TECHNICAL STANDARDS MANUAL DRAFT

VERSION 3.0

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I. OVERVIEW

For any PACE program to succeed, its property owners, lenders, service providers (contractors, engineers, architects, etc.), and community leaders must be able to confidently and objectively evaluate projected energy and water utility savings. The purpose of this technical standards manual is to outline the technical requirements necessary to qualify a project for the PACE in a Box program.

Once a project satisfies all underwriting requirements of PACE in a Box,[1] it must meet three technical requirements outlined in this manual:

- **First**, the property's current water and energy use is measured so that a baseline for comparison is established.
- **Second**, each potential energy or water conserving measure is evaluated to determine projected savings compared to the baseline in a technically sound, consistent, and transparent manner. Findings from these two steps together are compiled in a document referred to as an energy /water assessment report. The Texas PACE Act[2] requires that each report is evaluated by an independent third party reviewer (ITPR).
- **Third**, after the project retrofit activities are completed, the project must be reviewed by the ITPR to ensure that the project meets the intent of the energy/water assessment report, is properly completed, and is operating as intended.

On their own initiative, property owners are strongly encouraged to properly maintain the retrofits to ensure they receive the ongoing and full benefit of the improvements over time. Best practices are discussed further in the PACE Technical Standards Best Practices Guide for Property Owners.[3]

[1] See PACE in a Box Section 6.
[2] Texas Local Government Code chapter 399
[3] See PACE in a Box Section 8

Reference Materials

Industry accepted methods for data collection, measurement, and savings calculations should be used on proposed projects. This manual references several technical documents that will assist in determining pre-retrofit energy and water consumption, predicting retrofit energy and water savings, and verifying whether an installed measure or group of measures is performing as intended.

The technical methodology incorporated into the review process relies primarily upon the PACE in a Box guidelines (Section 6 – Guide to PACE Project Underwriting and Technical Standards[4]), and nationally accepted industry standards (see list below). Should a situation arise where the guidelines and the standards are in conflict, the PACE program guidelines should be followed.

The Texas PACE program guidelines are based on nationally accepted standards and protocols. The review process incorporates the technical methodology of three established industry protocols:

1. American Society for Testing and Materials (ASTM) E2797-15, Building Energy Performance Assessment (BEPA) Standard (data collection and baseline calculations for the energy audit, building asset data);
2. ANSI/ASHRAE/ACCA Standard 211-2018/ISO 50001: Standard for Commercial Building Energy Audits; and
3. International Performance Measurement and Verification Protocol (IPMVP) (latest edition).

Additional accepted technical standards relating to baseline determination/calculation, performing energy assessments, and guidelines for performance measurement and verification of energy and water conservation measures respectively are:

- American National Standards Institute/Building Owners and Managers Association (ANSI/BOMA) Z65.3-2018 (gross floor area measurement);
- ASHRAE Guideline 14-2014 (measurement of energy and demand savings);
- ASHRAE Procedures for Commercial Building Energy Audits (latest edition);
- ASHRAE Standard 202, Commissioning Process for Buildings and Systems (latest edition);
- ASHRAE Guideline 4, Preparation of Operations and Maintenance Documentation for HVAC&R Systems (latest edition);
- ASHRAE Guideline 1.4, Preparing Systems Manual for Facilities; (latest edition);
- ASHRAE Handbook-2017, Fundamentals, Chapter 34 (Codes and Standards); and
- ASTM E2797-15 Standard Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction

[4] The PACE in a Box underwriting criteria as of the publication date of this document are summarized starting on Page 6 of this document.

- FEMP M&V Guidelines V3.0: Measurement and Verification for Federal Energy Projects, Version 3.0, 2008
- National Institute of Standards and Technology (NIST) Life-Cycle Costing Manual, NIST Handbook 135 (latest edition);
- 2015 IECC /ANSI/ASHRAE/IES Standard 90.1 2013 – Energy Standard for Buildings Except Low-Rise Residential Buildings

Other acknowledged resources that may be considered are:

- The Alliance for Water Efficiency (AWE) Conservation Tracking Tool; and
- EPA WaterSense Product Guide.

An interactive workbook, PACE ITPR Workbook <LINK>, is available to help technical reviewers confirm that the program requirements are met and verify that the savings to investment (SIR)ratio is $\geq$ 1. The PACE ITPR Workbook will be referenced throughout this manual.

II. UNDERWRITING AND TECHNICAL STANDARDS[5]

This section sets forth the policies recommended by PACE in a Box for verifying that the subject property meets all statutory requirements, that any improvement to the property represents the potential for a sound investment, and that projected savings will justify the costs. These policies are based on the provisions of the PACE Act and best practices gleaned from PACE programs previously established in other states. They are designed to reduce risk to and protect the interests of all participants in the PACE financing program. The underwriting criteria are referenced here because the technical standards included in this manual are used to validate that the projects meet these requirements. The PACE in a Box criteria are reviewed through a feedback and improvement process. The following information is current as of the publication of Technical Standards version 3. Updates to the underwriting material provided in this section will be published on the Keeping PACE in Texas Document Library.[6]

Eligibility

The PACE program is an optional financing tool – a mechanism to enable owners of commercial and industrial property to gain access to funds for projects that will reduce water and energy utility costs under the most flexible and favorable terms. Although the program is designed to minimize risk by its very nature, it is still appropriate that all parties to a PACE agreement – local governments, lenders and property owners – understand where risks may arise and how they can be managed or mitigated.

The goal of establishing certain underwriting standards is to give all participants in a PACE agreement common factors to consider in evaluating proposed projects at a fundamental level before making an investment in detailed technical evaluations or engineering studies.

Eligibility requirements are incorporated in the PACE in a Box model documents and verified through the model application and administrative process.

1. Eligible Properties

The PACE Act permits a PACE assessment to be placed on privately-owned property that is:

- Commercial real property - including non-profit real property such as private schools, medical facilities, houses of worship, etc.;
- Industrial real property - including privately owned agricultural real property; or
- Multi-family real property with five or more dwelling units.

[5] PACE in a Box Section 6 – Guide to PACE Project Underwriting and Technical Standards
[6] https://www.keepingpaceintexas.org/library/document-library/

Any of these properties must also:

- Be located within the jurisdiction of the PACE program;
- Have a title that is not in dispute; and
- Where there is a preexisting mortgage lien on the property:
  - The mortgagee must be given written notice of the owner's intention to participate in the PACE program thirty days prior the owner entering into a contract with the PACE program; and
  - The mortgagee must provide written consent to participation in the PACE program.
- Properties that are statutorily *ineligible* for PACE assessments include:
  - Undeveloped lots or lots undergoing development at the time of the assessment[7]; and
  - Government owned real property.

2. Eligible Projects

The PACE Act authorizes PACE funding for the installation of Qualified Improvements. Qualified improvements must:

- Be permanently fixed to the real property;
- Have a demonstrated capacity to decrease –
  - Water consumption or demand; and/or
  - Energy consumption or demand (includes renewables and distributed generation products or devices on the customer's side of the meter that use energy technology to generate electricity, provide thermal energy, or regulate temperature);
- Have a useful life that exceeds the term of the PACE financing agreement[8]; and
- The package of measures must achieve a savings to investment ratio (SIR) ≥ 1[9].

A list of qualified improvements can be found on Exhibit A.

Ineligible Improvements – Improvements that are not permanently fixed to real property and can be easily removed are not eligible for financing through the program. For example, screw-in fluorescent light bulbs, removable low-flow showerheads, faucet aerators, and improvements that are not recognized as "energy efficient" or "water efficient" according to standard engineering or scientific principles would be considered as ineligible.

Once a PACE assessment has been placed on a property, the financed qualified improvements are deemed permanently fixed to the property and PACE in a Box documents prevent parties by

[7] Underwriting working group Undeveloped Lots update https://www.keepingpaceintexas.org/wp-content/uploads/2021/01/FINAL-Underwriting-2020-Guidance.pdf
[8] As defined on Page 8 of this guidance
[9] As defined on Page 9 of this guidance

contract or otherwise from removing any qualified improvement regardless of how they are defined in real estate case law or other contracts, until the assessment has been fully paid and the lien removed from the property. This PACE in a Box assessment standard applies whether the qualified improvement is purchased or leased. All parties must be confident in the measures selected and their projected value to, for example, existing and future tenants and property owners. PACE is not well suited for conservation measures that are design or stylistically relevant to a specific tenant or design trend if such measures are likely to go out of vogue before their life expectancy or the term of the assessment.

3. Eligible Term

Length of Assessment Term – The PACE Act requires that the assessment term not exceed the useful life of the improvement. In a multi-measure project, the weighted average useful life of the improvements, should be used.

PACE financing will enable some property owners to retrofit their property in a comprehensive manner with Qualified Improvements made up of a number of energy and/or water saving measures. This comprehensive approach is the most effective, cost-saving opportunity. To determine the useful life of a project made up of multiple measures with different projected life spans, the parties must determine the life of the project using a weighted average of the measures. This is calculated on a cost basis.

EXAMPLE:

Example: Lighting and Building Envelope improvements

Project:
Lighting - $100,000.00 (useful life = 10 years)
Envelope – $500,000.00 (useful life = 20 years)

Weighted Average Project Life = ($500,000)(20 years) + ($100,000)(10 years) / ($500,000+$100,000) = 10,000,000 $yrs + 1,000,000$yrs / $600,000

= 18.3 years

The PACE ITPR Workbook contains a Useful Life Reference worksheet adapted from the State Energy Conservation Office LoanSTAR program.[10]

[10] https://comptroller.texas.gov/programs/seco/funding/loanstar/guidelines.php

4. Eligible Loan to Value

Loan to Value (LTV) – The PACE Act requires an appropriate ratio of the amount of the assessment to the assessed value of the property. [11] The current PACE in a Box guidance sets the standard LTV at 25% and establishes guidelines for appraisals used in requests for variance from the use of assessed value to market value in determining the 25% LTV.[12]

Project Refinance

Refinancing enables an eligible property owner to retroactively finance qualified retrofits and development projects. Refinancing of PACE projects can occur up to 24 months after the qualified measures have been installed, provided all other PACE in a Box underwriting and technical standards are satisfied. The Savings to Investment Ratio (SIR) is calculated from the beginning of the refinancing. The life of equipment calculation starts at the time of installation. See the Keeping PACE in Texas guidance for additional information.[13]

Savings to Investment Ratio

Savings to Investment Ratio (SIR)	≥ 1.0 Requests for a variance may be evaluated on a case-by-case basis.

PACE assessments create incentives for new investment and allow property owners to achieve energy and water savings above historical usage. The Savings to Investment Ratio (SIR) is the ratio of anticipated monetary utility savings to a participating property owner compared to the total cost invested in the property conservation improvements. The SIR is expressed as the estimated energy/water savings over the effective useful life of the assessment divided by the amount financed through the voluntary PACE assessment. As an underwriting standard, a positive SIR will provide a lender greater assurance that a participating owner/borrower will realize a positive cash flow under the terms of the project and can service the debt at presumably no net cost or impact to normal cash flow from operations.

The responsibility for achieving the projected savings lies with the property owner. One method an owner may use in evaluating improvement measures is to calculate and compare the SIR for each conservation measure. To ensure a SIR ≥ 1 over the life of the assessment, the PACE program and project participants may:

[11] https://statutes.capitol.texas.gov/Docs/LG/htm/LG.399.htm
[12] https://www.keepingpaceintexas.org/wp-content/uploads/2021/01/FINAL-Underwriting-2020-Guidance.pdf
[13] https://www.keepingpaceintexas.org/wp-content/uploads/2021/01/FINAL-Underwriting-2020-Guidance.pdf

- Use energy auditing and modeling to identify measures that will yield a SIR > 1;
- Calculate SIR based on an entire project rather than on each individual measure; and
- Incorporate normal elements of generally accepted business calculations, such as depreciation and reasonable projections of changes in utility prices.

Project review calculations should be submitted to the Program Administrator via the PACE ITPR Workbook <LINK>. This tool helps technical reviewers and administrators confirm that the program requirements are met and verify that the savings to investment (SIR) ratio is ≥ 1.

In Texas, however, there may be other factors that justify a PACE assessment in which the SIR <1. For example, industrial retrofits may be required to insure the facility adequate power or water in spite of storms, peak demand or drought. Measures to correct non-attainment findings or to address federally mandated retrofits may be essential to the business' success regardless of the SIR. If a third party lender and building owner are willing to provide a solid rationale for accepting an SIR <1, they can request a waiver of the PACE in a Box general rule as defined in the most recent PACE in a Box Guidance.[14]

SAVINGS – Total energy/water $ savings over the weighted average useful life of the project.

SAVINGS = BASELINE USE – PROJECTED USE
(DELTA) (BEFORE PROJECT) (AFTER PROJECT)

INVESTMENT – Total amount of investment (financing amount)

SAVINGS TO INVESTMENT RATIO (SIR) = Savings / Investment

Example: Lighting and Building Envelope improvements

Project Cost: $1,500,000.00 (includes hard cost, soft costs and financing costs)
Project Savings: $2,000,000) over 20-year period

Savings to Investment Ratio $1,500,000.00 / $2,000,000.00

= SIR 1.5

[14] https://www.keepingpaceintexas.org/library/document-library/

Savings

Savings should be determined as:

Utility/Operating Savings

At least 50% of the calculated savings should be energy or water related. This can include:

- **Reduction in energy/water consumption.** This can include avoided annual electricity/water costs, including appropriate annual utility price escalation (not to exceed 3%, in most cases). This can also include annual demand charge reduction (must include the model that demonstrates how the reduction will be achieved and verified by the ITPR and approved by the program administrator). This can also include other system-related project revenues verified by the ITPR and approved by the program administrator.
- **Value of produced energy** (production-based incentive, net metering, PPA revenue). This can include annual revenue from excess electricity sales back to the grid at the wholesale rate, if applicable.
- **Rebates/Incentives.** This can include utility rebates, economic development incentives, federal, state or local incentives, etc.
- **Tax savings**. The property owner or third-party owner of the project is entitled to all tax benefits associated with the system However, this is allowed only if a tax liability is associated and must be cash benefit - tax credits, depreciation, accelerated depreciation, etc. If the ability to monetize the federal Investment Tax Credit, MACRS depreciation benefits, and/or other depreciation or tax benefits is available the value of the tax savings for each year in which the savings will be applied should be included. These tax benefits can be incorporated into the SIR calculation as savings if the property owner has demonstrated the ability to monetize those tax benefits. Capital depreciation as based on expected useful life of the technology and equipment may also be included.
- **Limited operational and maintenance** (O&M) savings are allowed. Any savings claimed from O&M activities must result in a real decrease from current expenditures after implementation, must be verified by the ITPR and approved by the program administrator. "Savings" due to redirected labor or O&M efforts that do not reduce real expenses cannot be claimed as savings.
- **Modeled annual cash flows** from the system over the length of the assessment.

Financial Savings

Financial savings MUST be ≥50% of the total savings amount over the project term. This can include:

- Avoided cost of capital or financing cost for securing a traditional loan (verified by the ITPR and approved by the program administrator.).
- An owner may choose to buy down (contribute cash) towards the project to increase the SIR. A SIR buy down should not exceed 50% of the total investment.

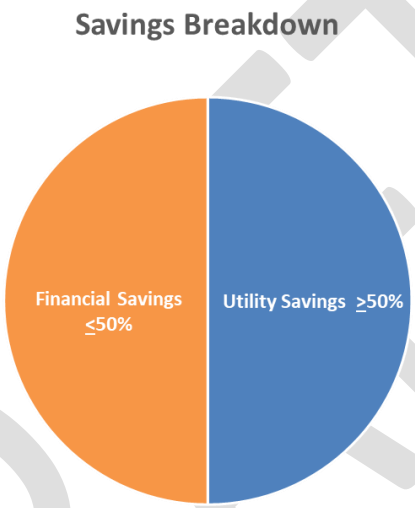


Figure 1 At least 50% of the project savings must be derived from utility and operating savings (avoided costs) directly associated with the project.

The Texas PACE program does not guarantee projected savings, and it is the responsibility of the property owner to exercise best practices to protect their interests through facility management best practices and/or a contract with the engineer, contractor or installer responsible for the project's success as recommended in the energy/water assessment report.[15]

[15] See PACE in a Box Technical Best Practices Guide in Section 8

Investment

Investment should be determined as:

- All costs associated with the PACE financed improvements and the financing thereof (including all principle, interest and related fees, soft costs, or other associated project costs); and

- Items necessary to maintain optimum system operations including preventative maintenance costs, pre-paid service contracts, and extended warranties can be capitalized into initial financing; plus

- Fixed or variable costs related to the performance or maintenance of the utility cost reduction measure(s) over the expected useful life.

Calculating SIR for Redevelopment Projects

Complete redevelopment projects include expansion of existing buildings, tear town/rebuild, or new development on a previously developed parcel. The baseline for redevelopment projects is established using the current Texas state energy code, which at the time of printing is 2015 IEECC/ASHRAE 90.1-2013, OR the local governing energy/water code, whichever is more stringent.

The redevelopment must achieve at minimum 5% energy/water performance above baseline, measured in energy use per square foot. This information will be used to determine the savings calculations including avoided annual electricity costs and annual demand charge reduction.

SIR will be calculated as discussed above: SIR = Savings / Investment

The incremental costs (code compliant to above code) versus incremental savings (savings of more efficient equipment compared to code) should be included in the engineering analysis.

III. INDEPENDENT THIRD-PARTY MONITORING

The Texas PACE law requires an independent third party review the water or energy baseline conditions and the projected water or energy savings for each proposed qualified project. It is the responsibility of the Independent Third Party Reviewer (ITPR) to validate projected future energy or water savings. Additionally, after a qualified project is completed, the ITPR must verify that the qualified project was properly completed and is operating as intended.[16] This requirement provides assurances to the PACE in a Box program, the property owner, and the lender that due diligence has been executed, that a standard of consistency has been applied throughout the PACE process, and that a Professional Engineer, licensed in the State of Texas, has validated the expected energy and water savings from the proposed project.

- ITPR Site Visit 1 - "Before Installation" analysis – The ITPR will review the project, assumptions, and projected savings
- ITPR Site Visit 2 - "After Installation" verification – The ITPR will verify that the project was completed and is operating as intended

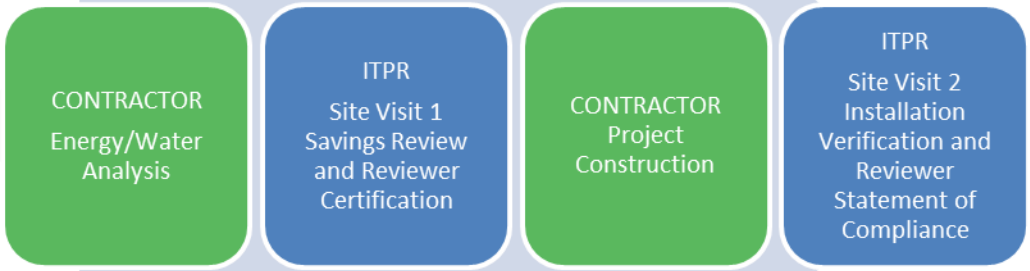


Figure 2 ITPR Review Process

[16] Texas Local Government Code Chapter 399.011

Third Party Review Process

Site Visit 1 / Reviewer's Certification

Once an engineer, contractor or installer has prepared an energy/water assessment report, a qualified ITPR selected by the property owner makes a site visit and reviews the energy/water assessment report to determine if the report complies with PACE in a Box guidelines. When the project is deemed compliant with PACE in a Box guidelines, the ITPR prepares a Reviewer's Certification to the PACE program.

The ITPR Reviewer's Certification shall include:

- A statement that the ITPR has no financial interest in the project.
- A letter stating the savings (energy, demand, water, and cost) expected project life, and cost are reasonable, are in compliance with PACE in a Box program guidelines.
- A Texas Professional Engineer signature and engineering seal.

The ITPR review and validation of energy /water savings calculations shall be submitted to the Program Administrator via the PACE ITPR Workbook <LINK>. The ITPR shall use this tool to help calculate the Savings to Investment Ratio for C-PACE projects.

An application for PACE financing will not be considered complete until Reviewer's Certification is submitted.

Site Visit 2 / Statement of Compliance

Once the project retrofit activities have been completed, the ITPR must revisit the site to confirm that the improvements were properly installed, meet PACE in a Box program guidelines, and are operating as intended. The reviewer must submit a Statement of Compliance to the PACE program indicating that the project was properly completed and is operating in accordance with the PACE in a Box guidelines.

The Statement of Compliance shall include:

- A statement that the ITPR has no financial interest in the project;
- A project documentation review letter that covers the PACE Project Report, detailed engineering drawings, designs, and specifications, copies of mechanical, electrical, plumbing, and building permits, and copies of equipment test and balance commissioning reports as well as any change orders; and
- A Texas Professional Engineer signature and engineering seal.

Retainage funding for the qualified project will not be provided for progress beyond the construction phase, if applicable, until the Statement of Compliance is received by the PACE program.

The process described above is required by PACE in a Box. The PACE program does not guarantee projected savings, and it is the responsibility of the property owner to exercise best practices to protect his interests through a contract with the engineer, contractor or installer responsible for the project's success as recommended in the energy/water assessment report.[17]

Independent Third-Party Reviewer Qualifications

To be of value, the work of the ITPR must be both professionally qualified and without conflict or relationship to the project they are reviewing. An ITPR must be a Texas licensed Professional Engineer with energy/water efficiency experience. Preferably, the Professional Engineer should have one of the following certifications:

- American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
  - Building Energy Assessment Professional (BEAP)
  - Building Energy Modeling Professional (BEMP)
- Association of Energy Engineers (AEE)
  - Certified Energy Manager (CEM)
  - Certified Measurement and Verification Professional (CMVP)
  - Certified Energy Auditor (CEA)
- AABC Commissioning Group
  - Certified Commissioning Authority (CxA)
- Building Commissioning Association
  - Certified Commissioning Professional (CCP)
- Energy Management Association
  - Energy Management Professional (EMP)

Ideally, the same ITPR should follow a project from initial review to project completion.

[17] See PACE in a Box Technical Best Practices Guide in Section 8

IV. FULL ASSESSMENT PROTOCOL

A project satisfying the underwriting requirements in PACE in a Box must also satisfy the Technical Standards required in this manual. This section establishes the basic protocol for complying with PACE in a Box technical standards.

> If a project meets the following criteria, it may qualify for FAST TRACK approach, which allows for faster implementation of projects:
>
> - Like-for-Like Replacement;
> - Single-Measure Efficiency Project; or
> - Distributed Renewable Generation

A proposed project qualifying for a FAST TRACK Protocol as established in Section V, shall use the technical standards in that section.

The Full Assessment Protocol divides an energy/water conservation project into six basic tasks:

1. Establish a Baseline	•Establish energy/water baseline conditions. Baseline should include utility provider, consumption and cost information and energy audit •Prior audit <3 years conditionally valid •New audit to follow ASHRAE Standard 211-2018
2. Prepare Energy /Water Assessment	•Create Energy/Water Assessment Report. •Include projected savings of proposed projects when measured against baseline data
3. ITPR Site Visit 1 "Before Installation" Analysis	•ITPR reviews project, assumptions, and projected savings
4. Implement the Project	•Installation of ECM, WCM and/or DG measures
5. ITPR Site Visit 2 - "After Installation" Verification	•ITPR verifies that the project was completed and is operating as intended
6. Project Reporting	•Post-construction annual savings report and ENERGY STAR data entry

Projects can range from installation of a single ECM or WCM, such as a new high efficiency boiler, installation of low-flow toilets, or a renewable energy system, to a whole building energy and water upgrade involving multiple, interactive ECMs and WCMs. Many projects will also achieve both energy and water savings, such as an energy efficiency measure that reduces heat load, thereby also reducing cooling tower water use.

Step 1: Establish a Baseline

A sound energy and water usage baseline consists of collecting the utility provider information and establishing the critical starting point for accurate projection of potential savings and measurement after implementing ECMs/WCMs. The baseline establishes how much fuel, electricity, and/or water a facility used over the previous 12-month period. It also factors in the impact of independent variables such as weather, occupancy, and operating hours on the property's energy/water use.

For the majority of energy projects, the requirements for establishing a baseline are outlined in:

- American Society for Testing and Materials (ASTM) E2797-15, Building Energy Performance Assessment (BEPA) Standard (data collection and baseline calculations for the energy audit, building asset data);

. The ASTM BEPA establishes a standard for data collection, compilation and analysis. This protocol currently targets energy measures in commercial facilities but are readily adapted to other projects including applicable areas of industrial and agricultural energy as well as water conservation and distributed generation. The standards provide a roadmap for key elements in performing a successful energy/water retrofit project. An alternative assessment for industrial/manufacturing/agricultural conditions is acceptable pending ITPR review and approval.

If a property is undergoing redevelopment through expansion, repositioning/new use, or tear down/rebuild a building energy use simulation model (e.g., Energy Plus, eQUEST, or equivalent) can be used to project the baseline energy consumption associated with the new use, assuming for the baseline that the energy-using equipment meets the current Texas state energy code, which at the time of printing is 2015 IEECC/ASHRAE 90.1-2013, OR the local governing energy/water code, whichever is more stringent. The redevelopment must achieve at minimum 5% energy/water performance above baseline, measured in energy use per square foot.

The protocols listed above are intended as minimum requirements for an energy and water assessment report to be considered for funding.

Energy and Water Audit

ASHRAE Standard 211-2018: Standard for Commercial Building Energy Audits defines the level of effort for energy audits and provide best practices for auditors and associated project deliverables. ASHRAE also provides necessary sample audit forms and templates for data collection during the audit process.

The level of audit selected is contingent on the complexity of the facility and its installed systems and components, as well as the number and types of anticipated energy and/or water saving opportunities. Information collected during the energy/water audit is integral in determining the facility energy/water baseline conditions. The auditor will also identify energy and water savings opportunities which meet threshold investment requirements and provide verifiable energy and water savings while conducting the audit.

Industrial and Agricultural Projects

For industrial and agricultural projects, an ECM/WCM may affect the facility, a process or equipment used within the facility, or a distinct area outside the facility. Depending on the project, a different standard may be used upon approval by the program administrator and ITPR. At this time, these standards do not provide a high level of detail for baselining these market-specific efficiency projects. As future nationally recognized protocols are developed, the PACE Technical Standards will be updated.

Distributed Generation (DG)[18]

DG projects have no pre-retrofit conditions as typically encountered in an energy conservation project. Since DG delivers energy rather than conserves or reduces energy, establishing a pre-retrofit baseline is not a strict project requirement. Metering of delivered energy without a baseline is often recommended in the M&V approach. DG protocol requirements can be found in International Performance Measurement and Verification Protocol (IPMVP) (latest edition).

Prior Audit

A prior ASHRAE Level II or Level III energy/water audit may be used provided that it was completed within the last three (3) years and that:

- Specific ECMs/WCMs were detailed in the audit and are still viable;
- Energy / water savings were projected for each proposed ECM/WCM;

[18] For purposes of the PACE in a Box Technical Standards, the Term "Distributed Generation" includes energy generation technologies such as CHP, co-generation, small wind, solar, and biomass systems that generate electricity on the customer's side of the retail electric meter and technologies such as solar water heating and geothermal heat pumps that utilize renewable energy resources to reduce electricity consumption and demand.

- Any major facility renovations and/or building additions that occurred after the last audit do not negate relevant findings of the prior audit; and
- Changes in facility equipment and/or facility end-use do not negate findings of the prior audit.

The level of effort associated with updating the project baseline is dependent on the date of prior audit. If the audit is older than six months, additional energy/water use data will be available, and must be included in the updated audit.

In the case where a previous audit was completed in the last six months, savings calculations may be taken directly from the report if applicable. For older energy/water audits, still within the three-year allowable time frame, the following items must be verified and accounted for in updated savings calculations:

- Any change in energy/water and/or demand rates or billing structure;
- Any change to existing facility, system, or project area that significantly affects savings; and
- Any change in building use and/or occupancy that significantly affects savings.

Projected Savings

The guidelines in the Reference Materials section of this Manual provide processes that should be used in projecting energy and water conservation savings. Models, spreadsheets, and similar tools must be based on "open book" methodology with sufficient explanation and documentation that savings calculations are transparent and results are readily verifiable. The use of "closed book" calculation methods or proprietary software is prohibited unless all methodologies associated with their use are well documented by transparent savings calculations and readily verifiable results. At least 50% of the savings must be derived from utility and operating savings (avoided costs) as described on page 11. The International Performance Measurement and Verification Protocol (IPMVP) (latest edition) should be used to determine projected energy and water efficiency and distributed generation savings.

Step 2: Create Energy/Water Assessment Report

An engineer, contractor or installer shall prepare an energy/water assessment report detailing the proposed project measures and projected savings of proposed projects when measured against the baseline data.

The energy/water assessment report shall contain the following information:

- Facility description
- Historical energy /water consumption / demand and performance
- Utility accounting (Utility providers/current tracking methods)
- Utility rates + escalation

- Utility Cost Reduction Measures (UCRMs)
- Energy code used
- Rebate/incentive documentation
- Applicable tax and depreciation benefits

- Narrative of UCRM project summary should include:
  - Estimated effective useful life for each UCRM
  - Estimated total installed cost of each UCRM
  - Estimated total project cost
  - Source used to establish measure costs
  - Cumulative simple payback
  - Discuss preliminary cost estimates and savings estimates
  - Discuss exact quantities, strategies, efficiencies, savings, etc.
  - Uncertainty (+/-) associated with the methodology used to establish costs and savings
- Measurement and Verification Plan
- Measurement and Verification Plan funding sources and rebates identified
- Ancillary project benefits (jobs created, GHG reduction, etc.)

Step 3: ITPR Site Visit 1 – "Before Installation" Analysis

The ITPR shall execute a review the energy/water assessment report and validate the project, assumptions, and reasonable savings of the proposed energy/water conservation measures. See page 9 for SIR calculation information. Additional calculation details including depreciation and utility escalation information can be found on the PACE ITPR Workbook. The ITPR review shall be submitted to the Program Administrator via the PACE ITPR Workbook along with the Reviewer's Certification.

Step 4: Implement Project

Once the proposed measures are approved by the ITPR and Program Administrator and the Notice of Assessment has been placed on the property, the specified energy and/or water conservation measures can be installed.

Step 5: ITPR Site Visit 2 – "After Installation" Verification

The Texas PACE law states, "After a qualified project is completed, the local government shall obtain verification that the qualified project was properly completed and is operating as intended."[19] The International Performance Measurement and Verification Protocol (IPMVP) (latest edition) should be used for verifying proper project completion and operation.
Upon completion of the project, the ITPR shall perform a site visit to verify that the qualified project was properly completed and is operating as intended. The ITPR shall then submit a Statement of Compliance to the Program Administrator.

Step 6: Reporting

The property owner is required to provide post-construction Annual Savings Reports to the PACE administrator to measure impact of the Texas PACE program. This report shall be submitted during the term of the assessment or through a term negotiated between the PACE Program Administrator and the property owner. Information required within the post-construction Annual Savings Reports shall be determined between the PACE Program Administrator and the property owner, and should include sharing of information through the EPA ENERGY STAR Portfolio Manager ® (ESPM) free online program. The ITPR should assist the property owner in setting up the ESPM account as part of the second ITPR visit. Information in the ESPM account should include basic building and energy and water data, financial data will not be included in this report. These Annual Savings Reports shall be submitted by the property owner. Section 5 of PACE in a Box outlines the reporting requirements of individual PACE projects.

[19] Texas Local Government Code chapter §399.011(b)

V. FAST TRACK APPROACH

The FAST TRACK approach allows for faster implementation of projects. These projects must meet specific eligibility criteria in order to utilize the FAST TRACK process. The FAST TRACK approach reduces project expenses associated with audit costs and, in some cases, the time required to review the proposed project. The property owner and contractor must decide whether the project qualifies for the FAST TRACK approach and whether this approach is applicable. For those projects that do not qualify under the FAST TRACK eligibility criteria, the FULL ASSESSMENT protocols are required. The qualifications for an ITPR under the FAST TRACK approach are the same as qualifications for a FULL ASSESSMENT.

The FAST TRACK approach is deemed relevant and appropriate for the three (3) project types specified below. The required procedures and documentation are unique to each project.

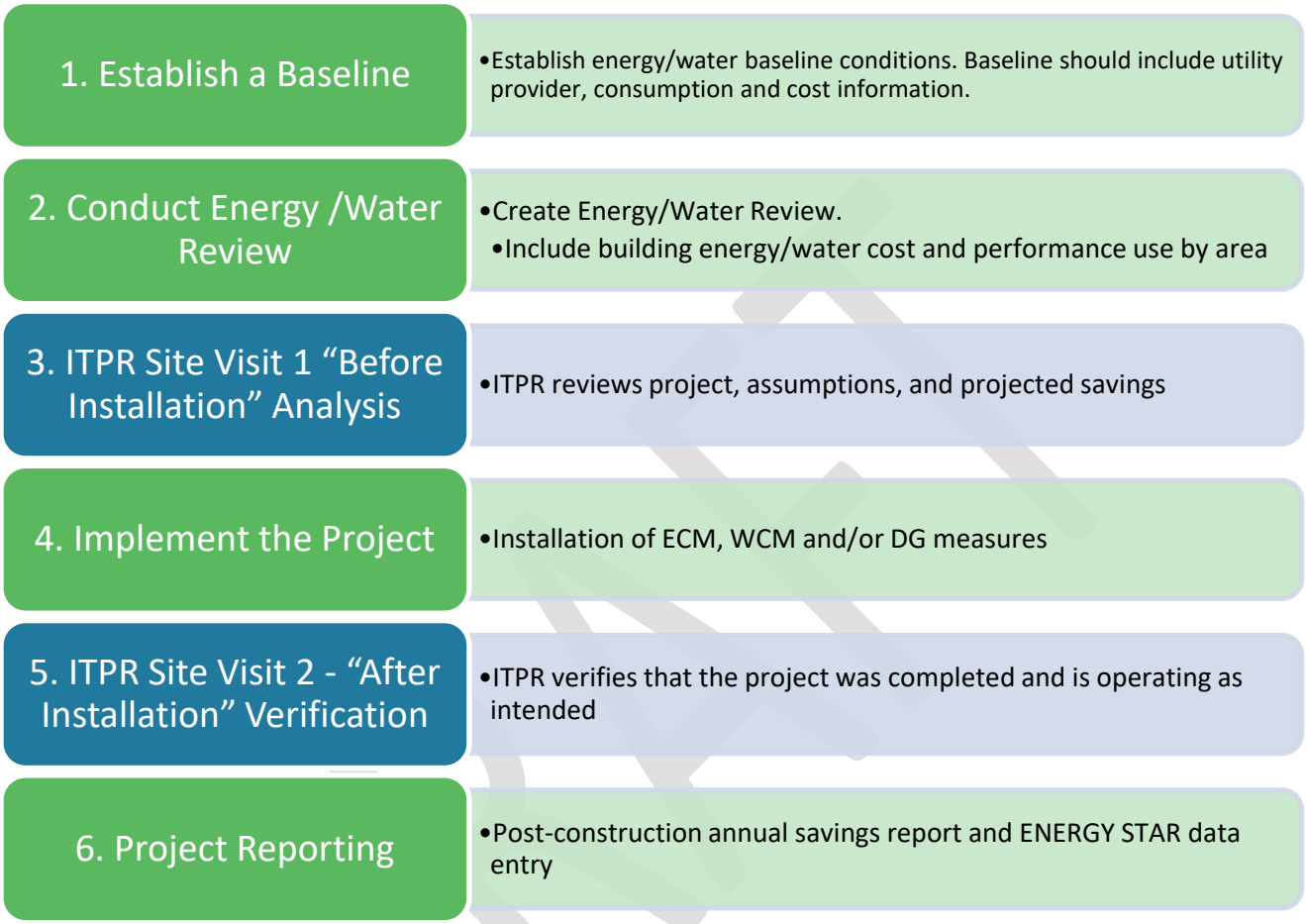
Type 1 – Like-for-Like Replacement. The FAST TRACK approach may be used for a project that involves like-for-like replacement of energy/water inefficient equipment with more energy/water efficient equipment. Examples may include a lighting retrofit or A/C unit upgrade.

Type 2 – Single-Measure Efficiency Projects. The FAST TRACK approach may be used for projects that install single efficiency measures such as window film, additional insulation, or reflective roof coating.

Type 3 - Distributed Renewable Generation. The FAST TRACK approach may be used for a project that involves only the installation of an industry accepted renewable energy system such as solar photovoltaic (PV).

Projects that fall within the above criteria do not qualify for the FAST TRACK approach if the PACE financed amount to building appraisal ratio exceeds 0.10 (10%).

The FAST TRACK Assessment Protocol divides an energy/water conservation project into five basic tasks:



Fast Track Step 1 - Establishing a Baseline

The following information is required to establish a baseline for a FAST TRACK approach project:

Site Visit

- Confirm building characteristics and major components
- Records collection (equipment, systems, utilities)
- Staff/occupant interviews
- Walk-through inspection (written and photo documentation)
- Verification of all collected information by a third party reviewer

Records/Data Collection

- Building construction data
- Equipment data – HVAC, etc.
- Building operating data
- Energy consumption data
- Water consumption data
- Weather data
- Previous audit reports

Note: Not all items listed will be applicable. Data collected is at the discretion of the professional performing the baseline work and subject to third party review.

Pertinent Interviews (optional)

- Concerning general building characteristics
- Operations of major building systems/components
- Past building operational history (service call logs)

Note: Verification of all collected information is required as part of the Site Visit to determine if there has been significant change; if verified, it is not necessary to conduct repeat interviews.

Fast Track Step 2 – Conduct Energy/Water Review

The ITPR will conduct a review/analysis of collected materials. As this is a like-for-like, single measure efficiency or distributed generation project, a full energy/water report is not required. The following information must be included:

- Data conversion and normalization
- Determine building energy and water consumption metrics
- Perform modeling and simulation as applicable
- Determine renewable energy system production as applicable

Preparation of Final Assessment Report

- Includes building energy/ water cost and performance
- Energy and use by area (HVAC, lighting), fuel (gas, electric), indoor v. outdoor water usage

If a unit of energy or water using equipment is beyond its useful service life, the work associated with the baseline analysis can be considerably reduced. Document the building's age, condition, operating parameters, and expected useful life based on manufacturer's warranty data or ASHRAE guidelines. If the project is a distributed renewable generation project, collect and document information on building structure and orientation relevant to installation, production and maintenance. For WCMs not all baseline data collection and analysis apply.

Projected Savings

The requirements in this section are applicable to all project types. For single component/system ECMs or WCMs, the contractor should provide appropriate annotations to assist in determining whether a listed requirement is necessary.

The following are considered the minimum requirements in determining savings from energy and water conservation measures under a FAST TRACK approach:

- Use of "open book" methodology, spreadsheet or software used in savings calculations;
- Detailed outline for savings calculation methodology; should be transparent and easily replicated by independent third party reviewer;
- Reasonable comparison of energy/water pre-retrofit estimates to historical end use data (for single measure/single component retrofits, use only necessary data set for calibration);
- Consideration of interactive effects of related loads or systems and potential for additional ECMs/WCMs which would affect the appropriate capacity or cost-effectiveness of equipment being replaced;
- Validation of return on investment (ROI) figures based on previous audit or newly incorporated data sets;
- Validation of appropriate rebate/incentives;
- Validation of appropriate tax credits and/or depreciation benefits.
- Validation of ECM/WCM implementation costs including labor and materials estimates; and
- Validation of savings.

The following items are the minimum that must be verified and accounted for in savings calculations for projects that propose the installation of an industry accepted renewable energy system, e.g., solar photovoltaic (PV), approved for interconnection by local utility:

- Current energy and demand rates;
- Applicability of incentives, rebates, and local utility requirements;

- Current distributed renewable generation component pricing, including design and installation of systems;
- Current electrical and/or building code requirements; and
- Current zoning and emissions requirements as they impact the project.

The ITPR shall execute a review the energy/water assessment report and validate the reasonable savings of the proposed energy/water conservation measures. See page 9 for SIR calculation information. Additional calculation details including depreciation and utility escalation information can be found on the PACE ITPR Workbook. The ITPR review shall be submitted to the Program Administrator via the PACE ITPR Workbook along with the Reviewer's Certification.

FAST TRACK Step 3: Implement Project

Once the proposed measures are approved by the ITPR and Program Administrator and the Notice of Assessment has been placed on the property, the specified energy and/or water conservation measures can be installed.

FAST TRACK Step 4: Evaluate Performance – Verifying Completion and Operation

The Texas PACE law states, "After a qualified project is completed, the local government shall obtain verification that the qualified project was properly completed and is operating as intended."[20] The International Performance Measurement and Verification Protocol (IPMVP) (latest edition) should be used for verifying proper project completion and operation.The requirements support projects with a single component replacement or multiple ECMs/WCMs or distributed renewable generation system, qualifying as a FAST TRACK project.

For single component/system conservation measures, the following are the minimum requirements in verifying completion and operation of installed measures under the FAST TRACK method:

- ITPR review of the installation of the required number and type of ECMs/WCMs as specified in the audit and project design/construction documents; and
- ITPR review of the proper installation and operation of all ECMs/WCMs as specified in the audit and project design/construction documents:
  - Ensure that operation and function meet design intent of the project;
  - Determine that installed ECMs/WCMs will provide savings as estimated in original audit findings and commensurate with baseline analysis; and

[20] Texas Local Government Code chapter §399.011(b)

- Determine that installed ECMs/WCMs will meet or exceed service life estimates based on observed operation.

For distributed renewable generation projects, the following are the minimum requirements in verifying completion and operation of installed measures under the FAST TRACK method:

- ITPR review of the installation of the required number and type of system components as specified in the audit and project design/construction documents; and
- ITPR review of the proper installation and operation of all components as specified in the audit and project design/construction documents:
  - Ensure that operation and function meet design intent of the project;
  - Determine that the installed system will provide savings as estimated in original audit findings and commensurate with baseline analysis; and
  - Determine that the installed system will meet or exceed service life estimates based on observed operation.

Upon completion of the project, the ITPR shall perform a site visit to verify that the qualified project was properly completed and is operating as intended. The ITPR shall then submit a Statement of Compliance to the Program Administrator.

FAST TRACK Step 5: Reporting

The property owner is required to provide post-construction Annual Savings Reports to the PACE administrator to measure impact of the Texas PACE program. This report shall be submitted during the term of the assessment or through a term negotiated between the PACE Program Administrator and the property owner. Information required within the post-construction Annual Savings Reports shall be determined between the PACE Program Administrator and the property owner, and should include sharing of information through the EPA ENERGY STAR Portfolio Manager ® (ESPM) free online program. The ITPR should assist the property owner in setting up the ESPM account as part of the second ITPR visit. Information in the ESPM account should include basic building and energy and water data, financial data will not be included in this report. These Annual Savings Reports shall be submitted by the property owner. Section 5 of PACE in a Box outlines the reporting requirements of individual PACE projects.

APPENDIX A – STANDARD ELIGIBLE MEASURES LIST

Below is a sample list of standard Texas PACE eligible measures. The first column shows broad category descriptions and the second column contains measure details.

STANDARD ELIGIBLE MEASURES LIST	
DESCRIPTION	EXAMPLES (including but not limited to)
UTILITY CONSERVATION MEASURES (UCRMs)	
01.0 Lighting	Interior lighting Parking lot lighting Lighting controls
02.0 HVAC	HVAC Controls High efficiency chillers, boilers, and furnaces Variable speed drives on motors, fans, and pumps Roof top unit
03.0 Electrical	Elevators; high efficiency hot water heating systems; building Elevators High efficiency hot water heating systems Building automation/energy management systems
04.0 Building Envelope	Windows (replacement/enclosures) Envelope insulation (roof/attic/ exterior walls) Roof (replacement/enclosure)
05.0 Water Efficiency	Domestic Hot Water Plumbing/Fixtures Irrigation System Renovation and Controls Pumps/Motors
06.0 Renewables/Distributed Generation	Solar power/storage Combined heat and power (CHP) Wind power Geothermal energy
07.0 Other UCRM	As needed
OTHER MEASURES	
08.0 Indirect Costs/Soft Costs	Architectural costs Engineering costs ITPR costs
09.0 Owner Buydown	
10.0 Avoided Cost of Capital	
11.0 Other Measures	

APPENDIX B - PACE ITPR WORKBOOK

The PACE ITPR workbook helps technical reviewers and administrators confirm that the program requirements are met and verify that the savings to investment (SIR) ratio is ≥ 1.

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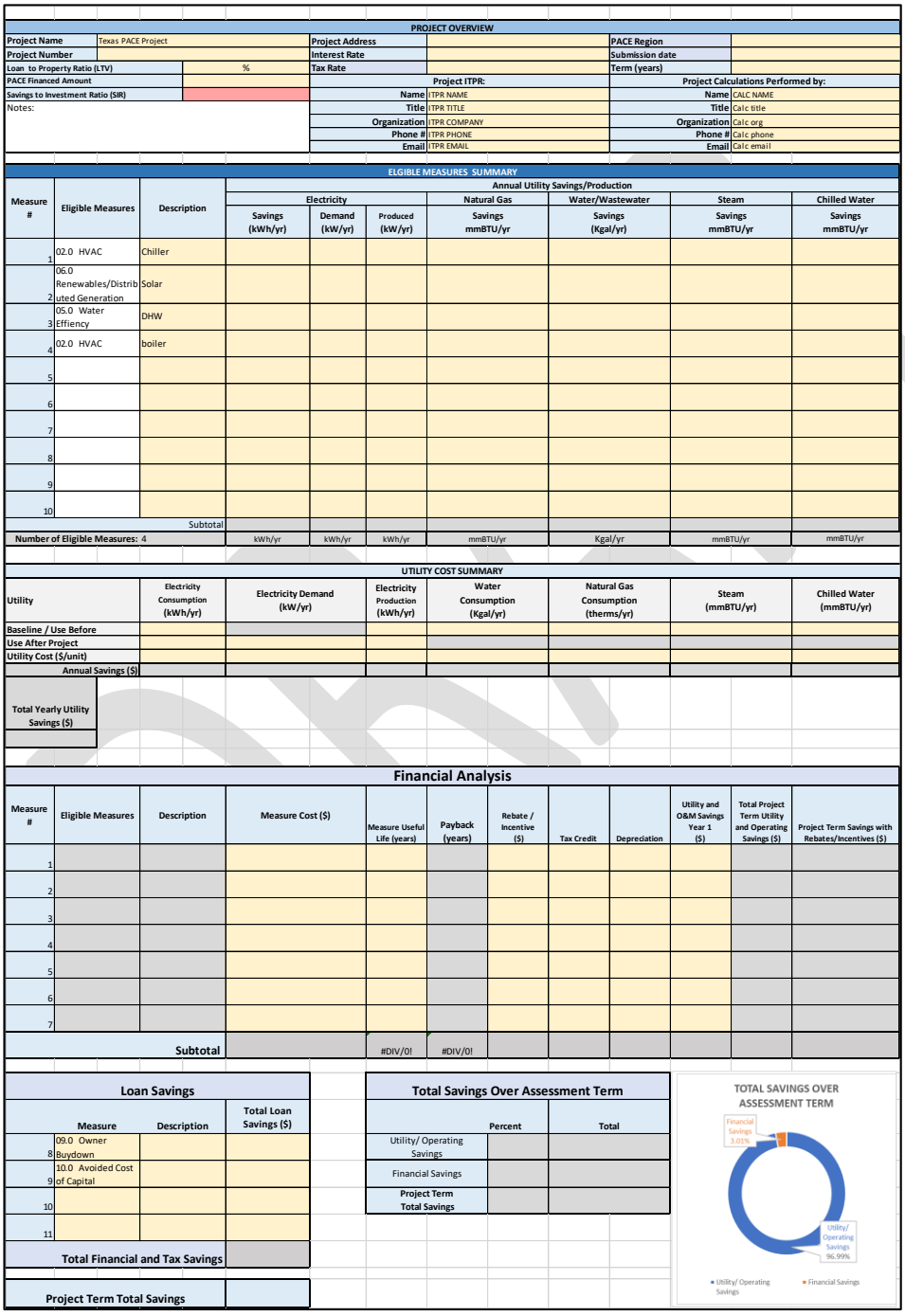

PROJECT OVERVIEW

Project Name	Texas PACE Project	Project Address		PACE Region	
Project Number		Interest Rate		Submission date	
Loan to Property Ratio (LTV)	%	Tax Rate		Term (years)	
PACE Financed Amount		Project ITPR:		Project Calculations Performed by:	
Savings to Investment Ratio (SIR)		Name	ITPR NAME	Name	CALC NAME
Notes:		Title	ITPR TITLE	Title	Calc title
		Organization	ITPR COMPANY	Organization	Calc org
		Phone #	ITPR PHONE	Phone #	Calc phone
		Email	ITPR EMAIL	Email	Calc email

ELGIBLE MEASURES SUMMARY

Measure #	Eligible Measures	Description	Annual Utility Savings/Production						
			Electricity			Natural Gas	Water/Wastewater	Steam	Chilled Water
			Savings (kWh/yr)	Demand (kW/yr)	Produced (kW/yr)	Savings mmBTU/yr	Savings (Kgal/yr)	Savings mmBTU/yr	Savings mmBTU/yr
1	02.0 HVAC	Chiller							
2	06.0 Renewables/Distributed Generation	Solar							
3	05.0 Water Effiency	DHW							
4	02.0 HVAC	boiler							
5									
6									
7									
8									
9									
10									
		Subtotal							
Number of Eligible Measures: 4			kWh/yr	kWh/yr	kWh/yr	mmBTU/yr	Kgal/yr	mmBTU/yr	mmBTU/yr

UTILITY COST SUMMARY

Utility	Electricity Consumption (kWh/yr)	Electricity Demand (kW/yr)	Electricity Production (kWh/yr)	Water Consumption (Kgal/yr)	Natural Gas Consumption (therms/yr)	Steam (mmBTU/yr)	Chilled Water (mmBTU/yr)
Baseline / Use Before							
Use After Project							
Utility Cost ($/unit)							
Annual Savings ($)							

Total Yearly Utility Savings ($)

Financial Analysis

Measure #	Eligible Measures	Description	Measure Cost ($)	Measure Useful Life (years)	Payback (years)	Rebate / Incentive ($)	Tax Credit	Depreciation	Utility and O&M Savings Year 1 ($)	Total Project Term Utility and Operating Savings ($)	Project Term Savings with Rebates/Incentives ($)
1											
2											
3											
4											
5											
6											
7											
		Subtotal		#DIV/0!	#DIV/0!						

Loan Savings

	Measure	Description	Total Loan Savings ($)
8	09.0 Owner Buydown		
9	10.0 Avoided Cost of Capital		
10			
11			
	Total Financial and Tax Savings		
	Project Term Total Savings		

Total Savings Over Assessment Term

	Percent	Total
Utility/ Operating Savings		
Financial Savings		
Project Term Total Savings		

APPENDIX C – ENERGY AND WATER REPORT REQUIREMENTS

The Energy/Water Assessment Report shall contain the following information:

- Facility description
- Historical energy /water consumption / demand and performance
- Utility accounting (Utility providers/current tracking methods)
- Utility rates + escalation
- Utility Cost Reduction Measures (UCRMs)
- Energy code used
- Rebate/incentive documentation
- Applicable tax and depreciation benefits

- Narrative of UCRM project summary should include:
  - Estimated effective useful life for each UCRM
  - Estimated total installed cost of each UCRM
  - Estimated total project cost
  - Source used to establish measure costs
  - Cumulative simple payback
  - Discuss preliminary cost estimates and savings estimates
  - Discuss exact quantities, strategies, efficiencies, savings, etc.
  - Uncertainty (+/-) associated with the methodology used to establish costs and savings
- Measurement and Verification Plan
- Measurement and Verification Plan funding sources and rebates identified
- Ancillary project benefits (jobs created, GHG reduction, etc.)

APPENDIX D – KEY TERMS

Assessment Payments – The periodic payments of the loan amount by the property owner.

Capital Provider – Also referred to as Lender. The entity that finances the eligible improvements.

C-PACE or PACE – Commercial Property Assessed Clean Energy

Distributed Generation – Includes energy generation technologies such as CHP, co-generation, small wind, solar, and biomass systems that generate electricity on the customer's side of the retail electric meter and technologies such as solar water heating and geothermal heat pumps that utilize renewable energy resources to reduce electricity consumption and demand.

Eligible Projects – Also referred to as Qualified Improvements. Measures that are permanently fixed to the real property; have a demonstrated capacity to decrease water consumption or demand; and/or energy consumption or demand (includes renewables and distributed generation products or devices on the customer's side of the meter that use energy technology to generate electricity, provide thermal energy, or regulate temperature); have a useful life that exceeds the term of the PACE financing agreement ; and the package of measures must achieve a savings to investment ratio (SIR) > 1 .

Eligible Property – Any private commercial, industrial, institutional or multifamily real property other than a residential dwelling containing less than five dwelling units, located in a participating region.

Energy Conservation Measure (ECM) – A commercially available energy conservation device or technology that is designed to reduce energy consumption at an existing facility, and that is permanently affixed to the building or is permanently installed on the site.

Estimated Useful Life / Expected Useful Life (EUL) – The average number of years that a particular type of mechanical/ electrical equipment, normally maintained, can be expected to perform reliably with reasonable efficiency.

Financed Amount – the combined costs of the PACE measure improvements and associated costs which will be financed through PACE for the eligible project.

Independent Third-Party Reviewer (IITPR) - A Texas licensed Professional Engineer with energy/water efficiency experience as detailed on Page 15 of this guide.

Loan to Value – Measurement of the relationship between the loan amount and the property value.

Program Administrator – Organization that oversees the Texas PACE program for a region.

Projected Savings – the estimated energy/water savings, calculated in accordance with the Technical Standards, from the financed improvements, over the expected useful life of such improvement(s)

Savings to Investment Ratio (SIR) – The total estimated energy/water savings over the effective useful life of the eligible improvements, divided by the finance amount and interest payments over the financing term. The SIR is expressed as the estimated savings over the life of the assessment divided by the amount financed through the voluntary PACE assessment.

Utility Savings – Energy and water related expenses that are eliminated or avoided as a result of equipment or technologies installed to reduce energy/water consumption at an existing facility.

Utility Cost Reduction Measure (UCRM) – A commercially available energy/water efficient device or technology that is designed to reduce energy consumption, peak energy demand, water consumption or utility costs at an existing facility, and that is permanently affixed to the building or is permanently installed on the site.

Water Conservation Measure (WCM) - A commercially available water conservation device or technology that is designed to reduce water consumption at an existing facility, and that is permanently affixed to the building or is permanently installed on the site.

This update of the PACE in a Box Technical Standards was underwritten by SECO.