Don't look back in anger:

Making dynamic electricity pricing work for Ireland

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In Summary

- Electricity suppliers in Ireland will be obligated by June 2026 to offer dynamic price plans to residential customers.
- Under a dynamic price plan for electricity, part of the unit rate or price per kilowatt-hour (kWh) of electricity consumed varies throughout the day based on the wholesale market price for electricity. The primary objective of dynamic electricity pricing is to shift demand away from peak hours when it costs more to generate electricity.
- Dynamic electricity pricing is most effective at achieving this when coupled with devices that automatically switch some appliances off when the price becomes very high, while maintaining customer autonomy.
- Supporting customers in understanding what price plan is best for them, for example by providing more feedback on consumption and cost, will be important in encouraging uptake of dynamic price plans.

1 What is Dynamic Pricing?

In 2024, the concept of 'dynamic pricing' made headlines in Ireland for all the wrong reasons when Ticketmaster allowed prices for Oasis tickets to rise in line with demand, with some standing tickets in Dublin's Croke Park increasing from €176 to over €400.[1] It may come as a surprise to some electricity customers that by June 2026, the five largest retail electricity suppliers in Ireland; Bord Gáis Energy, Electric Ireland, Energia, PrePay Power/Yuno and SSE Airtricity, will be obligated by the Commission for Regulation of Utilities (CRU)[2] to offer dynamic price contracts to customers.

Irish residential electricity bills typically consist of a standing charge per billing period and a base unit rate per kilowatt-hour (kWh) of electricity consumed. For the base unit rate, most residential electricity customers in Ireland are still charged a fixed price per kWh. In a dynamic price plan for electricity, the price per kWh instead varies throughout the day based on the cost of generating electricity, as measured by the wholesale market price.

The obligation to offer a standard dynamic price plan to customers is on foot of legislation enacted in 2022[3] based on EU law.[4] In these plans, a portion (at the discretion of the supplier) of the base unit rate will change every half hour based on the wholesale market price of electricity.

This paper outlines what research has told us so far about dynamic pricing and how it can be beneficial in the retail electricity market. It also explores outstanding challenges and implications for public policy in relation to dynamic electricity pricing.

2 What can dynamic pricing help with?

As storing electricity is expensive, the wholesale market price for supplying electricity varies throughout the day depending on the generation mix and the quantity produced to meet variable demand. When more costly

[1] Priced Out: Oasis unwittingly spark ticketing backlash — RTÉ

[2] Dynamic Electricity Price Tariffs — CRU.ie

[3] Statutory Instrument No. 20.2022 - European Union (Internal Market in Electricity) Regulations 2022

[4] Directive (EU) 2019/944 and Directive 2012/27/EU

Glossary of Terms

Critical peak pricing: Electricity pricing design that charges a fixed rate per kWh throughout the day, but with a higher rate on occasional high-cost days.

Demand response: A change in a customer's electricity consumption in response to changes in the price of electricity.

Dispatch down: A reduction in the output of a renewable electricity generator below its maximum available level at the direction of the transmission system operator (EirGrid).

Distributed generation (DG): electrical generation performed by small, grid-connected devices such as solar panels near the location it will be used.

Distribution network: Low-voltage power lines facilitating the delivery of electricity from an electrical substation to end users.

Dynamic pricing: Electricity pricing design where the charge per kWh changes in real time based on the wholesale electricity market price. Also known as **real-time pricing**.

Flat rate price plan: Electricity pricing design that charges a fixed rate per kWh throughout the day. Also known as fixed rate or 24-hour rate price plan.

Increasing block pricing: Electricity pricing design where the charge per kWh increases as total consumption within the billing period rises.

Marginal cost (of electricity generation): The cost of producing one more unit (of electricity).

Marginal cost pricing: Pricing design where the charge per unit changes based on the cost of producing additional units.

Peak load shedding: Reduction of electricity consumption during hours of high demand.

Glossary of Terms (continued)

Smart meter: Electronic device used for reading electricity consumption in real-time.

Time of use (TOU) pricing: Electricity pricing design that charges different fixed rates per kWh during peak and off-peak hours.

Transmission network: High-voltage power lines facilitating the bulk movement of electrical energy from a power plant to an electrical substation.

power plants are called on to produce electricity during hours of high demand, the cost of generating more electricity, or the marginal cost of electricity generation, increases.

Despite the variation in wholesale prices, many residential consumers are charged a constant retail price per kWh of electricity. This means they are not incentivised to reduce their consumption at times of high demand, known as peak load shedding, despite the higher marginal cost of generation. As electricity generation increases its reliance on intermittent energy sources such as wind and solar photovoltaic (PV), variation in this marginal cost may also increase and exacerbate the inefficiency of flat price plans.

Dynamic pricing is one measure that could help Ireland reduce its carbon emissions. It can incentivise customers to shift consumption to times when renewable electricity is plentiful, thus reducing the curtailment, or 'dispatch down', of renewable generation.[5] Ireland's 2024 Climate Action Plan[6] included dynamic electricity pricing in a strategy to shift demand to times of abundant renewable supply.

In October 2015, the world's first large-scale deployment of dynamic electricity pricing occurred in Spain, where households were moved by default to a dynamic price plan (that they were free to opt out of) to incentivise a reduction in peak demand. However,

[5] Blog: 'Dispatch Down' and the fight against climate change — Wind Energy Ireland

[6] Climate Action Plan 2024 — Government of Ireland

the response of households to price changes in Spain was found to be minimal (Fabra et al., 2021).

3 What does the research say?

3.1 What are the options for pricing electricity?

At the time-insensitive end of the spectrum lies what has traditionally been the most common price design, the **flat rate price plan** charging a fixed rate per kWh of electricity. Other price designs, including **increasing block pricing** and **critical peak pricing**, can be considered as various forms of marginal cost pricing, where the price per kWh varies to reflect the changing marginal cost of generation, though not in real time. **TOU pricing** generally entails different fixed rates per kWh in peak and off-peak hours, for example the day-night-peak price plans currently available to consumers in Ireland. Finally, at the time-sensitive end, full **dynamic pricing**, or **real-time pricing**, involves the price changing in real time based on wholesale prices. Figure 1 illustrates the differences between flat rate, TOU and dynamic price plans. While flat rate and TOU price plans are already available to customers in Ireland, full dynamic pricing is set to become available for the first time by June 2026.

Marginal cost pricing for electricity has generally been proposed as one component of a multi-part pricing structure, as suggested by Coase (1946). A dynamic, time-varying volumetric component incentivises a reduction in costly peak demand. Meanwhile, fixed standing charges can recover 'residual costs' that cannot be covered by marginal cost pricing, such as transmission and distribution network costs that mostly stem from factors that do not vary with demand (Farrell, 2023). However, if the fixed component is large relative to the time-varying component, incentives to invest in energy efficiency are lower (La Monaca & Ryan, 2017; Ryan et al., 2018).

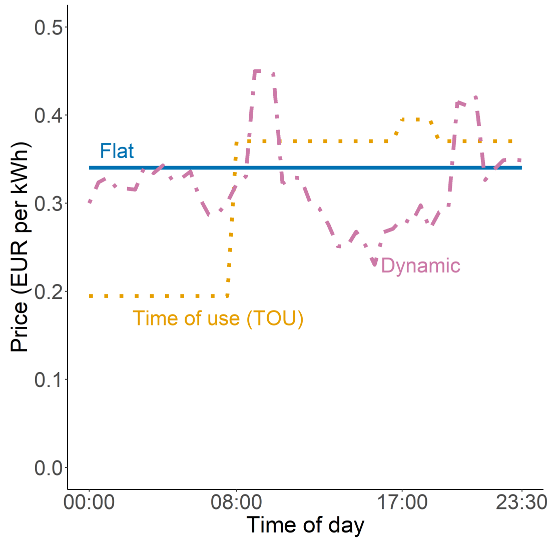

Figure 1: Examples of electricity pricing per kWh. Dynamic price profile would change daily.

3.2 What are the benefits and challenges of dynamic electricity pricing?

There are several benefits to pricing electricity based on the marginal cost of generation. First, it incentivises consumers to reduce demand at times of constrained supply, which can lower the necessity for investment in generation capacity and upgrading grid infrastructure. Second, this can enhance system efficiency whereby less investment in inefficient generation capacity (used only a few hours per year) is needed. Third, it can be helpful in integrating intermittent wind and solar into the generation mix by shifting demand to times when these sources are abundant and enhancing grid stability. Fourth, it can also reduce incentives for power plants to withhold electricity to drive up prices, which was one factor in the 2000-01 California electricity crisis (Borenstein, 2013). Fifth, the option of dynamic pricing expands consumer choice.

However, these benefits are contingent on enough customers being on a dynamic price plan, and there are several barriers to the implementation and adoption of dynamic pricing. First, investment in smart meter infrastructure and more elaborate billing systems are required, although these are already widely available in many countries, including

Ireland. Second, there may be privacy concerns associated with the data recorded by smart meters. Third, customers with inflexible above-average peak consumption would face higher bills under dynamic pricing (Borenstein, 2007). Lower-income households or other vulnerable groups with reduced access to enabling technologies may be more likely to fall into this category. Fourth, bill amounts would be more variable under dynamic pricing, and this may be perceived as risky by consumers (Faruqui & Sergici, 2010). While a sufficiently high proportion of customers would need to be subject to dynamic pricing for benefits to be realised by the wider energy system, these concerns give rise to significant political economy and equity concerns with making dynamic pricing mandatory.

3.3 Does dynamic pricing affect electricity consumption?

Studies have generally found reductions in peak demand in response to dynamic or TOU pricing. The findings of some of these studies, most of which were based in the US where air conditioning is a significant factor, are summarised in Table 1. Newer technologies such as electric vehicles (EVs) and heat pumps have been shown to increase the scope of TOU pricing to shift consumption (Bailey et al., 2025; Bernard et al., 2024). Fast EV chargers are highly energy-intensive, but the timing of EV charging is much more flexible than traditional appliances. Borenstein (2005) and Holland & Mansur (2006) demonstrated the greater long-run societal benefits of dynamic pricing relative to the simpler TOU pricing, even with a low level of demand flexibility.

3.4 How can household responsiveness to dynamic pricing be improved?

While experiments have found some reductions in peak demand, there has been ample evidence indicating that demand is very inflexible unless dynamic pricing is coupled with enabling technology to boost demand response, as summarised in Table 1. One such instrument is **information feedback**, for example an in-house display that provides real-time feedback on electricity consumption and prices to help customers manage their monthly bill.

Another technology that can be coupled with dynamic pricing is a device to **automate responses** to price changes at the discretion of customers. Such devices can have override mechanisms and be configured by customers, thus maintaining freedom of choice. For example, ESB Networks' Dingle Electrification Project[7] involved equipping participating households with devices that could control the use of EV chargers, heat pumps and electric immersion heaters based on the price.

Based on the experience of dynamic electricity pricing in Spain, Fabra et al. (2021) recommended supporting customers with technology to improve access to real-time usage and price information and to automate responses to price changes.

3.5 Does dynamic pricing reduce carbon emissions from electricity?

During hours of peak demand, more emissions-intensive power plants (for example, open cycle gas turbine plants in Ireland) are switched on to meet increased demand. Therefore, dynamic electricity pricing can reduce carbon emissions if it reduces peak demand (Bergaentzlé et al., 2014).

However, Holland & Mansur (2008) estimated that the effect on emissions is dependent on the underlying generation mix, as it would decrease peak consumption but increase off-peak consumption. The off-peak increase may be larger in magnitude than the peak load shedding (Bergaentzlé et al., 2014; Spees & Lave, 2007). Depending on the characteristics of the power system, the wholesale electricity price is not necessarily a good indicator for emissions from generation (Stoll et al., 2014).

In the long run, dynamic pricing may be expected to help accelerate the incorporation of intermittent renewable energy sources into the generation mix by incentivising consumers to shift consumption to times when these sources are plentiful.

[7] The Dingle Project — ESB Networks

Table 1: Research findings on electricity demand response to dynamic and TOU pricing

Study	Setting	Price design	Finding
Allcott (2011)	US	Dynamic	Total demand reduction
Dutta & Mitra (2017)	Mainly US	Dynamic	Low demand response, but higher with automation technology
Bollinger & Hartmann (2020)	US	Dynamic	Peak demand reduction only with automation
Newsham & Bowker (2010)	US	TOU, dynamic and others	Peak demand reduction of 5% with pricing alone; 30% with pricing and automation
Faruqui & Sergici (2010)	US, France, Australia, Canada	TOU	Peak demand reduction of 3-6%
Kim et al. (2022)	Korea	TOU	Peak demand reduction
Enrich et al. (2024)	Spain	TOU (for network)	Peak demand reduction of 1-9%
Bernard et al. (2024)	UK	TOU	Peak demand reduction of 50% among heat pump owners
Di Cosmo et al. (2014); Di Cosmo & O'Hora (2017)	Ireland	TOU	Peak demand reduction, greater with in-house display
Faruqui et al. (2010)	Canada	TOU	5.5% peak demand reduction with in-house display
Harding & Lamarche (2016)	US	TOU	Peak demand reductions, greatest with automation

3.6 What is the economic impact of dynamic pricing?

Another important dimension to dynamic pricing is the economic impact on customers. On a fixed price plan, the retail price changes substantially less than the wholesale price. This implies that customers who consume disproportionately more at peak times when the wholesale price is high are effectively being subsidised by everyone else. By passing wholesale price changes through to consumers to a greater extent, dynamic pricing removes some of this subsidisation (Borenstein, 2007; Chao, 2010), benefiting those who can consume less during peak hours.

Technologies such as EVs, home batteries and heating, ventilation and air conditioning (HVAC) appliances can increase the flexibility of a household's electricity consumption. Therefore, the rewarding of consumers who can use more of their consumption outside peak hours could have distributional impacts if these tend to be higher-income consumers. Similarly, the penalisation of consumers who lack the resources to shift their usage could exacerbate energy poverty. Further research is needed to understand the extent of these effects.

3.7 Will consumers adopt dynamic electricity pricing?

While TOU price plans have been available to customers in Ireland for some time, their uptake remains relatively low, so it seems unlikely that customers will flock to dynamic price plans overnight.

There is a default bias in residential electricity billing, with customers tending to remain on their existing plan. A dynamic price contract was set as the default for electricity customers in Spain in 2014, with customers free to switch (Fabra et al., 2021; Roldán Fernández et al., 2017). However, a reluctance to make dynamic pricing the default elsewhere due to potential consumer backlash means the willingness of consumers to switch is important. Barjaková et al. (2021) found positive reactions to TOU pricing with monetary savings viewed as the primary benefit of switching price plans.

It is difficult for a utility to design price plans that adequately incentivise consumers both to adopt the plan and to shift their usage (Choi & Murali, 2022). A range of socio-demographic and attitudinal factors determine whether households are willing to switch to TOU or dynamic price plans (Harold et al., 2020; Öhrlund et al., 2019; Schlereth et al., 2018).

Belton & Lunn (2020) showed that consumers have difficulty matching available price plans to their usage patterns, with a general aversion to TOU pricing. They found consumers made better decisions when aided by a price comparison tool offering personalised rather than average cost estimates. Full dynamic pricing has an additional layer of complexity as low-price hours may change daily, making it harder for customers to set a routine.

To promote uptake of dynamic pricing, Faruqui et al. (2020) suggested encouraging the use of automation technologies, helping customers understand various price plan options using tools such as comparison websites, and offering bill protection for a phase-in period. As dynamic pricing becomes available in Ireland, additional research will be required to determine factors in its adoption by consumers.

4 Policy recommendations for the introduction of dynamic pricing in Ireland

With dynamic electricity pricing due to be introduced in Ireland from June 2026, the authors believe the following actions are prudent to encourage uptake and maximise the potential benefits to both consumers and the energy system.

1. *Roll out automation capabilities in tandem with dynamic pricing.*

   Dynamic pricing is most effective at reducing peak electricity consumption when coupled with automation technologies, which consumers can configure to automatically switch some appliances off when the price becomes high. Including automation devices in price plans would facilitate their adoption and make dynamic pricing more effective.

Providing better feedback on usage, for example using in-house displays or mobile applications, can improve the effectiveness of dynamic pricing in reducing peak demand. When revising its 2016 decision[8] on near real-time usage data access, the CRU should establish minimum requirements for consumer access to their own usage data and to real-time price data.[9]

2. *Explore options for mitigating potential distributional effects and ensure that all benefit from the potential savings from dynamic pricing.*

   Flexible consumers who can shift more of their consumption to off-peak hours will benefit most from dynamic pricing. EVs, batteries and HVAC appliances increase this flexibility. Higher-income consumers tend to have more of these devices and are therefore more flexible. As part of ensuring a Just Transition as outlined in Ireland's 2025 Climate Action Plan[10], it will be important for policymakers to explore options such as targeted subsidies for ensuring the benefits of dynamic pricing accrue to consumers of all income levels and that dynamic pricing does not exacerbate energy poverty.

3. *Help consumers understand different price plans through communications campaigns.*

   Electricity price plans are complex and identifying the best plan based on individual consumption is a difficult task for most consumers. This may prevent them from switching to dynamic pricing even if it would result in lower bills. Given its focus on supporting people to maximise energy efficiency, the Sustainable Energy Authority of Ireland (SEAI) could play a leading role in providing advice on dynamic pricing. Web-based comparison tools that offer personalised cost estimates, such as the UCD Energy Cost Calculator[11], can help consumers choose their most suitable plan, and access to supplier price data will be important in facilitating such tools.[12] Suppliers engaging with their customers and informing them at the end of billing periods what they would have paid under alternative plans could further support consumers in this decision.

4. *Offer bill protection for phase-in period.*

   Price uncertainty is higher in a dynamic price plan. Suppliers could offer a guarantee that bills will not exceed a certain level for a phase-in period. This bill protection would allow consumers to try a dynamic price plan without risk to determine whether it is suitable. Linked to this, while the CRU has decided to permit early termination fees in dynamic price plans, these fees increase the risk to consumers. Restricting early termination fees for a phase-in period would help encourage uptake of dynamic price plans.

5. *Analyse smart meter data to investigate the effect of dynamic pricing on electricity consumption.*

   As dynamic price plans are availed of, it will be important to robustly and securely analyse smart meter data to determine whether they are effective in reducing peak demand, and in shifting demand to times of high-renewable output as set out in the 2024 Climate Action Plan. The impact on consumer bills should also be carefully assessed for any impact on energy poverty.

[8] CER16125 - Empowering Protecting Customers

[9] The NexSys response to the CRU's consltation paper on *Smart Meter Upgrade - Access to Near Real Time Smart Metering Data* is available at https://www.nexsys-energy.ie/policyengagement/policysubmissions/

[10] Climate Action Plan 2025 — Government of Ireland

[11] https://www.energycostcalculator.ie/

[12] NexSys and UCD EI response to CRU Consultation Paper on Dynamic Pricing

Table 2: What is needed to implement these recommendations?

Responsible entity	Short-term actions	Long-term actions
Retail electricity suppliers[13]	• Inform customers of how dynamic price plans will be offered. • Set up online cost calculators and advise customers on the best plan for their use. • Consider offering bill protection and waiving early termination fees on dynamic price plans for phase-in period.	• Analyse effect of dynamic pricing on peak demand and customer bills. • Provide enhanced feedback on electricity consumption and cost to customers.
Commission for Regulation of Utilities (CRU)	• Complete implementation of the Smart Meter Data Access Code. • Establish minimum requirements for access to near real-time metering data. • Restrict or prohibit early termination fees on dynamic price plans for phase-in period.	• Monitor standard and extent of consumer access to near real-time metering data. • Analyse effect of dynamic pricing on peak demand and on monthly bills for consumers.
Department of Climate, Energy and the Environment	• Explore options for mitigating potential distributional effects of dynamic electricity pricing.	• Develop policy on sharing benefits of dynamic electricity pricing across all income levels.
ESB Networks (Distribution System Operator)	• Complete rollout of the National Smart Metering Programme.	• Analyse localised effects of dynamic pricing on low- and medium-voltage distribution networks.
Sustainable Energy Authority of Ireland (SEAI)	• Engage with customers and inform them of potential benefits of dynamic electricty pricing.	• Promote adoption of automation technologies to couple with dynamic electricity pricing.

[13] Bord Gáis Energy, Electric Ireland, Energia, PrePay Power/Yuno SSE Airtricity

5 Conclusion

A dynamic price plan varies the cost per unit of electricity consumed throughout the day based on the cost of generating electricity. The primary objective of this is to shift demand away from peak hours, when it costs more to generate electricity, towards times of high-renewable output. If dynamic pricing becomes available to residential customers in Ireland from 2026, it will be important to ensure it is effective at achieving these goals.

More research is required to fully understand the effects of dynamic pricing, particularly in an Irish setting. It has been shown to be most effective at shifting demand when coupled with devices that automatically switch some appliances off when the price becomes high, while maintaining customer autonomy through an override. Helping customers to identify what price plan is best for them and devise strategies for shifting their usage, for example by providing better feedback on usage and cost, will be important in encouraging uptake of dynamic price plans.

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