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REVIEW OF US LMP RETAIL MARKETS

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1 Introduction and scope

During 2022 and 2023, there has been a significant increase in interest in the possibility of implementing locational marginal pricing (LMP) in the GB power market. Most significantly:

- DESNZ consulted on LMP as part of its wider Review of Electricity Market Arrangements,¹ and is undertaking further analysis of the idea;
- Following its Net Zero Market Reform (NZMR) project, NG ESO is recommending LMP as the wholesale market model best suited to support the transition to Net Zero. NG ESO has published an initial report setting out the rationale for its preference;² and
- Ofgem commissioned a study into LMP, the results of which indicated a significant benefit to customers.³

There has been significant focus to date on what LMP would mean for the wholesale market and transmission network build in GB. However, there has been less analysis of the implications of LMP for the state of the GB retail market and the extent to which LMP is compatible with the current nature of the GB retail market.

In this context, Centrica has commissioned Frontier Economics and London Economics International to conduct a review of key features of two LMP retail markets in the United States (Texas and New York) and assess the extent to which they are consistent with the current GB retail market. The key aspects of the GB retail market we consider are summarised in the box below.

¹ DESNZ, Review of electricity market arrangements, <https://www.gov.uk/government/consultations/review-of-electricity-market-arrangements>.

² National Grid ESO, Net Zero Market Reform, <https://www.nationalgrideso.com/future-energy/projects/net-zero-market-reform>.

³ Ofgem, Locational Pricing Assessment, <https://www.ofgem.gov.uk/publications/locational-pricing-assessment>.

Aspects of the GB retail market considered in this report

Industry structure: There is no practical need for vertical integration (standalone suppliers are successful). Over time, the market has seen a decline in the share of vertically integrated (VI) retailers, such that as of the end of 2022, between 59% and 80% of GB domestic electricity customers are served by non-VI firms.⁴ This is the result of consumers switching to independent suppliers on the one hand and incumbent suppliers divesting GB generation assets on the other.

Retail competition: Consumers are free to switch their energy supplier, and suppliers compete for customers. Whilst a number of ‘incumbent suppliers’ affiliated with previous vertically integrated energy companies enjoy a large combined market share, following market liberalisation, GB has seen the entry (and exit) of numerous small suppliers.

Price regulation: In 2018, Parliament required Ofgem to introduce a domestic energy price cap on standard variable and default tariffs. This default tariff cap – which came into effect on 1 January 2019 – is periodically updated with reference to wholesale prices, among a host of other costs faced by a notional efficient supplier. Whilst suppliers can offer customers fixed tariffs and compete for consumers to switch suppliers, the price cap is the maximum price that can apply to default tariffs.

In the remainder of this report, we consider the Texas (ERCOT) and New York (NYISO) electricity markets in turn, describing the prevailing industry structure, the extent of retail competition and any price regulation.

We then summarise the key differences between these markets and GB, concluding with an overview of challenges of LMP in context of the GB market arrangement.

⁴ Based on market share data from <https://www.ofgem.gov.uk/energy-data-and-research/data-portal/retail-market-indicators>. 59% figure is based on market share excluding Scottish Power, EDF, and British Gas. 80% figure is based on market share data excluding Scottish Power and EDF only. Whilst Centrica still retains a 20% stake in existing GB nuclear capacity, its generation output (8.7TWh) is far smaller than its supply base (28.8TWh) and therefore, it is partially, but not fully vertically integrated. See <https://www.centrica.com/media/atfir41y/ofgem-consolidated-segmental-statement-2022.pdf>.

2 Texas market case study

2.1 An overview of the Texas market

The majority of the electricity grid in Texas is operated and managed by the independent system operators (ISO), collectively called Electric Reliability Council of Texas (ERCOT). ERCOT operates the transmission grid and administers the wholesale electricity market for most of Texas. The ERCOT footprint interconnects 90% of Texas load and 75% of the land area in Texas.⁵ ERCOT also performs other functions, such as scheduling wholesale power options and administering retail switching in areas where competitive choice is available.

Unlike other ISOs, which are subject to the Federal Energy Regulatory Commission (FERC) oversight, ERCOT operates under the supervision of the state regulator – the Public Utility Commission of Texas (PUCT). This is primarily because ERCOT has only a few DC-based connections with other states (and therefore, interstate commerce is limited). The ERCOT market is dominated by natural gas generation which contributes to 42% of total generation followed by wind, which makes up 28% of total generation.⁶

ERCOT electricity prices are established based on LMP, with end-customers facing prices determined individually at each load zone.⁷

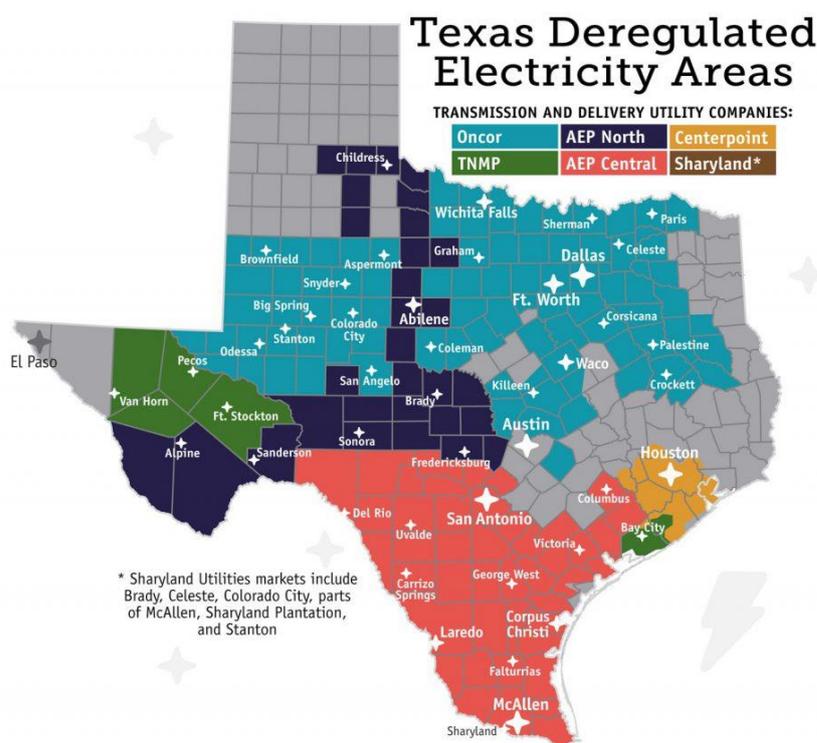
Five Transmission and Distribution providers (TDU) deliver electricity within the ERCOT footprint (see Figure 1). TDUs enjoy a quasi-local monopoly within their respective service areas and their transmission and distribution rates are regulated by the PUCT. TDUs are also responsible for maintaining the power grid and must allow third-party retail electricity providers (REPs) access to the grid. These firms specialise in the purchase and sale of electricity to customers, where retail competition is allowed in Texas.

⁵ ERCOT. *Quick Facts*, August 2023. https://www.ercot.com/files/docs/2022/02/08/ERCOT_Fact_Sheet.pdf

⁶ Ibid.

⁷ A load zone groups several nodes.

Figure 1 Map of Texas’s utilities and their coverage areas as of 2022



Source: Power Wizard. “[Texas Deregulation Map](#)”. February 1, 2022.

Note: Areas in Texas outside of the ERCOT area are shaded grey.

2.2 Industry structure

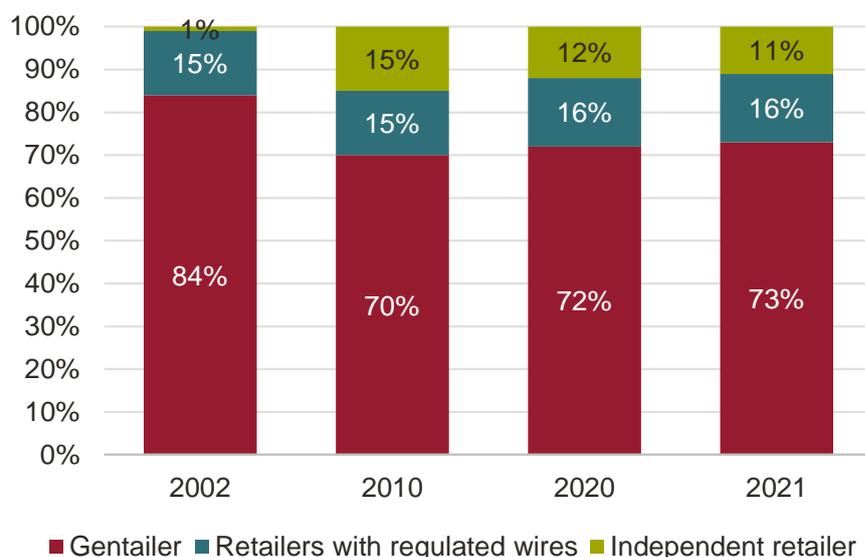
We classify REPs into 3 categories for the purpose of this paper – ‘Gentailers’ which both generate and retail electricity; ‘Retailers with regulated wires’ which have transmission and distribution/transmission infrastructure; and ‘Independent retailers’ which operate without such assets.⁸

The market is characterised by a very high degree of vertical integration, as Gentailers dominate the REPs in terms of market shares (73% of the market shares in 2021).⁹ The historical dominance of Gentailers has inched down slightly over the years, but their market share remains steady as shown in Figure 2 below.

⁸ Under ERCOT’s market restructuring, a single company is not authorised to own generation, transmission and distribution, while participating in the retail market. However, retail providers are permitted to have independent subsidiaries that own assets across the power generation value chain.

⁹ For ease of comparison, if a REP or its parent owns generation, we have classified those as a gentailer. If a REP has regulated wires business, we have classified those as retailer with wires while the others are classified as independent retailers that are not affiliated with other major utilities.

Figure 2 Evolution of market share of independent retailers



Source: EIA 861 "Total Retail Electric Volume, Bundled (MWh)" data consolidated by S&P Global Market Intelligence.
 Note: All customer types.

2.3 Retail competition

Retail competition was introduced in Texas when Senate Bill 7 was signed into law in 1999. The Bill ordered investor-owned utilities (IOUs) to unbundle retail, generation, and wires business activities, and to provide retail choice to their customers by 2002.¹⁰ The Bill applied to most of Texas territory, with the exception of all municipal and cooperative electric systems, which were granted the choice to opt into retail competition (but not mandated to do so).^{11 12}

The retail electricity market in Texas can be considered a vibrant example in the North American context, with over a hundred registered retail electric providers and significant levels of load switching achieved across all customer classes; 75% of the Texas load is served by REPs.¹³

There is evidence of broadening of competition, as the five largest Gentailers (TXU Energy, Reliant Energy, EDF, Entergy, Austin Energy) made up 39% of the market shares in 2021,

¹⁰ 1999 Senate Bill.

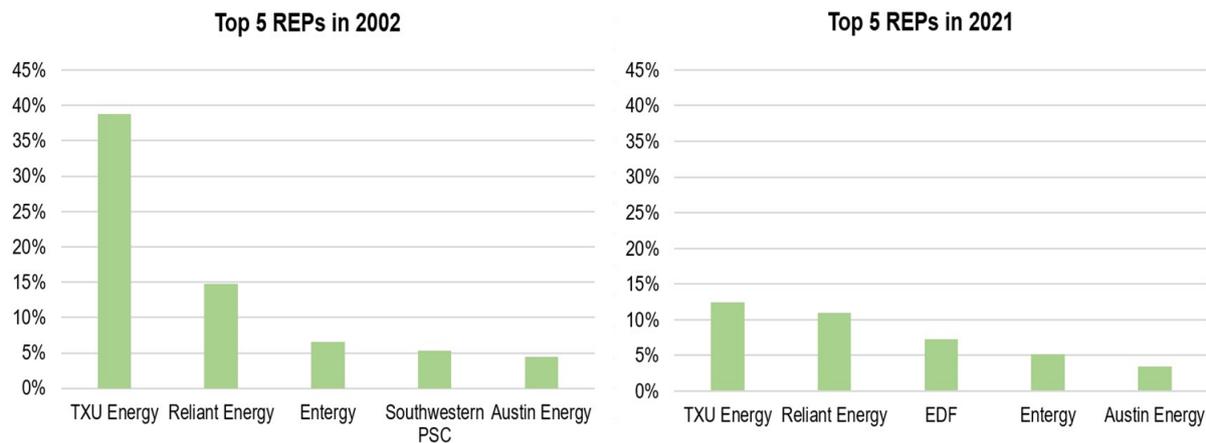
¹¹ PUCT. "Municipally Owned Electric Utilities and Electric Cooperatives FAQs". Website. August 2023. <https://www.puc.texas.gov/consumer/facts/faq/muni.aspx>

¹² Customers outside of the ERCOT region, are served by vertically integrated utilities, whose tariffs are set by the PUCT. These customers account for only 10% of Texas load and are based in the El Paso area, Northeast Texas (Longview, Marshall and Texarkana), and Southeast Texas (Beaumont, Port Arthur and The Woodlands).

¹³ The remaining load is served by municipally owned utilities ("munis"), co-operatives ("co-ops", which are utilities owned by member customers), and other authorities such as river authorities.

which is a significant fall from their 70% market share in 2022, shown in Figure 3. This illustrates retail sales data of the top five REPs for sales made to household customers. The share of retail sales provided by independent retailers has increased from less than 5% when retail competition started in 2002 to about 11% in 2021. Furthermore, no single player makes up more than 15% of the market (as opposed to nearly 40% share for TXU Energy in 2002).

Figure 3 Market share of top five REPs (including all customer classes), 2002 and 2021



Source: EIA

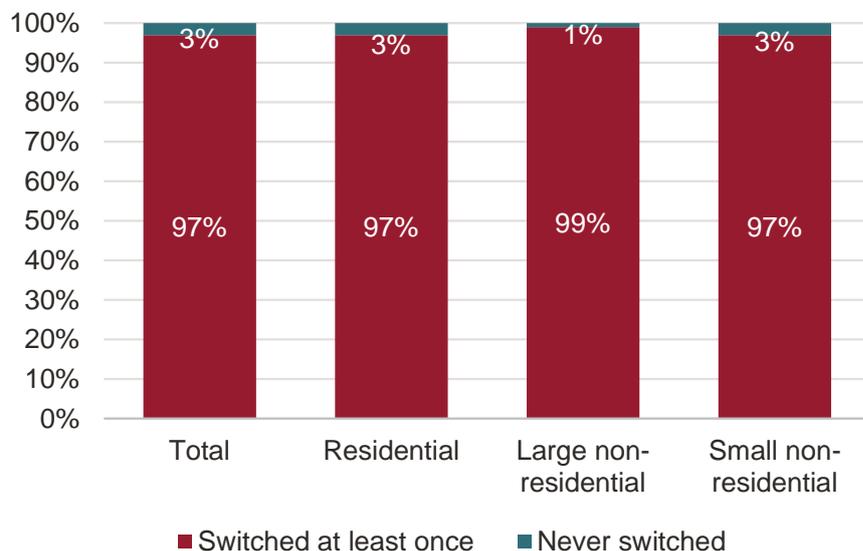
Note: EIA has aggregated REPs under the same parent company.

The outcome of retail competition in Texas is seen through the number of retail energy providers and available offers in the market. For the residential sector, these rose from 10 providers (with a total of 11 offers) in 2002 to 116 providers (with over 300 offers) by the end of 2018, based on latest data available.¹⁴

The PUCT has also published statistics on switching (at least once) from the investor-owned utilities to retail providers. According to the PUCT, at least 90% or more customers in each customer class have made the switch to retail providers since retail competition was implemented (see Figure 4).

¹⁴ PUCT. *Scope of Competition in Electric Markets in Texas*. January 2019. Website. https://ftp.puc.texas.gov/public/puct-info/industry/electric/reports/scope/2019/2019scope_elec.pdf

Figure 4 Customer switching statistics since the start of retail competition in Texas



Source: ERCOT. [Observed Selection of Electric Providers July 2023](#).

Note: The percentage of customers switched represents the number of customers in ERCOT that have changed at least once from the initially established provider of record since the start of Retail Competition in 2002. The balance represents customers that have never changed from the initially established provider since the start of the Retail Competition in 2002.

2.4 Price regulation

The Texas market does not operate a retail price cap.¹⁵

The Texas market regulates default tariffs related to provider of last resort supply. Every two years, the PUCT designates a group of certified REPs that will act as Provider of Last Resort (POLR) for each customer class within a service area. The POLR, also referred to as the “default provider”, is a designated back-up electric service provider that remains available to serve customers opting out of retailers’ contracts. While REPs with the highest market share are obligated to serve as POLR, other REPs interested in serving as POLR must submit a request to the PUCT.¹⁶

¹⁵ When retail competition was established in 2002, it featured a “price to beat” benchmark for competitive providers. The price-to-beat was a transitional mechanism that ensured that non-incumbent utilities offered prices that were at least as good as, and more often lower than, those offered by the default provider. The mechanism ended in 2007 as it was intended to be a transition measure. Since then, no other hard cap has been imposed by the PUCT.

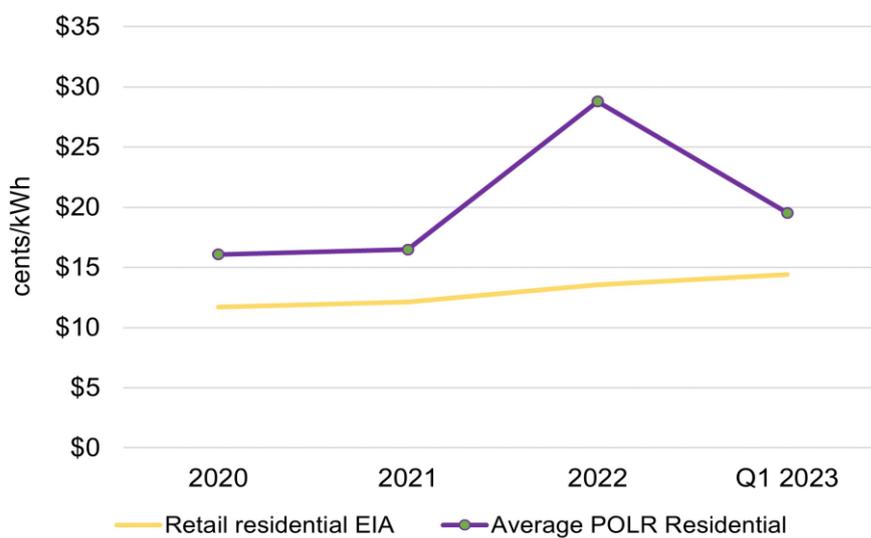
¹⁶ The PUCT takes into consideration REPs’ financial standing, volume of retail sales, among other factors, to determine REPs’ eligibility and eventual designation as POLR. Once designated as such, the POLR must serve a two-year term.

The PUCT can designate up to 15 REPs to serve as a POLR in a given TDU area based on their retail market share. The PUCT publishes POLR rates annually.¹⁷

Traditionally, POLR rates have been relatively high primarily due to uncertainty surrounding planning and the risk of serving an uncertain volume of customers. This inherent uncertainty is priced into the POLR rate.

Although there are no regulatory limitations on retailers' price offerings in Texas, the relatively high level of POLR rates nonetheless could act as a 'soft cap'. Figure 5 compares average retail electricity prices in Texas for residential customers, to the POLR rates in the same period (2020-2023). This particular sample indicates that POLR tariffs include an average 30% headroom, relative to retail electric rates.

Figure 5 Retail electric rates for residential sector in Texas compared to POLR rates



Source: Residential retail rates from [EIA](#) and Average POLR residential rates for 500 kWh monthly consumption from electric filings made by designated POLR to [PUCT](#).

2.4.1 Other restrictions on competitive retail providers and plans

In the aftermath of the highly disruptive February 2021 Storm Uri,¹⁸ the following changes were made to rules governing REPs:¹⁹

¹⁷ Ibid.

¹⁸ The severe price volatility generated by Storm Uri led to the bankruptcy several REPs; in addition, some REPs withdrew their retail offerings to avoid signing up new customers until the market had stabilized. "Stranded" customers were then forced to switch to higher-priced contracts.

¹⁹ PUCT. Order dated December 16, 2021. [Project 51830: Review of Certain Retail Electric Customer Protection Rules](#).

- REPs are prohibited from offering retail rates that are indexed to real time ERCOT wholesale prices²⁰ to residential and small commercial customers; and
- REPs can no longer pass through ancillary costs to residential and small commercial customers, unless PUCT designates those costs as outside the control of REPs.²¹

²⁰ House Bill 16, Section 39.110 <https://capitol.texas.gov/tlodocs/87R/billtext/html/HB00016S.htm>.

²¹ ERCOT Contingency Reserve Service. <https://www.energyby5.com/ercot-contingency-reserve-service>.

3 New York case study

3.1 An overview of the New York market

The New York Independent System Operator (NYISO) is responsible for the reliable operation of the bulk electricity grid of New York State (NYS), design and implementation of open and competitive wholesale electricity markets and planning for New York's energy future. The entire state of New York, also referred to as the New York Control Area (NYCA), is divided into eleven load zones each consisting of various nodes tied to individual generator busbars and transmission system substations. Energy prices are established using a zonal Location Based Marginal Pricing (LBMP) system which sets prices at various nodes (grouped into zones) based on prevailing market and grid conditions. NYS is a fully deregulated market.

Consumers are supplied energy by utility companies or Energy Service Companies (ESCOs), which are eligible to sell electricity to customers using the distribution and/or transmission system of a utility. Figure 6 below displays utilities' service territories in New York.

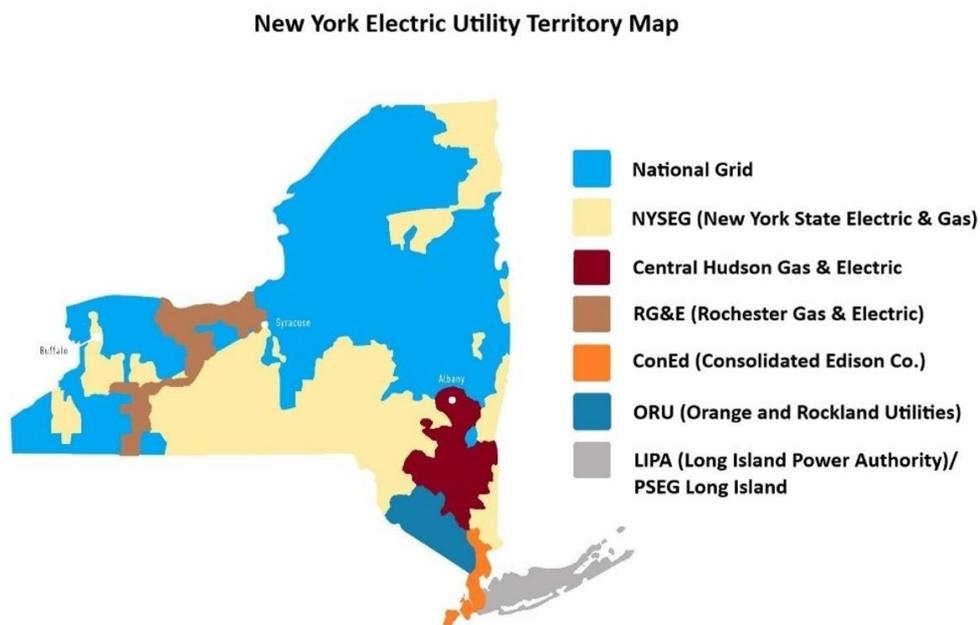
ESCOs do not generate, transmit, or deliver electricity. ESCOs purchase energy from the wholesale market and sell it directly to consumers, with utility companies acting as the intermediary and handling the actual delivery.²² ESCOs differentiate themselves by offering an array of products to accommodate the diverse preferences of customers. These encompass variable rates with guaranteed annual savings against a benchmark, and fixed rates that ensure price stability.

The New York Public Service Commission (NYPSC) is responsible for ensuring safe, affordable, and reliable services for all consumers. Additionally, it oversees competition among retailers, while also assessing and managing the environmental impact of energy generation.

Utilities can offer single rate tariffs or tariffs differentiated by the time of use (e.g. day and night). As New York operates LBMP pricing at load zone levels, utilities calculate separate default tariffs for each pricing load zone, and each distinct type of rate (i.e. single or differentiated by time of use) i.e. customers face a zonal price.

²² "How New York City Gets Its Electricity." The New York Times. Published 10 February 2017.
<https://www.nytimes.com/interactive/2017/02/10/nyregion/how-new-york-city-gets-its-electricity-power-grid.html>.

Figure 6 Map of New York’s utilities and their coverage areas as of today



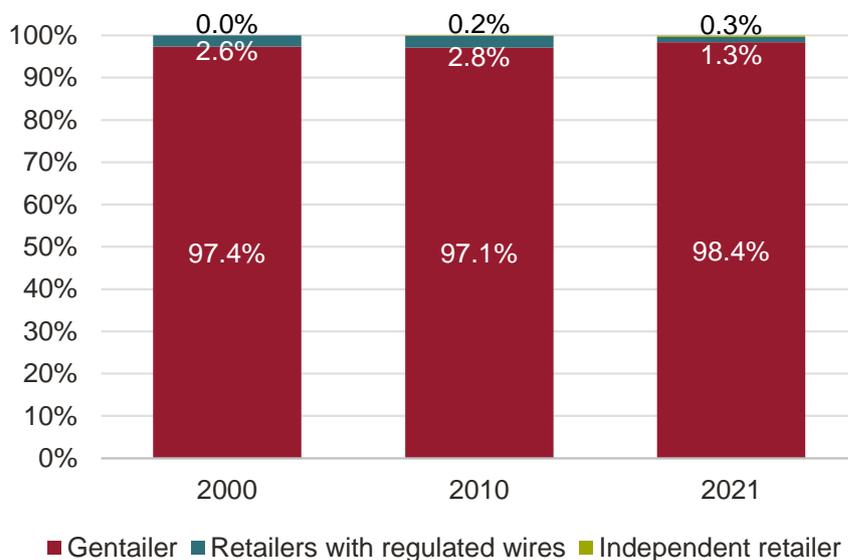
Source: EnergyToolBase - New York Electric Utility Territory Map: [New York Electric Utility Territory Map](#).

3.2 Industry structure

Similarly to the Texas case study, we distinguish the supply market into ‘Gentailers’, ‘Retailers with regulated wires’ and ‘Independent retailers’.

The market is characterised by nearly full vertical integration (98% in 2021). Between 2000 and 2021, no significant shifts were observed in the composition of the electricity retailers in New York. Figure 7 below illustrates the shifts in market share seen in 2000, 2010 and 2021. During this period, Gentailers’ market shares modestly inched up, while Independent retailers’ market shares have remained marginal, at less than 1%.

Figure 7 Market Share by Retailer Type: 2000, 2011 and 2021



Source: S&P Global. [“Electric Retail.”](#)

3.3 Retail competition

In New York, consumers are entitled to select their own electricity supplier, with the primary options being utility companies and ESCOs.

In 1996, the New York Public Service Commission (NYPSC) passed the Competitive Opportunities for electric Service²³ order, to lower consumer rates, broaden customer choices, and ensure service reliability. It marked the beginning of New York’s transition from to a deregulated market.

The legislation laid down the foundation for comprehensive deregulation that enabled the establishment of a competitive wholesale market in 1997, followed by the retail markets in 1998.²⁴ This shift, paved the way for Energy Service Companies (ESCOs) to enter New York’s electricity market.²⁵

As of August 2023, 49 utilities and 133 electric ESCOs fall under the jurisdiction of the NYPSC.²⁶ However, utilities account for the majority of the electricity sales volume. Their

²³ New York State Assembly. “Shedding Light On The Electric Utility Restructuring In New York State.” New York State Assembly. <https://www.assembly.state.ny.us/Reports/Energy/199902/>.

²⁴ “New York Electricity Deregulation.” New York Energy Ratings. <https://www.nyenergyratings.com/resources/new-york-deregulation>.

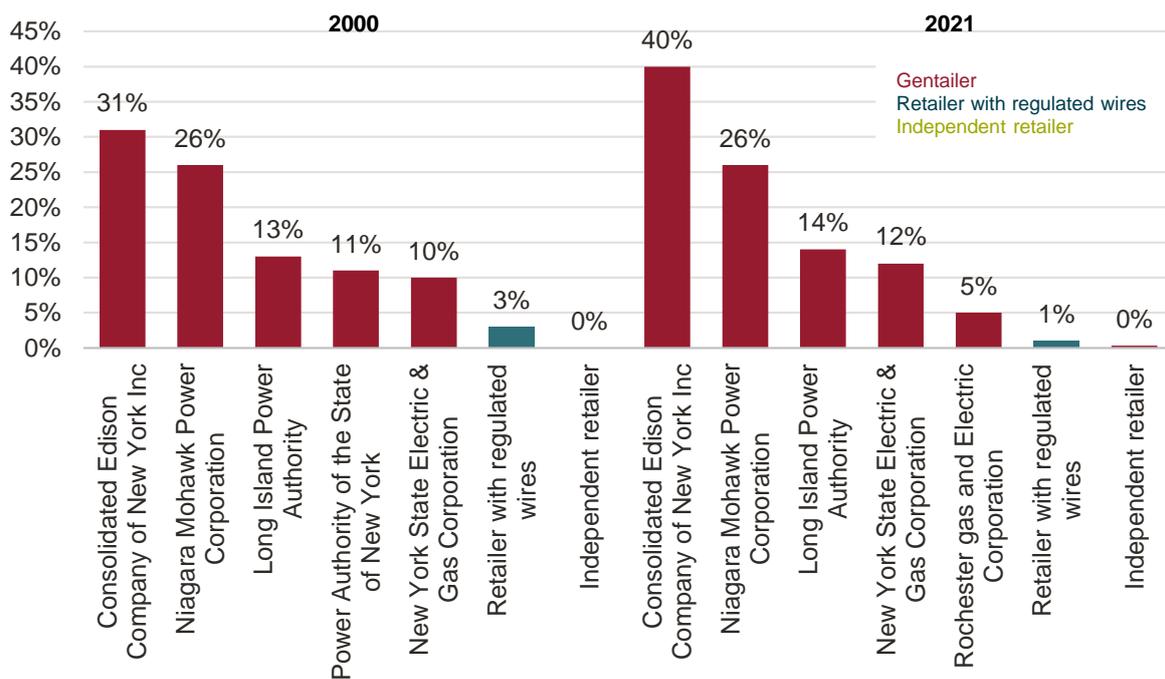
²⁵ “Navigating NYISO.” Sustainable FERC Project. Web. Published 10 April 2023. <https://sustainableferc.org/navigating-nyiso/>.

²⁶ “Department of Public Service.” NYSDPS-DMM: Search ESCO Company. <https://sustainableferc.org/navigating-nyiso/>.

predominance can be largely attributed to their ‘default’ rates (approved by NYPSC), which are in general more economical than those offered by ESCOs. Additionally, selecting an ESCO is not an obligation and consumers who do not opt for an ESCO, automatically fall back to a utility's default tariff, which is established following a ratemaking process, requiring the NYPSC’s approval.²⁷ Importantly, this default rate serves as a benchmark for evaluating offers presented by ESCOs.

The market continues to be dominated by 5 utility companies, all of which are vertically integrated, and collectively account for 97% of market shares – a rise from 91% in 2000 (see Figure 8). While the Power Authority of the State of New York has ceded its position to Rochester Gas and Electric Corporation among the top electricity providers, Con Edison, the leading market retailer, has steadily consolidated its position, expanding its share from 31% in 2000 to 40% by 2021.

Figure 8 Top 5 Electric Retailers in the NY Electricity Market, compared to retailers with regulated wires and independent retailers: 2000 vs 2021



Source: S&P Global. [“Electric Retail.”](#)

Over the 2000-2021 period the top 5 players progressively consolidated their market position thus shrinking market shares of Retailers with wires and Independent retailers. The graph above illustrates the shifts in market share seen in 2000, 2010 and 2021. During this period,

²⁷ “Major Rate Case Process Overview.” Department of Public Service. <https://dps.ny.gov/major-rate-case-process-overview#:~:text=A%20rate%20case%20is%20the,government%20regulation%20of%20these%20industries>.

Gentailers' market shares have modestly inched up, while Independent retailers' market shares have remained marginal, at less than 1%.

Moreover, we understand that the 2019 Reset Order, which we describe below, has led to a reduction in the variety of tariff products on offer and suppliers exiting the market, although more recent data to help evidence this, is not yet available.

3.4 Price regulation

The New York market does not operate an absolute retail price cap. Instead:

- As described above, tariffs offered by utility companies are regulated (but not subject to a cap); and
- Tariffs offered by ESCOs are subject to restrictions.

In 2019 the NYPSC issued a Reset Order to tighten the rules governing the tariffs that ESCOs can offer and the eligibility criteria for permitting ESCOs to sign on new customers. The Reset Order also stipulated a regulatory limit on ESCOs' fixed-rate plans,²⁸ relative to default tariffs offered by utility companies. Specifically, fixed-rate plans offered by ESCOs are capped at a 5% premium, over the utility company's trailing 12-month average single-rate tariffs.

Additionally, ESCOs' variable rate plans are required to demonstrate savings compared to utility rates, and the Reset Order placed additional obligations related the minimum share of renewables in the supply mix, in relation to certain tariffs.²⁹

These restrictions interfere with retailers' ability to appropriately hedge for specific tariff products, and offer profitable fixed tariffs. For example, if prices were forecast to increase significantly over the term of a tariff, a retailer's hedged energy cost over this time period, could exceed a 12 month average that is measured over a period of lower wholesale prices.

²⁸ Ibid.

²⁹ "Updated: New York PSC Imposes Price Caps On Fixed, Variable ESCO Products, In 'Reset' Order." EnergyChoiceMatters.com. <http://www.energychoicematters.com/stories/20191212aaaa.html>.

4 Comparison to the GB retail market and implications for LMP

Several features of the Texas and New York markets differ from or are absent in the GB context. This means that they are not appropriate comparators, and cannot be used to show how the retail market in GB would work under LMP.

We identify those issues and explain the implication in the GB retail context, in the sections below.

4.1 Comparison of Texas and New York markets to the GB context

4.1.1 Industry structure

As we describe in Section 1, the GB retail market is characterised by relatively low vertical integration, with a minority of customers served by vertically integrated firms (as low as 20%, depending on the definition applied). We also note that the structure of the GB market is such that historically incumbent suppliers do not have an advantage in offering generally cheaper tariffs than pure retailers.

The opposite is true in the case study markets, with around 73% of customers served by VI firms in Texas and 98% in New York, with these market shares having remained steady in the roughly 20 years since retail competition was introduced in both markets.

4.1.2 Retail competition

The GB market is characterised by a large number of suppliers that compete for customers to switch in a given area (although we note some recent supplier exits and collapses).

Where retail competition is permitted in Texas, there are a large number of retailers to choose from, with over 100 operating in the overall market area. The ERCOT area has also seen a reduction in the market concentration of suppliers over the last two decades. On the face of it, this therefore seems like a competitive market. However, as noted above, the continued prevalence of vertical integration seems to place some limits on which types of firms can compete for the majority of consumers. This is illustrated by the fact that each of the two largest Getailers has an individual market share larger than the combined 11% of all independent retailers.

The New York market on the other hand appears to be very concentrated, despite a large number of retailers, with large incumbent suppliers gaining additional market share, since retail competition was introduced. Furthermore, we understand that the 2019 Reset Order may have caused competition in the market to cool off and contributed to retailer exits.

4.1.3 Price regulation

The GB market operates a default tariff cap, which stipulates maximum rates that retailers can charge default tariff customers. The tariff is recalculated on a quarterly basis and is set separately for customers on single rate tariffs and those with an Economy 7 meter (differentiating peak and off peak tariffs). In contrast, neither the Texas nor the New York markets stipulate absolute tariff caps.

The Texas regulator determines a tariff for customers who fall to a supplier of last resort, which includes a substantial level of headroom (around 30% on average), compared to a competitive tariff in the market, which is significantly greater than the headroom included in Ofgem's default tariff cap (DTC) and therefore does not provide the same degree of consumer protection. We also note two further elements of the Texas regime that are inconsistent with the GB context. Firstly, tariffs cannot be indexed directly to wholesale prices, which would rule certain out time of use tariffs that already exist in the GB market. Additionally, certain ancillary costs cannot be passed through to residential consumers, which is not fully cost-reflective.

In New York, energy retailers are required to cap certain tariffs, relative to the tariffs charged by incumbent utilities, but this requirement does not cover all tariff types (for example, tariffs differentiated by time of use). As described in our previous paper,³⁰ it is difficult to see how a relative price cap could co-exist with both time-of-use tariffs and different hedging strategies. The proportion of customers served by retailers covered by this cap is also tiny: the vast majority (98%) of customers are supplied by utility companies, whose tariffs are directly set by price determinations.

4.2 Conclusion: Challenges for LMP in the GB retail context

The issues raised in the comparison mean that neither case study market bears similarity to the GB context and neither appears appropriate to serve as an example of how LMP can be implemented in the GB context, or how challenges could be mitigated. This is consistent with our paper on retail market issues related to LMP,³¹ where we identified two key reasons why LMP may not be compatible with features seen in the GB context:

- **There is a conflict between LMP and unbundling:** Vertical integration can help retailers hedge against price volatility, through ownership of generation assets located at different nodes. Conversely, this poses challenges for pure retailers because they have to purchase electricity at nodes where they serve customer demand, which may have low liquidity, compared to a national energy pricing market. The persistence of high levels of vertical integration in both these LMP case study markets is consistent with this.

³⁰ Assessment of retail market issues arising from the introduction of LMP and Compatibility of relative price caps with ToU tariffs and a range of hedging strategies.

³¹ *Assessment of retail market issues arising from the introduction of LMP.*

- **Maintaining an absolute price cap would require the calculation of separate wholesale allowances at each node**, using reasonable assumptions of hedging strategies for each node. Whilst in principle this may be feasible, issues such as thinly-traded energy products at specific nodes and offering tariffs differentiated by time of use, can make it substantially challenging to specify a cap that would neither over-remunerate retailers, nor reduce competition. As described above, neither of these markets operates an absolute price cap that operates similarly to Ofgem's.

To the extent that the highlighted features of the GB market are considered desirable, these case studies do not show how they can be reconciled with the adoption of LMP.



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