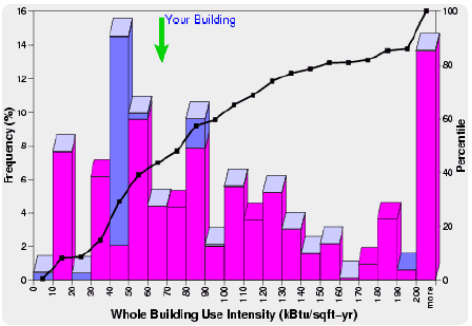
Recipe for Developing a Winning M&V Formula in Indian ESCO Projects: Balancing Rigor and Accuracy with Cost-Effectiveness and Practicality



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Evolution of Energy Services Sector in India

- ESCO Industry began in India in 1995-96
- Two types of ESCOs in India
  - Vendor ESCOs
  - ESCOs
- Stimulation of ESCO industry through various pilot projects
- ESCO industry is yet to grow to its full potential
  - Lack of awareness
  - Payment security mechanisms
  - M&V as a risk management tool not properly understood

Latest BEE Initiatives

BEE has undertaken many projects to create a framework at the National level and facilitate implementation of performance contracting programs in India:

- Accredited 37 ESCOs With CRISIL and ICRA
- Signed MOUs with PTC and IREDA- finance EE projects through EPC
- Launched municipal DSM project for 175 municipalities in 2008
- Conducting energy audits of 400 public sector buildings- Designated State Agencies
- Creation of a Super ESCO - EESL

Other ESCO Market Stimulants

- Thrust given to ESCO industry by Energy Conservation Act 2001
  - Pilot Buildings EE project
  - Energy Manager and Energy Auditors certification
  - BEE's accreditation and rating program
- Donor supported Programs to foster ESCO growth in India – a few examples
  - USAID Energy Conservation and Commercialization Project
    - Energy Assessment Guide for Commercial Buildings
  - World Bank's 3 Country Program
  - IFC ESCO linkages Program
    - Manual for Development of Municipal Energy Efficiency Projects
  - Clinton Climate Initiative

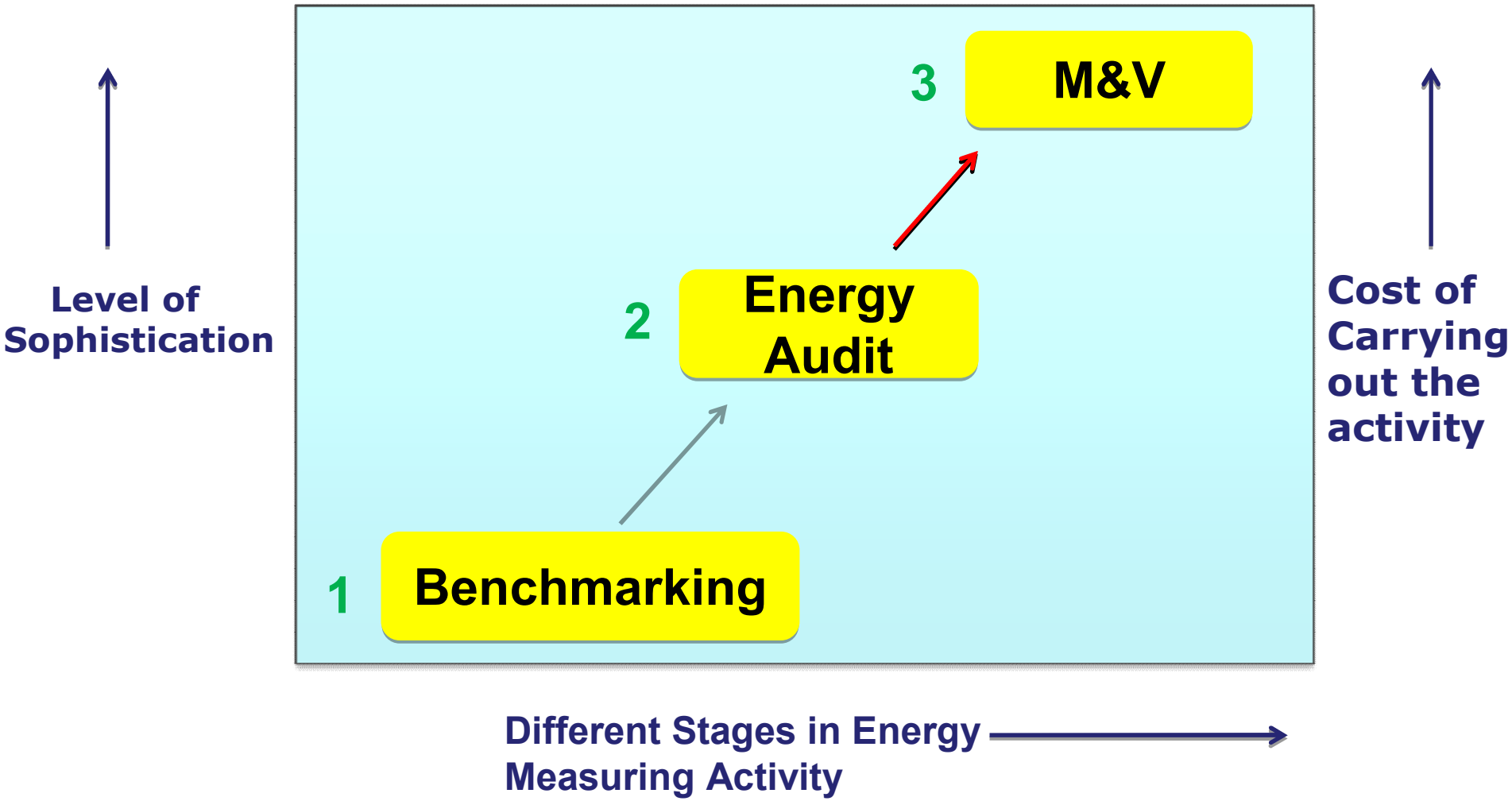
M&V in Indian Pilot Projects

- EE projects in India evolved from Energy Audits
- Implementation of no-cost/low-cost stage to IGA and implementation through Energy Performance Contract
- Key Issues
  - Baseline definition, Baseline adjustments (under what conditions)
  - Lack of metered data
  - Energy consumption at the whole building level is the key parameter
  - Lack of trust
  - Personnel turnover
- Limited knowledge of IPMVP
- Successful ESCO Projects will stimulate market growth and lead to formation of more ESCOs
  - M&V crucial to certify project success

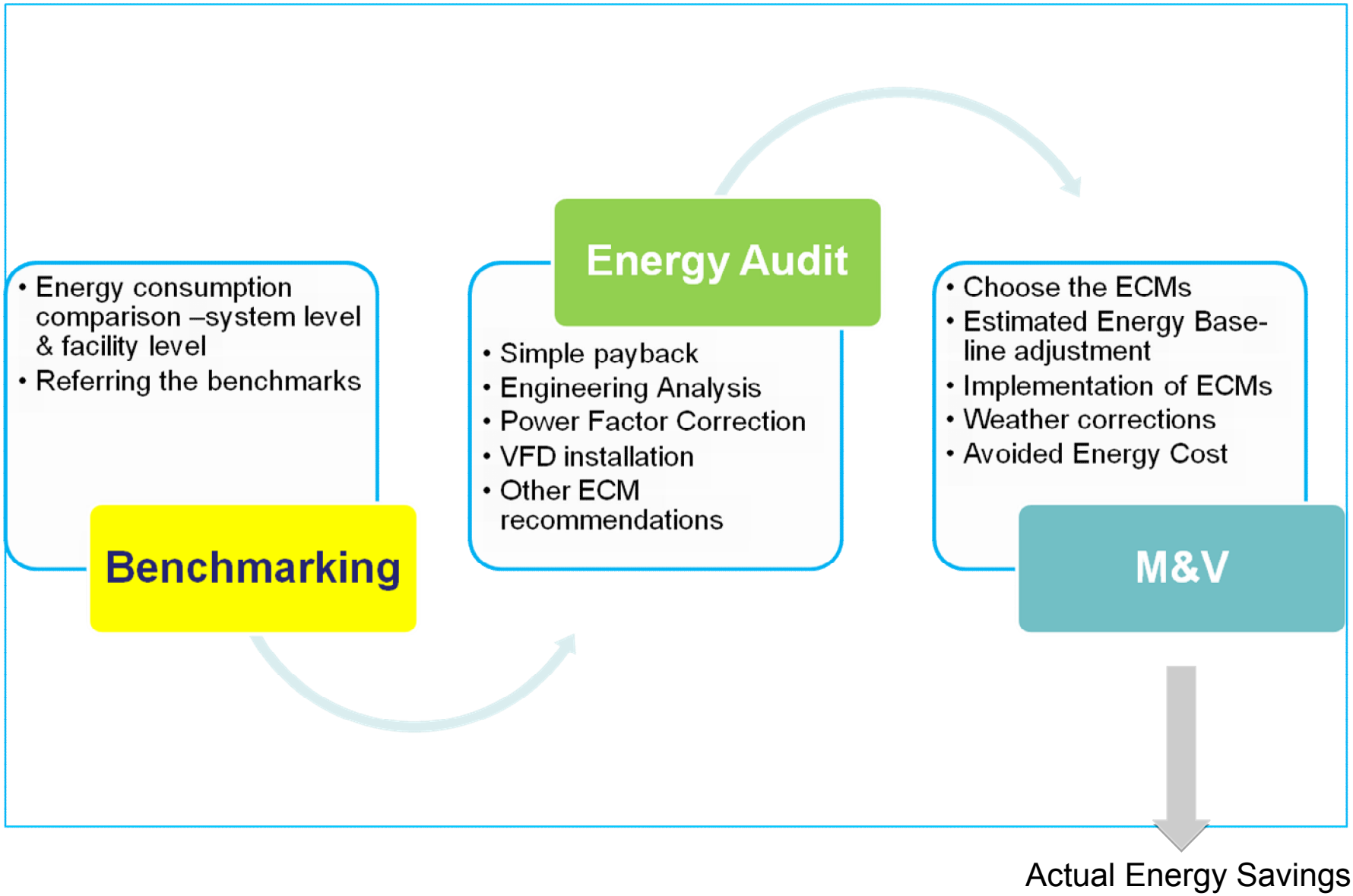
Minimum M&V Activities in Indian Projects

- Keep in mind the capacity, understanding, and Indian Culture in the Govt. and within companies
- Preliminary Energy Data (Site Data Package) - Basis of Requesting RFP
- Baseline Definition - Detailed Energy Survey (Investment Grade Audit)
- Post-installation report with first-year estimates.
- Annual M&V verification - “potential to perform”
- Annual M&V reports.

Evolution of Energy Measurement

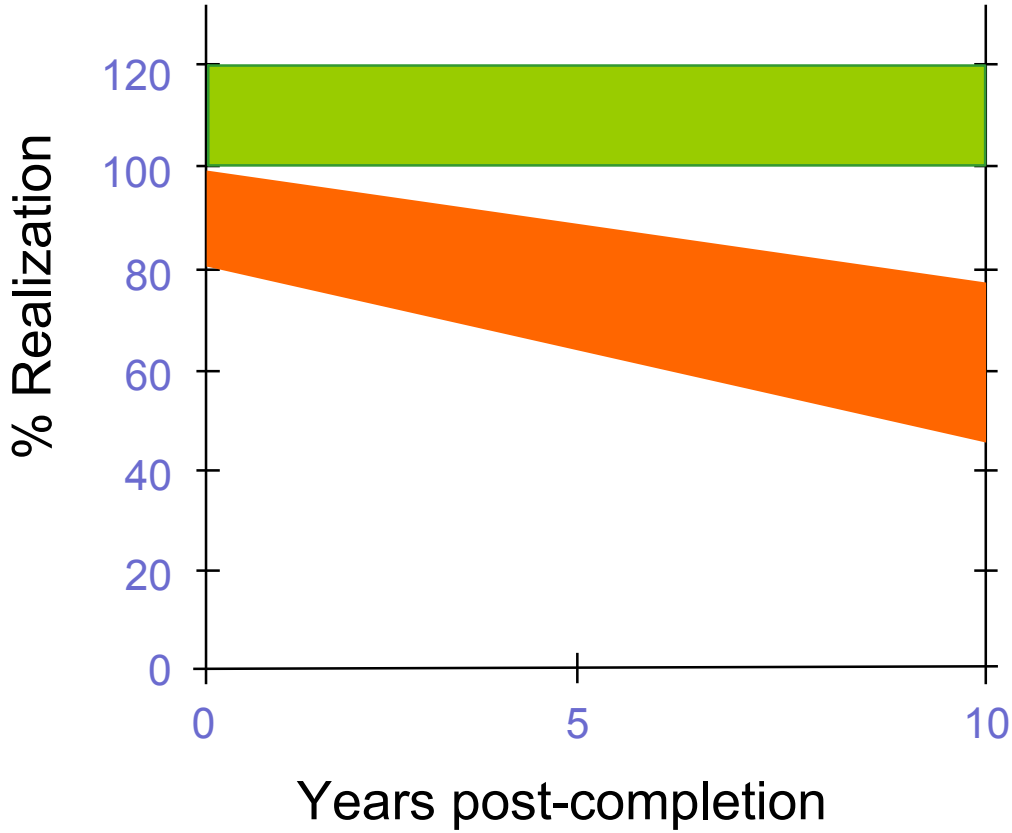


The sequence of energy measurement –Achieving actual energy savings



Benefits of Good M&V

- Initial savings level
- Persistence of savings
- Variability



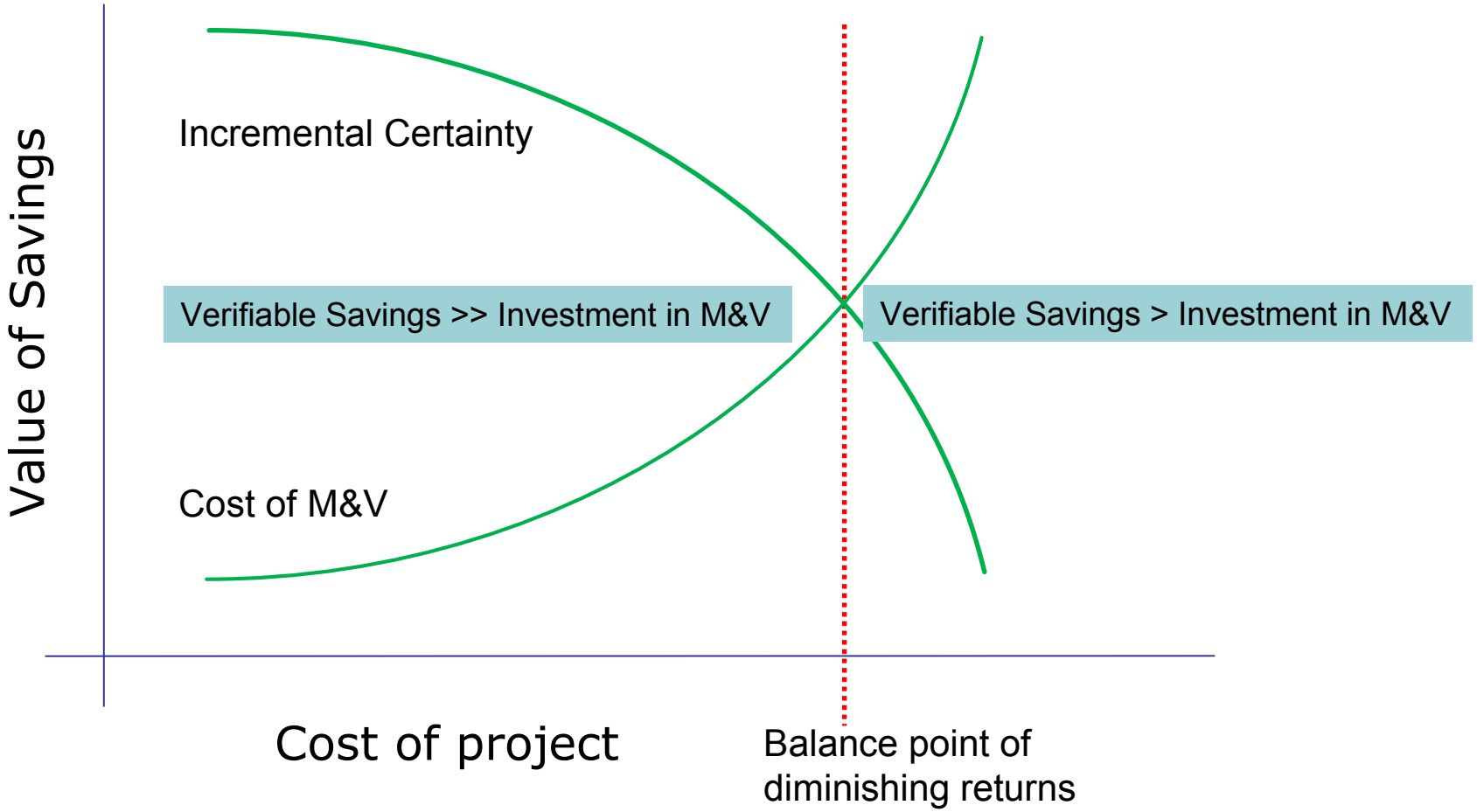
Source: IPMVP Project, US DOE

Benchmarking Performance

	Cars	Lighting System
Performance Metric	**MPG**	**Lumen/Watt**
Actual Savings	**Miles Driven**	**kWh**

Source: IPMVP Project, US DOE

Trade-off Between M&V and Cost (Idealized)



Source: IPMVP Project, US DOE

M&V is an Insurance Policy

- Insurance policy helps protect the value of cars and homes
  - What is the deductible
  - What is the coverage

- Similarly, M&V helps manage risks involved in a performance contracting project
  - Level of M&V
  - M&V approach/options
  - Other checks and balances

Million Dollar Question

- How does one ensure that actual energy savings are being achieved in projects?
  - Before and After Utility Bills (preferred by clients)
    - But … (Learning from FEMP's experience)
  - Retrofit Isolation (Option A & B)
- What's the right amount of M&V?
  - Difficult to reach consensus on a specific project
  - General concern about the degree of stipulation and utility bill reduction
  - *Can we do this without complex (expensive) analysis?*

Energy Savings Discrepancy Analysis

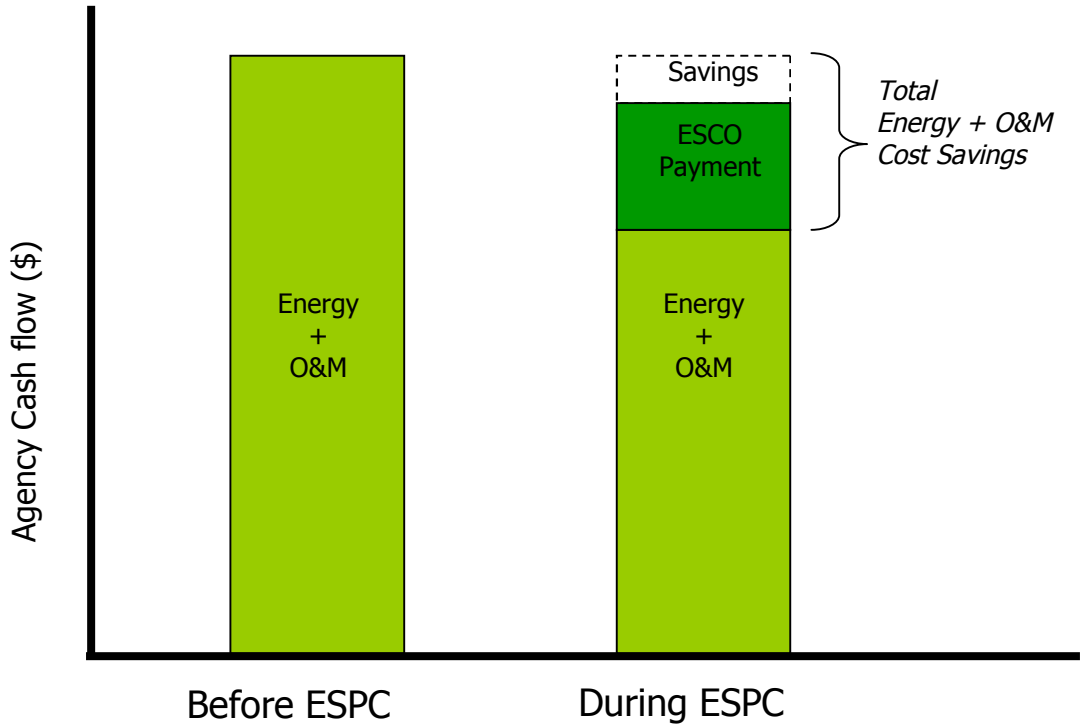
- **Understand the difference** between utility bill accounting and cost avoidance
- Load creep and utility unit costs significantly increase installation utility bill baseline
- ESPC promotional efforts advertise savings in dollars and imply an impact to installation and agency budgets
- But ESPC projects guarantee energy savings only in terms of kWh, kW, Btus, etc. – not dollars
  - Energy savings are translated to rupees/dollars using stipulated unit energy costs and escalation rates
- Not uncommonly, government personnel see higher (or flat) energy bills at sites where ESPCs took place and wonder (very loudly, sometimes) whether savings were really achieved

Factors that might Mask Savings' Visibility in Utility Bills

- Utility rate changes
- Weather
- Mission changes (e.g., # of people on base, operating hrs. of building)
- Facility changes (e.g., added bldgs.)
- Limited utility metering (e.g., one meter for whole base or large campus)
- Small scope of project (relative to site)
- Load creep

ESPC Cash-flow Model

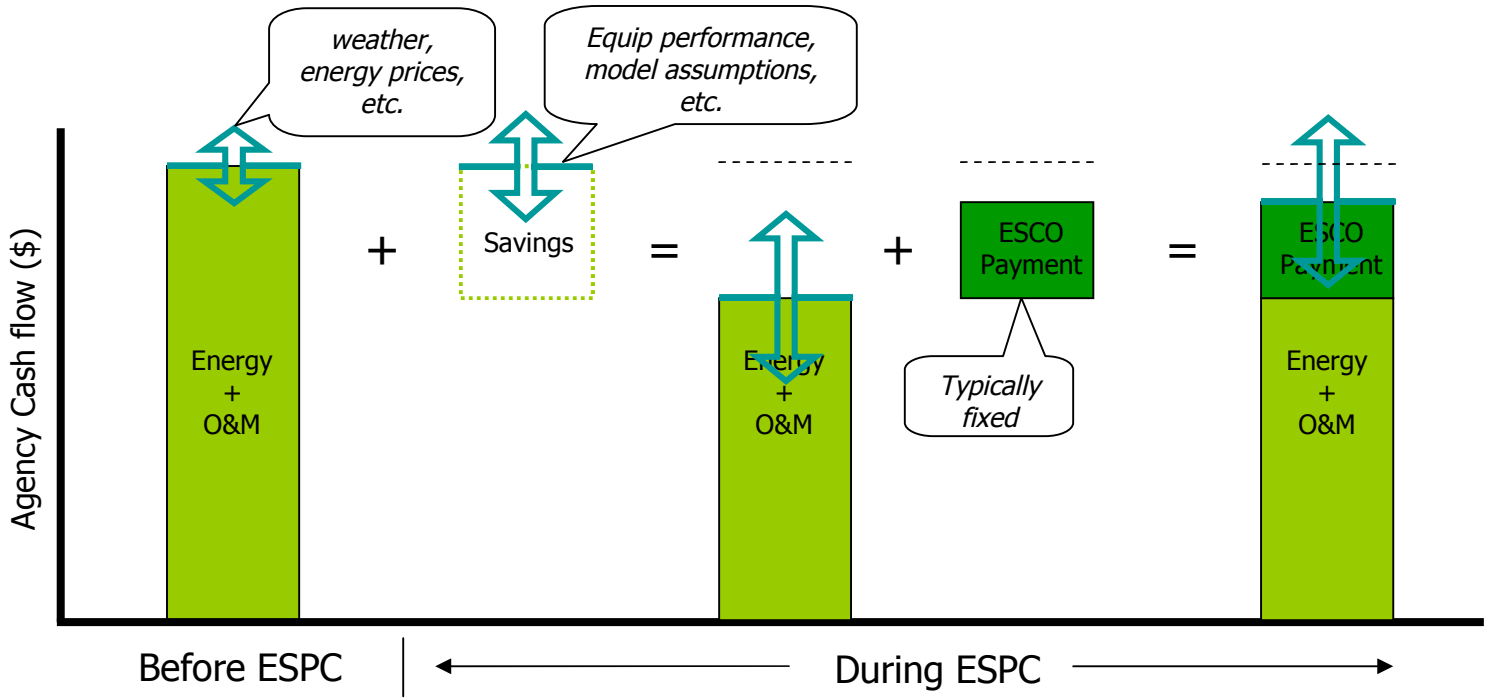
- Payments to ESCO <= Total cost savings
- Total Cash flow during ESPC is (supposed to be) less than before ESPC



Source: FEMP and LBNL

ESPC Cash-flow Model

- In reality, there are uncertainties around each cash flow component



Source: FEMP and LBNL

Lesson Learnt - Program design and Contractual issues

- "Contingency Grant" with non-discretionary provisions where a portion of savings go in
  - Dept. that saved can spend it
- Bundle Projects to reduce transaction cost and easy program management
  - TN and Gujarat
- Reduce project development time
  - Often been cited as one of the biggest barriers that ESCOs face in working with public sector
- Developing and promoting a standardized approach with fixed milestones can reduce long project development time
  - Project kick-off, site visits by ESCOs and so on
- Maintain the integrity of the performance contract
  - Key to successful Program
- Keep bundled performance-based municipal energy efficiency projects separate from carbon credits projects
  - Energy efficiency project documents could provide necessary linkage clauses for undertaking carbon credits as a follow-up activity by the state

Lesson Learnt - Project Support, Facilitation, Resolving Technical Issues, Management

- High turnover among government decision makers and staff can stall projects
- Absence of a professional facilitation organization can slow a project
- Put in place an overreaching regulation, directing government organizations to reduce their energy consumption
- A Project Management Committee (PMC) consisting of a government officials, a project facilitation organization, and other neutral organization can facilitate the implementation
- Capacity of the project management committee members should be developed to enable them to carry out reviews
- Need for training ESCOs in conducting IGAs and preparing bankable reports

Lesson Learnt- ESCROW Accounts, Payment Security Guarantees, Security Fees

- Pre-requisite for selecting government facilities as potential sites
  - Track record for paying the utility bills in full and on time
  - ESCO feel confident about working with such facilities
- ESCOs may request that the Government set up a Trust and Retention Account to ESCROW electricity bill payments
  - TN and Gujarat – setting up a TRA with proper checks and balance is very important
- In case of under of non-performance of the project by the ESCO, the other party should have the means to hold ESCO accountable

Lesson Learnt - Technology Selection and Appropriateness

- Awareness level of government officials' vis-à-vis the appropriateness and effectiveness of technology varies greatly
  - Street lighting
- Technology leapfrogging and subsequent infrastructure upgrades
  - That will automatically deliver high levels of EE savings
  - International best practices
  - Tip Sheets

Lesson Learnt – M&V as a Risk Management Tool

- Performance contracting entails risks by both parties entering into the contract
  - M&V assigns risks to the two parties and provides a framework for how those risks will be managed
  - Develop cost-effective M&V strategies to mitigate the risk associated with projects
- Manual for the Development of Municipal Energy Efficiency Projects (http://www.ase.org/content/article/detail/4525)
- Building Energy Assessment Guide (http://www.eco3.org/download)
  - Provides guidelines for IGA

Lesson Learnt – M&V as a Risk Management Tool

- Electricity meters that are either not properly calibrated or not wired to capture the full load of the equipment is an issue
  - Particularly acute with street lighting and is repeatedly highlighted by the ESCOs and energy auditors
- A deemed savings approach can be a cost-effective and reasonable way to determine savings
  - Savings are based on engineering calculations
- Responsibility of the 3rd party is to carry out the M&V plan agreed upon by the two parties and not to question the M&V plan itself
  - Not investigative exercise but collaborative effort
- Develop a training program for development of a cadre of trained M&V professionals in the Energy Efficiency Cell Government Departments
  - M&V training programs with EVO and AEEE

Challenges to ESCO Projects in the municipal sector (1/2)

- Lack of knowledge on ESCO concept that impede the real take-off of the market
- ESCO Procurement procedures based on quality and cost selection (not common in Municipal sector)
- Need to reduce costs for project development supported by the ESCOs to keep projects within acceptable pay-back period
- Low quality of existing data (electrical wiring drawings not regularly updated, number of lighting points not operating, self-consumption of existing ballast, etc.)
- MCs need to provide security for ESCO repayment (Escrow account)
- Risk of payment delay from some MCs due to several factors: Staff replacement, lack of ESCO knowledge of financial Department, etc.
- M&V protocol needs to consider the potential illegal connections (design M&V around the new efficient devices as per IPMVP rules)

Challenges to ESCO Projects in the municipal sector (2/2)

- State Electricity Board(SEB) meters may not be operating adequately (the project may create the opportunity to upgrade them)
- State Electricity Board is billing the MCs based on number of lighting points and not on real energy consumption
- Some SPs may be overloaded and will need immediate action from SEB
- Need for special solution in slam areas (to be discussed between MC and selected ESCO)
- Additional benefit due to lower maintenance costs during reimbursement period
- Improved service to population (availability of lighting and improvement of the Urban equipment) not quantifiable
- ESCOs not confident in regard to above challenges and may decide not to answer (invest) in the project

Summary

- There is no one single winning formula
- It’s a good M&V plan that reduces the risk and makes the project viable

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