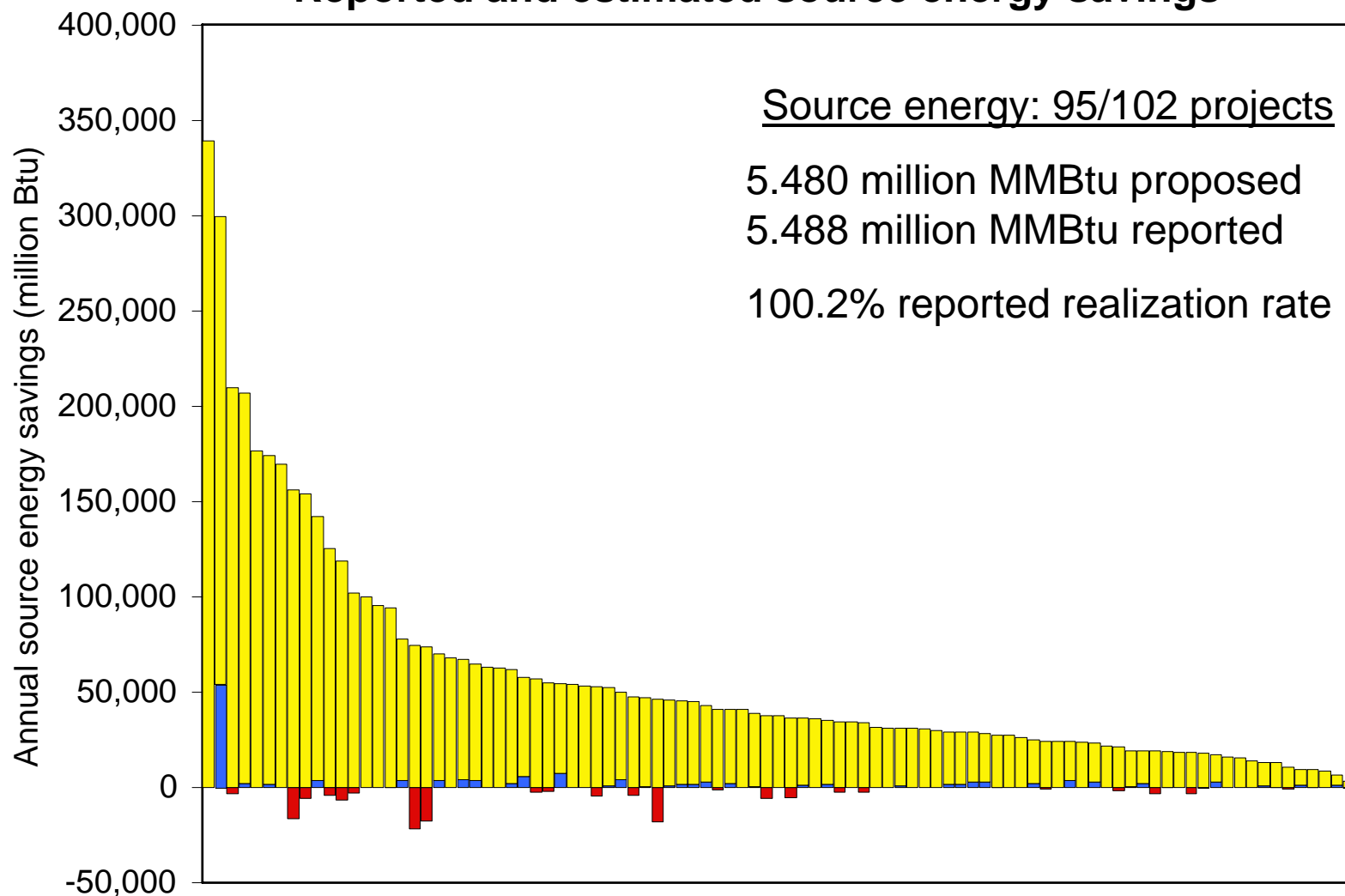


ESCOs report 108% of guaranteed cost savings program wide

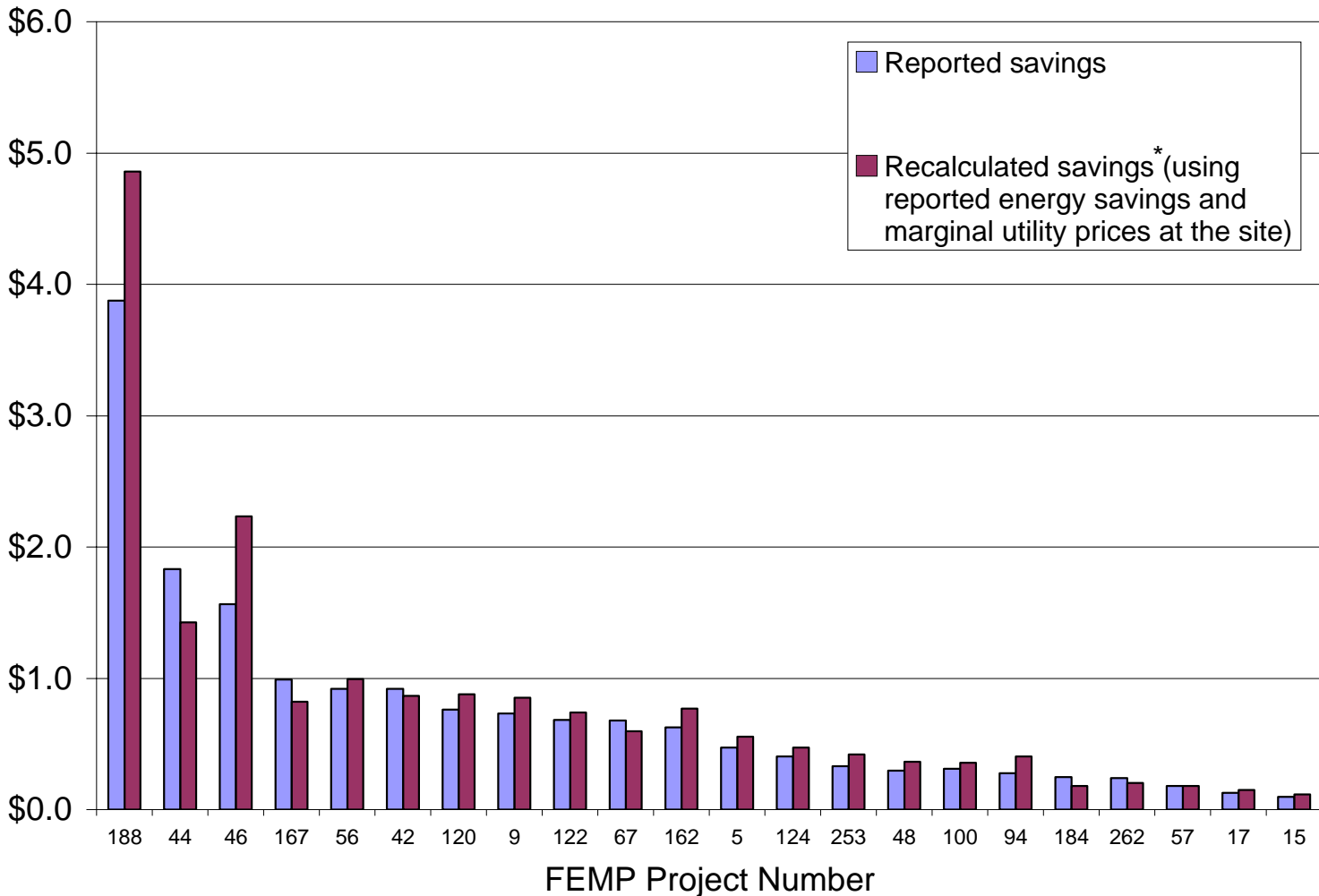


ESCOs report 100.2% of estimated energy savings program wide

Reported and estimated source energy savings



For most projects, energy savings are worth more than what is paid to ESCOs



*Assumes O&M savings per contract values, utilities other than gas and electric at contract rates

ESPC activity in the EU

- In general, market not as active as in US, though it is growing
- Estimates are that energy consumption across EU could be reduced by 20% through cost-effective measures
- ESPC environment varies across the EU: very active markets in some countries, others have very little activity at all
- Similar obstacles mentioned in countries with less activity
 - Lack of legal framework for ESPC
 - Lack of knowledge about ESPC
 - ESPCs are complicated and take a great deal of time to set up
- Similar obstacles were present at early stages of US market

Differences between US and EU environment for ESPCs

- Varying legal structures in member countries make it difficult to develop model contracts that apply across the EU
- On the other hand, the generally higher energy prices in EU countries make ESPC economics more favorable
- Higher savings can be used to pay for additional performance period savings, or shorten performance period -- usually the latter

Relative level of ESPC activity

- Germany
- Austria
- France
- Finland

More ESPCs
Well-developed legal framework

- Norway
- Sweden
- Italy
- Greece

Fewer ESPCs
Less-developed legal framework

ESPC actively promoted in EU by EUROCONTRACT

- Partners from Austria, France, Finland, Greece, Norway, Sweden, UK
- Membership consists mostly of officials of government energy agencies
- Provides best practice examples, model contracts and country specific information for many European countries
- Good summaries of ESPC market in most EU countries at <http://www.eurocontract.net>

Energy conservation goals have been key drivers in both the US and the EU

- Energy Policy Act of 1992
- Executive Order 13123, “Greening of the Government”
- Energy Policy Act of 2005
- EO 13423: Strengthening Federal Environmental, Energy, and Transportation Management
- Energy Independence and Security Act of 2007

EU energy legislation also promoting use of ESPC

- Energy End-use Efficiency and Energy Services Directive (2006/32/EC) adopted April 2006
- Purpose: encourage energy efficiency through development of market for energy services and delivery of energy efficiency programs and measures to end users
- Sets energy reduction targets of 1% per year from 2008 to 2016
- Requires public sector to play a leading role
- Encourages the use of ESPC and directs Member States to remove legal barriers that restrict their use

The EU directive includes some interesting provisions

- Requires member states to make energy audits available for all buildings including smaller residential and commercial structures
 - In Finland, these audits are subsidized by the government
- Promotes the use of smart metering
- Requires third-party M&V

Motivations for ESPC are similar in US and EU

- For public entities, ESPC is usually a much faster way to implement projects
 - Funding requests from government budgets must be made some years in advance
 - Not all funding requests are authorized, so process is uncertain
- ESPC projects can be funded with no up-front cost
 - Capital funds retained for more pressing needs or used to leverage additional ESPC funding

Other incentives for use of ESPC

- ESCO provides a single point of contact: design, installation, commissioning, operations & maintenance (O&M)
 - Avoids finger-pointing associated with traditional design/bid/build contracts
- Savings guarantees ensure equipment performs to specifications for life of project
- Future O&M costs can be fixed at known levels

ESPC is standard operating procedure in the U.S.

- Since 1998, U.S. federal agencies have awarded about \$2 billion in ESPC projects
- These projects are saving 19 trillion Btu (20 PJ) annually
- Most U.S. States have also passed ESPC implementing legislation and are actively promoting ESPC use

ESPC market in the EU is less well-developed, but growing

- Varying legal framework makes it difficult to develop EU-wide policies
- Some countries such as Germany have very robust, innovative ESPC market
- Europeans are actively working to reduce barriers to ESPC and realize their potential for saving energy and reducing greenhouse gas emissions

Summary

- Annex 46 — including Subtask C — can play an important role in meeting the objectives of the EC Directive
- Opportunity for U.S., Europeans, and others to learn from each other and find what works best