POLICY GUIDELINES

by the Energy Community Secretariat

on the Grid Integration of Prosumers

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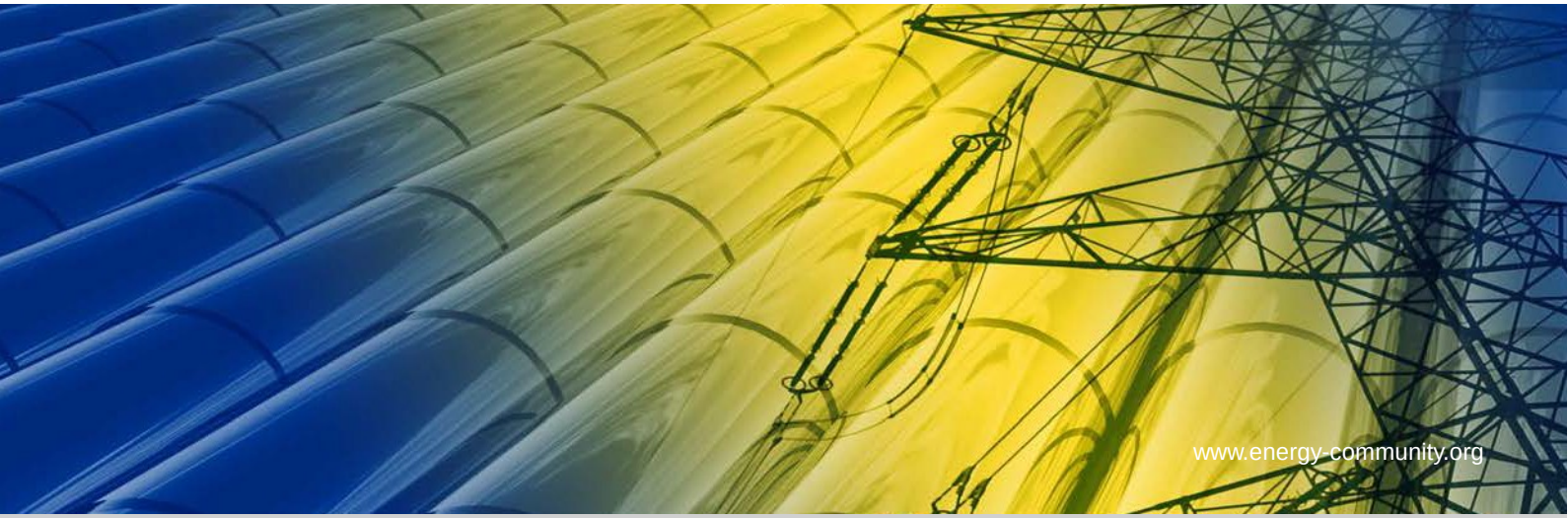

1 PURPOSE

Renewable energy technologies are transforming the way we produce and use energy. The power sector is currently experiencing one of the most significant challenges of the last 70 years. The share of distributed energy sources is rapidly increasing, thereby requiring all stakeholders to revisit the approach to network planning and operation of the electricity system.

Due to increasing retail electricity prices and decreasing technology costs, distributed generation is becoming more and more attractive from the electricity consumers' point of view. Consumers can now choose to produce part of the electricity for their own needs instead of purchasing it from a supplier.

From the system point of view, self-consumption is an additional tool to meet renewable energy targets, which also may help to reduce network losses and peak loads, increase energy efficiency, improve demand response and contributes to CO_2 emissions reduction.

> The neologism ''**prosumer**'' refers to an electricity consumer that produces part of his/her electricity needs from his/her own power plant and uses the distribution network to inject excess production and to withdraw electricity when self-production is not sufficient to meet his/her own needs.

The significant decrease of costs of small scale renewable energy technologies creates new opportunities for electricity consumers to get involved in driving the energy transition. The decision-makers are expected to proactively anticipate and accommodate the emergence of this self-consumption model while promoting energy security, efficiency and decarbonisation.

Recalling that the majority of Energy Community Contracting Parties (EnC CPs) lacks comprehensive legislation in relation to small scale renewable installations for self-consumption purposes, the Energy Community Secretariat aims to provide with these Policy Guidelines the basis for establishment of the missing legal and regulatory framework in these countries.

The Policy Guidelines summarize the findings and recommendations of the study: "***Distributed Generation for Self-Consumption, Key Aspects and Recommendations of Good Practice***"[1] prepared under the cooperation platform of Energy Community Distribution System Operators (ECDSO-E), with a focus on recommended practice for small installation of "prosumers" connected to distribution network.

In July 2015, the European Commission issued the working document ***"Best Practices on Renewable Energy Self-consumption"***[2] building on lessons learnt from projects in the European Union Member States on the new models promoting market integration of variable renewables using self-consumption of electricity. The present Policy Guidelines take into account the recommendations of the Commission Staff Working document to the extent possible, which were integrated with those of the ECDSO-E study.

The Guidelines provide a set of recommendations of good practice for all important aspects that have to be regulated to make self-consumption schemes fully operative in EnC CPs.

The Policy Guidelines are also intended to empower self-consumers in the EnC CPs, thereby helping to achieve renewable energy targets set in accordance with Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

2 DEFINITIONS

The terms used in these Guidelines have the following meanings:

''Self-consumption'' is the consumption of an electricity consumer with an installed distributed generation system intended for his/her own or on-site consumption and entitled to receiving

[1] Link: https://www.energy-community.org/dam/jcr:78a1b5d0-9df7-41f4-9691-553d2c813437/WSEL052017_Muratovi%C4%87_Key_aspects.pdf

[2] https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_autre_document_travail_service_part1_v6.pdf

remuneration for the non-consumed electricity fed into to the grid.

''Self-consumption scheme'' is the commercial arrangement applied to valuate self-consumed energy and excess energy injected into the grid.

''Self-consumption rate'' is the amount of electricity actually consumed onsite as a percentage of the total electricity produced.

''Self-sufficiency rate'' is the ratio of total electricity needed by the consumer, provided from his/her own renewable energy system.

''Value of excess energy'' is the value the prosumer receives for electricity injected into the grid.

''Net metering'' is a regulatory framework under which the excess electricity injected into the grid can be used later to offset consumption in the period when onsite renewable generation is absent or not sufficient, where the excess energy value is equal to the retail electricity price.

''Net billing'' is a regulatory framework under which the excess electricity injected into the grid can be used later as a monetary credit to offset the costs of electricity withdrawn in the period when onsite renewable generation is absent or not sufficient, where the excess energy value is lower than the retail electricity price.

''Energy credit'' is a quantity of excess energy surplus which remains after a regular billing period, given as a positive difference between injected and withdrawn electricity.

''Monetary credit'' is a monetary value of excess energy surplus which remains after a regular billing period, given as a positive difference between the monetary values of injected and withdrawn electricity.

3 LEGAL AND REGULATORY FRAMEWORK

A stable, transparent and comprehensive legal and regulatory framework is crucial for developing the distributed generation for self-consumption purposes.

Self-consumption schemes should be comprehensive and as simple as possible, while consumers should be provided with all necessary information to calculate incomes and costs relevant to the distributed generation (DG) installation.

Recommendation Set #1

General principles	Self-consumption schemes with or without decentralized storage should be permitted and enforced by renewable energy law or other applicable legislation. In addition, primary and/or secondary legislation should be amended to set connection and metering rules for consumers with installed DG units. Tariff design should be flexible and adjusted timely to allow additional customer classes and effective billing and reporting systems to be established.
Cost reflectivity	The self-consumption regulatory framework has to be market-oriented, resulting in the least possible market distortion, whilst at the same time respecting the principles of cost reflectivity, cost recovery and avoidance of cross-subsidization among network users. The cost for used grid services must not be shifted to grid customers who do not have the possibility to become prosumers.
Consumer categories	The regulatory framework is expected to provide precise definitions of consumer categories and their eligibility for self-consumption schemes. For these purposes, households and small commercial consumers should be treated separately from industrial and large commercial consumers.
Subsequent legislative changes	Subsequent legislative changes should not have retroactive impact on existing self-consumption installations nor impose costs on other grid

	users, thereby ensuring legal certainty for investors and protecting investment stability. The unit price changes of excess energy, grid tariffs or other taxes and levies are not considered as a change of legislative framework.
VAT legislation	VAT legislation should allow or, if needed, be amended to allow implementation of the self-consumption schemes, and in particular netting schemes recommended by these Policy Guidelines.
Support	When support for energy from renewable sources injected in the grid is granted, it should be explicitly provided, having taken into account the market wholesale or retail price. Any hidden subsidies, particularly through the grid costs exemption, should be avoided, since they result in cross-subsidization among network users.
Commercial arrangement	A commercial arrangement between suppliers, a grid operator and prosumers has to be adjusted to allow for implementation of the selected netting schemes. The grid operator should provide all relevant meter data to facilitate clear commercial conditions.
Energy statistics	Energy statistics on the share of self-consumption at the power system level should be established via a reporting system and key statistical indicators defined in a comprehensive manner.

4 TECHNOLOGY AND CAPACITY CRITERIA

Solar PV power plants are generally allowed to be used for self-consumption purposes in the Energy Community without any exceptions. In a number of EnC CPs, but not all, other types of small DG technologies are also allowed, including biomass and biogas power plants, micro wind generators, fuel cells, etc.

A consumer's installation might also be equipped with storage facilities, thus increasing the self-consumption rate, enhancing demand side management, and facilitating further balancing market integration. Storage facilities may be a convenient solution for adaptation to grid capacity and better commercial arrangement with the supplier.

Recommendation Set #2

Technology criteria	All types of DG technologies should be allowed for self-consumption purposes.
Installed capacity criteria	As a general rule, the installed capacity eligible for self- consumption schemes shall not exceed the requested connected and/or contracted capacity of the customer. Until the regulatory framework on setting the tariffs for access to the distribution grid is revised to take into account the new reality of a system with significant penetration of self-consumption, the network operators might impose overall capacity limits in the system to ensure a smooth transition for the operation and viability of the networks. These overall capacity limits shall be revised and set annually.
Capacity limitation for households and small commercial consumers	For households and small commercial consumers, it is appropriate to apply the general capacity threshold per single installation and the individual DG capacity limit depending on the consumer's capacity and annual consumption. If the netting scheme is applied, the DG's annual production should be lower than the customer's consumption in the preceding year. In case of new, first time connecting consumers, planned consumption might be applied as a reference value.
Capacity limitation for industrial and large	For industrial and large commercial consumers, the general capacity threshold per single installation is not recommended, provided that

commercial consumers	electricity fed to the grid is subject to commercial contracts with negotiated conditions. In any case, the maximum capacity requested and contracted for grid services should determine the connection costs. Specific, technology-based capacity limits might be determined on a case-by-case basis, depending on the consumer's annual consumption and using constraints from grid connection criteria, if relevant.

5 SELF-CONSUMPTION COMMERCIAL SCHEMES

Commercial schemes, currently in use for self-consumption are:

1. Standard supply arrangement,
2. Net metering, and
3. Net billing.

Under the standard supply arrangement, the injection of electricity to the grid and the withdrawal of electricity from the grid are valued and invoiced separately.

Technical frameworks for the net metering and net billing schemes are similar, while the difference is given by the commercial arrangement with regard to the excess energy value.

Under both netting schemes, prosumers use the supplier to offset their excess power production. In a situation when quantities of injected energy are greater than withdrawn energy during the billing period, the prosumer is credited in kWh or in monetary units for the next billing period. The maximum timeframe for credit compensation may vary, in a range from real-time compensation per hour, up to a multi-year period or indefinitely.

Under the net-metering scheme, a net difference of the withdrawn and injected energy is invoiced by the supplier, while any remaining surplus of the injected energy during the billing period is credited in kWh for the next billing period. As a result, total excess energy is valued at the volumetric retail electricity price, thereby exempting the prosumer from paying volumetric grid tariffs and other taxes and levies for entire DG production. Consequently, the net-metering scheme has a negative effect on other non-producing consumers, since the avoided grid costs and other taxes and levies have to be socialized and recovered by increasing prices charged to other consumers without DG.

Net-metering also undermines efforts to enhance flexibility through demand-side management, since the prosumer is not incentivized to maximize the self-consumption rate because of the same values of the self-consumed and excess energy.

Net-metering is seen as an appropriate mechanism to promote self-consumption in the phase-in periods, when solar PV installations have achieved grid parity. However, the recent rapid decline of technology costs, together with concerns about grid cost recovery and likely overcompensation, have initiated a wide debate about reform of the self-consumption schemes. Council of European Energy Regulators (CEER), in its position paper on self-generation[3], strongly recommends to avoid net metering as it implies that the system is used as storage capacity for free. In addition, the European Commission gives preference to the self-consumption schemes with a standard supply arrangement over the net metering schemes, while the latter are deemed to be appropriate for phase-in periods[4].

Under the net billing scheme, the invoice issued by the supplier is based on the value of withdrawn energy, which is decreased by the value of injected energy. In this case, any remaining surplus of injected energy during the billing period is credited in monetary units to the next billing period. The excess energy is valued at a level below the retail electricity price.

Recommendation Set #3

Scheme selection	For prosumers - households and small commercial consumers, it is recommended to apply the net billing scheme for energy delivery, preferably with monthly invoicing. One year is deemed to be an optimal credit compensation period.

[3] CEER, Position Paper of self-generation, 2016
[4] Commission Staff Working document, Best practices on Renewable Energy Self-consumption, 2015

	Any monetary credit surplus remaining after the annual compensation should be subject to a special arrangement, whereas a system user with annual generation exceeding its annual consumption should not qualify as a prosumer. For industrial and large commercial prosumers with larger self-consumption installations, the standard supply arrangement should be applied with separate invoicing of the electricity supplied by the supplier and of the electricity injected by the prosumer respectively.
Overall impact assessment	When netting is evaluated as a support scheme, overall social welfare of access to electricity at low cost for small customers has to be considered, in particular those in remote and less developed areas, taking into account the life cycle cost of DG in line with energy efficiency requirements, avoided network costs and contribution to social cohesion objectives.
Net billing advanced arrangements	Application of the netting schemes might be allowed even if the generation and consumption locations are different, making the arrangement also known as ''virtual net metering (billing)''. In addition, netting might be applied in multi-apartment buildings, where the net production on one site is split between several consumers, in accordance with the contract, previously agreed by the consumers involved.
Net billing gradual implementation	It is preferable to introduce the net billing schemes in two steps, thus avoiding over-complexity in the phase-in period. At the initial phase, it should be permitted only for installations at the same location, which are connected to the grid via the same electricity meter. At the second phase, the regulatory framework might allow net billing schemes in multi-apartment buildings or in a situation when generation and consumption locations are different.
Third party ownership	Third party ownership of DG installations should be allowed under the net billing-scheme, as it provides new business opportunities and helps low income consumers to make electricity savings out of which investment can be paid off.
Monetary credit treatment in specific situations	When supplier switching occurs, the final settlement should include the value of outstanding monetary credit or debit. In a situation of permanent decline in energy consumption during the DG's life-time (e.g. a factory is closed or capacity decreased, changes in household demand, etc.), prosumers should be allowed to transfer the monetary credit surplus.

6 EXCESS ENERGY TREATMENT

A number of methods are available to set the value of excess energy.

1. Retail electricity price is a volumetric price that includes the energy component, grid costs, taxes and levies.
2. Wholesale electricity price is the varying reference price obtained from the wholesale electricity market in a longer period (week, month, year), whereas this price might also include compensation for the supplier's costs of energy transaction at the market.
3. The energy component of the retail electricity price is the unit price of the commodity which is incorporated in the final retail electricity price faced by the consumer. At the competitive electricity market, it is expected that the wholesale electricity price and the energy component of retail electricity prices would normally converge; however, this is usually not the case even in most of the EU Member States. Wholesale electricity prices have been highly volatile for the last ten years, while the energy component of retail electricity prices shows much more stability and predictability.

4. The spot market electricity price reflects the hourly value of wholesale electricity at the power exchange in the day-ahead market.
5. A special form of the previous method is the spot market PV electricity price, which was established in order to make a true market assessment of the PV electricity at the power exchange.
6. The avoided costs method sets the value of excess energy equal to the incremental costs borne by the power companies to generate and distribute comparable electricity. This method compensates the excess energy for all avoided costs that the power system no longer has to incur as a result of lower consumption and demand. Avoided generation costs are driven by the variable costs of the marginal resource that is being replaced by the DG, which depend on that resource's fuel prices, variable operation and maintenance costs. Avoided network costs are the avoided capacity costs (if any) and avoided network losses. The avoided costs method may not be as easy to implement as other methods, given the complexity of parameters to be taken into account.
7. The value of solar tariff is a new approach which, in addition to avoided costs of grid electricity, also includes wider environmental, social and financial benefits of solar PV installation.
8. The excess energy in some countries has no value and any injections in the electricity network are not compensated at all.

Recommendation Set #4

Excess energy remuneration	Fair remuneration of excess energy should be ensured and the ''no compensation'' option should be excluded by the relevant legislation. Adequate remuneration is expected to promote consumers' market empowerment, aggregation and further integration into the balancing market.
Valuation method	Having regard to the current level of market development in EnC CPs, it is recommended to set the excess energy value at the level of the energy component of the retail electricity price, also taking into account incurred reasonable costs of energy transactions and distribution system operators' (DSOs) benefits related to network losses reduction. This method is proposed assuming that the energy component of the retail electricity price properly reflects the market value of electricity to the consumer. As a result, the excess energy unit price should equal the energy component of the retail electricity price increased by the network losses contribution unit price and decreased by the supplier's energy transaction unit price.
No double incentives for prosumers	Feed in tariff or feed in premium, as the administratively set unit price, which also includes a certain level of subsidy, should not be used to value excess energy fed into the grid by a prosumer.
Time of use price differentiation	Time of use (ToU) price differentiation should be applied for excess energy valuation provided that the supplier includes time of use of the retail price differentiation. ToU tariffs enhance demand side response, but also bring more proper market valuation of PV production during the daily periods of high prices.
Excess energy counterparty - Standard supply arrangement	During the initial phase, the supplier or other corporate body (e.g. system operator, market operator, specific support system operator, etc.) should be obligated to purchase the excess energy under predefined conditions. Once the electricity market reaches a sufficient degree of liberalization, for this category of prosumers it is possible to leave the excess energy purchase and valuation to market mechanisms.
Excess energy counterparty - Net billing scheme	If a net billing scheme is applied, the prosumer's supplier is by default in charge of purchasing the excess energy fed from households and small commercial prosumer installations.

7 GRID COSTS

In theory, self-consumption could reduce the need for grid extension on a local level. However, the consumption and generation profiles are generally not coinciding, or at least not every day or hour. Additionally, the distribution system usually faces peak demand in the evening hours when PV production is not available and does not have a positive impact on the distribution system dimensioning.

The issues of cross-subsidization among consumer categories and DSO cost recovery are inherent to self-consumption, irrespective of the deployment level. Cross-subsidization is of particular concern if volumetric grid tariffs are predominantly used for grid cost recovery. In these circumstances, prosumers contribute less to grid cost recovery, because the net amount of distributed electricity is reduced for the quantities of self-consumed electricity. Therefore, as a result of grid costs exemption, self-consumption shifts recovery of these costs to other consumers without an own DG system. When the net metering scheme is applied, this effect is even aggravated, due to the exemption from paying volumetric grid tariffs for total generated electricity.

Recommendation Set #5

General	The DSO must dimension grid capacity to deliver the requested demand at any time during the year as if there are no self-consumption installations. Having in mind that the DSO's fixed costs are mainly driven by system capacity, a reasonable assumption is that the increased level of self-consumption does not decrease fixed costs of grid operation.
DSO's cost recovery	Specific tariff rates for prosumers, as a separate subclass(es) of network users, are deemed to be a proper solution to mitigate DSO's risk related to cost recovery, raised due to decreased consumption.
Cost reflectiveness	From the network usage point of view, prosumers are expected to contribute to grid cost recovery in the same way as other non-producing consumers.
	To avoid cross-subsidization, design of grid tariffs should preserve the principle of cost reflectivity and prosumers should pay the appropriate share of grid costs as the other non-producing consumers of the same category. For that purpose, tariff design should be modified to introduce specific prosumer subclasses of network users corresponding to the non-producing consumers of the same categories.
Grid tariffs for prosumers	The prosumer should be charged for network use through capacity and volumetric tariffs, which are specifically designed for the prosumer subclass of network users. The capacity tariff's weight in total grid costs should be increased as they should reflect fixed network and system costs to deliver the requested capacity at the prosumer's connection point. On the other side, volumetric tariffs should be proportionally decreased to reflect variable network and system costs. The proposed principles of tariff design are envisaged to exempt prosumers only from payment of the variable network and system costs for the self-consumed electricity. Additional capacity requests at the metering point should be contracted and paid by the prosumer, following the principle of cost reflectivity.
Grid tariffs for prosumers with storage systems	To design grid tariffs for prosumers with integrated storage systems properly, demand analyses are needed to determine whether these prosumers have a different load profile and lower peak demand in comparison to the prosumers without storage system and other non-producing consumers of the same category. A reasonable assumption is that the prosumers with a storage system have lower peak demand and/or feed-in capacity as a result of enhanced demand side response.

8 VAT AND OTHER TAXES AND LEVIES

Usually, it is not a matter of energy policy solely to allow the netting schemes and subsequently to allow VAT charging on the net value of energy supplied to the customer from the grid. Considerations and impact assessments may weigh wider benefits from energy sustainability and affordability against the costs of lower state income from VAT in a longer-term perspective. Overall social benefits must not be underestimated either, as smart initiatives towards aggregation and flexibility can contribute to lower network costs, lower balancing costs and even create new added value in the system through aggregation and provision of balancing services.

The impact assessment of the self-consumption schemes on the public revenues should take into account different taxes: VAT on electricity consumption or similar consumption taxes, but also VAT on the CAPEX investment (non-taxable person's DG systems) and the OPEX costs, the corporate income tax for the installer company, OPEX related taxes, insurance taxes etc.

If the netting schemes are allowed, VAT on electricity consumption is charged and paid on the net difference between the delivered and injected energy during a certain billing period.

In the year the DG system is installed, the taxes collected will raise significantly, while later, during the lifetime of the DG plant, the taxes linked to electricity consumption will be reduced, particularly if the netting schemes are allowed.

Self-consumption has a positive initial impact on public tax revenues in the long-term perspective. In the long-term perspective, the net billing scheme in comparison to the net metering scheme alleviates negative effects on VAT cash flow for the tax authority through the postponement of ''VAT cash flow zero crossing'', since the excess energy value is lower than the retail electricity price and the tax basis is accordingly higher.

An electricity bill is usually used to collect a number of electricity and even non-electricity related taxes and levies, which are charged on a volumetric basis per kWh of the distributed energy. The taxes and levies are used as policy support charges, whereby the renewable support fee is the most frequently used add-on to the electricity price. Other policies financed by the levies on electricity consumption might be combined heat and power generation, conventional back-up capacity, energy efficiency schemes, vulnerable consumer protection, cross-regional DSOs compensations, etc. Higher taxes and levies accelerate grid parity for DG.

Taxes and levies to be charged to prosumers should be subject to a consistent, in-depth regulatory analysis, in order to determine whether the prosumers have to contribute to the specific policy support scheme and to what extent.

If the netting scheme, either net billing or net metering, is not allowed or applicable, the prosumer should pay for the electricity taken from the grid and at the same time charge its counterparty for electricity fed into the grid. However, non-taxable persons are not entitled to issue invoices and charge VAT for the electricity fed into the grid, thus preventing numerous households from making best use of their DG systems.

Recommendations Set #6

General	Individual households may be empowered to take a more active role and contribute to power system sustainability and other energy policy goals only if the netting scheme is allowed for their DG installations.
VAT	VAT legislation should not be rigid in order to prevent invoicing based on the net difference between energy delivery and injection, thus allowing small customers and the whole system to exploit energy, environmental and social benefits accrued from properly designed self-consumption schemes.
Other taxes and levies	Prosumers should not be entirely exempted from the payment of other taxes and levies for the self-consumed electricity. Prosumers' bill savings, which are the result of self-consumption, therefore include the energy component of the retail electricity price, volumetric grid tariff, VAT and other taxes and levies for which exemption on self-consumption is granted.

9 IMBALANCE SETTLEMENT

Balance responsibility is generally binding for all DGs with installed capacity above a prescribed threshold, as given by the Guidelines on State aid for environmental protection and energy 2014-2020[5], which are also applicable in EnC CPs[6].

For balancing purposes, households and small commercial consumers are still predominantly modelled by standardized load profiles. In a situation when a consumer becomes a prosumer, load profiles are fully altered, depending on the DG's size, generation profile and demand side management.

Recommendations Set #7

Balance responsibility	When the supplier or other energy purchasing body has balance responsibility and must take into account the changed load profile and injected energy, implicit balance responsibility of prosumers is to be established as well. As the number and capacity of prosumers increase, their influence on power system operation and balancing is proportionally growing.
Exemption criteria	Prosumers with DG installations whose installed capacity is below 500 kW should not be subject to standard balance responsibilities; these costs should be borne by the prosumer's supplier or other corporate body in charge of purchasing the excess energy.
Standardized profiles	To facilitate imbalance settlement, a set of standardized prosumer load profiles should be established to properly reflect DG production patterns (if feasible), consumers' load profiles, existence of storage facilities, etc.
Standard balance responsibility	Prosumers with DG installations whose installed capacity is above 500 kW should be subject to standard balance responsibilities and should be liable for imbalances regarding the excess energy, as any other DG installation of the same capacity.
Imbalance settlement	If the netting schemes are applied, energy or monetary credits should not interfere with the imbalance settlement. It should be performed within the billing period on the basis of physical energy flows in that period. Excess energy values should be adjusted for balancing service costs borne by the supplier.

10 GRID CONNECTION

The installed capacity of the individual DG installations for self-consumption purposes is generally very low when compared to DG installations not intended for self-consumption.

Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators[7], which is applicable in EnC CPs from 2018, represents the basic document that provides technical and regulatory requirements for DG units to be connected to the distribution network.

DG units having the installed capacity of 0,8 kW or more are classified as ''Type A'' DG units which must fulfil requirements related to frequency ranges and must have the rate of change of the frequency withstand capability. In addition, DG installations should also comply with relevant technical standards for electromagnetic compatibility (i.e. series IEC 61000-3-x).

Recommendations Set #8

[5] European Commission, Guidelines on State aid for environmental protection and energy 2014-2020, April 2014
[6] Energy Community Secretariat, Policy Guidelines on the Applicability of the Guidelines on State Aid for Environmental Protection and Energy 2014-2020, November 2015
[7] European Commission, Network code on requirements for grid connection of generators, 2016

Electricity metering	An electricity bi-directional meter at the connection point should register both the energy withdrawal and injection, while the metering interval should be aligned with the trading interval at the wholesale electricity market, as well as the Guidelines for Electricity Balancing[8], to facilitate self-consumption rate optimization, imbalance settlement, generation forecasting and excess energy valuation based on the wholesale electricity prices.
	An additional electricity meter should be installed to register the total electricity generated by the renewable installation, otherwise the state of progress in achieving renewable energy targets could only be estimated.
Single phase installations	Capacity limits for single phase installations should be used to avoid voltage and current imbalances in low voltage distribution networks.
Connection procedure and DSO authorization	A streamlined and simplified connection procedure should be established to shorten connection time and decrease administrative costs. Nevertheless, all technical and safety criteria must be fulfilled and DG installation and connection must be subject to DSO authorization.

[8] Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

12 ACRONYMS

Acronym	Meaning
CAPEX	Capital expenditure
CEER	Council of European Energy Regulators
DG	Distributed generation
DSO	Distribution system operator
IEC	International Electrotechnical Commission
LCOE	Levelized cost of electricity
OPEX	Operational expenditure
PV	Photovoltaic
VAT	Value added tax

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