ESPC Campaign Workshop: Reviewing the Investment Grade Audit and Project Proposal

October 24, 2024

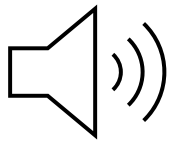
A copy of the slides from today's presentation will be provided to you for reference.

ENERGY SERVICES COALITION
A Public Private Partnership
www.energyservicescoalition.org

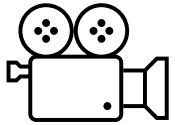
ESPC Campaign

Virtual Housekeeping

Drop your questions in the Chat box at any time or raise your hand!



Unmute your microphone to ask questions and join the conversation



This workshop is being recorded but will only be available to ESPC Campaign Public Sector Partners. We want this session to be interactive and leave plenty of room for discussion. The slides will be shared after today's event.

Introductions

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About ESC

The Energy Services Coalition (ESC) is a national nonprofit organization composed of a network of experts from a wide range of organizations working together at the state and local level to increase energy efficiency and building upgrades through Energy Savings Performance Contracting.

Local chapters; public and private sector individuals coming together to provide outreach and education.

Workshop Agenda

Learning Objective: Understand how to work collaboratively with your ESCO partner in reviewing the major components of the IGA, including project scope, baselines, savings calculations, M&V plan, and ESCO's pricing buildup. ESPC is the best implementation tool you have, let's make it successful!

Introductions

IGA Review Expectations, Responsibilities, and Schedule

IGA Review Process

1. Verify Scope and Methodology
2. Analyze Baseline Energy Use
3. Evaluate Proposed ECMs
4. Scrutinize Savings Projections
5. Examine M&V Plan
6. Review for Cost Reasonableness

Best Practices and Resources

Questions, Discussion

Next Steps

Follow these steps, work closely with your team and ESCO will extract the maximum value for your ESPC project!

This symbol indicates that more information on this topic will be featured in future trainings.

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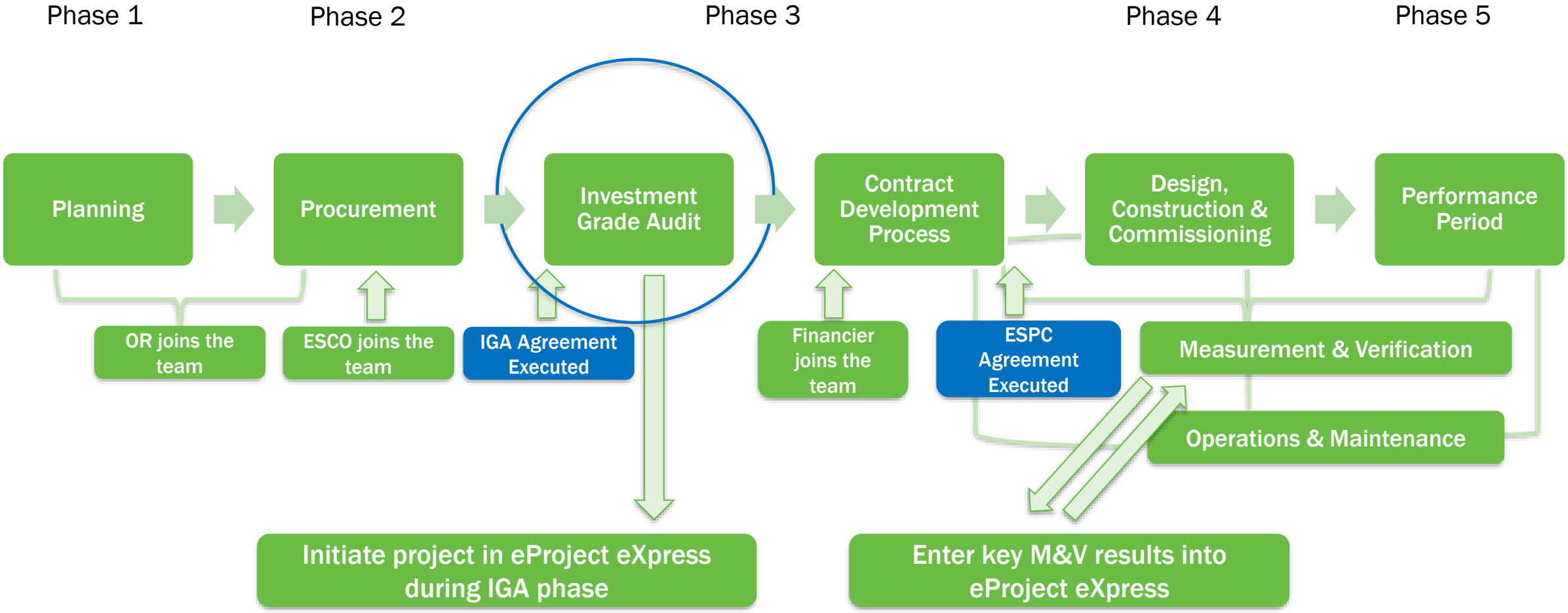
Acronyms Explained

- Cx = commissioning
- DOE = Department of Energy
- EUI = Energy Use Index
- ESCO = energy services company
- ECM = energy conservation measure
- ESPC = energy savings performance contract
- IGA = Investment Grade Audit
- IGAA = Investment Grade Audit Agreement
- IPMVP = International Performance Measurement and Verification Protocol
- M&V = measurement & verification
- OMR&R = operations, maintenance, repair and replacement
- RFP = Request for Proposals
- RFQ = Request for Qualifications

IGA Review Expectations, Responsibilities, and Schedule

The Five Phases of ESPC – Where are we?



Best Practices for Audit Development

ESCO should submit multiple iterations of the IGA, each with increasing detail and responsibility. This allows for iterative decision making with the customer (the Owner organization).

30% IGA Baseline Report

-Facility descriptions (general, envelope, lighting, HVAC, controls, water, misc.)

-Baseline analysis of utilities, O&M practices, etc.

-Equipment inventories; baseline EMS trending and data logger measurements

- Typically, 30-50 slide PPT deck or Word doc

60% IGA Scoping Report

-Scoping document to outline potential ECMs and those that will not be implemented.

-High-level cost and savings analysis (*In native electronic format, not PDFs*)

-Draft pro forma/financial models

-Draft M&V plan

- Medium size document with 100-200 pages. Word, Excel, and energy modeling software

90% Draft Final IGA Report

- Executive summary with facility description, ECM list, pro forma, utility analysis and EUIs for all buildings

- ECM section with detailed descriptions of existing conditions and proposed upgrades

- Draft Final M&V, Cx, training, and OMR&R plans

- Draft Final ECM costs following open-book pricing model

- Final ECM savings analyses

- Appendices for supporting data including EMS trending, data logger results, etc.

- Large document w/ hundreds of pages. Word, Excel, and energy modeling software

100% Final IGA Report

-Ensure end scope reflects municipal priorities and construction planning

-Incorporate all engineering, economic, financial, and overall scope of work changes, as well as completed Comment/ Response/ Resolution document

- Large document w/ hundreds of pages. Word, Excel, and energy modeling software

IGA Table of Contents

Table of Contents

Actual IGA Table of Contents for a ~$14M, high quality, very comprehensive project.
Detailed site and ECM descriptions, baseline and savings analyses, and all plans and backup data.

IGA Review Expectations, Responsibilities, and Schedule

Reviewing, revising, and approving an IGA as part of an ESPC requires a concerted effort on the Owner's part. Expectations for participation and timeline should be set from the beginning.

Recommendations:

- **Set review schedule with ESCO and internal stakeholders from the start to review the multiple, increasingly detailed iterations of the IGA.**
  - 30% IGA – 1-2 weeks
  - 60% IGA – 2-3 weeks
  - 90% IGA – 3 weeks
  - 100% Final IGA – 1-2 weeks
- **Owner's staff, Owner's Rep (OR), and other advisors should review the IGA according to their discipline - see Matrix**
  - Set aside multiple 2–4-hour blocks to concurrently review various portions of the IGA. Transfer questions and comments into Comment/Response/Resolution document. (p. 135)
  - Look for inaccurate descriptions/calculations, vague or confusing language, mathematical logic, etc., to help ESCO deliver a superior IGA.
  - U.S. DOE Performance Contracting National Resource Center (PCNRC) created an 8 module Training Certificate series for a detailed training about all ESPC issues.

IGA Review Responsibility Matrix

IGA Components	Reviewers: Owner's Rep	Leadership	Facilities	O&M	Budget	Finance	Purchasing	In-house legal	Outside Legal	Financial Advisor
Technical										
Baseline O&M Practices	✓	✓	✓	✓						
ECM Descriptions	✓	✓	✓	✓			✓			
Savings Calculations	✓		✓	✓						
M&V Plan	✓		✓	✓						
Commissioning Plan	✓		✓	✓						
O&M/Training Plan	✓	✓	✓	✓						
Financial										
Baseline utility/O&M costs	✓		✓	✓	✓	✓	✓			
Subcontractor Costs	✓		✓	✓	✓	✓	✓			
ESCO Overhead & Profit	✓	✓	✓		✓	✓	✓			✓
ESCO Fees	✓	✓	✓		✓	✓	✓			✓
Finance costs	✓	✓	✓		✓	✓	✓			✓
Cash Flow	✓	✓	✓		✓	✓	✓	✓	✓	✓
Contractual										
Risk/Resp./Perf. Matrix	✓	✓					✓	✓	✓	
ESCO/Owner Resp.	✓	✓					✓	✓	✓	
Warranty	✓	✓					✓	✓	✓	
Substantial vs. Final Compl.	✓	✓					✓	✓	✓	✓

ESPC IGA Comment/Response/Resolution Document

ESPC Project Comment/Response/Resolution Document								
Date	Comment	Discipline	Reviewer	Comments or Recommendation	ESCO Response	Follow up Comment	Final Disposition	Accepted? (Y or N)
8-28-2024	1	O.R. Celtic Energy	Chris Halpin	Page 1 - The PV development fees seem high. Provide backup pricing in open book format.	The PV Design Costs will be removed in the 100% proposal and will be revisited if/when GSA decides to pursue and additional phase of the ESPC ENABLE in 2025.	Accepted	Accepted	Y
8-28-2024	2	O.R. Celtic Energy	Chris Halpin	Page 1 - 1.3 - Please provide a full, open-book, transparent cost pricing buildup, with live formulae.	ESCO will include a Pricing section with price build-up in an attachment in the updated 100% IGA proposal.	Thank you submitting the price build-up. See comments on submitted price buildup in next tab for 98%.	TBD	N

1. **Owner** input comments and questions from IGA review into on-line spreadsheet using collaboration software like Teams, Google Drive, Dropbox, etc.

2. **ESCO** enters responses. **Owner** provides follow up, otherwise fills out Final Disposition, clicks Y or N for acceptance

3. Repeat, using multiple tabs for each submission. Creates a great record of the many interim decisions that are made.

4. Hold calls/meetings with internal team, then ESCO to discuss and resolve comments. **OR** can be utilized to manage this process.

IGA Review Process

IGA Review Steps

To review an investment grade audit (IGA) as part of an energy savings performance contract (ESPC), follow these key steps:

1. **Verify Scope and Methodology**
2. **Analyze Baseline Operational Information and Energy Use Data**
3. **Evaluate Proposed Energy Conservation Measures (ECMs)**
4. **Scrutinize Savings Projections**
5. **Examine Measurement and Verification (M&V) Plan**
6. **Review Financial Analysis for Cost Reasonableness**

By thoroughly reviewing these aspects of the investment grade audit, you can ensure that the proposed ESPC project is technically sound, financially viable, and likely to achieve the guaranteed energy savings.

It's crucial to involve qualified technical and financial experts in this review process to ensure a comprehensive evaluation!

1. Verify Scope and Methodology

a. Compare ESCO's IGA submissions to the IGA Agreement.

Did the ESCO:

- Follow audit scope and report requirements? Facilities, systems, ECMs? (See next two slides)
- Follow guidance on maximum contract term, allowed funding streams, cash flow statements, etc.?
- Follow timeline for interim & final report submissions and starting the ESPC Agreement negotiation?
- Comply with their responsibilities based on risk/responsibility matrix? (Slide 18)

b. Check that the methodology aligns with industry standards for energy audits (e.g., ASHRAE Level III)

c. Does Executive Summary give a good, high-level idea of the IGA process and findings?

Did ESCO follow audit scope and report requirements?

Facilities, systems, ECMs?

Review site list in IGA vs. IGA Agreement

Facilities in Scope	Address	Sqft
WPCA	123 West Street	26,826
Town Hall	10 Main Street	24,882
Richmond	40 Main Street	22,242
Police	49 Poplar Street	12,892
Probate Court & IT	47 Bridge Street	8,029
The Maxx	94 Railroad Street	7,030
Lanesville Fire	16 Lanesville Road	5,500
[redacted] High School	388 Danbury Road	272,519
Sarah Noble Intermediate School	25 Sunny Valley Road	178,445
Northville Elementary School	22 Hipp Road	76,041
Schaghticoke Middle School	23 Hipp Road	133,527
Pettibone Community Center	2 Pickett District Road	74,571
Hill & Plain Elementary School	60 Old Town Park Road	65,664
Facilities Maintenance Office	20 Youngs Field Road	2,600
Board of Education / Central Office / Lillis Admin	50 East Street	14,880
Facilities Maintenance Barn	10 Main Street	2,500
Public Works Bldg. # 1	6 Youngs Field Road	5,000
Public Works Bldg. # 2	6 Youngs Field Road	1,500
Public Works Bldg. # 3	6 Youngs Field Road	1,000
Public Works Bldg. # 4	6 Youngs Field Road	3,000
Public Works Bldg. # 5	6 Youngs Field Road	3,800
Railroad Station	11 Bridge Street	2,500

Who should review Audit Scope?

- Facilities manager
- Operations director
- Owner's Rep
- Owner's leadership do high-level review

Descriptions of all audited facilities

WATER POLLUTION CONTROL AUTHORITY (WPCA)

Structure and Envelope

The [redacted] Sewer Commission and Water Pollution Control Authority is located at 123 West Street in [redacted]. The facility consists of seven (7) primary buildings, including the Front Office, Headworks and Process Building, and the Administration Building. Several smaller buildings are located throughout the facility which include mostly process equipment or storage. In total the reported gross square footage of the buildings is 26,826 square feet.

The table below shows the multiple DPW buildings and additional information on each.

Building	Location	Building Description	Wall Construction	Roof Construction
Administration Building	123 West Street,	Office, Break Room, Conference Room	Insulated Metal Panels	Standing seam
Front Office Building	123 West Street,	Office, Break Room, Conference Room	Corrugated Metal Panels	Standing seam
Headworks and Process Building	123 West Street,	Garage, Storage, Process Building	CMU with Brick	Standing seam

Table 1

Many of the other smaller buildings are constructed with corrugated metal panels and metal roofs. All of the buildings on this campus appear to be in good condition. There are very few exterior doors and windows.

The Front Office is installed with double pane casement windows. Figure 1 shows the typical window installed at the Front Office. The Administration Building also has several double pane windows installed on the front and back of the building.

ECM Matrix

Key	
Investigated and Included in proposed project	X
Investigated and not Included in proposed project	O
Not investigated	

Showing what was evaluated, but not recommended, is helpful.

ECM	ECM Number	New Milford High School	Schaghticoke Middle School	Sarah Noble Intermediate School	Northville Elementary School	Hill & Plain Elementary School	Pettibone Community Center	Town Hall	DPW Building 1-6	DPW - Facilities Maintenance Office	Lanesville Fire	Ambulance Barn	Police	Richmond (Senior Center)	Probate Court & IT	The Maxx	Lynn Deming Park Bath house	Railroad Station - The Gallery	P&R Barn - Behind Town Hall	WWTP - WPCA
Boiler Replacement - All Condensing Boiler Option (w/ HW Reset)	TC.1.1B	X		X			O							O						
High Efficiency Boiler Replacement - Fuel Oil Only	TC.1.2		O										O							
Boiler System Optimization	TC.1.2	X		X	O															
Fuel Oil to Propane Furnace Replacement/Conversion	TC.1.3										O									
Fuel Oil to Natural Gas Conversion	TC.1.4							O	O											
Cogeneration	TC.10.1	X		O																
Solar PV	TC.11.1	O	O	X	O	X			O		O	O	X			O				X
Transformer Replacement	TC.12.1	X		X	X															
Water Conservation	TC.13.1	X	X	X	X	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O
Demand Response	TC.14	X	X	O	O	O														
Plug Load Controls	TC.19.1	X	X	X	X	X	O	X	X	O	O	O	X	X	X	X	O	O	O	X
Walk-In Cooler/Freezer Controllers	TC.19.2	O	O	O	O	O														
Air Cooled Chiller Replacement	TC.2.1		X	X																
Chilled Water System Optimization	TC.2.2	O		O																
Condenser Water System Optimization	TC.2.3	X																		
Install DDC System; Town	TC.3.1						O	X	O	O	O	O	X	X	X	O	O	O	O	O

Risk, Responsibility & Performance Matrix (RRPM)

The purpose of the RRPM is to help public entities:

- Understand how key contract elements affect costs and savings,
- Understand how to tailor the contract to match their own needs and priorities,
- Give some structure to the decision making and negotiations, and
- Document the decisions in these areas.

The RRPM is a summary only. The details of these agreements are in the M&V Plan, RFP, and the ESCO's management approach. The RRPM in the final contract summarizes the agreements.

The following is a list of the 14 areas of risk and responsibility in the RRPM. The website discusses some of the implications of choosing some options over others.

Resource: Recognizing and Assigning ESPC Risks and Responsibilities Using the Risk, Responsibility, and Performance Matrix (RRPM)

Financial

- Interest rates
- Construction costs
- M&V confidence
- Energy-related (one-time) savings
- Delays
- Major changes in facility

Operational

- Operating hours
- Loads
- Weather
- User Participation

Performance

- Equipment Performance
- Operations
- Preventive Maintenance
- Equipment repair and replacement

Did ESCO comply with their responsibilities on the risk/responsibility matrix?

ATTACHMENT J-7

ENERGY SAVINGS PERFORMANCE CONTRACT RISK, RESPONSIBILITY AND PERFORMANCE MATRIX

RESPONSIBILITY/DESCRIPTION	CONTRACTOR PROPOSED APPROACH
1. Financial	
a. Interest rates: Neither the contractor nor the agency has significant control over prevailing interest rates. Higher interest rates will increase project cost, financing/project term, or both. The timing of the TO signing may impact the available interest rate and project cost.	
b. Construction costs: The contractor is responsible for determining construction costs and defining a budget. In a fixed-price design/build contract, the agency assumes little responsibility for cost overruns. However, if construction estimates are significantly greater than originally assumed, the contractor may find that the project or measure is no longer viable and drop it before TO award. In any design/build contract, the agency loses some design control. **Clarify design standards and the design approval process (including changes) and how costs will be reviewed.**	
c. M&V confidence: The agency assumes the responsibility to determine the confidence that it desires to have in the M&V program and energy savings determinations. The desired confidence will be reflected in the resources required for the M&V program, and the ESCO must consider the requirement prior to submittal of the final proposal. **Clarify how project savings are being verified (e.g., equipment performance, operational factors, energy use) and the impact on M&V costs.**	
d. Energy Related Cost Savings: The agency and the contractor may agree that the project will include savings from *recurring* and/or *one-time* costs. This may include one-time savings from avoided expenditures for projects that were appropriated but will no longer be necessary. Including one-time cost savings before the money has been appropriated may involve some risk to the agency. Recurring savings generally result from reduced O&M expenses or reduced water consumption. These O&M and water savings must be based on actual spending reductions. **Clarify sources of nonenergy cost savings and how they will be verified.**	

Reminder: Each note should be included as a comment in the ESPC IGA Comment/ Response/ Resolution document

Check that the methodology aligns with industry standards for energy audits (e.g., ASHRAE Level III)

- An ASHRAE Level 3 energy audit, is the most comprehensive and detailed analysis of a building's energy performance. The primary components include:
  - Extensive Data Collection - Involves thorough data gathering, including:
    - Detailed energy consumption data
    - Equipment performance metrics
    - Operating schedules
    - Occupancy patterns
  - Energy Modeling - ESCO conducts energy modeling to:
    - Simulate the building's energy performance in different scenarios
    - Evaluate potential energy-saving measures
  - Financial Analysis - A crucial component of a Level 3 audit is the in-depth financial analysis, which includes:
    - Life-cycle cost analysis of proposed ECMs
    - Detailed cost-benefit analysis of potential ECMs

Who should check Audit methodology?
- Facilities manager
- Owner's Rep

  - Engineering Analysis - comprehensive engineering analysis of:
    - Building systems and equipment
    - HVAC systems
    - Lighting systems
    - Building envelope
  - Sub-metering and Monitoring – L3 audits often involve:
    - Sub-metering of energy consumption for key systems like HVAC
    - Monitoring of individual system characteristics
  - Detailed Recommendations - The audit provides:
    - Specific, actionable recommendations for ECMs
    - Technical specifications and designs for proposed ECMs
    - Drawings and schematics for implementation
  - Risk Assessment - A qualified energy auditor conducts a risk assessment as part of the Level 3 audit process.
  - Presentation of Results - The ESCO presents the findings and recommendations to the Owner, providing a comprehensive report that serves as a roadmap for implementing energy efficiency improvements

Does Executive Summary give a good, high-level idea of the IGA process and findings? Are assumptions clear?

ECM Summary Table included in the Executive Summary:

ECM	ESCO Total Cost	Owner's Rep Fee	Total Project Cost	Rebates / RECs/ DR Revenue Estimates ($)	Total Annual Savings Estimate- Energy ($)	Total Annual Savings Estimate- O&M ($)	Simple Payback
Project-Level Costs	$ 469,543		$ 469,543				
Boiler Replacement - All Condensing Boiler Option (w/ HW Reset)	$ 1,947,087	$ 70,095	$ 2,017,182	$ 69,985	$ 53,994	$ 5,000	33.0
Cogeneration	$ 742,888	$ 26,744	$ 769,632	$ 360,000	$ 73,013	$ -	5.6
Solar PV	$ 4,926,088	$ 177,339	$ 5,103,428	$ 785,210	$ 185,994	$ -	23.2
Transformer Replacement	$ 396,469	$ 14,273	$ 410,742	$ 15,203	$ 18,156	$ -	21.8
Water Conservation	$ 91,789	$ 3,304	$ 95,093	$ 3,588	$ 12,082	$ -	7.6
Demand Response	$ 33,709	$ 1,214	$ 34,922	$ 145,203	$ -	$ -	-
Retro Commissioning	$ 27,915	$ 1,005	$ 28,920	$ 1,031	$ 5,656	$ -	4.9
Plug Load Controls	$ 80,629	$ 2,903	$ 83,531	$ 3,092	$ 4,358	$ -	18.5
Air Cooled Chiller Replacement	$ 781,200	$ 28,123	$ 809,323	$ 28,337	$ 8,771	$ -	89.0
Install Town Wide DDC System	$ 476,470	$ 17,153	$ 493,623	$ 17,602	$ 3,788	$ 1,500	90.0
DDC System Expansion	$ 75,668	$ 2,724	$ 78,392	$ 2,795	$ 4,320	$ -	17.5
DCV Control	$ 60,015	$ 2,161	$ 62,176	$ 2,217	$ 3,867	$ -	15.5
Programmable Thermostats	$ 17,563	$ 632	$ 18,195	$ 649	$ 411	$ -	42.7
Cooling Tower Replacement (w/ CW Reset)	$ 489,903	$ 17,636	$ 507,539	$ 17,770	$ 15,111	$ 9,000	20.3
AHU/RTU Replacement	$ 601,848	$ 21,667	$ 623,514	$ 20,551	$ 1,093	$ 17,000	33.3
Lower Pressure Drop AHU Filters	$ 120,686	$ 4,345	$ 125,031	$ 4,541	$ 8,932	$ -	13.5
Lighting - Interior and Controls - Option A Lamps & Drivers	$ 1,094,992	$ 39,420	$ 1,134,412	$ 133,688	$ 78,344	$ 12,947	11.0
Lighting - Interior and Controls - Option B Fixtures	$ 1,488,962	$ 53,603	$ 1,542,564	$ 238,932	$ 59,473	$ 8,059	19.3
Lighting - Exterior	$ 215,707	$ 7,765	$ 223,472	$ 16,120	$ 6,075	$ 1,585	27.1
Building Envelope - Weatherization, Insulation	$ 234,858	$ 8,455	$ 243,313	$ 9,266	$ 43,097	$ -	5.4
Pipe, Valve & Fitting Insulation	$ 85,509	$ 3,078	$ 88,587	$ 3,374	$ 10,328	$ -	8.3
Lighting Add/Alt #1 - Drop-Off Circle Site Lighting Addition	$ 99,342	$ 3,576	$ 102,918	$ -	$ -	$ -	-
Niagara Site Supervisor	$ 77,982	$ 2,807	$ 80,790	$ -	$ -	$ -	-
Niagara School Integration	$ 285,571	$ 10,281	$ 295,852	$ -	$ -	$ -	-
TOTAL	$ 14,922,390	$ 520,302	$ 15,442,692	$ 1,879,152	$ 596,863	$ 55,091	20.8

Low payback and high payback ECMs are bundled for a comprehensive project that pays for itself through savings.

Some ECMs have almost no savings but are essential infrastructure upgrades.

Significant rebates are listed, improving economics, but must be planned carefully.

2. Analyze Baseline Operational Information and Energy Use Data

a. Review ESCO's portrayal of your operations and maintenance practices.
b. Examine the baseline energy consumption data and calculations.
c. Verify that utility bills and other data sources are accurate and complete.

Operational Info

Misc. Baseline Data
Occupancy Baseline – Schools

Facility	Grades Served by each building	Number of Students	Number of Teachers/Staff	Typical Hours of Operations	Typical Weekend/afterschool Activities & Runtime	Typical Summer activities
Hill & Plain Elementary School	Pre K- 2	401	66	M-F 8am-3:15pm	Minimal; basketball in the winter	Minimal
Northville Elementary School	Pre K - 2	480	94	M-F 8am-3:15pm	Minimal; basketball in the winter	Minimal
Sarah Noble Intermediate School	Gr 3-5	816	140	M-F 8am-3:15pm for school. After hours activities go until 9 or 10pm	Extensive. After school programs, BOE mtgs, Basketball, PTO, etc	Extensive. Summer school (all classrooms M-TH 8am-11:30am), Youth Agency (café, gym and MPR) 7am-6:30pm
Schaghticoke Middle School	Gr 6 - 8	927	143		Moderate; sports, after school programs etc	Minimal; Cafeteria

Utility Data Collection Plan

ESCO collected 2-3 years of electricity, natural gas, fuel oil and water consumption and cost data for all project buildings.

Baseline periods were selected to be the most recent complete operational cycle; 12 months of data for all project buildings, excluding March-June 2020, which were deemed to be not representative of typical building use. The exact time period used varies by utility, depending on data availability.

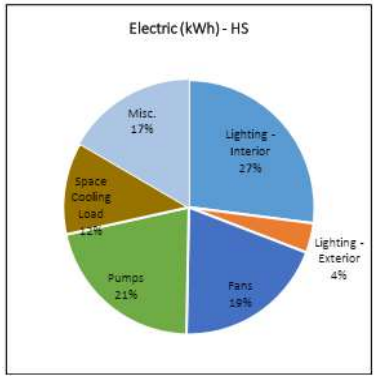
The following tables are the summaries of electric, gas, fuel oil and water baseline data. Detailed utility analysis tables and graphs are attached electronically in the appendix section (Appendix 1).

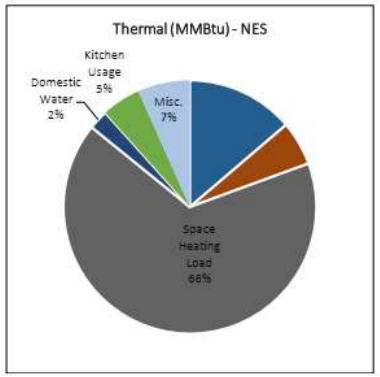
Utility Baseline Data

Electric Utility Consumption Summary

Baseline Data								Electric				
Facility Name	Square Feet	Peak Monthly kW	Annual kw	Total kw $	$/kw	Watts/ft²	Annual kWh	kwh/sq ft²	Total kwh $	Total $	$/kWH	$/ft²
[redacted] High School	272,519	756	6,721	$166,005	$24.70	2.77	2,335,680	8.57	$231,535	$397,540	$0.099	$1.46
Sarah Noble Intermediate School	178,445	472	3,657	$85,214	$23.30	2.64	1,328,400	7.44	$131,295	$216,509	$0.099	$1.21
Northville Elementary School	76,041	130	1,369	$24,593	$17.96	1.71	396,786	5.22	$39,198	$63,791	$0.099	$0.84
Schaghticoke Middle School	133,527	251	2,442	$38,069	$15.59	1.88	665,600	4.98	$73,471	$111,540	$0.110	$0.84
Hill & Plain Elementary School	65,664	125	1,315	$28,020	$21.32	1.90	308,960	4.71	$30,823	$58,843	$0.100	$0.90
Board of Education / Central Office	14,880						65,917	4.43	$11,209	$11,209	$0.170	$0.75
Town Hall/Fac. Mant. Barn/ P&R Barn	29,382	46	369	$7,893	$21.37	1.56	110,080	3.75	$10,958	$18,850	$0.100	$0.64
Richmond (Senior Center)	22,242	35	308	$6,552	$21.28	1.58	93,920	4.22	$9,357	$15,910	$0.100	$0.72
Police	12,892	54	458	$9,775	$21.34	4.17	249,200	19.33	$28,196	$37,971	$0.113	$2.95
Probate Court & IT	8,029	15	145	$3,100	$21.35	1.88	49,410	6.15	$4,923	$8,023	$0.100	$1.00
The Maxx (teen Center)	7,030	44	317	$6,830	$21.57	6.22	99,738	14.19	$10,688	$17,518	$0.107	$2.49
Lanesville Fire	5,500	10	58	$1,226	$21.25	1.78	13,375	2.43	$1,335	$2,561	$0.100	$0.47
Library	16,772	67	507	$10,837	$21.37	3.96	115,360	6.88	$11,482	$22,319	$0.100	$1.33
Ambulance Facility (New)	9,300	35	329	$7,020	$21.33	3.75	140,320	15.09	$13,977	$20,997	$0.100	$2.26
Pettibone Community Center	74,571	0	0	$0	$0.00	0.00	-	0.00	$0	$0	$0.000	$0.00
Public Works Bldg. # 1	5,000	13	91	$1,926	$21.24	2.64	35,110	7.02	$3,509	$5,435	$0.100	$1.09
Public Works Bldg. # 2 & 3	2,500	5	32	$686	$21.19	2.12	18,556	7.42	$1,857	$2,543	$0.100	$1.02
Public Works Bldg. # 4	3,000	13	75	$1,584	$21.23	4.23	23,210	7.74	$2,324	$3,907	$0.100	$1.30
Public Works Bldg. # 5	3,800	16	158	$3,359	$21.26	4.18	46,409	12.21	$4,635	$7,994	$0.100	$2.10
Public Works Office; 20 Youngs Field Rd	2,600	15	106	$755	$7.15	5.65	31,727	12.20	$4,664	$5,419	$0.147	$2.08
Railroad Station	2,500	2	11	$268	$25.50	0.96	6,450	2.58	$641	$908	$0.099	$0.36
Lynn Deming Park Bath house	1,500	5	23	$496	$21.49	3.07	9,109	6.07	$905	$1,401	$0.099	$0.93
The Gallery	2,500	5	44	$927	$21.31	1.96	5,926	2.37	$589	$1,516	$0.099	$0.61
[redacted] WPCF	26,826	187	2,125	$28,673	$13.49	6.95	1,189,440	44.34	$128,987	$157,659	$0.108	$5.88
Totals	977,020	2,299	20,657	$433,808	$21.00	2.35	7,338,683	7.51	$756,557	$1,190,365	$0.1031	$0.77

**grey highlighted cells indicate no service of that type in the baseline period*



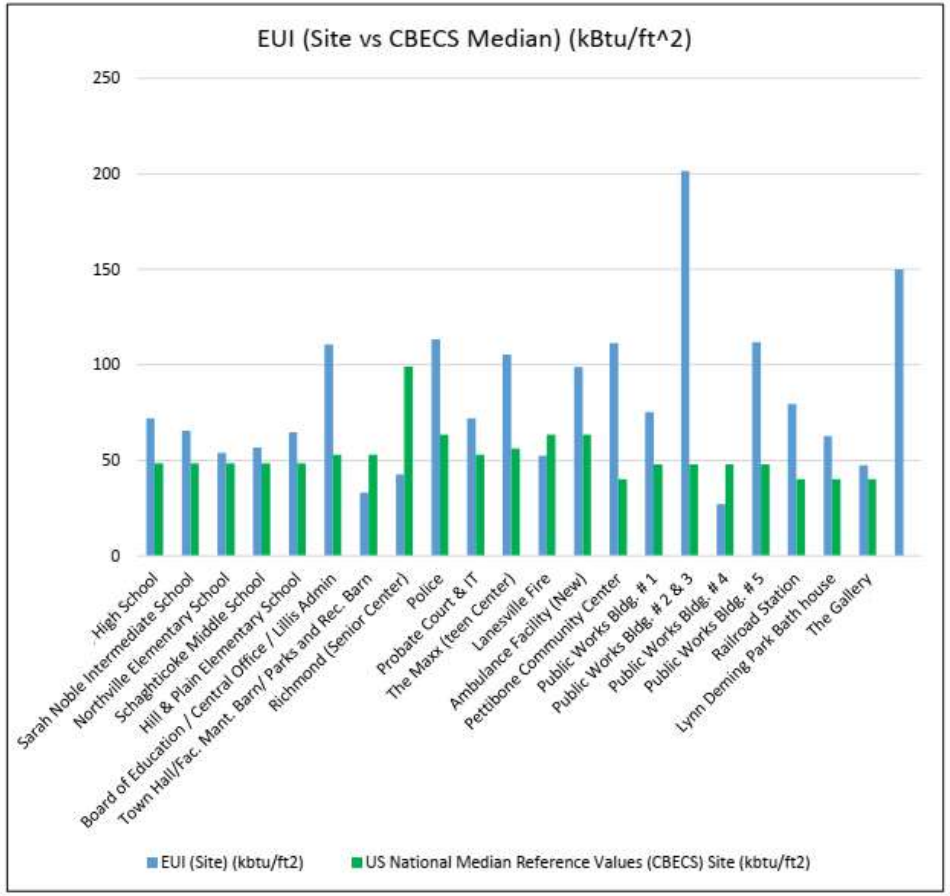


Costs for Demand and Consumption are shown separately.

End use breakdowns illustrate opportunities.

Comparative metrics are very helpful for focusing efforts.

As is typical, wastewater is almost highest energy cost for town.



3. Evaluate Proposed Energy Conservation Measures (ECMs)

a. Review each proposed ECM for technical feasibility and appropriateness.

b. Assess the estimated costs, savings, and payback periods for each measure.

- Did ESCO get three bids for most ECMs?
- Owner's Representative (OR) can be of major assistance in this area
- R.S. Means Cost Estimating Guide is also helpful

TC.2.1: AIR COOLED CHILLER REPLACEMENT

ECM Description

There are two (2) older air-cooled chillers installed at the School District that are identified as good candidates for replacement. Both of these units are greater than 15 years in age and are in fair to poor condition. One of the chillers is operated on R-22 refrigerant. R-22 is no longer manufactured or readily available, making these units more expensive to maintain.

Recommendation

It is recommended to replace both air-cooled chillers with new, equivalently sized, high efficiency units. The replacements will increase the system efficiency and decrease the annual operating cost. The new systems will utilize new refrigerants, decreasing the school's dependence on the costly and outdated R-22 refrigerant.

Building	Equipment	Cooling Capacity	Estimated Existing Efficiency	Proposed Unit
Schaghticoke (Ground Installation)	Trane-RTAC	140 Tons	10.5 IPLV	York YLAA 0156HE 15.5 IPLV
Sarah Noble (Roof Installation)	Trane-RTAA	340 Tons	10.5 IPLV	York YVAA 15.2 IPLV

TC.11.1: SOLAR PHOTOVOLTAICS (PV)

ECM Description

Photovoltaics is one of the cleanest, most environmentally friendly and sustainable renewable energy technologies. A solar photovoltaic (PV) system converts solar energy from the sun into electrical energy via photovoltaic cells. Photovoltaic cells are semiconductors that produce direct current when struck by photons; as long as the cell area is illuminated, the cell produces power. Photovoltaic cells are linked together in series and in parallel to produce power of the desired voltage and current. Direct current (DC) electrical power produced by the PV cells is converted to alternating current (AC) power via an inverter before being applied to the facility load.

Building	kWDC Planned	kWAC Planned
WPCA	292	248
Police Station	175	160
Sarah Noble Intermediate School	843	699
Hill & Plain Elementary School	200	170
Total	**1,510**	**1,277**

4. Scrutinize Savings Projections

a. Verify that savings calculations are based on sound engineering principles, as they will back up the savings guarantee.

b. Check for reasonable assumptions in energy savings estimates, including ***escalation rates***.

c. Traceability of energy and cost savings is critical in the review of the proposal.
   - Reviewers should ensure that each energy and cost savings estimate is properly identified and transferred to the price proposal.

d. The unit cost of energy for each fuel source and utility rates must be mutually agreed upon by the ESCO and Owner

e. Any "excess savings" always goes to Owner. No "Rollover minutes" in ESPC!

An Owner's Representative's assistance is invaluable in this portion of the IGA review!

Savings Projections

ECM Savings Summary

PROPOSED MEASURES	kW savings ye ar	kWh savings / year	NG therms savings / year	Gal FO savings / year	Gal LP savings / year	Water & Sewer kGal saving s / year	Total energy savings ($)	Guarantee d Energy Savings ($)
Lighting - Interior and Controls - Option A Lamps & Drivers	1,942.11	454,597.6 7	(188.53)	(2,235.06)	(131.55)	-	$84,695.6 8	$78,343.5 0
Lighting - Interior and Controls - Option B Fixtures	1,189.80	384,768.3 8	(7,500.37)	-	-	-	$69,967.7 7	$59,472.6 0
Lighting - Exterior	-	58,642.25	-	-	-	-	$6,822.74	$6,075.48

Energy and cost savings are summed for all buildings, by ECM.

Detailed savings calculations should be displayed and reviewed by building for accuracy. *(e.g., 8 - T8 fluor. fixtures being replaced by 8 LEDs, saving ~45% makes sense.)*

Ensure ESCO uses live formulae. No "hard entered" numbers, or PDF calculations.

Lighting ECM – "Line-by-line" spreadsheet shows current & proposed technology, energy use, and savings.

Current														
Location	Area	Room	ID#	Current	Qty	Watts per Fixture	kW	Burn	kWh	$/kWh	kWh$	$/kW	Demand$	Total$
HPES	First Floor	Copier Room	2	F-F28T8-2	8	48	0.384	2200	844.8	$0.10	84.48	$21.32	98.24256	$182.72
HPES	First Floor	Reading Room	5	F-F28T8-2	4	48	0.192	600	115.2	$0.10	11.52	$21.32	49.12128	$60.64
HPES	First Floor	Storage Room/Data	6	F-F28T8-2	2	48	0.096	600	57.6	$0.10	5.76	$21.32	24.56064	$30.32
HPES	First Floor	Psychologists Office	7	F-F28T8-2	4	48	0.192	2285	438.72	$0.10	43.872	$21.32	49.12128	$92.99
HPES	First Floor	Classroom Special Ed	8	F-F28T8-2	4	48	0.192	2586	496.512	$0.10	49.6512	$21.32	49.12128	$98.77

Proposed										Savings			
Proposed	Qty	Watts per Fixture	kW	% Red	Burn-Hours	kWh	kWh$	Demand $	Total$	Watts Saved	kW Saved	kWh Saved	Total Saved $
(2) TLED 15W T8 with (1) TYPE C LP DRIVER, 4', 4000K	8	26	0.21	0.0%	2200	458	$45.76	53.21	$98.97	22	0.18	387.2	$83.75
(2) TLED 15W T8 with (1) TYPE C LP DRIVER, 4', 4000K	4	26	0.10	0.0%	600	62	$6.24	26.61	$32.85	22	0.09	52.8	$27.79
(2) TLED 15W T8 with (1) TYPE C LP DRIVER, 4', 4000K	2	26	0.05	0.0%	600	31	$3.12	13.30	$16.42	22	0.04	26.4	$13.90
(2) TLED 15W T8 with (1) TYPE C LP DRIVER, 4', 4000K	4	26	0.10	0.0%	2285	238	$23.76	26.61	$50.37	22	0.09	201.1	$42.62
(2) TLED 15W T8 with (1) TYPE C LP DRIVER, 4', 4000K	4	26	0.10	0.0%	2586	269	$26.89	26.61	$53.50	22	0.09	227.6	$45.27

5. Examine Measurement and Verification (M&V) Plan

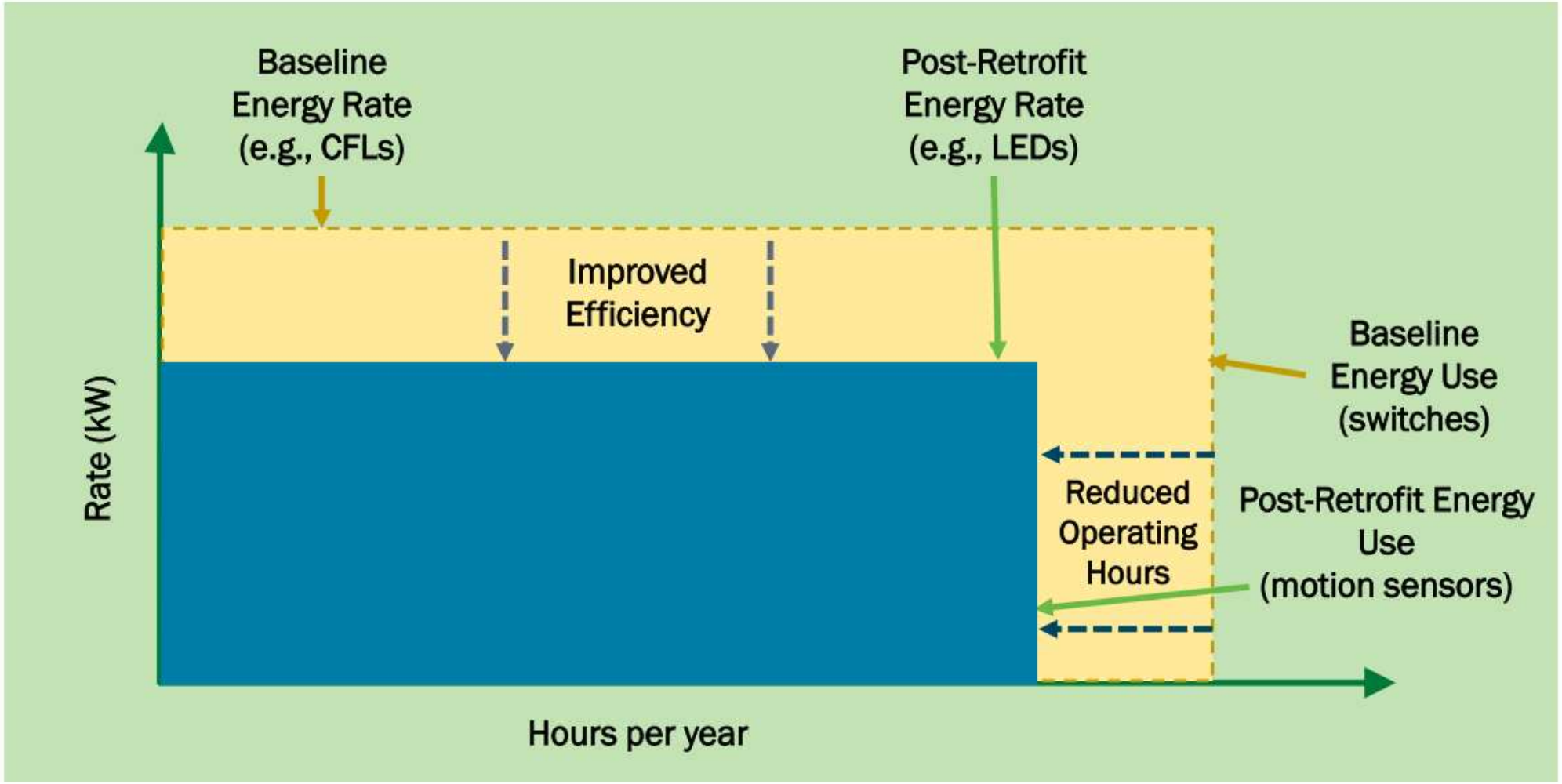
a. Ensure the M&V plan follows recognized protocols (e.g., IPMVP).

b. Verify that the proposed M&V methods are appropriate for each ECM.

c. Use OR's experience for this very niche technical item.

Option	Performance (e.g., power)	Usage (e.g., hrs.)	Total Energy	Simulation	Cost	Typical ECMs
A: Retrofit Isolation w/ Key Parameter Measurement	Short- or long-term	Measured or agreed upon			$	Lighting Motors Water
B: Retrofit Isolation w/ All Parameter Measurement	Usually long-term	Usually long-term	Often (via meter), but at component level		$$	Chiller repl. Solar Energy Cooling tower water meter
C: Whole-Facility Measurement			Whole-building level		$$$	Deep retrofits Plant replaced
D: Calibrated Computer Simulation	Component level for calibration		Building level for calibration	Building and components	$$$$	EMCS/BAS Window repl.

M&V Savings



Helpful auto analogy: kW=MPG, kWh=gal of gas used

6. Review Financial Analysis for Cost Reasonableness

a. Review ECM cost buildups, which should be "open-book" with complete transparency, and match values shown in original RFQ/P. If indicative pricing was not used in the RFQ/P, then it should be negotiated during the IGA Agreement process.

b. Analyze the project's financial projections, including cash flow and return on investment.
   - Until financing is in place, use indicative rates from lenders, or Financial Advisor.

c. Verify that all costs, including financing and ongoing maintenance, M&V, etc. are accounted for in cash flow.

d. Use OR's and your O&M staff's experience to help ensure cost-reasonableness.

Open Book ESCO Pricing

ESCO should provide an open-book, transparent cost buildup that shows all subcontractor costs, as well as their fees, markups, etc. in an Excel file, with working cell formulae.

	CATEGORY	Cost	ESCO Costs
a	SUB CONTRACTOR COSTS	To be completed as part of the IGA with site-specific scope, costs, etc.	Hard Costs - To be provided with open book pricing
b	OTHER DIRECT PURCHASES OF EQUIP.MAT/SUPPLIES		
c	**TOTAL OF HARD COSTS**		c = a + b
d	PROJECT DEVELOPMENT		2.00%
e	DESIGN/ENGINEERING		4.00%
f	PROJECT MANAGEMENT		5.00%
g	PERMITS		0.50%
h	PERFORMANCE BOND		0.75%
i	PAYMENT BOND		1.00%
j	COMMISSIONING		1.00%
k	MEASUREMENT & VERIFICATION		2.00%
l	TRAINING		0.75%
m	CONTINGENCY		2.00%
n	WARRANTY SERVICE		1.00%
o	MAINTENANCE		1.00%
p	**TOTAL OF ESCO FEES**		**21.00%**
q	OVERHEAD		**10.00%**
r	PROFIT		**5.00%**
s	**TOTAL OF SOFT COSTS**	s=p+q+r	36.00%

Cash Flow Analysis

Are loan rate, escalation, term, fees, savings, payments accurate?
Are assumptions clear?

ENERGY PERFORMANCE CONTRACT CASH FLOW

Project Value	$14,922,390						
Down Payment							
Utility Rebates	$588,740	Use as Down Payment? (Y or N)			Y		
Client Contingency							
OR Fee	$520,302	3.60%					
Other Fees							
LOAN VALUE	$14,853,953						
TELP Rate (%)	2.50%	Utility Escalation	3.50%		O&M Escalation	3.00%	

Project Scenario 1

Savings Term	20	years	Construction Period	18	Months
Loan Repayment Term	20	years	Payment at	1	Start of the period
M&V Term	3	years	Construction Start	1/1/2021	
Mech Term	20	years	Construction End	7/2/2022	
O&M Savings Term	20	years	Finance PMT Start	7/4/2022	Specify → 7/15/2019
Payment Freq	Annual		Finance PMT End	6/27/2041	
Loan Payment	Variable				
Minimum Balance	$0				

Inc Const Savings in Yr 1?	Yes	Escrow	Yes		Retainage	3.0%	
Apply CP Interest?	Yes	Traditional	No		Escrow APR	1.0%	
					NJ ESIP	No	
					Included SED Aid	No	

CASH FLOW ANALYSIS

Year	Guaranteed Annual Energy Savings		O & M Savings	ZREC Revenue	Class III REC Revenue	DR Revenue - Curtailment	Capital Cost Avoidance	Total	Loan Payment	ESCO M&V Cost	OR M&V Cost	Service Costs	Total Costs	Net Savings
Construction	$105,614		$0	$0			$0	$105,614		$0		$0	$0	$105,614
1	$723,367		$56,744	$ 54,960	$ 18,000	$ 45,875	$0	$898,946	$805,332	$49,115	$12,355	$32,144	$898,946	$0
2	$639,374		$58,446	$ 54,576	$ 18,000	$ 39,584	$0	$809,980	$714,232	$49,852	$12,787	$33,109	$809,980	$0
3	$661,752		$60,199	$ 54,194	$ 18,000	$ 24,384	$0	$818,529	$720,593	$50,599	$13,235	$34,102	$818,529	$0
4	$684,914		$62,005	$ 53,814	$ 18,000	$ 35,360	$0	$854,093	$818,968	$0		$35,125	$854,093	$0
5	$708,886		$63,866	$ 53,438	$ 18,000	$ -	$0	$844,189	$808,010	$0		$36,179	$844,189	$0
6	$733,697		$65,782	$ 53,063	$ 18,000	$ -	$0	$870,542	$833,278	$0		$37,264	$870,542	$0
7	$759,376		$67,755	$ 52,692	$ 18,000	$ -	$0	$897,823	$859,441	$0		$38,382	$897,823	$0
8	$785,954		$69,788	$ 52,323	$ 18,000	$ -	$0	$926,065	$886,532	$0		$39,533	$926,065	$0
9	$813,463		$71,881	$ 51,957	$ 18,000	$ -	$0	$955,301	$914,582	$0		$40,719	$955,301	$0
10	$841,934		$74,038	$ 51,593	$ 18,000	$ -	$0	$985,565	$943,624	$0		$41,941	$985,565	$0
11	$871,402		$76,259	$ 51,232	$ 18,000	$ -	$0	$1,016,893	$973,693	$0		$43,199	$1,016,893	$0
12	$901,901		$78,547	$ 50,873	$ 18,000	$ -	$0	$1,049,321	$1,004,826	$0		$44,495	$1,049,321	$0
13	$933,467		$80,903	$ 50,517	$ 18,000	$ -	$0	$1,082,888	$1,037,058	$0		$45,830	$1,082,888	$0
14	$966,139		$83,330	$ 50,164	$ 18,000	$ -	$0	$1,117,632	$1,070,427	$0		$47,205	$1,117,632	$0
15	$999,953		$85,830	$ 49,813	$ 18,000	$ -	$0	$1,153,596	$1,104,975	$0		$48,621	$1,153,596	$0
16	$1,034,952		$88,405	$ -	$ 18,000	$ -	$0	$1,141,357	$1,091,277	$0		$50,080	$1,141,357	$0
17	$1,071,175		$91,057	$ -	$ 18,000	$ -	$0	$1,180,232	$1,128,650	$0		$51,582	$1,180,232	$0
18	$1,108,666		$93,789	$ -	$ 18,000	$ -	$0	$1,220,455	$1,167,325	$0		$53,130	$1,220,455	$0
19	$1,147,469		$96,602	$ -	$ 18,000	$ -	$0	$1,262,072	$1,207,348	$0		$54,723	$1,262,072	$0
20	$1,187,631		$99,500	$ -	$ 18,000	$ -	$0	$1,305,131	$1,117,050	$0		$56,365	$1,173,415	$131,717
AGGREGATE	**$17,575,471**		**$1,524,725**	**$785,210**	**$360,000**	**$145,203**	**$0**	**$20,390,609**	**$19,207,221**	**$149,566**	**$38,378**	**$863,728**	**$20,258,892**	**$237,330**

Best Practices Summary and Resources

Best Practices Summary

- **Review Tracking:** Use an on-line collaborative Comment/Response/Resolution document throughout the process to track progress through interim and final IGAs.
- **Completeness:** Check that the audit covers all required elements as specified in the contract.
- **Compliance:** Verify that the audit meets all regulatory and contractual requirements.
- **Technical Accuracy:** Ensure all engineering calculations and assumptions are sound.
- **Risk Assessment:** Evaluate potential risks associated with implementing the proposed ECMs.
- **Savings and Cost Reasonableness:** Assess whether the proposed measures and savings projections are realistic and achievable. Are ECM costs reasonable?
- **Timing:** Work with ESCO, stakeholders, and advisors to ensure financing and ESPC agreement is ready to be executed as IGA is nearing completion.

Resources

- ESPC Podcasts | Energy Services Coalition
  - Podcasts 107-120 focus on components of the IGA
- Model Documents for an Energy Savings Performance Contract | U.S. DOE
  - U.S. DOE offers template documents to facilitate the IGA and Project Proposal
- Performance Contracting National Resource Center | U.S. DOE
  - Modules 5 and 6 examine the Owner's Representative's role in facilitating the IGA, and address how to review the IGA and Project Proposal
- eProject eXpress | U.S. DOE
  - Initiate your ESPC project in eProject eXpress upon acceptance of the final IGA Report/Project Proposal

Resources: ESPC Campaign

The **Energy Savings Performance Contracting (ESPC) Campaign** engages states, local governments, school districts, universities and colleges, hospitals, and other market stakeholders to:

- **Support** the use of performance contracting to increase efficiency, modernize public buildings, reduce utility expenses, increase resilience, and meet lead-by-example goals
- **Share and Leverage Practical Resources** to strengthen ESPC and measurement & verification (M&V)
- **Amplify and Implement Best Practice Approaches** for ESPC projects and programs
- **Demonstrate Impact** with measured and verified energy and cost savings
- **Showcase Achievements** and share examples of successful ESPC implementation

- ✓ ***Expert-led Trainings***
- ✓ ***Webinars***
- ✓ ***Peer Exchanges***
- ✓ ***"Ask-an-Expert" Office Hours***
- ✓ ***Resource Library***

Complete the Expression of Interest form to obtain a Partner Agreement

Questions, Discussion

Next Steps

Upcoming Events

Peer Exchange

- **Thursday, October 31st, 4-5PM ET –** Tools and Tips for Your RFP and ESCO Selection
  - By Invitation Only – Join U.S. DOE's ESPC Campaign to participate in this and future peer exchange opportunities

Workshop

- **Wednesday, November 13th 2-3PM ET –** Working with Internal Stakeholders to Ensure a Successful ESPC Project

Webinar

- **Wednesday, November 20th 2-3PM ET –** Benefits of ESPC for Finance and Leadership

Trainings

- **Wednesday, December 5th 2-3:30PM ET** - Paying for Your Project: Understanding ESPC Project Financials, Financing Options, and the Leveraging Effect of ESPC on Contributed Funds
- DOE's Energy Efficiency and Conservation Block Grant (EECBG) program is offering monthly trainings for communities on a wide range of topics. Complete this form and express interest in Cohort 2B to receive training invites on ESPC topics.

Office Hours

- State and local ESPC Campaign partners are invited to set up a time to speak with a Department of Energy Project Facilitator (Owner's Representative) for virtual office hours. Discussion topics can be anything regarding an ESPC project, including specific questions on your project. **To request a meeting time,** please complete this Office Hours Sign-Up Form.

Call for Case Studies!

DOE is collecting case studies to share examples of impactful ESPC projects and programs and highlight your efforts to accomplish your goals.

To share a case study, please provide preliminary information via this Submission Form.

ESC will draft the document and work with you to review and finalize before DOE publication.

SCEP
STATE & COMMUNITY ENERGY PROGRAMS

ENERGY SERVICES COALITION
A Public Private Partnership

Thank you!

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A copy of the slides from today's presentation will be provided to you for reference

ESPC Campaign