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Public Utility Commission of Texas

Re: Comments on TRM for Program Year 2026, docket number 56768

New Measure Addition: Virtual Commissioning (VCx)

Power TakeOff is an energy efficiency program implementer and operates the company's Virtual Commissioning® (VCx®) program across the US in approximately 30 investor-owned utility operating companies.

VCx targets low and no cost operational and maintenance (O&M) measures in traditionally hard to reach customer segments. Customer AMI data is ingested, organized, and analyzed to find opportunities for energy savings. Trained energy advisors then reach out to sites, explaining the opportunity and helping them with implementation, all virtually.

Traditionally VCx has claimed savings using a custom approach, with evaluated realization rates near 100%. VCx projects provide persistent energy reductions that are measurable at the facility level and comply with IPMVP Option C. As such, it would be reasonable to add VCx to the TRM as an M&V Measure, similar to 2.5.1 Behavioral Measure Overview (TRM Measure ID: NR-MS-BC), using Savings Methodology: M&V and whole facility measurement.

These comments are being submitted with the interest of adding Virtual Commissioning (VCx) to the Texas Technical Reference Manual starting in Version 13.0, for Program Year 2026. We believe that it would be reasonable to add this new measure under Vol. 4, Section 2.5, M&V: Miscellaneous, using the proposed measure language provided as part of this comment submission.

Additionally, to simplify program implementation and reduce administrative costs for utilities, research was conducted to understand VCx's applicability as a prescriptive measure using a deemed savings value. Reviews[1] of 836 projects across 16 utilities through 2022 & 2023 present simple, percentage savings calculations that can be applied to a facility's weather normalized, annual baseline consumption to produce weather normalized, annual kWh and peak kW savings values. The analysis splits percentage savings by building size, building type, and change type, and finds the savings to be consistent across all three.

The deemed savings reviews were done using IPMVP Option C calculated savings values, in line with the Texas TRM Vol. 1, Section 1.1, Deemed Savings Discussion. VCx is currently operating as a deemed savings program in Arizona and more jurisdictions are expected to follow. If desired, Power TakeOff would also be interested in sharing our research and exploring adding VCx to the TRM under Vol. 3, Section 2.7, Nonresidential: Miscellaneous, with a prescriptive program delivery type, and a deemed savings value.

Sincerely,
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[1] Power TakeOff & Abacus Energy Works, Prescriptive Program Design for Virtual Commissioning® Using a Deemed Savings Approach, April 2025 & Econoler, Memo – Power TakeOff Virtual VCx Prescriptive Savings Estimate, January 2025

2.5.X Virtual Commissioning (VCx)

TRM Measure ID: XX-XX-XX

Market Sector: Commercial

Measure Category: Miscellaneous

Applicable Building Types: Commercial

Fuels Affected: Electricity

Decision/Action Types: Operation and maintenance (O&M)

Program Delivery Type: Custom *(Prescriptive if desired)*

Deemed Savings Type: Not applicable *(Deemed Savings Calculation if desired)*

Savings Methodology: M&V and whole facility measurement

The purpose of this measure is to create a framework to provide verified savings within standards currently applied to other commercial energy savings measures.

Measure Description

This measure applies to non-residential operation and maintenance (O&M) energy savings opportunities identified via statistical analysis of customer interval meter data.

To qualify for this measure, the savings opportunities must be identified via statistical identification of the appropriate target population. Individual baseline models are created for the population of non-residential customer meters and the target population is identified by screening the population for goodness-of-fit of baseline models based on hourly AMI data. The goodness-of-fit criteria are developed using accepted industry-wide methods that conform to IPMVP or other industry protocols and documents. The method is described in LBNL's Site-Level NMEC Technical Guidance document.

Trained Energy Advisors engage targeted customers to better understand their operations and energy usage, enroll them in the program, and generate energy savings through O&M changes.

Post-implementation, each site's pre- and post-implementation AMI data is reviewed monthly to verify that the anticipated changes were implemented with an associated reduction in energy usage apparent in the site's AMI data, as well as to monitor and ensure continued implementation of the changes for the duration of the relevant program year.

For some buildings, irregular building operations or other factors may make it impossible to verify the existence or persistence of implemented changes in the site's AMI data, and in such cases the changes will not qualify for the measure.

Eligibility Criteria

The buildings must:

- Be a non-residential customer
- Have a utility meter providing hourly or more granular energy consumption

Baseline Condition

The baseline case refers to buildings where one or more of the following issues have been observed by an Energy Advisor reviewing the building's AMI data:

- Minimal change in energy consumption between suspected occupied and unoccupied periods.
- High energy consumption during suspected unoccupied periods.
- Other patterns in energy usage that are not consistent with typical, efficient building operation (such as unexplained spikes in energy consumption, rapid oscillation in energy usage which may suggest short cycling)

High-Efficiency Condition

The efficient case refers to a building that has completed one or more of the following Virtual Commissioning changes:

- Optimizing equipment schedules (including lighting and exhaust fans)
- Optimizing economizer operation
- Managing HVAC equipment start-up and shut-down schedules
- Identifying HVAC equipment setbacks to address unnecessary usage
- Managing HVAC equipment sequencing to address short cycling
- Optimizing occupied HVAC zone temperature setpoints to operate within building design parameters
- Optimizing chilled and hot water systems
- Lowering compressed air system pressure and/or identifying setbacks
- Resolution of major maintenance issues (e.g. compressed air system leaks)
- Other non-HVAC equipment measures (e.g. scheduling industrial equipment)

Energy and Demand Savings Methodology

Savings Algorithms and Input Variables

Not applicable.

M&V Methodology

The evaluation, measurement, and verification (EM&V) methodology presents a plan to determine (i.e., calculate and verify) energy savings due to significant and persistent facility wide changes for a commercial facility, following IPMVP Option C. Whole facility guidance is found in IPMVP Core Concepts EVO 10000-1:2022. Guidance is also taken from the Uniform Methods Project, Chapter 24: Strategic Energy Management (SEM) Evaluation Protocol.

Virtual Commissioning's standard, Option C, Measurement and Verification modeling approach uses an hourly or daily analysis time interval similar to Lawrence Berkeley National Labs' Time of Week Temperature model (Price 2010; Mathieu et al. 2011). This model is a good fit for temperature dependent non-residential buildings with no production data (Stewart 2018), which accounts for the entire population of participants.

M&V Plan and M&V Report

A program-level M&V plan is provided ahead of program implementation which guides M&V protocols for all sites.

At a minimum it will document the methodology selected and include assumptions and details regarding model development, testing, handling of errors, and information to validate regression model(s). Documentation should be transparent and allow for repeating modeling steps and results and may:

- Describe how modeling outliers were identified and addressed
- Describe how missing data errors were addressed and document what changed from the original model.
- Describe options for handling non-routine events and adjustments across the measurement periods.

Normalized Energy Model Fit Metrics

Sites should be modeled on an ongoing basis. A model must meet these fitness criteria, at a minimum[2]:

- NMBE < 0.5%
- CV(RMSE) < 25%
- Savings Uncertainty < 50% at 68% confidence

Baseline Data and Model

The participant baseline data should be used to create a baseline model equation. The M&V plan should document the data used to determine the baseline completely and accurately, including selecting constants and independent variables. The baseline and independent variables shall be derived based on the historical electric consumption 12 months immediately before the capital project and the nearest actual weather data file. Historic electricity consumption is expected to be an hour interval to support the development of the peak demand savings.

[2] This approach is built off of ASHRAE-14 and prior evaluation experience.

Reporting Period Data and Model

The participant's consumption data starts immediately after completing implementation of all project components to create a performance period model equation. The M&V plan should document the data used to determine consumption completely and accurately, including the selection of constants and independent variables. Independent variables shall be derived based on the historical electric consumption, the actual weather data file from the same source as the baseline, a typical weather data file specified for the climate zone, and other relevant variables. Actual electricity consumption is expected to be an hour interval to support the development of the peak demand savings

Deemed Energy and Demand Savings Tables

If desired:

Annual Energy Savings Algorithm

The following algorithm is used to estimate annual energy saving impacts:

$$\Delta kWh = kWhbase \times PES$$

Where:

ΔkWh	=	Energy savings for measure (in kWh)
kWhbase	=	Weather normalized, baseline annual energy use[3] (in kWh)
PES	=	Percentage energy savings

Demand Savings Algorithm

The following algorithm is used to estimate annual energy saving impacts:

$$\Delta kWpeak = kWaverage \times PDS$$

Where:

ΔkWh	=	Peak period demand savings for measure (in kW)
kWaverage	=	Weather normalized, average demand[4] (in kW)
PDS	=	Percentage demand savings

[3] Calculated using a custom modelling approach, normalized to the appropriate TMY dataset.

[4] Average kW demand is calculated as the weather normalized (appropriate TMY dataset), annual baseline consumption divided by the hours in 1 year (8760).

Algorithm Input Values by Measure

The values presented in the following table are based on reviews[5] of 836 past participants in the Virtual Commissioning program across the United States, and recent program evaluations.

Table X-X Measure Lookup Values – Virtual Commissioning

Change Type	Weather Normalized, Baseline Annual Energy Consumption (GWh/year)	PES	PDS
All Types	< 8 GWh	15	14
	> 8 GWh	Use Custom M&V approach per M&V Plan.	Use Custom M&V approach per M&V Plan.

Claimed Peak Demand Savings

The methodology used to determine peak demand savings should be consistent with the methodology of energy savings.

Additional Calculators and Tools

Third-party software used for estimating annual energy use and demand is acceptable, provided that the calculation methodology of the software is documented.

Measure Life and Lifetime Savings

This measure has an EUL of 7.3 years.[6]

[5] Power TakeOff & Abacus Energy Works, Prescriptive Program Design for Virtual Commissioning® Using a Deemed Savings Approach, April 2025 & Econoler, Memo – Power TakeOff Virtual VCx Prescriptive Savings Estimate, January 2025

[6] As defined in the IL-TRM through ComEd EUL Research (https://www.ilsag.info/wp-content/uploads/ComEd-EUL-Research-CY2020-Final-Outcomes-Virtual-Delphi-Panel-2020-12-18.pdf)

Program Tracking Data and Evaluation Requirements

The following primary inputs and contextual data should be specified and tracked within the program database to inform the evaluation and apply the savings properly:

- Climate zone or county
- Decision/action type: Operations and maintenance
- Building type

The following inputs and data should be documented and available for evaluation review:

- Baseline operating practice
- Efficient operating practice
- Actual one-hour interval consumption data
- Actual weather data file
- Model development inputs and outputs for baseline and post-install analysis
- Normalized energy consumption and peak demand reduction estimates

References and Efficiency Standards

Not applicable.

Petitions and Rulings

Not applicable.

Relevant Standards and Reference Sources

- International Performance and Measurement Verification Protocol Core Concepts 2022
- Stewart, James. 2018. "Chapter 24 : Strategic Energy Management (SEM) Evaluation Protocol," no. May 2017.
- ASHRAE (American Society of Heating Refrigerating and Air-Conditioning Engineers). 2014. "Measurement of Energy, Demand, and Water Savings." ASHRAE Guideline 14-2014. Vol. 2014. www.ashrae.org/technology.
- LBNL Site-Level NMEC Technical Guidance Version 2.0, section 2: Baseline model goodness of fit screening for the target population, https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/l/6442463695-lbnl-nmec-techguidance-01072020.pdf
- Standard and references unique to each project to be documented in the M&V plan and report