NexSys (Next Generation Energy Systems)

Submission to Electricity Network Tariff Structure Review Consultation

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Introduction

NexSys (Next Generation Energy Systems) is an all-island, multidisciplinary energy research programme. Through this programme of research, 50 leading academics across 9 institutions are working in partnership with industry to tackle the challenges of energy system decarbonisation, developing evidence-based pathways for a net zero energy system.

NexSys is committed to engaging with national policy processes in order to provide evidence based research and policy insights in support of our net zero ambitions. Further information on NexSys engagement with Ireland's sustainable energy transition policies is available on our website.

NexSys welcomes the opportunity to respond to the consultation paper on the Electricity Network Tariff Structure Review published by the CRU. Our responses to specific questions are based on NexSys and expert review of third-party research relevant to the consultation topic.

1. How should the CRU engage with stakeholders over the course of the Electricity Network Tariff Review?

- The CRU should engage with a wide range of stakeholders, including experts from the Transmission System Operator (TSO), Distribution System Operator (DSO), suppliers, and representatives of different types of consumers and network users, including small, medium and large energy users. Focus groups should be used for engaging with residential consumers who may not have the resources to respond to detailed consultations. The CRU should also engage with vulnerable consumer groups to ensure fairness is prioritised and to avoid exacerbating energy poverty.

2. If a dedicated Electricity Network Tariff Review stakeholder group is established would you be interested in participating? If such a group was over-subscribed how should the CRU limit the number of members?

- NexSys researchers would be interested in participating in such a group. In the event of the group being over-subscribed, we recommend ensuring that representatives from distinct consumer segments (for example industrial, residential and energy poverty advocates) are included in addition to members with specific technical expertise.

3. Do you agree with the objectives of the Electricity Network Tariff Structure Review? Please state your reasoning.

- *Objective 1: To deliver network tariff structures that are in the best interest of consumers and are fit-for purpose for the modern evolving electricity networks.*
    - We support this objective if it includes the idea of fairness in the distribution of costs across consumers. A fit-for-purpose tariff should provide forward-looking

price signals that guide efficient investment, in addition to recovering historical costs. However, as noted in the consultation document, some tariff designs such as time-of-use (TOU) will result in some customers paying less while others pay more. The principle of fairness needs to be maintained in terms of affordability and consumers' ability to shift their electricity usage.

- *Objective 2: To deliver network tariff structures that help facilitate a low carbon future that is secure, competitive and cost-effective.*
    - This is a necessary objective given Ireland's commitments to mitigating climate change. It should be noted that a low carbon future includes energy efficiency measures as well as low carbon generation. As with Objective 1, equity should be a key consideration so that consumers with lower capacity to take up technologies such as electric vehicles (EVs), solar photovoltaic (PV), and home batteries do not face excessive charges compared with those who do install these technologies.

4. Should the CRU include any other objectives? If so please explain your reasoning.

- We recommend including an explicit objective on equity. To enable the Just Transition outlined in Ireland's 2025 Climate Action Plan, it is important that those who are unable to invest in technologies such as EVs, solar PV, and home batteries are not unfairly disadvantaged relative to those who can afford them. While principles may address this, establishing it as an objective would ensure tariff reform does not unintentionally penalise vulnerable consumers or those with lower capacity to adopt smart technologies as this would lead to a regressive transfer of wealth between consumers.

5. Do you agree with the proposed principles of the Electricity Network Tariff Structure Review? Are they clearly defined?

- We agree with the proposed principles, and they are generally well-defined. As noted in the consultation paper, there is a potential lack of alignment between some of the principles and trade-offs may be required. For example, there is a trade-off between the principles of Cost Reflectivity, implying complex price signals, and Simplicity, favouring signals accessible to residential customers. More details will be required on how the Cost Reflectivity and Cost Recovery principles will be reconciled, especially in future congestion or low renewable availability scenarios.
- The definition of the Adaptability principle should be extended to allow all system users, including suppliers and consumers, to respond to developments in future years. The interpretation of the Cost Reflectivity and Cost Recovery principles should prioritise reflecting the long-run marginal cost of network capacity, rather than short-term or historical costs, to send correct signals for future investment and network use and ensure forward-looking efficiency.

6. In your view should any further principles be added or any existing proposed principles be removed? Please explain your reasoning.

- See response to Q4. If equity and fairness are not included as an explicit objective, we recommend including them at least as additional principles to incorporate the Just Transition in tariff reform. No existing principles should be removed.

7. Do you agree with the areas that are identified as in-scope and out-of-scope for the review? Please state your reasoning

- The scope of the review is generally appropriate. However, it is important to be aware of interactions between the incentives associated with different parts of the retail tariff. For example, when dynamic price contracts are offered to consumers for the energy component from June 2026, how would these interact with a dynamic network tariff as alluded to in the consultation paper? Are some behaviours more appropriately addressed under system service arrangements rather than network charges? The incentive for end-users will be based on the sum of all the different components, and consumer behaviour will only change if they are provided with clear information and data (Ryan et al, 2018). If changes are anticipated to other tariff components, there should be coordination to maintain simplicity and coherency in approach across the different parts of the consumer bill.

8. Acknowledging that resources are finite, are there any other areas that should be included in or excluded from the in-scope and out-of-scope areas for the review? If so please explain your reasoning.

- See response to Q7.

9. How do you see the use of the electricity networks in Ireland changing and developing in the future?

- The consultation paper provides a good overview of the main changes to the development and use of electricity networks in the future. Increasing renewable generation, increasing electricity demand and more active demand will be key features of future electricity networks. It is expected that network use will become increasingly decentralised and bidirectional. Our research modelling technology adoption shows increasing numbers of EVs and heat pumps in households geographically spread throughout the country (Meles et al, 2022; Mukherjee and Ryan, 2020). The simultaneous, uncoordinated charging of EVs and use of heating, ventilation, and air conditioning (HVAC) appliances will create new, highly localised peak demands. This will result in the need for increased flexibility and storage, smarter systems and bidirectional flows on equipment that was not designed for this. As a result of all these changes there will be significant need for network investment and upgrades. While the

design of tariffs and incentives may be able to reduce the need for investment in some areas, significant investment will still be required across the network.
- In addition to decentralisation and bidirectional power flows, emerging energy sharing models are expected to play a growing role in how electricity networks are used in the coming years. These models enable prosumers within local communities such as residential clusters, campuses, or business parks to trade or share surplus renewable generation directly with nearby consumers through digital platforms. As the electricity market becomes more decentralised, locally coordinated energy exchanges could reduce strain on the transmission network, improve local balancing, and defer costly network reinforcement.

10. In your view are there any drivers of change in the future use of the electricity networks that the CRU hasn't covered in this paper? If so please identify them and explain your answer.

- There have been some references to hybrid units throughout the consultation paper which will require consideration in the network tariff review. Other areas which may be important are power to gas and other devices connecting to the power system to provide system services, e.g. synchronous compensators.
- In addition to increasing electricity demand, for example from EV charging and HVAC appliances, another driver of change may be consumers with solar PV and home batteries significantly reducing their reliance on the grid and thus avoiding volumetric network charges. If tariffs are not restructured, this could lead to cross-subsidisation between consumers with network costs transferring unfairly to consumers with less capacity to adopt these technologies.

11. How do you think the roles of different parties/stakeholders across the networks will change in the coming years?

- More consumers will become prosumers and flexibility providers. The connection of more devices to the electricity network can provide a useful source of flexibility. If consumers are expected to be more active, there will be a strong need for good information and data to support decision making. Electricity suppliers will need to provide platforms that aggregate the data for individual customers to enable them to make informed decisions in relation to electricity use and respond to signals appropriately. There is potential for there to be more of a role for aggregators in managing some aspects of demand management.
- By coordinating flexible demand, storage, and distributed generation, aggregators can help DSOs and TSOs manage grid congestion, support system stability, and integrate renewable energy more effectively. Their participation can also improve competition and ensure that the benefits of flexibility and local trading are accessible to a wider range of consumers, including those unable to directly invest in new technologies.
- System services are likely to play an increasingly important role. The System Operators will be increasingly responsible for managing bidirectional power flows and procuring

local flexibility services. They will need to ensure that appropriate incentives are in place, and this will require support from regulatory authorities and the wider energy industry.
- Communities, energy cooperatives, or local aggregators could act as market facilitators, enabling households and small businesses to trade excess renewable generation or flexibility within their local network. The DSO's role may evolve from a passive infrastructure operator to an active system enabler, coordinating network-aware trading and ensuring that local transactions remain within dynamic operating envelopes and network limits. These developments will require clear tariff structures and data access frameworks that recognise and reward local energy exchanges while maintaining fairness and cost recovery across all users.

12. How could changes to the electricity network tariff structures facilitate and/or encourage a whole system approach to network investment network management and system operation? Please explain your answer.

- Tariff structures can facilitate a whole system approach by creating coherent price signals across all energy vectors. For retail tariffs to successfully encourage customers to reduce or shift electricity consumption, customers' demand for electricity must be at least somewhat elastic. Ryan et al (2018) showed that the literature on retail prices demonstrates that consumers change their consumption of electricity in response to both the amount of the average electricity price and the type of price. In particular, a time-varying price signal coupled with automation devices or detailed information encourages consumers to shift the timing of their consumption to off-peak periods.
- Ryan et al (2018) assessed how the three main retail tariff components differ in their potential to support environmental objectives. A proportionately high fixed charge component in the retail tariff reduces the incentive for consumers to invest in energy efficiency or self-generating technologies in line with renewable energy targets, but does ensure that network costs are covered irrespective of energy efficiency or distributed generation (DG) deployment. Variable, per unit energy pricing, combined with good feedback information, gives price signals to consumers to reduce their energy consumption overall and at peak times, and this will help energy efficiency and renewable energy targets. Finally, demand charges allow another price signal to improve the efficiency of operation by incentivising lower demand at peak times.
- This has implications for the need for network investment to cater for energy peaks as well as implications for network management and system operation, where the demand may shift from traditional peaks to other times.
- In addition, moving towards a whole system approach will require tariff structures that reflect both the temporal and locational value of electricity. Dynamic and capacity-based components can signal the true cost of using the network at times of congestion, guiding consumption and generation to where it is most beneficial for the system.
- Recognising local flexibility through tariff design can help integrate distributed resources, storage, and responsive demand into network operation. For example,

consumers participating in demand response or community-level peer-to-peer (P2P) energy exchanges could be rewarded through reduced use-of-system charges when their actions relieve network stress or support voltage management.

13. How do you foresee the increasing uptake of behind-the-meter generation for the purpose of self-consumption changing the load profile of electricity consumers particularly domestic electricity consumers

- La Monaca and Ryan (2017) carried out an analysis of the impact of solar PV generation on the consumption patterns of a typical Irish household. Using hourly household demand data from ESB Networks and generation data from the National Renewable Energy Laboratory (NREL) System Advisory Model, they were able to obtain an accurate estimation of self-consumption and net export potential. The analysis showed that daily peak household electricity demand does not coincide with the timing of peak PV generation in either winter or summer. PV generation is insufficient to meet the household demand in the winter time, but there is significant opportunity for export in the summer months in Ireland when there is low heating and cooling load and high generation potential.
- This means that behind-the-meter generation, primarily from solar PV, will create a 'duck curve' effect at local distributional levels, with net demand dropping during midday and ramping up significantly in the late afternoon/early evening as solar output falls and consumers return home. This could potentially lead to over-voltage issues in the middle of the day while creating a challenging evening peak for the distribution network.
- Automated technologies such as home energy management systems (combined with flexible EV charging, PV generation or technologies such as vehicle-to-home) have the potential to provide demand flexibility in response to price signals. However, they also have the potential to synchronise demand across time. If adopted at a large scale, this will cause new peaks in residential demand.

14. What are your views on the impacts of future changes identified in this Section and their implications for electricity network tariffs?

- Network tariffs will need to be adapted to reflect the changing nature of customers and different types of connections to the electricity system. Network tariff design must reflect the rapid growth in distributed grid resources and the additional network costs that may arise from both microgeneration as well as a range of other grid modernisation considerations. These costs can be discussed in the context of either the economic regulation of DSOs that allows additional revenues for the additional network costs from DG integration, or on the network tariff design for grid users that adequately reflects the network costs in cost-causal and equitable manner.
- Existing volumetric tariffs are not well suited to managing bidirectional flows and localised congestion caused by decentralisation. Tariffs should signal the cost of using the grid at points of peak stress on capacity rather than being based simply on total usage.

- As EVs, heat pumps, and new forms of electrified demand become widespread, the network will experience more volatile and location-specific load patterns. This requires tariffs that are dynamic, adaptive, and capable of reflecting real-time network conditions.

15. Do you think that there are implications or issues that need to be addressed for electricity network tariffs that we have not mentioned in this paper? If so please explain what these implications are and why they need to be addressed.

- See responses to Q4 and Q7.

16. How do you think changes to the electricity network tariff structures could help stakeholders avail of opportunities opening up due to future changes to the electricity networks?

- There are likely to be different opportunities for different stakeholders, for example a reduction in electricity bills for those who can provide demand flexibility. Depending on the structure of the full retail tariff for different types of energy users, the impact may be different. For example, TOU or dynamic capacity tariffs create clear financial incentives for customers to invest in flexible technologies such as EV charging systems and home batteries. This could allow aggregators to manage these assets and sell network flexibility services back to the DSO.
- Tariffs that reflect community energy groups and aggregators participating directly in delivering network services could support the growth of local energy initiatives and create new revenue streams at the community level.

17. In your view how do the current network tariff structures impact different types of network users? Do any network users have particular challenges or issues with the current network tariff structures? Please explain your answer.

- Our research has not focused on the impact of the current network tariff structures on different types of network users or their associated challenges. However, volumetric tariffs can create cross-subsidies between consumers. Prosumers with solar PV and home batteries can benefit significantly by reducing their exposure to volumetric charges, potentially avoiding their fair share of fixed network costs. On the other hand, low-income consumers are challenged by high volumetric charges and may be more limited in their capacity to shift usage.

18. In your view could the existing electricity network tariff structures hinder the changes that are necessary for the electricity system in the coming years? Please explain your answer.

- The electricity system is undergoing significant changes as we decarbonise our energy mix. Given the objectives of this review, the existing electricity network tariff structures could be adapted to provide more appropriate signals to help facilitate a low carbon future, for example incentivising a shift in demand to times of abundant renewable supply. A large, fixed component will dampen the impact of time of use charges. On the other hand, a larger weighting on the volumetric component of the tariff will be problematic in a high-DG penetration scenario, as the number of consumers paying the volumetric component would be reduced and other consumers may have to pay more, causing an unfair cross-subsidisation between consumers. A review of the network tariff design is timely and must reflect growth in distributed grid resources, including DG.

19. In your view do the price signals within the current electricity network tariffs sufficiently affect behaviour and influence use of the electricity networks? Please explain your answer.

- No. For most domestic customers, current network tariffs are not time-specific and are not sufficiently distinguished from the rest of the retail bill to incentivise a shift in usage. Uptake of TOU tariffs has been slow to date[1], and analysis conducted by NexSys researchers suggests that uptake of dynamic tariffs will be similarly slow without additional measures.[2] See also response to Q18.
- From a residential consumer perspective, a key requirement to affect behaviour is the existence of sufficient demand components that can be flexible and automated. This has not been the case to date, but the expectation is that this would change with a higher uptake of EVs.

20. What are your views on the network tariff components and considerations outlined in this paper?

- A move from volumetric tariff components towards capacity-based components makes sense as network costs are fundamentally driven by capacity rather than throughput. There is a balance to be struck in the complexity of price signals between the principles of cost reflectivity and simplicity.
- In order to ascertain the most appropriate network tariff option, detailed analysis of the options would need to be carried out. A number of scenarios and user types would need to be identified based on the projected future requirements of the electricity networks.
- Ryan et al (2018) reviewed literature on retail prices and found that a time-varying price signal coupled with automation devices or detailed feedback encourages consumers to shift the timing of their consumption to off-peak periods. This is applicable to both the TOU network tariffs and dynamic network tariffs. The latter has an additional level of complexity compared with TOU tariffs, but it can respond to variability in renewable generation which can help promote low-carbon energy use or ease congestion associated with DG. Locational network tariffs and generation Distribution Use of System (DUoS) charges would need to take the interaction with

[1] Smart tariff uptake at just 11% despite major smart meter rollout | RTÉ
[2] Making Dynamic Electricity Pricing Work for Ireland

connection policy into account, while interruptible network tariffs may overlap with system services arrangements.

- The major costs for DSOs are sunk and fixed costs, typically representing around 60% and 20% of their total costs respectively, whereas operating costs take approximately 20% (Simshauser, 2016). This can vary depending on location, but conventionally aggregate network tariffs (excluding generation, carbon, and supply charges) follow a two-part structure which includes a fixed rate (€/period) and a uniform variable rate (€/kWh). The final residential customer may receive one bill, which incorporates networks, supply, and policy costs; two bills, which separate supply from network costs; or even three bills which separate supply, DSO, and TSO costs. The customer's actual comprehension of different charges, how they come about, and how they could potentially affect the costs of individual components by behavioural change may differ considerably by bill design. Moreover, distribution tariffs that are based purely on a uniform variable rate (for example, a one-part tariff in €/kWh) or that reflect sunk costs only marginally (for example, a two-part tariff with a small fixed charge, in €/kWh + €/period) will not reflect the economic reality DSOs face at very high rates of DG penetration. With the standard two-part distribution tariff, households with solar PV (or, indeed, those who invest in energy efficiency technologies that reduce overall demand but not peak instantaneous demand) may not pay network costs in proportion to their reliance on the grid, whereas households without PV (or who do not or cannot become more energy efficient) may have to pay higher rates to make up these costs (Simshauser, 2016). This is because households with PV may save on flat-rate variable charges, though their peak demand requires the same sunk and fixed cost investments from the DSO's perspective. As a result, utilities in other jurisdictions have begun to evaluate three-part tariffs (for example, in €/kWh + €/period + €/kW/period) that add an additional capacity (or demand) charge (in €/kW/period), due to the non-trivial growth in DG, such as solar PV.
- In terms of ensuring that rates are aligned with the fair allocation of network costs, Eid et al. (2014) show that a combination of net metering and pure volumetric tariffs is the most detrimental with respect to cross-subsidies between consumers compared to alternative tariff structures that include capacity charges. Another analysis (Picciariello et al., 2015) shows that, depending on the amount of DG connected to the grid, substantial cross-subsidisation from consumers to prosumers may occur. Solutions to overcome this cross-subsidisation are typically capacity, demand, or power-based distribution tariffs (Tuunanen, Honkapuro & Partanen, 2016) that include an electricity demand charge (Simshauser, 2016). Tariffs with peak capacity components have been identified as more cost-reflective, equitable and economically sustainable from a DSO's perspective (Honkapuro et al., 2012).
- Ryan et al. (2018) also examined a number of retail tariff options and discussed some of the merits and downfalls of the options presented. Many of these apply also to the network tariff component. The following is a brief overview:
    - *Demand charges*: This option is discussed in Section 6.2.1 'Rebalance existing tariff structural components' of the consultation paper. Power charges constitute an additional bill component based on the size of a customer's peak usage during the period. Alternatively, capacity charges implement a fee based on the maximum amount of electricity the customer may draw from the grid

throughout the period, even if overall usage is low. A demand charge can be based on customers' demand during system peak hours, with the aim of better reflecting the direct generation and network costs that are driven by peak demand. In some cases, they may be based on highest demand during a given time interval, irrespective of whether demand occurs during peak or off-peak times, and therefore do not promote reduction in peak demand. One of the main motivations for using demand charges is to prevent the possibility of cross-subsidisation of grid users without DG (consumers) to those with DG (prosumers) under one or two-part tariffs (Simshauser, 2016; Strielkowski, Štreimikienė & Bilan, 2017).
    - *Net metering*: Under net metering, electricity customers with on-site generation capabilities, such as rooftop solar PV, may offset their total usage by the amount of self-generation and be compensated for excess generation. This behind-the-meter arrangement allows customers to be billed only for the net amount of electricity they draw from the grid, thereby rewarding self-generation. However, because every kWh of generation is effectively awarded at the same rate (the retail price of electricity offset or credited), it does not incentivise the use of self-consumption for shifting peak demand from the grid. Net-metering can also lead to distributional issues, particularly in relation to fixed network charges. By reducing behind-the-meter energy usage, those with the means to invest in self-generation pay a lower share of the network costs that are charged on a volumetric basis compared to those that do not. This, in turn, can lead to lower revenues for utilities. Jurisdictions that employ two-part tariffs to separate out the portion of retail charges that cover energy-only expenses and those which cover network and/or capacity costs may not be as adversely affected with respect to covering those costs.

21. Are there additional tariff components structures or options not described above that the CRU should consider? If so please identify them and provide rationale.

- The CRU could consider a Critical Peak Pricing component for residential customers. This is a variant of TOU where prices spike substantially only during a small number of high-stress network events per year. In this structure, the high price signal is very simple and could produce a reduction in load if communicated effectively to consumers.

22. Are there lessons or insights highlighted in our Advisors' Paper (CRU/21/123a) that are particularly relevant to this Electricity Network Tariff Structure Review? Please explain your answer.

- N/A

23. Are you aware of any other lessons or insights from these (or other) jurisdictions that may be relevant to this review? Please explain your answer.

- From June 2021, network charges in Spain were charged at 3 different rates by TOU. A recent study by Enrich et al (2024) examined the effect of this change on residential electricity consumption and found a reduction in peak consumption.
- The paper by Ryan et al (2018) highlights some examples from Finland, Massachusetts and California in relation to some of the tariff options outlined above.

24. In what ways could changes to the electricity network tariff structures interact with other regulatory policies and arrangements?

- One purpose of the electricity tariff structure is for cost recovery of network investment. Our review has shown that tariff design can impact consumer behaviour. However, it is important to acknowledge that this encompasses the full retail tariff and not just the network tariff component. Therefore, the interaction with other components of the tariff design is important when incentivising consumer behaviour.
- Some aspects such as locational charging may be better dealt with in Connection Policy as the incentive only applies at the time of connecting to the network. These signals are also likely to change with other network connections or network upgrades. Once a customer has connected, changes to locational incentives will have no impact on their ability to connect. Locational aspects to peak pricing may still influence behaviour at particular times of day or generation profiles depending on how they are designed.
- It is understood that flexibility will play an increasingly important role in future electricity networks. The system service arrangements provide the investment signals for the provision of system services to the system operators. The overlap between the incentives provided through the tariff design and the system services arrangements needs to be carefully considered.
- Changes to network tariffs have critical interactions with social policies. Increasing fixed charges could exacerbate energy poverty, requiring complementary regulatory action to ensure the change does not impede a Just Transition.
- Tariff structure affects incentives for consumers to adopt technologies such as EVs, HVAC appliances, solar PV and home batteries. As a result, the tariff structure will interact with existing policy incentives supporting the adoption of these technologies.

25. Please identify developments since the publication of CRU/21/123 which you consider are relevant to the review and advise of why and how you think they should be considered during the review.

- The energy crisis in Europe, the reason this project was paused in 2022, and the impact of high wholesale prices on consumer bills represents one of the most critical developments since the publication of the consultation paper. Given consumer sensitivity to price changes, the review should prioritise simplicity and stability while implementing a tariff design that can manage future growth in demand for electricity, increasing decentralisation and larger renewable shares in the generation mix. Equity should also be established as an explicit objective of the reform.
- Another development is the continued increase in adoption of EVs and HVAC appliances, and a focus in more recent Climate Action Plans on actions and mechanisms

required to meet previously established targets. The simultaneous uncoordinated charging of EVs and use of HVAC appliances will create new, highly localised peak demands. However, recent studies have also shown that EVs (Bailey et al., 2025) and heat pumps (Bernard et al., 2024) can increase the flexibility of consumers in responding to price signals.

References

Bailey, M. R., Brown, D. P., Shaffer, B., & Wolak, F. A. (2025). Show me the money! A Field experiment on electric vehicle charge timing. American Economic Journal: Economic Policy, 17(2), 259-284. https://doi.org/10.1257/pol.20230653

Bernard, L., Hackett, A., Metcalfe, R., & Schein, A. (2024). Decarbonising heat: The impact of heat pumps and a time-of-use tariff on energy demand. https://doi.org/10.3386/w33036

Eid, C., Guillen, J. R., Marin, P. F., & Hakvoort, R. (2014). The economic effect of electricity net-metering with solar PV: Consequences for network cost recovery, cross subsidies and policy objectives. Energy Policy, 75, 244-24.

Enrich, J., Li, R., Mizrahi, A., & Reguant, M. (2024). Measuring the impact of time-of-use pricing on electricity consumption: Evidence from Spain. Journal of Environmental Economics and Management. https://doi.org/10.1016/j.jeem.2023.102901

Honkapuro, S., Partanen, J., Tuunanen, J., & Niemelä, H. (2012). Tariff scheme options for distribution system operators. Lappeenranta: LUT.

LaMonaca, S. andL.Ryan, Solar PV where the sun doesn't shine: Estimating the economic impacts of support schemes for residential PV with detailed net demand profiling, Energy Policy, Volume 108, 2017, Pages 731-741, ISSN 0301-4215, https://doi.org/10.1016/j.enpol.2017.05.052.

Meles, T. H., L. Ryan, and S. C. Mukherjee (2022) Heterogeneity in preferences for renewable home heating systems among Irish households, Applied Energy, 307(118219) https://doi.org/10.1016/j.apenergy.2021.118219

Mukherjee, S. and L. Ryan (2020) 'Factors influencing early battery electric vehicle adoption in Ireland', Renewable and Sustainable Energy Reviews, 118. https://doi.org/10.1016/j.rser.2019.109504

Picciariello, A., Vergara, C., Reneses, J., Frias, P., & Söder, L. (2015). Electricity distribution tariffs and distributed generation: Quantifying cross-subsidies from consumers to prosumers. Utilities Policy, 37, 23-33.

Ryan, L., S. La Monaca, L. Mastrandrea, P. Spodniak (2018) 'Harnessing Electricity Retail Tariffs to Support Climate Change Policy', UCD Energy Economics Working Paper 18/22. Available at: https://www.ucd.ie/economics/t4media/WP18_22.pdf

Simshauser, P. (2016). Distribution network prices and solar PV: Resolving rate instability and wealth transfers through demand tariffs. Energy Economics, 54, 108-122.

Strielkowski, W., Štreimikienė, D., & Bilan, Y. (2017) Network charging and residential tariffs: A case of household photovoltaics in the United Kingdom. Renewable and Sustainable Energy Reviews, 77, 461-473.

Tuunanen, J., Honkapuro, S., & Partanen, J. (2016). Power-based distribution tariff structure: DSO's perspective. 13th International Conference on the EuropeanEnergy Market(EEM) (pp. 1-5). Porto: IEEE.

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