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Response to the CRU National Energy Demand Strategy Consultation

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Introduction

We welcome the opportunity to contribute to the CRU's consultation on the National Energy Demand Strategy. In this document, we respond to the subset of the questions for which we can provide insight.

To begin, we discuss the overall approach to energy demand flexibility and the definition of same (approximately covering questions 1, 6 & 8 of Area 1).

We are cognisant of the fact that demand flexibility is a heterogeneous concept. For instance, it can be short or long term, it can provide energy arbitrage or system services. It is difficult to create a definition that captures all aspects of flexibility, as a result, and a definition particular to a type of flexibility would simplify this exercise. An additional consideration is context: the precise definition of demand flexibility and the inclusion or exclusion of a particular source of flexibility may be predicated on the purpose of defining demand flexibility. Therefore, the approach of seeking to identify a single definition for many heterogeneous services is particularly difficult (Nolan and O'Malley, 2015) and could be simplified by separating the various types of flexibility according to the service provided to the system. If the regulator wishes to procure system flexibility, then these services, and the extent to which each will be required, should be identified, and targets specified accordingly. From this, the demand flexibility obligation may be achieved in a way that best serves the system.

Public procurement, however, is second-best. The most efficient and effective way to incentivise flexibility is to give efficient price signals. Not only will this incentivise existing consumers to adopt demand response in efficient amounts, it will also incentivise innovation in new solutions to meet these requirements. Ideally, market forces would incentivise the right types of flexibility in the right amounts. Failure to do so represents a market failure. The role for regulation and policy therefore is to ensure that barriers to investment and provision are removed. In the medium to long term, policy should focus on creating the policy environment that best facilitate flexibility provision. This will be especially important as targets become increasingly binding and marginal changes in a certain type of flexibility will have relatively greater impacts on system performance. The lack of an integrated demand side is a potential market failure (Botterud and Doorman, 2008) although whether any lack of demand flexibility represents a market failure or a missing market is an open question (Newbery, 2016). In either case, the first remedy is to identify and correct any market failures, and then to supplement with new markets if necessary.

2) Do you agree with the sources of demand flexibility that have been identified (storage, transport, domestic, industrial & LEUs, commercial)? Are there other sources of flexibility that could contribute to the demand flexibility targets?

Should interconnectors be included in the definition of demand flexibility?

Interconnection provides flexibility. It is a sink for excess supply and a source of additional supply when required. This is flexibility that can provide energy arbitrage and load-shifting, as well as system services, should the markets for system services be appropriately coupled.

Whether this should be included as part of a definition is determined by the purpose of the policy and the type of flexibility that the policy wishes to incentivise. For instance, if the policy wishes to incentivise any sort of flexibility, then it is our view that it should be included. If the focus of policy is to encourage specific types of flexibility, then it may need to be excluded, while noting that the exclusion of interconnectors from the provision of flexibility within their capabilities will lead to over-procurement and higher costs (Newbery and Grubb, 2014).

The rationale for excluding interconnectors from the definition of flexibility, namely "to focus on the opportunity and role for demand flexibility within Ireland" does not appear to be justified and is not in line with economic principles. Excluding one source of supply from any procurement mechanism will, all else equal, increase costs and decrease efficiency, as the demand for flexibility will have to be met from other, higher cost, sources. Furthermore, in the specific case of interconnectors, excluding them from the definition removes any potential gains from trade.

Should storage (including batteries, pumped storage and other storage methods) be included in the definition of demand flexibility?

Storage technologies can provide flexibility as both a source of additional supply and a sink for excess supply. Storage can provide energy arbitrage and load shifting, as well as many existing and new required system services. Indeed, research suggests the latter may be of more benefit to the system and the storage owner alike (O'Dwyer and Flynn, 2015, and O'Dwyer *et al*., 2017). Whether this should be included as part of a definition is determined by the purpose of the policy and the type of flexibility that the policy wishes to incentivise. For instance, if the policy wishes to incentivise any sort of flexibility, then it is our view that it should be included. If the focus of policy is to encourage specific types of flexibility, then it may need to be excluded, bearing in mind that doing so will increase costs and decrease efficiency, all else equal.

Should energy efficiency be included in the definition of demand flexibility?

Energy efficiency is not directly linked with changes in demand/supply at short notice so is not necessarily a form of flexibility. Furthermore energy efficiency does not "flex" up and down as mentioned for flexibility on the supply and demand side alike and so does not appear to meet the criteria for inclusion.

Should demand flexibility that provides system services contribute towards the target?

The distinction of system services is unclear. The document states that "The objectives of the strategy around demand flexibility are focused on utlilising renewable energy, reducing system emissions and increasing network capacity in the longer term". However, this limitation of demand flexibility to these three focuses does not appear previously in the document, and furthermore appears to be contradictory of principle 5 ("Initiatives should support security of supply for customers") and potentially principle 4 ("Initiatives should achieve efficient long-term costs for customers associated with upgrading, expanding and operating the electricity system"). System services contribute greatly to security of supply; indeed, the primary rationale

for separate revenue streams for system services is to enable secure and reliable system operation.
Removing demand flexibility that provides system services from contributing to the target appears therefore to separate the current, integrated objective of the System Operator (Operate the system at least cost, while meeting policy-determined security and renewable penetration constraints) into two separate objectives: (i) Operate the system at least cost while respecting system security, for which system service flexibility can be utilised, and (ii) integrate renewable energy, reduce emissions and increase network capacity, for which non-system service flexibility can be utilised. Separating policy targets and objectives leads to inefficiencies (Knudson, 2008) and removing sources of flexibility, such as flexibility that provides system services, from the supply pool of flexibility providers will at a minimum increase costs, and may also lead to over-procurement, all else equal.

Should non-procured demand flexibility be included in the definition of demand flexibility?

This distinction is unclear. As before, this rests on the purpose of the definition. If the purpose of defining and setting targets is to ensure that a certain amount of publicly procured flexibility is provided to prime the system, then no, this should not be included. If the purpose is to ensure that a certain amount of flexibility is on the system, regardless of source, then yes, this should be included.

The latter seems closer to the spirit of the regulation in our view and therefore non-procured flexibility should be included.

Should flexible demand connections be included in the definition of demand flexibility?

This distinction is unclear, with inclusion or exclusion resting on the type of flexibility to be included by the policy. Assuming the policy encompasses all types of flexibility, then flexible demand connections should be included.

7) Do you support the proposed Volume Shift option for defining demand flexibility?

Of the proposed definitions, this seems to be a simple and broadly the most intuitive interpretation relative to the stated targets. However, there are important downsides associated with this metric. As stated at the outset, a preferable approach would be to consider the many types of flexibility and assign definitions accordingly. These definitions could then be better aligned with broad system requirements. A single definition opens up the possibility of meeting a policy target with one type of flexibility, resulting in oversupply of one type relative to other types. This may raise potential scenarios such as a portfolio of flexible demand that meets the technical definition of flexible demand chosen, meets the defined policy target and yet is not available at the times and/or timescales necessary to achieve climate targets and/or facilitate secure system operation. Recognising the various types of flexibility with a number of definitions is a first step towards reducing the chances of this happening.

It should be reiterated, the best way to avoid these unintended outcomes is to establish an efficient market structure with market signals that can incentivise sufficient private investment, particularly by internalising the demand side to the greatest extent possible.

As such, in the context of a target for flexible demand, consideration should be given to the characteristics/capabilities required from flexible demand. Furthermore, there is no detail on the timescales at which flexible demand should be capable of changing its consumption profile when one uses the volume shift definition.

In short, the policy target should be disaggregated according to system requirements, with demand flexibility evaluated against the ability to deliver/meet the requirements. In the absence of such disaggregation, the current definition of flexible demand may meet the general policy target but with a limited impact on system emissions and/or security.

4) Do you have additions or modifications to offer on the summary of the key mechanisms through which market participants can provide flexibility?

In general, each system service that provides value to the system should have a price that reflects this value. If there is a price, there is an incentive to provide this. That should be the fundamental tenet upon which mechanisms are brought in place. As such, the regulator in the first instance should identify all system services that have value, many of which may have been unpriced in a fossil fuel-dominated system, and ensure there is a price associated with that service. Internalising these services may also lead to changes in the system portfolio which may either compound or undermine the original service procurement (see Buchsbaum et al. (2022) for a discussion on investment spillovers from the ancillary services market to the wholesale market).

Price will only lead to adequate provision if there are no other market failures. A second step in ensuring a sufficient set of mechanisms to identify any associated market failures and/or missing markets. For firms, issues of importance include access to capital, opportunities to hedge risk, etc. For householders, are there behavioural barriers prohibiting adoption?

There is a vast literature on the potential market failures and proposed solutions. It is outside the scope of this consultation to provide a comprehensive account. We are happy to discuss further, however, to help with identification of barriers and policies that may overcome these issues.

10) Do you have any views on the approach to Area 1: Smart Services, developed to increase customer engagement and participation in support of the NEDS?

We have some views on a subset of the topics discussed in Area 1: Smart Services. These will now be outlined.

Energy sharing

The Energy Sharing concept addresses an important point; with increasing distributed generation, there is a possibility of households and small businesses to become 'prosumers', theoretically participating in the market. This would increase competition and increase potential flexibility. There are barriers to entry for small players and aggregators may be required. This may limit the potential benefits for competition. Energy sharing is a potential option, as are virtual power plants. Morstyn *et al.* propose 'federated power plants'. Lowering barriers for such systems to develop, as is suggested in the energy sharing discussion, is an important point.

Facilitating competition

Facilitating the introduction of time of use tariffs is important and it is good to see this take prominence, but a competitive market is required for suppliers to offer cost-reflective time of use tariffs. Without this, there is a possibility that sub-optimal tariffs are in place. This may lead to poor performance in terms of flexibility. Consumers may not wish to adopt ToU tariffs as unattractive tariffs are offered and, if they do adopt, the incentive to shift consumption may be weak. Furthermore, even in the presence of cost-reflective tariffs, optimal participation by consumers is not guaranteed: a 2018 review paper of 27 studies across six countries put the median uptake of smart tariffs at 29%, with a wide range (0% to 96%) (Nicolson *et al*., 2018). Furthermore, consumers have long been known to make poor choices regarding electricity tariffs (Wilson and Waddams-Price, 2010), with large portions of consumers on tariffs that do not minimise their bills. Consumer uptake of smart meters that do not, for whatever reason, lead to a reduction in bills may have additional negative impacts as it may lead to a negative perception, discouraging adoption in the long term. As such, efforts to encourage retail competition will be of fundamental importance. A second-best alternative is regulation of ToU tariffs. While this will lead to a poorer outcome than a competitive market (the regulator will have imperfect information when setting the regulated tariff which will be less reflective of costs than a supplier revealing their true costs), it is likely better than a tariff set by a strategic supplier in an uncompetitive environment.

Information campaigns

There is much focus on information campaigns with respect to 'reducing barriers'. Studies have failed to find any impact of such information campaigns on energy consumption (See Diffney et al.). Efforts to facilitate uptake of Time of Use tariffs, the adoption by households of flexibility-enabling technologies, etc. should be evidence based. For instance, there is much work in the field of behavioural science demonstrating how one may maximise the likelihood that a householder will adopt a given technology, and overcome negative biases to make decisions that are in their private and the public interest. We would strongly advocate for an evidence-based approach to any such undertakings in this regard.

Consultation questions: 11) Can the items proposed for Area 2: Demand Flexibility & Response, as outlined, provide appropriate incentives to improve flexibility, particularly non-fossil fuel flexibility, across the relevant target sectors (i.e. larger business and industrial users, and the transport and public sectors)? 12) Are there additional mechanisms to facilitate demand flexibility that should be considered as part of the NEDS? 13) Do you have views on

whether incentives are the best mechanisms to accelerate the delivery of flexibility or if mandatory measures could be more effective?

Private firms are profit-maximising and therefore respond more predictably to price-based mechanisms than households. As such, the design of effective market structures is crucial to effective flexibility provision among this sector. Efforts in this regard should be built upon the establishment of cost reflective tariffs for each service that offers value.

With regard to markets for flexibility, the developments outlined are encouraging. One element to add to this is the guiding principle that every service offered the system should have a price that reflects the value they contribute. It may be the case that fossil fuel generators provided such services for free (particularly certain ancillary services, eg, voltage support, frequency response, intertia) and we require new markets to ensure delivery in a renewables-dominated system.

One element that is alluded to in the document is the interaction between changing market rules and investor confidence. If there are many small changes, this may undermine confidence. Investments are long-lived. If investors perceive a regulator as being inclined to change the regulations on a regular basis, this increases risk for their investment. They may increase their risk premium (increasing costs) or deter investment altogether. Fewer, well-motivated adjustments may lead to greater confidence and lower costs for consumers.

With regard to electricity network tariffs, a key tenet of efficient pricing is cost-reflectivity. There are several economic principles that one may apply when setting tariffs for utilities that involve numerous cost components. One such approach is that of Coasian pricing. This is the basis for multi-part tariffs that comprise a fixed, capacity and energy-related charge. Applying these principles to transmission tariffs, the volumetric price should be set equal to the marginal cost of electricity transmission (i.e. the cost of transmitting the last kWh of electricity through the system); the standing charge should be proportional to the burden that consumer places on fixed costs while a capacity charge should be proportional to each consumer's contribution towards the transmission capacity requirement. This should ideally contain a spatial component, guiding efficient investment and not overburdening a given location on the system.

b) What are your views on how the costs of this procurement should be recovered; is the DUoS charge an appropriate mechanism?

Costs that are unrelated to the distribution use of system should not be recovered from DUoS charges. In this case, it is not clear that flexibility procurement is related to distribution system use, and appears to be better described as a wider system service. Thus, DUoS is an inappropriate mechanism for recovering these costs.

The following tenets above should apply when considering how to recover these costs.

Procurement, as outlined above, should be market-driven. Should there be public procurement, this should be recovered in a cost-reflective manner. Please see Farrell and Meles (2022); Farrell (2021) for a discussion of cost-reflectivity. If investment in flexibility is connected directly to

energy consumption, then it should be recovered via a volumetric charge (€/kWh). If investment in flexibility is connected directly to fixed system costs that do not vary with energy capacity or energy consumption, then it should be recovered via the fixed standing charge (€/consumer). If investment in flexibility is connected directly to capacity requirements that do not vary with energy capacity requirements, then it should be recovered via a capacity charge. These should be the principles guiding the charging mechanism.

In this case, flexibility investment costs are arguably driven by policy-led renewable targets. These targets lead to significant changes on the system supply portfolio, which give rise to an increased requirement for flexibility and a reduced set of resources available to provide this flexibility. They are driven in the least instance by the demand side. Thus, any costs that are purely or primarily policy-driven should be covered by public funding, eg, the exchequer. In the event that this proves unacceptable, recovering costs via energy users requires further research. This is because the relationship between the demand for flexibility and the demand for energy is unknown, but is at the very least non-linear and is also heavily dependant on the supply side, over which the consumer has no control. Efficient recovery of policy-led and generator-induced costs from the demand side has not been addressed in the literature and so no efficient solution can be recommended. Some principles from the economic literature may be relevant, namely that fixed charges are likely to be less distortionary than variable charges. However, fixed charges are known to be regressive (Farrell and Lyons, 2015), and may also undermine energy efficiency efforts.

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