Quick Take

Here's What May Happen if ERCOT Introduces Marginal Losses

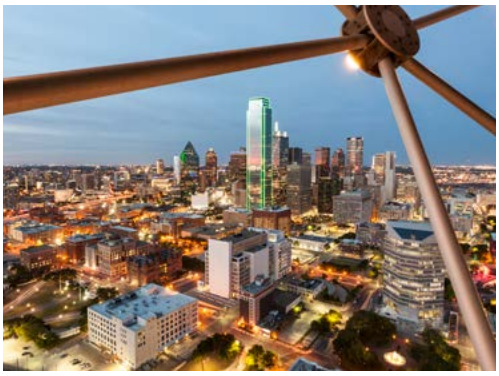
By Rakesh Maurya, Harris Loizou, and Himali Parmar, ICF

Shareables

- Impact of marginal losses on dispatch of renewable generation in ERCOT will likely not be significant
- Power prices in wind-rich Western Texas could face modest declines
- Load zones such as Houston experience an uptick in power prices and may see an increase in generation dispatch

Executive Summary

ERCOT implemented a nodal market structure in late 2010 with a 'congestion only' Locational Marginal Pricing (LMP) structure. But now, ERCOT is considering including marginal losses in its LMP. An ICF study on the effects of marginal loss pricing in 2020 found there may be no significant shift in the dispatch of renewable generation. Yet, reduced pricing in ERCOT West may affect the economic viability of renewables. All other nodal markets use an LMP market structure that accounts for both congestion and marginal losses. With the focus on reducing congestion in the market, ERCOT introduced a 'congestion only' LMP structure. This means difference in power prices at different pricing points in the system differed only by their impact on transmission congestion and not due to transmission losses. The inclusion of marginal losses may affect cost-benefit assessments of recently approved or future transmission projects.



The Advocacy of Marginal Losses

By excluding marginal losses, ERCOT's dispatch decisions are based only on the variable cost of the generating facilities and their congestion impact on the grid. The dispatch engine does not take into account the long distance over which the power would have to be exported to serve load. As a result, the decisions may not be the most cost-effective. Exclusion of marginal losses from market pricing does not send the right price incentives to new generation. It may be considered a boon for renewables in ERCOT West. This may also provide incentives for transmission providers in the region to expand.

A May 2017 study sponsored by NRG and Calpine[1] recommended the introduction of the marginal-loss factor into dispatch and pricing amongst other changes to the market structure. According to the study authors

"Current omission of marginal losses creates a persistent inefficiency in locational prices and an elevation of the real cost of serving load that can accumulate to have an effect of the same order of magnitude as the effect of marginal congestion".

The ERCOT Independent Market Monitor also released market enhancement recommendations during the June 2017 Board of Directors meeting. Several recommendations, including marginal losses, align with recommendations made by the study sponsored by NRG and Calpine. At a PUCT workshop held on 16th October, 2017, a study funded by Vistra Energy, The Wind Coalition, and First Solar put forward an opposition to the proposed change to marginal losses. The study suggests the proposed change would shift costs and benefits versus the current market design in which average transmission losses are socialized.

The Effects of Marginal Losses in 2020 on ERCOT

ICF developed a production cost simulation of the ERCOT market using PROMOD[2] to assess the impact of the introduction of marginal losses on the ERCOT System. We modeled a Base Scenario that simulated business as usual conditions with losses not factored into pricing, and an Alternative Scenario where losses were priced on the margin. We selected 2020 as the simulation year.

Introduction of marginal losses led to an increase in power prices in regions that import power. Especially, ERCOT Houston where power prices increased by 6%. ERCOT West, where most of the wind generation is located, could experience a decline in prices. The decline in ERCOT West prices was less than the price increase in importing areas of ERCOT Houston and North. ICF did not observe any meaningful impact on renewable generation in ERCOT West between the cases. Yet, thermal generation in ERCOT West declined and remained flat in ERCOT South. Gas-fired generation in ERCOT Houston increased in dispatch due to stronger power pricing. As generation increased in ERCOT Houston, the average power flow from ERCOT North to Houston reduced substantially and followed by West to North corridor. Introduction of marginal losses resulted in a 6% increase in production cost, and roughly 10% increase in cost to serve load ERCOT-wide.

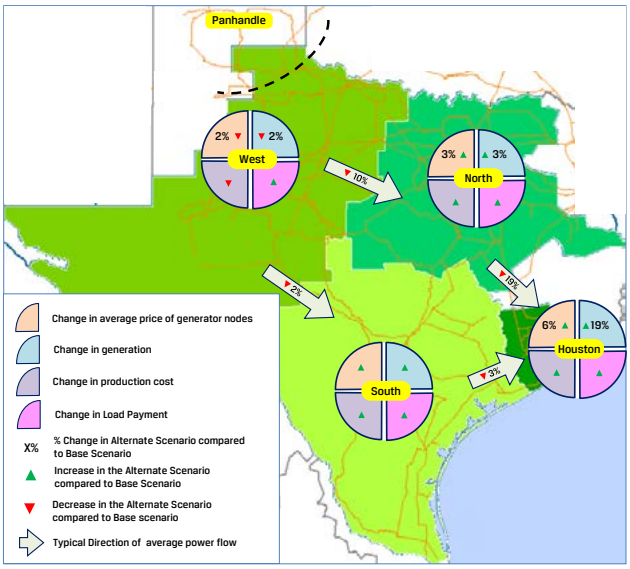
[1] PUTC. "Informational Filing by Calpine Corporation and NRG Energy, Inc. – Report: "Priorities for the Evolution of an Energy-only Market in ERCOT". Web. Available online: from http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/40000_669_939373.PDF

[2] A wholesale electric market simulation model from ABB

ERCOT Houston observed the highest increase in production cost and load payment due to marginal losses.

The lowest was seen in ERCOT West. ICF's assessment does not take into account the broader and longer-term societal benefits especially the environmental impacts. This is a single year assessment that doesn't account how inclusion of marginal losses may affect the economic viability of future renewable projects. Additionally, it doesn't review how marginal losses incentivizes some oil/gas steam and coal units to continue operating in the ERCOT Houston and North. These may have meaningful impact on future entry/exit decisions.

EXHIBIT 1: MARGINAL LOSS PRICING EFFECTS ON ERCOT MARKET



Source: ICF

ICF's single year assessment does not show any significant shift in renewable dispatch. Yet, in the longer-term marginal losses may affect the economics of siting new renewables. Generation owners in load centers will realize better returns on investment due to stronger pricing. The inclusion of marginal losses could lead to increased reliance on local generation and thereby lead to reduced inter-zonal power flows. As a result, the economics of any major transmission expansion may be impacted.

About ICF

ICF is a global consulting services company with over 5,000 specialized experts, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future.

About the Authors

Rakesh Maurya has 5 years of experience providing transmission asset valuation, locational marginal price (LMP) forecasting, merchant transmission investment assessment, and generation interconnection and risk assessment. He also has experience in estimating transmission congestion and losses and their effect on plant dispatch and cost benefits in power markets for many different types of clients, including investment firms; independent power producers (IPP) and developers; utilities; and state, federal, and local governments and regulators.

Harris Loizou is a research assistant with ICF's Commercial Energy division with expertise performing advanced quantitative and economic analysis of energy and transmission infrastructure. He has contributed to the development and enhancement of ICF proprietary models and data bases.

Himali Parmar performs analysis in generation, transmission, and ancillary services valuation; transmission studies; and utility restructuring. Her expertise includes forecasting transmission congestion and losses and their effect on locational power prices and plant dispatch in the U.S. power markets. After earning a master's degree in Electrical Engineering from University of Wisconsin, she was an intern with the American Transmission Company. She did load flow and contingency analysis to develop short-and long-term transmission system plans for the transmission planning group. While a student at University of Wisconsin, Ms. Parmar was a teaching assistant for undergraduate courses in the Electrical Engineering Department.

For more information, contact:

Rakesh Maurya
rakesh.maurya@icf.com +91.11.4354.3036

Harris Loizou
harris.loizou@icf.com +1.571.459.4042

Himali Parmar
himali.parmar@icf.com +1.703.934.3497

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