



## Filing Receipt

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# PUBLIC UTILITY COMMISSION OF TEXAS

Evaluation, Monitoring & Verification (EM&V) of  
the Texas Investor-Owned Utilities' Energy  
Efficiency Portfolios

Energy Efficiency Implementation Project

October 12, 2021



**TETRA TECH**

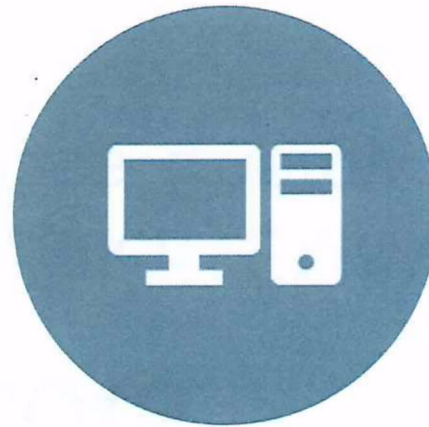


TEXAS  
ENERGY  
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# AGENDA



PY2020 KEY  
FINDINGS AND  
RECOMMENDATIONS



PY2021 EM&V  
OVERVIEW

# PY2020 ENERGY EFFICIENCY PROGRAMS

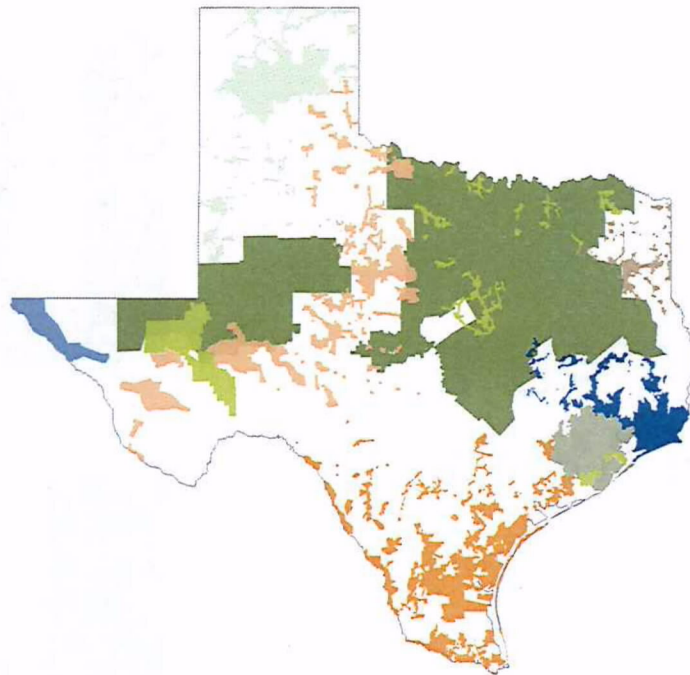


EM&V Key Findings  
& Recommendations





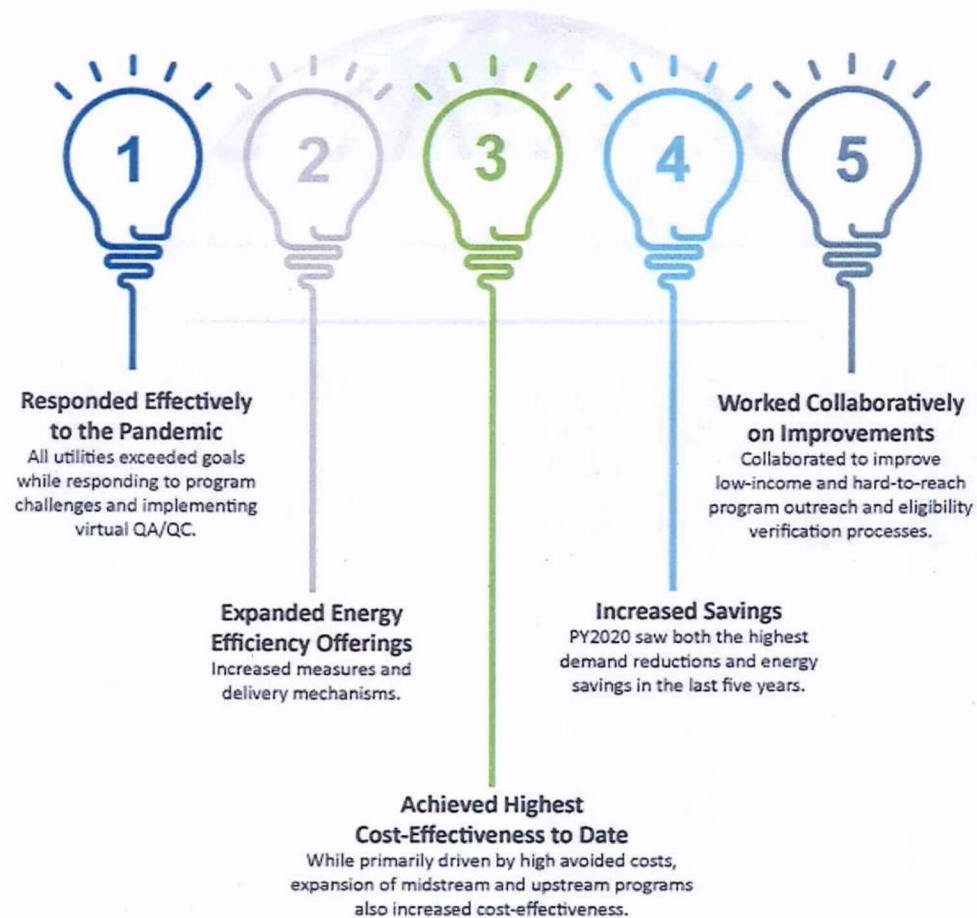
Saved  
695,012,552 kWh  
Reduced demand by  
536,770 kW

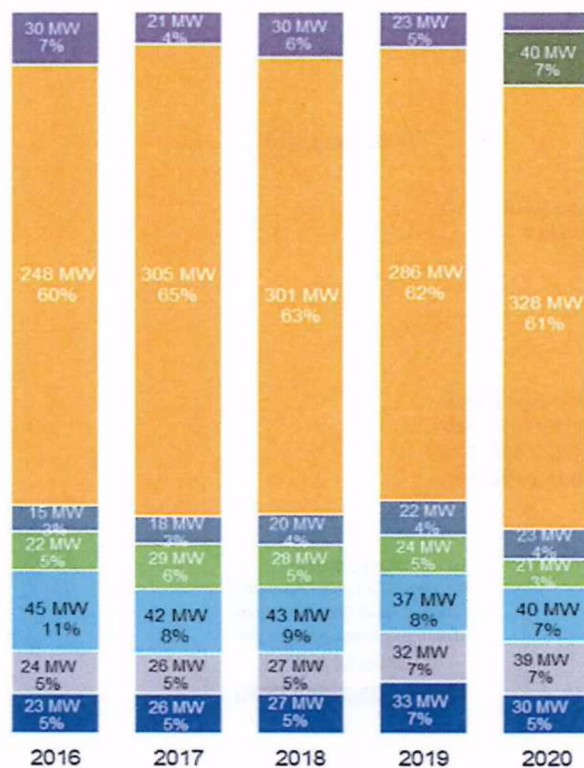


- AEP Texas, Inc. - Central Division
- AEP Texas, Inc. - North Division
- CenterPoint Energy Houston Electric, LLC
- El Paso Electric Co.
- Entergy Texas, Inc.
- Oncor Electric Delivery Co. LLC
- Southwestern Electric Power Co.
- Texas-New Mexico Power Co.
- Xcel Energy SPS Co.

LIFETIME SAVINGS  
COST OF \$0.02 KWH  
AND \$11.56 PER KW.

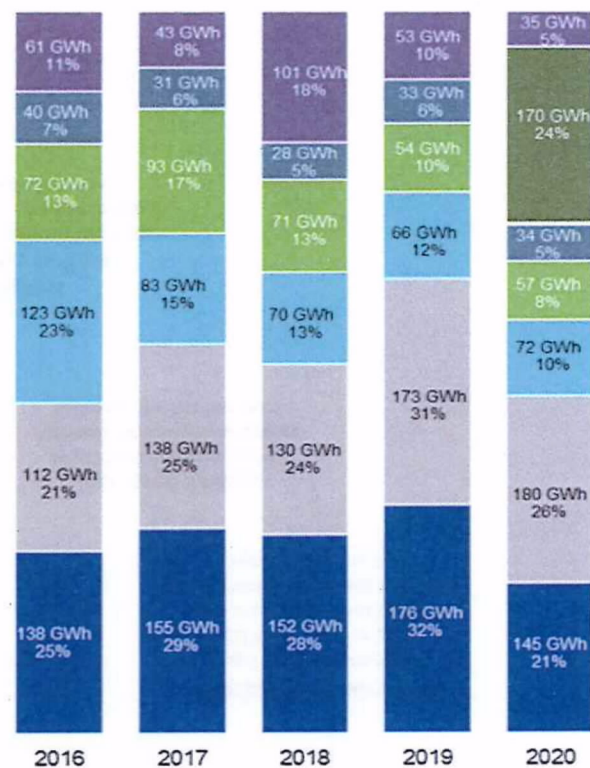
## PY2020 ENERGY EFFICIENCY ACCOMPLISHMENTS





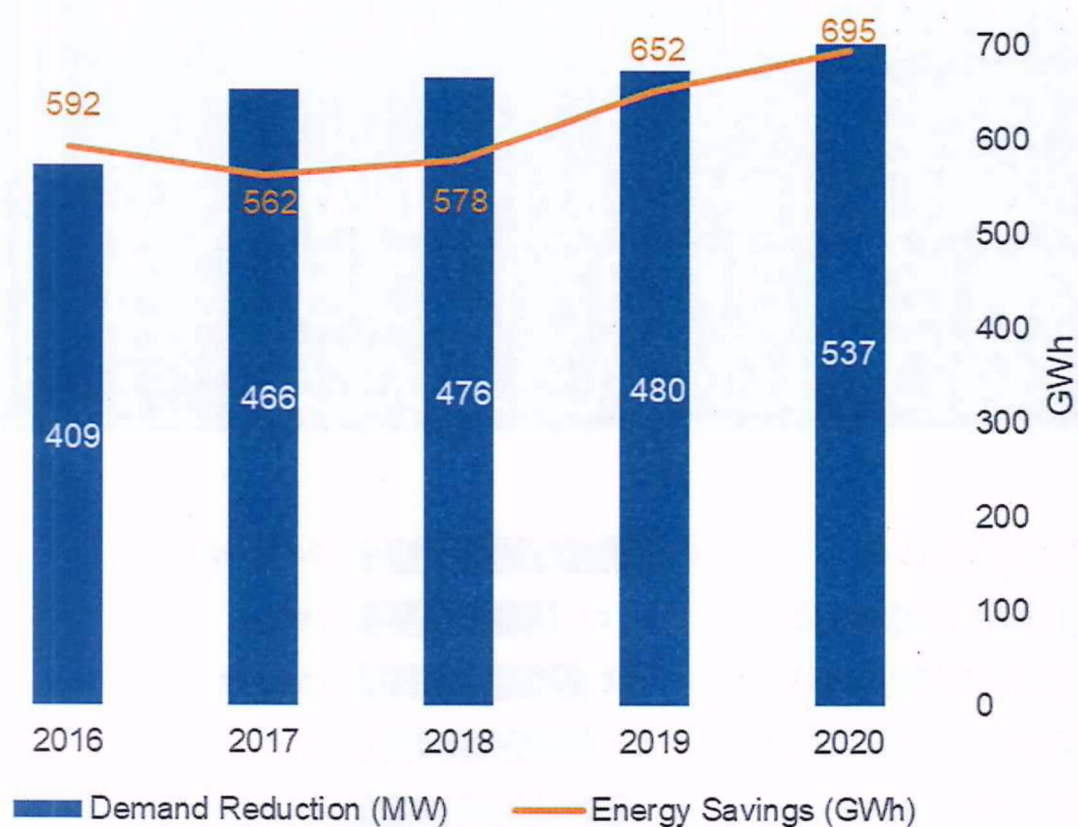
Other: HTR MTP, LI, PV/Solar (prior to PY2020 midstream was captured under 'Other')

■ Com SOP ■ Com MTP ■ Res SOP ■ Res MTP ■ HTR SOP ■ Load Management ■ Upstream/midstream ■ Other



# SAVINGS BY PROGRAM TYPE



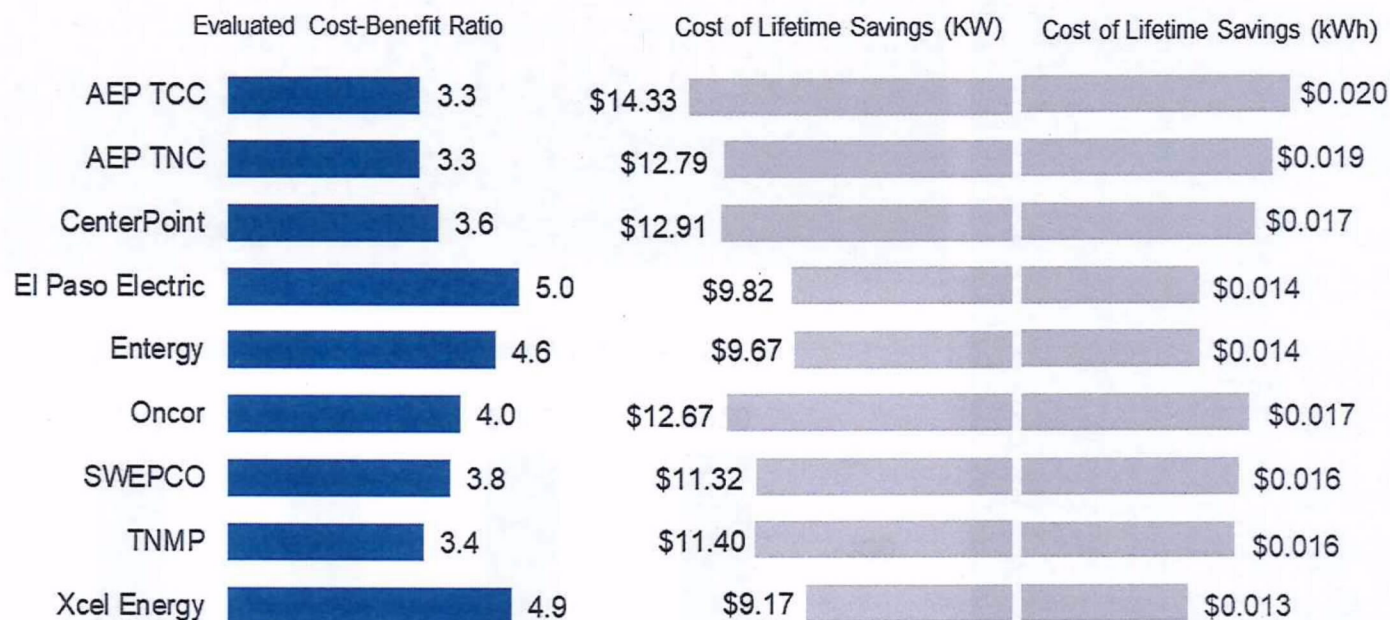


DEMAND  
REDUCTIONS AND  
ENERGY SAVINGS  
2016 – 2020

PY2020 SAW HIGHEST  
DEMAND REDUCTIONS  
AND ENERGY SAVINGS.



## 2020 Cost-Benefit Ratio & Cost of Lifetime Savings

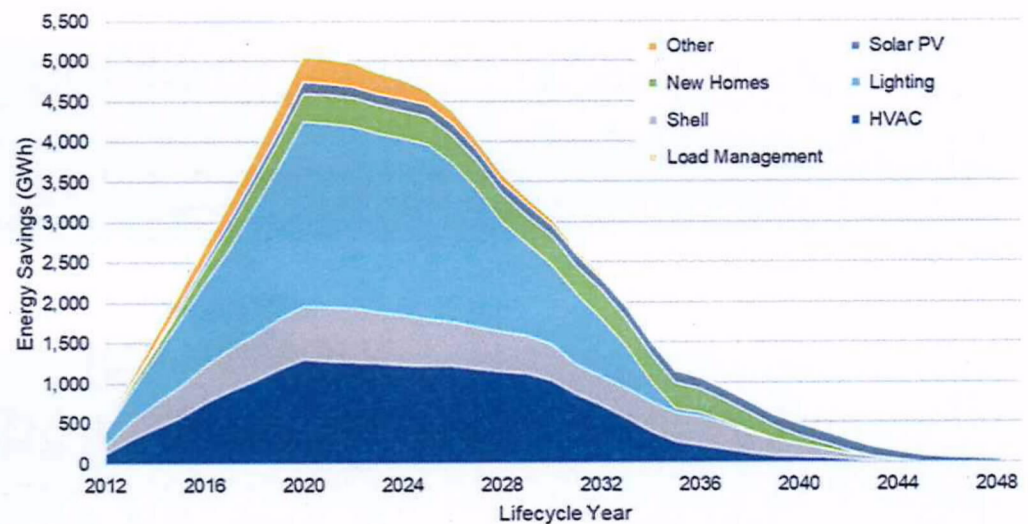


STATEWIDE COST-EFFECTIVENESS WAS 4.0, RANGING FROM 3.3 TO 5.0 ACROSS UTILITIES

EVALUATED  
COST-EFFECTIVENESS

LIGHTING,  
HVAC,  
&  
BUILDING  
SHELL  
IMPROVEMENTS  
ARE  
DELIVERING  
THE  
MOST  
SAVINGS  
OVER  
TIME.


PY2012—2048 Lifecycle Energy Savings by End Use (GWh)






# EM&V INFRASTRUCTURE

Senate Bill 1125 2011  
established the requirement for an EM&V  
framework



Rule-making 2012  
Commission Energy Efficiency Rule 25.181



PUCT selects and manages EM&V  
Annual EM&V since PY2012



# EM&V SCOPE

Census tracking system savings verification with additional activities prioritized by program

- Verify gross energy and demand savings for all energy efficiency and load management programs
- Estimate net savings
- Determine program and portfolio cost-effectiveness
- Prepare and maintain a statewide Technical Reference Manual (TRM)
- Provide information to improve program performance

Engineering desk reviews, interval meter data analysis, in-depth interviews

## EVALUATED AND CLAIMED SAVINGS WERE SIMILAR

The utilities have demonstrated a willingness to work with the EM&V team

upfront M&V reviews or additional technical assistance or input can reduce uncertainty in savings estimates

Utility		kW		kWh
AEP TCC	↓	-28	↑	5,986
AEP TNC	↑	12	↑	17,539
CenterPoint	↓	-310	↓	-1,337,233
El Paso Electric	↓	-3	↑	34,526
Entergy	↓	-212	↓	-8
Oncor	↑	5	↑	18,316
SWEPCO	↓	-26	↓	-166,991
TNMP	↑	3	↑	9,508
Xcel Energy	↓	-16	↓	-21,305
Overall	↓	-577	↓	-1,439,663

**PROJECT NO. 52373****REVIEW OF WHOLESALE ELECTRIC § PUBLIC UTILITY COMMISSION  
MARKET DESIGN § OF TEXAS****COMMENTS OF SIERRA CLUB**

COMES NOW the Lone Star Chapter, Sierra Club and files these Comments as follow-up to our November 1st comments, as well as observations to the November 4th workshop.

The Lone Star Chapter of the Sierra Club has nearly 30,000 members throughout Texas, most of whom are located in the ERCOT region. We and our members have long advocated at the PUC, ERCOT, legislature and at local utilities and cities for clean energy, demand response and other distributed energy technologies, energy efficiency and adoption of building codes, as ways to reduce energy demand.

Again, we want to reiterate that we believe that the Commission and ERCOT will be well served by focusing on changes to the energy and ancillary markets that can be implemented in a non-discriminatory manner, and in a relatively short time frame, and again express our opposition to longer-term administrative solutions such as the LSE Obligation, or physical firming requirements on generators, both of which will be expensive to consumers, will fail to ensure reliability and will undermine the incorporation of new technologies and approaches.

We do want to express our support of recent changes made at ERCOT that allow loads to participate in a larger portion of RRC, as well as a proposal to allow non-controllable loads to participate in NSPS, the creation of a Fast Frequency Response Service and the decision to begin a new ancillary product known as ERCS. We are supportive of making this ERCS a two-hour product that will help provide reliability and resiliency as we continue to incorporate variable resources. We agree with Chairman Lake's memo that ERCOT should continue to develop these products. ERCOT has also been making major changes in the use of Non-Spin. We are supportive of the decision that could lead to non-controllable loads providing non-spin, and continue to be engaged with other stakeholders about the correct duration, response, and volume (i.e. minimum size and overall size) requirements. While we do not believe a requirement that NSPS be able to perform for four hours is needed, we would support separating NSPS into separate two-hour and four-hour products, and will be filing comments to that effect at ERCOT.

ERCOT should continue discussions about how to refine the use of non-spin and consider the need to create NSPS of different durations. This would allow, as an



example, batteries to provide non-spin for shorter durations, and loads and more traditional generation to provide longer duration needs when there are sudden changes in net-load that last more than two hours. We wanted to remind the market that ERCOT is in the process of having its 2022 methodology for ancillary services approved, which will expand the use of RRS and Non-Spin, and in fact, those changes will increase the minimum amounts of RRS and non-spin utilized in the market, offering a more conservative approach to assure reliability. Last week, ROS approved these changes and we expect action by TAC and the Board by the end of the year.

We are also supportive of the decision to begin utilizing ERS earlier than an EAA event, and to add \$5 million dollars to the ERS program in the short-term to cover the winter period, and to consider a new rulemaking to either raise the \$50 million current cap or obligate a certain amount in MW capacity. As we have previously stated, simply doubling the cap to \$100 million and allowing ERCOT to run the program as needed would provide more surety to the market.

We are also supportive of changes to ORDC and appreciate the Brattle analysis. Based on the results, we believe that implementing a \$5,000 VOLL/HCAP with a 3,000 MW MCL would provide a slight boost in prices, avoid the need to RUC, and assure that the price adder rises to the cap when reserves fall below 3,000 MWs. It would slightly boost reliability to the market while keeping costs low. We also believe that a slightly modified version of the Nextera proposal might be warranted, since it appears to incentivize new generation (or DR), though we worry about the potential higher cost on consumers.

In addition, we continue to believe that ERCOT and the Commission should reconsider an idea that has previously received stakeholder support but has never been implemented - multi-interval SCED --also known as MIRTM - a Multi-Interval Real Time Market. A market that allowed bids into several time periods such as 30 minutes or an hour would allow more participation by demand response, distributed resources and quick start resources like gas plants and batteries. A MIRTM would improve the efficiency of the short term commitment decisions, dispatch and pricing of resources such as storage and distributed generation, combustion turbine Generation Resources and Load Resources providing demand response by coordinating the commitment and honoring the resources' temporal constraints and by reflecting the physical realities of the system.

It would also allow ERCOT operations more understanding of what resources are available and likely to show up when net load is high. Such a look-ahead market would take time to implement but we believe would enhance the move to real-time co-optimization and allow a better mix of market and ancillary service participation. Indeed, to reduce costs it should be implemented along with co-optimization. We call on the

Commission to analyze how development of a 30-minute or one-hour multi-interval real-time market could improve reliability.

We are submitting a previous analysis of a proposed 30-minute MIRT<sup>TM</sup> from 2017 and would ask the Commission to have Brattle analyze this approach as a potential solution. We are also submitting the Tetra Tech recent power point on the 2020 results of the TDU energy efficiency and load management programs, which again show how cost-effective they are.

We again continue to ask the Commission to open up two new rulemakings/projects to open up discussions on:

- The energy efficiency and load management programs run by TDUs (Rule 25.181);
- Rules for incorporating distributed energy resources into our energy and ancillary markets, including receiving nodal pricing and allowing for aggregations of resources that are near a bus or node;

Finally, we will reiterate our support for a future public hearing on these changes that would allow for any stakeholder or member of the public to address the Commission.

The Sierra Club appreciates the opportunity to file these comments in Project 52373.

Sincerely,

Cyrus Reed

Conservation Director, Lone Star Chapter

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# Summary of Multi-Interval Real Time Market (MIRTM)

## Feasibility Study

### BACKGROUND

- In the current ERCOT real-time market, software dispatches and prices energy in single five minute intervals. It does not commit or de-commit resources and does not consider potential changes in system conditions more than five minutes into the future. Generally, the ERCOT Nodal Real Time Market relies on generation owners (QSEs) to self-commitment/self-decommitment based on the generator owner's anticipation of future real time market prices.
- This construct has limitations in that it is unable to coordinate the economic commitment of resources such as combustion turbine Generation Resources and Load Resources providing demand response that are available within 10-30 minutes but unable to respond within five minutes. Additionally, these resources may be less flexible than online resources due to operational constraints (*e.g.*, start-up times, minimum loading requirements, minimum or maximum run times, etc.).
- Soon after nodal go-live, The Nodal Protocols were modified to provide an “optional work-around” solution to effectively commit and dispatch Quick Start Generation Resources (QSGRs) in the Real Time market:
  - QSGRs capable of coming online within 10 minutes are allowed to telemeter a status of online although physically offline, and also to telemeter a low sustainable limit (LSL) of zero MW even though their physical LSL is greater than zero.
  - Under this approach, QSGRs are dispatched by SCED as if the generator is already online even though they are physically unable to respond for the first 10 minutes. As a result, regulation reserves are deployed to balance the system.
  - Many operators of fast responding Generation Resources such as combustion turbines cannot meet the QSGR requirements and therefore have no other option than to self-commit. Other QSGR-qualified Generation Resources choose not to participate as QSGRs in SCED and instead self-commit. These fast responding Generation Resources that choose the self-commitment path will have to factor in their expectation of prices and weigh that against their costs over the expected run-time of the Generation Resource
- A MIRTM could potentially improve the efficiency of the short term commitment decisions, dispatch and pricing of resources such as combustion turbine Generation Resources and Load Resources providing demand response by coordinating the commitment and honoring the resources' temporal constraints and by reflecting the physical realities of the system.

### WHAT WOULD CHANGE WITH THE IMPLEMENTATION OF MIRTM?

- In contrast to the current design which evaluates single five minute intervals, in the MIRTM construct the real-time market software will analyze multiple consecutive five-minute intervals (the “MIRTM horizon”) to determine the most economical commitment and dispatch of resources.



- The MIRTM horizon enables the coordination of a more efficient commitment and dispatch of the current fleet of resources, and also could be expected to enhance competition by attracting more resources, especially demand response, to the real-time market. For Load Resources not providing Ancillary Services would also receive an ORDC payment to offset the costs of operating as a fully integrated Load Resource in ERCOT's systems.
- For MIRTM to be effective, accurate forecasting of system conditions over the MIRTM horizon is critical. Important inputs to MIRTM include:
  - Short-term load forecast
  - Current actual load (GTBD)
  - Intermittent (wind, solar) resource capacity short-term forecasts
  - Projected Resource status
- Commitment instructions issued by MIRTM would be binding, but Locational Marginal Prices (LMPs) would be binding for only the next (current) five-minute interval.
- To ensure that fast responding Generation Resources such as combustion turbines and Load Resources committed by MIRTM contribute to system wide price formation when they are marginal to meet system demand, a SCED pricing run using the mechanics in NPRR 626 would be applied.
- Resources committed by MIRTM would be eligible for "make-whole" payments if real-time LMPs are insufficient to recover the three part offer costs over the resources run time. Increased accuracy in the forecast of system conditions and effective price setting by marginal resources should both work to minimize the frequency and magnitude of "make-whole" payments.
- MIRTM could replace the existing approach for the dispatch of QSGRs.
- Resources would retain the ability to self-commit if they so choose.
  - There is a concern that there exists the potential for Resources that self-commit to increase make-whole payments as the previous MIRTM runs could have committed Fast Responding Generation Resources or Load Resources without the knowledge that a Resource would be self-committing in the future.
  - If MIRTM were to move forward, the interaction between MIRTM commitment and self-commitment would need to be addressed.

### **FINDINGS FROM MIRTM STUDY**

- ERCOT developed a software platform in-house to perform MIRTM simulations for selected operating days in 2015 and 2016 for purposes of assessing MIRTM feasibility and evaluating MIRTM's potential production cost savings (a measure of economic efficiency).
- The simulations demonstrate that the MIRTM approach is feasible for both Fast Responding Generation Resources (FRGRs) and Load Resources (LRs) that have temporal constraints.
  - With centralized commitment and dispatch, the scope of potential participation in the real-time market is expanded to include FRGRs and LR that currently can only participate in the real-time market through voluntary self-commitment.
  - Increased participation in the real-time market by FRGRs and LR would provide ERCOT with improved system visibility and operational flexibility.
- For now, the MIRTM simulation study window of 30 minutes appears to strike a reasonable balance between net load forecast accuracy and the scope of potential participation by FRGRs and LR in MIRTM.

- A shortened window of 15 minutes would significantly limit the scope of potential participation by FRGRs and LR.
- A lengthened window to 45 minutes to one hour may increase the scope of participation by FRGRs and LR, but would increase the net load forecast error.
- If implemented, the MIRTM window would be configurable such that it may be expanded or contracted based on operating experience to achieve the optimal balance between participation and net load forecast accuracy.

## **CONCLUSIONS**

- On average, the MIRTM simulations did not indicate significant production cost savings for the operating days studied in 2015 and 2016.
  - This result is influenced by the fact that system conditions and the balance of supply and demand during the period studied did not present a significant need for the types of resources that would participate in MIRTM.
  - Changes in the future resource mix, the balance of supply and demand or system conditions could demonstrate more significant value to MIRTM.
  - ERCOT has previously estimated the cost for ERCOT system changes needed to support MIRTM in the range of \$20-\$25 M. The costs to QSE systems were not estimated.
- Generally, the MIRTM simulation produces a tighter commitment pattern for FRGRs and LR compared to the current system.
  - A tighter commitment pattern indicates a desirable outcome where the FRGRs' and LR's capacity utilization is maximized (e.g., if a FRGR is committed, its dispatch level is above its LSL).
  - In some cases, the MIRTM simulations resulted in more price spikes than Sequential SCED. If MIRTM were to be implemented, the improvements noted below could mitigate the number and severity of price spikes.
- For the days studied in the MIRTM simulation, significant make-whole payments were not required for FRGRs or LR committed by MIRTM.
- Potential improvements to the forecasted inputs to MIRTM could include:
  - Resource status forecasts (e.g., Start Up, Shut Down, On Test)
  - Accuracy of short-term Intermittent Renewable Resource forecasts
  - Accuracy of the short-term load forecast
  - Changes in Ancillary Service (AS) requirements across the hour boundary and associated Resource AS responsibility changes and Non Frequency Responsive Capability (NFR) that impacts a Resource's High Dispatch Limit (HDL)
  - DC Tie schedule changes on a five-minute boundary (the MIRTM study used DC tie schedule changes on a 15 minute boundary)
  - Local price formation for FRGRs and LR committed by MIRTM (i.e., improvements to NRR626 RT Deployment Price Adder)
  - Inclusion of higher configurations for online combined-cycle generators as eligible for commitment by MIRTM (e.g., 1x1 to 2x1, or 2x1 to 2x1 + duct burner)
  - Consideration of impacts from upcoming planned Resource status changes including outages and Transmission outages in the MIRTM study horizon

- Considering the results of the limited analysis, ERCOT and stakeholders find that the MIRTM study demonstrates that the estimated cost are in excess of the measured benefits and therefore insufficient to support a recommendation to move forward with MIRTM at this time.