Implementing the CEP

Implementing the CEP: options for balance responsibility for active consumers in the Netherlands

Aliene van der Veen, Eva Winters
TNO
Den Haag, The Netherlands
{aliene.vanderveen, eva.winters}@tno.nl

George Trienekes
TenneT
Arnhem, The Netherlands
george.trienekes@tennet.eu

Koen Kok
Eindhoven University of Technology
Eindhoven, The Netherlands
j.k.kok@tue.nl

2024 20th International Conference on the European Energy Market (EEM) | 979-8-3503-8174-0/24/$31.00 ©2024 IEEE | DOI: 10.1109/EEM60825.2024.10608980

***Abstract*—At present, small consumers in Europe are not responsible for balancing their own supply and demand of electricity. In the context of ongoing discussions on the implementation of the Clean Energy Package (CEP), we see a need to research alternatives to the traditional integrated balance responsibility model where the responsibility is always at the Energy Supplier. Alternatives include models in which consumers have the ability to mandate responsibility to other parties than their (first) Energy Supplier or are responsible themselves. Such alternative models remove barriers for active consumer participation in energy trading and energy flexibility activities, but have an impact on the level of consumer protection. In this paper, we give an actual view on the pros and cons of different balance responsibility management approaches for active prosumers in the Netherlands.**

***Index Terms*—Balance responsibility; Active consumer; Transfer of Energy**

I. Introduction

The in 2019 adopted Clean Energy Package (CEP) introduces rules to enable active consumer participation in the European internal electricity market. In European Member States, the regulatory and practical implementation of the CEP is ongoing.

One challenge in the implementation of active consumer activities is to deal with balance responsibility [1]. Activities such as demand response and energy sharing may impact the balance position of the Balance Responsible Party (BRP) of the consumer. To ensure safe and cost-effective balancing, BRPs should be informed about the effects of such activities. In addition, settlement should take place to ensure that parties that cause imbalances pay the costs of resolving it. Since consumers with small grid connections were seen as passive energy system users neither rules nor systems existed to do this until recently. This absence is a barrier for active consumer activities.

Active consumers make use of Third Party Service Providers (TPSPs) such as aggregators or P2P trading facilitators. Furthermore, they can be active either as an individual or as part of a group of consumers. Rules for active consumers about informing BRPs and imbalance settlement should take into account the role of TPSPs and consumers as a group.

The regulation of balancing responsibility in case of active consumer activities is ongoing in Europe. For example, enabling independent aggregation has gained a lot of attention in recent years and various Member States have now an enabling framework. Member States have each unique frameworks, but solutions have in common that residential consumers are not actively involved in the imbalance management and settlement processes [3].

Another example is the implementation of energy sharing and collective self-consumption schemes. Here Member State implementations differ as well, but have in common that balance responsibility management is avoided by registering shared energy after the allocation process [5].

In the Netherlands, the implementation of balance responsibility management for active consumers is an actual topic centred around the implementation of the CEP in the new Dutch Energy Law. The Netherlands has not yet an enabling regulatory framework for active consumer participation in the electricity market.

In 2021, Utrecht University, TNO and Alliander published (in Dutch) the study *'Power to the People'* (*PtP study*) [2]. This work discusses how balance responsibility for residential energy consumers in the Netherlands is managed, identifies ongoing developments, and explores alternative ways to manage balance responsibility of residential prosumers. Since its publication, the *PtP study* has been used to support discussions around the enabling framework for active consumers in the Netherlands.

In this paper, we evaluate the balance responsibility models introduced in the *PtP study* in the context of the latest

This research was funded by the research program "MegaMind—Measuring, Gathering, Mining and Integrating Data for Self-management in the Edge of the Electricity System", (partly) financed by the Dutch Research Council (NWO) through the Perspectief program under number P19–25.

developments in the Netherlands. The goal of this analysis is to identify promising pathways to regulate balance responsibility of active consumers. In Section II, we discuss the status of active consumers activities in the Netherlands. In Section III, we introduce the balance responsibility models. In Section IV, we discuss the pros and cons of these balance responsibility models. Based on this analysis, we give recommendations for the implementation of active consumer activities in European Member States in Section V.

II. Active consumer activities in the Netherlands

In this section, we introduce existing and novel active consumer activities. First, we describe the activities and the parties involved. Second, we explain whether an activity can cause imbalance or requires *energy sourcing*: which means that energy volumes should be transfered from the perimeter of the consumer's BRP to the perimeter of another BRP. This so called *Transfer of Energy* can be the result of either an ex ante agreement or an action such as the activation of flexibility.

A. Offering balance services

Currently, a residential consumer in the Netherlands can offer its flexibility to a Balance Service Provider (BSP) who offers automatic Frequency Restoration Reserve (AFRR) services to the Dutch TSO TenneT. A third party BSP can contract the active consumer, but an agreement with the Energy Supplier is needed.

In contrast to countries where independent aggregator frameworks are in place, a residential consumer in the Netherlands has an active role in finding agreement with his Energy Supplier. TenneT TSO settles the *Transfer of Energy* between the BSP and the BRP of the consumer according to the activation at each allocation point as registered by the BSP. Additional financial settlements can be defined in the contract between the Energy Supplier and the consumer. The Dutch Energy Law will foresee in an enabling framework for independent aggregation.

B. Offering congestion management services

Consumers in the Netherlands can provide congestion services in the form of long-term capacity limiting contracts and short term flexibility products. Consumers should inform their BRP about long term obligations. A Congestion Service Provider (CSP) is required to be involved in short term products. When the flexibility product is traded, a *Transfer of Energy* between the BRP of the consumer and the BRP of consumer in another grid area takes place via GOPACS [6]. At the moment, CSPs provide bids via the BRP of the consumer. In case of non-delivery, the consumer and the BRP have to settle imbalance costs bilaterally.

Residential consumers cannot offer flexibility to a CSP since aggregation of smaller loads is not yet supported. Developments are ongoing to enable aggregation and independent CSPs.

C. Sell explicit flexibility to market participants

Currently, selling flexibility to market participants is only possible via the BRP of the Energy Supplier. Some Energy Suppliers in the Netherlands make use of the flexibility of residential consumers to improve their trading and balancing strategy. Measures to enable independent aggregators to provide such propositions will be implemented in the Dutch Energy Law.

For consumers without Smart meter Allocation (SMA), due to the lack of 15-minute measurements, allocation volumes are estimated by the DSO on grid area level. Since average energy volumes are allocated to BRPs, there is (unless the BRP is a dominant player in that grid area) no incentive to activate flexibility behind these grid connections. The allocation of consumption and production volumes of consumers with SMA are aggregated by the DSO per grid area and per BRP. Flexibility activation at these consumers will have an effect on the BRPs position.

During the flexibility activation the consumer's behavior can cause imbalances. For privacy reasons, the DSO does not share individual allocation volumes with the BRP. However, it is possible that the consumer shares his Smart Meter data with the Energy Supplier for settlement of imbalance costs.

A trend is ongoing to attribute costs to causative agent groups: some Energy Suppliers have started to charge additional balancing costs to households with solar-PV. This development may trigger the interest of consumers in explicit flexibility propositions.

D. Implicit flexibility activation

For residential consumers in the Netherlands today, the main focus is on responding to dynamic tariffs. Due to the existence of yearly net metering the incentive for self-consumption is not strong, but this might change under influence of tariff and tax reforms.

Energy service companies (ESCOs) support consumers in the automation and optimization of their response to these incentives. ESCOs do not need a *Transfer of Energy*: they are not selling energy or flexibility. According to the CEP, the active consumer is responsible for imbalances that he causes. This means that Energy Suppliers may charge additional costs to consumers that activate flexibility implicitly.

E. Energy trading and sharing

Some Energy Suppliers in the Netherlands provide propositions that include matching of consumers and producers, but it is not yet possible for consumers to trade energy independent from their Energy Supplier.

The CEP introduces various options for active consumers to sell or buy energy on wholesale markets either individually or as part of a collective. These options will be implemented via the new Dutch Energy Law. One option is to trade energy via an energy community without an Energy Supplier license. A second option is to trade energy via a feed-in aggregator that brings the excess renewable energy production to the market.

Third, consumers can make use of the services of peer-to-peer trading facilitators.

All three options require to split the balance responsibility between the BRP of the consumer to another BRP: the BRP of an aggregator, a community or another consumer. A physical split of supply or a *Transfer of Energy* process is needed.

Energy sharing as defined in the provisional agreement on the reform of the EU's electricity market [7] is not yet implemented in the Netherlands. Parties involved in the sharing process are consumers, Energy Sharing Organisers (ESO) and the consumer's Energy Supplier and BRP. What party can be an Energy Sharing Organizer should be defined by Member States. It depends on choices in the energy sharing implementation whether sharing requires a *Transfer of Energy* [5].

For both trading and sharing imbalances can be caused by late or ex post notification of a *Transfer of Energy* or (implicitly) by the fact consumers activate flexibility to optimize the benefit from energy sharing schemes.

III. Balance Responsibility Models

In this section, we introduce five balance responsibility models identified by the *PtP study*. Table I summarizes how the balance responsibility models differ from each other on two aspects:

- **balance responsibility division:** if and how balance responsibility for a certain grid connection can be divided between the (primary) BRP and other BRPs. The *PtP study* distinguishes *single BRP* models from *multi-BRP* models. Furthermore, the *PtP study* identifies two ways to ensure there is no overlap or missing of a responsible party at a certain moment or for a certain volume in a *multi-BRP* model. The first way is to implement a higly regulated *multi-BRP* model where a supervisor is appointed to divide the responsibilities according to regulation. The second option is to choose a model where a *main BRP* is appointed: a party that is responsible for managing the balance responsibility division. Figure 1 shows how to categorize a BRP model in one of these three categories.
- **Consumer responsibility:** who is primarily responsible to assign a BRP for a residential consumer. The *PtP study* identifies three *consumer responsibility* options. The first option is *non-responsibility*: consumers are not seen as balance responsible. The responsibility is at their Energy Supplier. The second option is *mandatory transfer*: consumers have to assign a *main BRP* or get a BRP via a last resort mechanism. This option fits in a *multi-BRP* model. The third options is *self-responsibility*: consumers can choose to be their own BRP and can divide the balance responsibility among multiple BRPs.

A. The integrated model (1)

In the *integrated* model, a *single-BRP* and *non-responsibility* model, the balance responsibility of consumers is always at the Energy Supplier. Balance responsibility can only be divided physically. This means that a metering installation should be installed at physical balance responsibility splitting points. Split-supply models, in which sub-meters can be installed and allocated to a second Energy Supplier, are separated *integrated* models. A TPSP that needs a *Transfer of Energy* to source its activities can work under sub-contract of the Energy Supplier's BRP only.

TABLE I
THE MAIN CHARACTERISTICS OF THE BALANCE RESPONSIBILITY MODELS

BRP model	division type	responsibility is at
integrated	single BRP	Energy Supplier
balance manager	multi-BRP	*main BRP*
self-responsibility	multi-BRP	consumer
supervised	multi-BRP	regulator

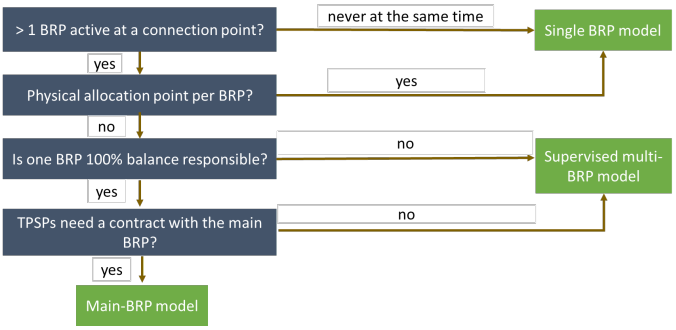

Fig. 1. Options to divide balance responsiblity [2].

B. The balance manager model (2)

In the *balance manager* model, a *multi-BRP* and *mandatory transfer* model, the consumer assigns a *main BRP*. Since it is possible to split the balance responsibility in time and volume, this *main BRP* acts as a balance manager: he is in charge of contractual agreements about division of balance responsibility with (BRPs of) TPSPs. The BRP of the Energy Supplier can take this role, but it is possible to assign an independent BRP as *main BRP*.

In this model, there is always a contractual relationship between the *main BRP* and TPSPs. Rules of responsibility division and settlement are defined in this contract, but the content of contracts can be (partially) regulated. The consumer and/or the (BRP of) TPSPs have to negotiate with the *main BRP* about the *Transfer of Energy*, notifications and imbalance settlements. The execution of notifications and settlements can take place via central systems or commercial platforms.

There are two key differences with the *integrated* model. First, in the *balance manager* model, it is possible to administrate a *Transfer of Energy* in central systems that allocate energy consumption and production to BRPs. Second, the primary responsibility for balancing is not necessarily at the party that 'supplies' the energy: it is possible that the consumer assigns a party as BRP that does not buy or sell energy on the wholesale markets but only manages imbalances. This 'non-supplying' party may look a lot like todays Energy Suppliers

e.g. it can take care of responsibilities such as collecting taxes and levies.

C. The self-responsibility model (3)

In the *self-responsibility* model, a variant of the *balance manager* model, the consumer can decide to be responsible for his own balance and be in charge of making agreements with TPSPs: he can become his own balancing manager. Self-responsibility means that e.g. sending energy and transport forecasts to the TSO and providing bank guarantees for imbalance cost allocation becomes also the consumer's concern. Managing this is practically infeasible for small consumers. This could be solved by the introduction of a light-variant of the BRP role. Self-responsibility may result in practice in the *balance manager* model, since it is very likely consumers mandate BRPs. The difference is that the negotiation position for consumers is stronger.

D. The supervised model (4)

In the *supervised* model, a *multi-BRP* model, the regulator defines how responsibilities should be divided between parties that are active at the connection. Similar to the *balance manager* model, central allocation systems can register a *Transfer of Energy*. The difference is that in the *supervised* model central facilitators can register a *Transfer of Energy* without approval of the *main BRP*. In an extreme variant of the *supervised* model there is not a *main BRP*: a central authority ensures responsibility is always assigned to the party that caused the imbalance. It is likely that this model is used on top of another model. This means that the *supervised* model is used when specific activities (e.g. offering balancing services) take place.

IV. Pros and cons of alternative balance responsibility models

The activities of active consumers in the Netherlands as introduced in Section II are evaluated under the different balance responsibility models introduced in Section III. First, we explain what balance responsbility models the *PtP study* identifies as feasible options. Second, we dicuss the pros and cons of alternatives in terms of barriers to consumer empowerment and consumer risks.

A. Offering Balancing Services

The *PtP study* concludes that the combination of a not balance responsible consumer and a not regulated model is not feasible: the CEP prescribes that consumers should be able to contract a Balance Service Provider without permission of the Energy Supplier. Therefore the current *integrated model* is not feasible: it requires the consumer to negotiate with his Energy Supplier.

The *supervised* model ensures that a TPSP and a consumer independently from the Energy Supplier can make an agreement. Therefore, this is the preferred option to open the market for aggregators when this does not happen. A drawback of this model is that the process of notification and settlement rule definition is challenging: for example baseline methods and settlement prices should be defined that are good enough for a heterogeneous group of consumers and contract types. This can be solved by providing options to TPSPs and BRPs to propose their own baseline methods for the *Transfer of Energy*.

The *balance manager* model provides more options to customize the *Transfer of Energy*. However, since the TSO calculates already the activated flexibility, it is not efficient if parties do this calculation for the *Transfer of Energy* again. The additional empowerment might be relatively small compared to the burden of setting up the balancing management processes. *Self-responsibility* is not adding additional value as long as the consumer cannot become his own BSP. Rebound effects are not automatically taken into account by the TSO. Therefore, settlements of rebound effects fit better in the *balance manager* model.

B. Offering congestion management services

Consumers should be able to contract independent aggregators as their CSPs. Therefore, the integrated model is not a feasible option.

CSP services are different from BSP services in that the flexibility to resolve grid congestion is activated ahead: the *Transfer of Energy* takes place at the moment of trading instead of the moment the flexible asset is controlled. Another difference is that for congestion management, the imbalance corrections (in case of a deviation from planned activation) are not included in this *Transfer of Energy*. This should be defined in a separate (ex post) settlement process.

The grid operator might not calculate the exact flexibility activation: he is likely satisfied if the consumption or production volume is dropped to a certain level. Therefore the *supervised* model requires that additional rules and processes are defined for the ex post *Transfer of Energy*. On the short term, a *supervised model* with oversimplified rules will be sufficient. On the long term, it might be more efficient to use the *balance manager* model: stakeholders can implement the process as complex as needed and regulators are not responsible for taking into account all kind of corner cases such as situations with flexibility value stacking. Nevertheless, in the *balance manager* model, the regulator should regulate the contracts between BRPs of independent CSPs and the *main BRP* to ensure independent aggregation is possible and at the same time ensure that requirements do not lead to excessive implementation costs. *Self-responsibility* is not adding additional value as long as the consumer cannot become his own CSP.

C. Sell explicit flexibility to market participants

For wholesale market flexibility trading by TPSPs, the requirements are similar to the congestion services case. Different is that the flexibility requesting party is a market participant instead of a grid operator. As such there is no natural supervisor. The *balance manager* model with a fallback *Transfer of Energy* calculation methodology and price is probably easier to implement. However, monitoring and

enforcement of such a model come with a certain societal cost. The *self-responsibility* model is interesting in case of value stacking because it reduces the number of transactions and information updates.

D. Implicit flexibility

The current *integrated* model works well for implicit flexibility activities such as responding to dynamic tariffs or grid connection limits that are known by the Energy Supplier. In case the consumer responds to other signals he should notify the Energy Supplier, TPSPs and/or their BRPs and should be hold responsible for balancing costs according to the CEP. Expectations and obligations of consumers and Energy Suppliers about these signals should be defined. For example, Energy Suppliers should allow ESCos behind the meter, but consumers should notify activations upfront or pay additional balancing costs.

Since a *Transfer of Energy* is not required for implicit flexibility, a *supervised* model will not provide additional value. The *balance manager* model would be a solution if the response prediction is a specialism that energy suppliers don't have. The *self-responsibility* model would be an interesting future pathway when consumers are better in predicting their own response because they can make use of sensitive personal data. However they still need to mandate a BRP, they can negotiate about the value of their own forecasts.

E. Energy trading and sharing

Energy trading and sharing introduces a second party that supplies to or takes off energy from the consumer. A Member State is allowed to require a secondary metering installation to support a second supplier, but a choice for the *integrated* model introduces barriers for consumers: metering costs increase and self-consumption behind the meter may be limited. Given that rules should be proportional the *PtP study* recommends regulators to consider *multi-BRP* models for trading and sharing.

The *Transfer of Energy* in case of trading or sharing can take place from years ahead to ex post. In this dynamic situation, a *supervised* model is challeging to implement: it requires the registration of all kind of bilateral contracts on a central platform with real-time supervisory actions. For early implementations of energy sharing, where sharing takes places at a fixed moment of the day, a *supervised* model may work. However, this model limits the consumer's ability to arbitrate on energy (sharing) or flexibility markets. A *balance manager* model enables customized dynamic sharing schemes. If communities or individual consumers can become their own BRP this gives them the opportunity to freely customize their energy sharing schemes.

V. Recommendations

Today, consumer protection and empowerment are the key requirements for the implementation of active consumer activities. Therefore, we expect that *supervised* models are the preferred option for balancing and congestion flexibility propositions on the short term: they are needed to kickstart the active consumer business. We observe that *supervised* models are less feasible for explicit flexibility and energy trading propositions: it is challenging to cover all cases. A *balance manager* model with regulatory defined fallback contracts is a feasible alternative. For implicit flexibility propositions, the *integrated* model can function but there is a risk: Energy Suppliers may not invest in forecasting flexibility activities and instead charge additional costs.

TABLE II
Recommended balance responsibility models for the Netherlands.

Activity	Recommended ST	LT option
balancing flex	supervised	-
congestion flex	supervised	balance manager
wholesale flex	balance manager	self-responsibility
implicit flex	integrated	self-responsibility
energy trading/sharing	balance manager	self-responsibility

A market for customized *multi-BRP* contracts may emerge when active consumer activities become more mature. *Supervised* models should not become a barrier for this development. Self- (or community-) responsibility is a promising alternative on the long term especially for consumers that combine energy sharing with flexibility propositions. However, *self-responsibility* models require investments in the allocation and settlement processes. When BRPs support customized balancing strategies already, the benefits of self-responsibility models are low.

We observe that active consumer activities can be generalized to a relation between the consumer, a main BRP and TPSPs. As such, we think that it is possible to simplify the regulation of active consumer activities. We advise Member States to not await regulatory reforms but start with preparing allocation and settlement systems for *multi-BRP* models by implementing generalized processes for TPSP communication. This will enable innovative TPSP propositions and new active consumer activities we don't even think of today.

References

[1] S. Bjarghov et al., "Developments and Challenges in Local Electricity Markets: A Comprehensive Review", in IEEE Access, vol. 9, pp. 58910-58943, 2021.

[2] A. Buijze et al, "Power to the People: een onderzoek naar alternatieven voor de huidige balans-onverantwoordelijkheid van kleinverbruikers", report by Universiteit Utrecht, TNO en Alliander, 2021.

[3] A. Armenteroz, H. de Heer, M. van der Laan, "Flexibility Deployment in Europ", USEF White paper, 2021.

[4] Saviuc, I., Lopez, C., Puskas, A., Rollert, K. and Bertoldi, P., "Explicit Demand Response for small end-users and independent aggregators", EUR 31190 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-55850-7.

[5] European Commission and Directorate-General for Energy and Veen, A and Winters, E and Fumagalli, E and Klobasa, M and Breitschopf, B and Seigeot, V, "Multi-supplier models and decentralized energy systems – Energy sharing approaches", Publications Office of the European Union, 2023

[6] https://en.gopacs.eu/

[7] https://data.consilium.europa.eu/doc/document/ST-16964-2023-INIT/en/pdf