Energy Efficiency Project Barriers

- Lack of funding to pay for improvements:
  - 2012: 37%
  - 2013: 31%
  - 2014: 24%

- Insufficient payback/ROI:
  - 2012: 21%
  - 2013: 20%
  - 2014: 14%

- Uncertainty regarding savings/performance:
  - 2012: 17%
  - 2013: 16%
  - 2014: 12%

- Lack of technical expertise to evaluate or execute:
  - 2012: 10%
  - 2013: 7%
  - 2014: 6%

- Lack of awareness about opportunities:
  - 2012: 14%
  - 2013: 7%
  - 2014: 7%

- Lack of organizational ownership/dedicated attention:
  - 2012: 9%
  - 2013: 9%
  - 2014: 10%

- Landlord/tenant split incentives:
  - 2012: 5%
  - 2013: 3%
  - 2014: 4%
Breaking Down Barriers to EE Finance

**Project Finance**
Long-term financing of projects based upon the projected cash flows of the project rather than the balance sheets of its sponsors.

- Benchmarking
- Asset Labeling
- Disclosure

- On-Bill Repayment
- Commercial PACE
- Green Banks
Near-Term: Increase Deal-Flow

• Increase Confidence in Savings
• Reduce Transaction Costs
• Streamline Origination Process

Long-Term: Market Transformation

• Standardized Performance Data
• Project Finance Underwriting
• Enable Portfolios and Securitization
Energy Efficiency Today
ICP Energy Performance Protocols

Baselining
- Existing Building
- Drawings
- Weather File
- Energy Usage
- Energy Rates
- Occupancy

Savings Projections
- Model File
- Calibration Data
- Bid Packages
- Certifications

Design, Construction, Commissioning
- Cx Plan
- Cx Authority
- Test Procedures
- Facilities Req.

Operations, Maintenance, Monitoring
- BMS Points
- Fault Plan
- Maintenance Plan

Measurement & Verification (M&V)
- M&V Model
- Regression Model
- Adjustments
- Impact
- Baseline Adjustments

BASELINING
SAVINGS
COMMISSION
OPERATIONS
MEASUREMENT

INVESTOR CONFIDENCE PROJECT
# Investor Confidence Project Protocols

<table>
<thead>
<tr>
<th></th>
<th>Commercial</th>
<th>Multifamily</th>
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</thead>
<tbody>
<tr>
<td><strong>Large Projects</strong></td>
<td>EPP – Large Commercial</td>
<td>EPP – Large Multifamily</td>
</tr>
<tr>
<td>(project size &gt;$1M)</td>
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<tr>
<td><strong>Standard Projects</strong></td>
<td>EPP – Standard Commercial</td>
<td>EPP – Standard Multifamily</td>
</tr>
<tr>
<td>(project size &lt;$1M)</td>
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<tr>
<td><strong>Targeted Projects</strong></td>
<td>EPP – Targeted Commercial</td>
<td>EPP – Targeted Multifamily</td>
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<tr>
<td>(limited interactivity)</td>
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Investor Ready Energy Efficiency™

1. Project Development
2. Third-Party Verification
   LARGE COMMERCIAL v1.1
   INVESTOR READY
   Energy Efficiency
Investor Ready Energy Efficiency™

IREE is the logo in the lobby, like LEED but for a building retrofit project.
UNDERWRITING
Building owners and investors can make investment decisions with increased confidence based on predicted savings.

PERFORMANCE
Building energy performance is optimized through execution of construction verification, O&M, and M&V plans.

For more information please visit www.EEperformance.org
Commissioning
(Operational Performance Verification)

• ICP Requirements

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<th>Element</th>
<th>Large</th>
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<th>Targeted</th>
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<tr>
<td>Operational performance verification (OPV) Plan</td>
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<tr>
<td>Training</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Systems manual</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
</tbody>
</table>
Commissioning
(Operational Performance Verification)

• Applies to existing building “retrofits”
  – Commissioning specific measures
  – Recommissioning

• Operational Performance Verification Plan
  – Developed preconstruction
  – Verification activities
  – Target energy budgets
  – Key performance indicators
Design, Construction & Verification

Operational Performance Verification

• Operational Performance Verification Effort
  – Consultation with energy auditors
  – Monitoring of designs, submittals and project changes
  – Inspections of implemented changes
  – Means of reporting deviations from design
    • Help the customer / PD team fully install the measure properly and then re-verify its performance; or
    • Work with the PD team to revise the ECM savings estimates using the actual post-installation data and associated inputs.
Design, Construction & Verification

Operational Performance Verification

• OPV approaches:
  – *Visual inspection* - verify the physical installation of the ECM
  – *Spot measurements* - measure key energy-use parameters for ECMs or a sample of ECMs
  – *Pre-functional checklists*
  – *Functional performance testing* - test functionality and proper control
  – *Trending and data logging* - setup trends or install data logging equipment and analyze data, and/or review control logic
Design, Construction & Verification

Operational Performance Verification

• Resources

  – **ASHRAE Guideline 0-2013**, The Commissioning Process - The procedures, methods, and documentation requirements in this guideline describe each phase of the project delivery and the associated Commissioning Processes from pre-design through occupancy and operation.

  **ASHRAE Standard 202-2013** - Describes how to plan, conduct, and document this vital part of a successful project. Informative appendices provide sample documentation, including checklists, systems manual, reports, training plan, and more.

  – **International Performance Measurement and Verification Protocols (EVO)** - Volume I, Chapter 4.4 and IPMVP Core Concepts 2014, Section 5.2 contain information regarding OPV.

  – **Verification by Equipment or End-Use Metering Protocol (BPA)** - Presents methods for isolating equipment or end-uses, and monitoring / metering methods and M&V practices specific to retrofit isolation. Provides descriptions of the operational performance verification general process.
Design, Construction & Verification

Training

• Building operators
  – Involve in OPV activities

• Training
  – Descriptions of the ECMs and improved performance
  – Energy performance targets
  – Key performance indicators
  – Owner’s project requirements (OPR)
  – Ongoing data analysis and investigation process
Design, Construction & Verification
Systems Manual – Large and Standard

• Systems manual
  – building design and construction (OPR, CFR, BOD)
  – facility, systems and assemblies information
  – operational requirements
  – maintenance requirements and procedures
  – Training
  – OPV plan, testing reports, issue and resolution logs
Design, Construction & Verification

*Documentation*

<table>
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<tr>
<th>Protocol</th>
<th>Documentation</th>
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<tr>
<td>All</td>
<td>Qualifications of the OPV provider</td>
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<td>LC,SC</td>
<td>OPV Plan</td>
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<tr>
<td>LC,SC</td>
<td>OPV concise report</td>
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<tr>
<td>LC,SC</td>
<td>Systems manual</td>
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<tr>
<td>All</td>
<td>Statement that project conforms to intent of scope</td>
</tr>
<tr>
<td>All</td>
<td>Training materials and record of training</td>
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Investor Confidence Project
www.EEperformance.org

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