REPORT ON PVP4GRID CONCEPTS AND BARRIERS

Belgium

D2.4

Public Deliverable

Author: eclareon GmbH

Berlin, July 2018

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 764786

REPORT ON PVP4GRID CONCEPTS AND BARRIERS

About PVProsumers4Grid

Europe´s electricity sector is in the midst of major transformation moving from public monopolies into competitive private companies in liberalized markets. The liberalization of the market is expected to deliver more competitive and therefore more efficient and cheaper energy. Due to its cost and growth perspective, photovoltaics (PV) will be a key driver of this development throughout Europe because PV has reached a level of competitiveness that allows moving to self-consumption schemes in many European countries and eventually to peer-to-peer selling of the self-produced energy.

Such a “prosumption” role empowers consumers to participate actively in the electricity market by producing energy themselves. Technical developments such as battery systems or smart meters, and advanced business models promoting self-consumption change the technical design of the electricity systems. The success of these developments depends, however, on the regulatory and administrative framework in terms of energy policy and regulation, grid financing, taxation and legal relationships amongst the involved entities and it requires innovative solutions coupled with suitable business and management models to achieve sustainable system integration.

PV-Prosumers4Grid (PVP4Grid) is an EU-funded project coordinated by BSW-Solar, involving 11 partners from various European countries[1] and runs from October 2017 until March 2020. The main objectives of PVP4Grid are: to increase the market share and market value of PV by enabling consumers to become PV prosumers in a system-friendly manner, as well as a better power system integration of PV with a focus on market integration. New management and business models to combine PV, storage, flexible demand and other technologies into a commercially viable product, will be assessed, improved, implemented and evaluated.

To achieve this, detailed guidelines for Prosumers and Distributed System Operators (DSOs), as well as policy recommendations for national and European policy makers on how to achieve the suitable regulatory framework for prosumption, will be developed. Additionally, an online tool to help prosumers to get an economic assessment of PV prosumer projects will be created, among other relevant outcomes.

Please visit www.pvp4grid.eu to learn more about the PVP4Grid project, including the outcomes, tools & events.

[1] See project partners and project outcomes on the website: www.pvp4grid.eu.

1 Introduction

1.1 Deliverable D2.4: Report on PVP4Grid Concepts

The present deliverable D2.4 comprises a description of regulatory and policy framework, identified barriers as well as current initiatives to overcome barriers in the eight target countries, categorised by the related prosumer concept. In particular, it is analysed technical, economic, legislative and regulatory barriers preventing the implementation of PVP4Grid concepts in the eight target countries. The following aspects are studied:

- Aspects related to the self-consumption of PV electricity. The right to self-consume, revenues from self-consumed PV behind the meter and fees to finance grid (Distribution and Transmission) costs are studied. The question relative to the financing of the grid is also considered.
- Aspects related to the PV electricity not used by the prosumer, i.e. excess electricity. The issue of revenues from excess electricity, maximum timeframe for credit compensation and geographical compensation are considered.
- Aspects linked to prosumers' behaviour patterns.

The above-referred aspects are studied based on a desktop research and interviews conducted with key stakeholders. Interviews should mirror the view of PVP4Grid concepts from different angles, e.g. view of prosumers, grid operators, solution providers and regulation authorities. The results of the desktop research and the interviews are summarized in the present "Report on PVP4Grid Concepts" (D2.4).

1.2 PV Prosumer Definition

A widespread and generally accepted definition of a prosumer is not yet established. Most definitions are focusing on private local self-consumption.

The neologism "prosumer" refers to an electricity consumer producing electricity to support his/her own consumption (and possibly for injection into the grid). The word is built based on the association of "producer" and "consumer".

The Renewable Energy Directive [MDI Directive] mentions the following definition:

"'renewable self-consumer' means an active customer or a group of customers acting together as defined in Directive [MDI Directive] who consume and may store and sell renewable electricity which is generated within their premises, including a multi-apartment block, residential area, a commercial, industrial or shared

services site or in the same closed distribution system, provided that, for non-household renewable self-consumers, those activities do not constitute their primary commercial or professional activity;"

The International Standard IEC 60050-617:2009/AMD2:2017, published by the International Electrotechnical Commission, introduces/defines the following terms:

- "'prosumer": network user that consumes and produces electrical energy;
- "self-producer": party generating electric energy essentially for its own use, but who can also sell the excess energy.

1.3 The Status of PV in Belgium

In the present Section 1.3 a classification of installed PV capacities is conducted. Doing so, in a first step, installed PV capacity in year 2017 is listed according to size classes ($KW_{p(eak)}$ ranges: <10 kW_p, 10-100 kW_p, 100-500 kW_p, >500 kW_p) in Belgium. The empirical data are collected either from national statistics, documents of responsible ministries or from the corresponding renewable associations. In addition, it is important to note that the size classes to a large extent coincide with the different system boundaries of possible PVP concepts, meaning that:

- size class <10 kW_p refers to group 1 (single direct use) in terms of system boundary of PV usage. In practice this category mainly addresses the private residential sector.
- size class 10-100 kW_p, refers to group 2 (local collective use of PV in one place, e.g. in one building). This category mainly addresses the multifamily-, commercial- and tertiary-building sector grouped together within a single system boundary.
- size class 100-500 kW_p, needs to be treated with caution. Depending on the customer group it can either still refer to group 2 (e.g. notably for tertiary/industrial buildings, commercial centers, hospital, schools, and so on) or already to group 3 (e.g. ground mounted PV systems up to 500 kW_p).
- size class >500 kW_p refers to group 3 (district power models) where besides smaller customers (commercial and tertiary) mainly industries and ground mounted solar PV systems are grouped together within a single system boundary.

In a second step, in this section also total PV generation and electricity demand per sector (residential, commercial, and industrial demand in percentage) is listed in Table 2 for year 2017. The knowledge of the different fractions of electricity demand per sector shall support the estimation of the PVP potential within the different system boundaries (i.e. group 1, 2, and 3).

Total installed PV (MW) 2017	3846
Size	**%**
< 10 kW	62.89%
< 100 kW	17.71% (> 10 kW et ≤ 250 kW)
< 500 kW	
> 500 kW	19.39% (> 250 kW)

Figure 1: Table Installed PV Capacities Belgium in 2017[2]

	2015	2016	2017
Total annual electricity demand (GWh)	83,140*	84,187***	81,200****
Share of residential sector (%)	22.7%*	22.6%[3]	Not yet available
Share of commercial/tertiary sector (%)	26.6%*	26.2%	Not yet available
Share of industrial sector (%)	45.6%*	45.6%	Not yet available
Total annual PV generation (GWh)	3,049**** (3.7%)	3, 047**** (3.6%)	3,200****

Figure 2: Table Electricity Demand and PV-Generation in Belgium

*Final ' observed ' electricity consumption by sector in Belgium in 2015 - FEBEG 2016 - MISSING 5,5 % (transport, agriculture, energy transformation)
** SOURCE: IEA PVPS 2015 - 2016 REPORT
*** ENTSO -E – National electrical consumption
**** APERe 2017 website: http://www.apere.org/fr/observatoire-photovoltaique

[2] Data provided by APERe. It is not possible to have a different split because the Belgian regulation follows these categories (≤ 10 kVA household installations, > 10 kVA et ≤ 250 kVA commercial, > 250 kVA industrial installations)
[3] FEBEG report 2017

2 PV Prosumer Concepts in Belgium

2.1 Introduction to PV Prosumer Concepts

In this section, existing PVP concepts, as defined for the purpose of PVPV4GRID in this document, are listed and described.

Recent, present and near future regulations have been analysed with regards the prosumer concepts, based on the methodology defined in section 1, thus, the PVP concepts are grouped with regards to their system boundaries. Table 3 provides an overview of all considered concepts.

Table 3. Overview of considered PVP concepts

Group 1	**Single direct use**	• Private local self-consumption • E-mobility as DSM option • Load management applications • Sector coupling
Group 2	**Local collective use of PV**	• Shared use of PV in larger buildings and facilities.
Group 3	**District power models**	• Providing local grid services through active PV management • Shared use of PV in industrial parks, University facilities, etc.

Figure 3: Table Overview of considered PVP concepts

The starting source of information for the proposed assessment has its origin, in many cases, in the National Associations and countries representatives in PVP4GRID project, whose information has been completed with data extracted from previous EU-funded projects and other documents, e.g. Study on "*Residential Prosumers in the European Energy*" - *GfK Belgium consortium, May 2017*, which gathers the drivers, regulatory aspects and economic performance in the area of small scale self-generation for residential consumers over the life-cycle of investment in EU countries.

2.2 PV Prosumer Concept 1

2.2.1 Description of the PVP Concept

2.2.1.a. Key partners

There are four relevant parties for concept 1: prosumers, energy providers, grid operators and the regulatory authorities. First, prosumers are individuals producing their own energy with a PV installation. All prosumers with a PV installation must register their installation with the grid operator. Each grid operator sets its own requirements concerning necessary documentation.

Second, there is one federal regulator: The Commission for Electricity and Gas Regulation (CREG). The latter supervises the transparency and competitiveness on the energy market, ensures that the market operates in line with public interest and advises the federal government (CREG, n.d.a). Since the legal and policy framework on renewable energy is implemented at the regional, rather than at the federal level, the CREG is losing its importance in this field. Furthermore, there are three regional regulators: VREG in Flanders, CWaPE in Wallonia and Brugel in Brussels. These regulators are responsible for the organisation and functioning of the regional electricity markets. They advise the regional governments and control the application of decrees and decisions. The regional energy regulators also approve the grid tariffs and organise a mediation service that helps consumers in case of problems with their energy provider or grid operator (CREG, n.d.b.a).

Third, the energy providers deliver energy to the consumers. They can either produce energy themselves or buy it from a third party. Energy providers must dispose of a supply permit. Engie (formerly ELECTRABEL) has the largest share on the electricity market in Flanders, Wallonia and Brussels-Capital Region. Other important players are: EDF Luminus, Eni and Lampiris.

Fourth, the grid operators are an important actor. Elia is the transmission system operator for the entire country; it also operates some medium voltage parts of the grid. The distribution grid operators are regulated at a regional level. The different distribution grid operators are each responsible for a specific geographical zone. Accordingly, consumers and producers of (renewable) energy must cooperate with the operator active in their region.

The following distribution grid operators are active in the three Belgian regions:

- Flanders: EANDIS and INFRAX (VREG, n.d.a);
- Brussels-Capital Region: Sibelga (Brugel, n.d.a);
- Wallonia: ORES, RESA, AIEG, AIESH, Régie de Wavre (CWaPE, n.d.a).

The following figure gives a schematic overview of the relations of the different actors on the Belgian energy market.

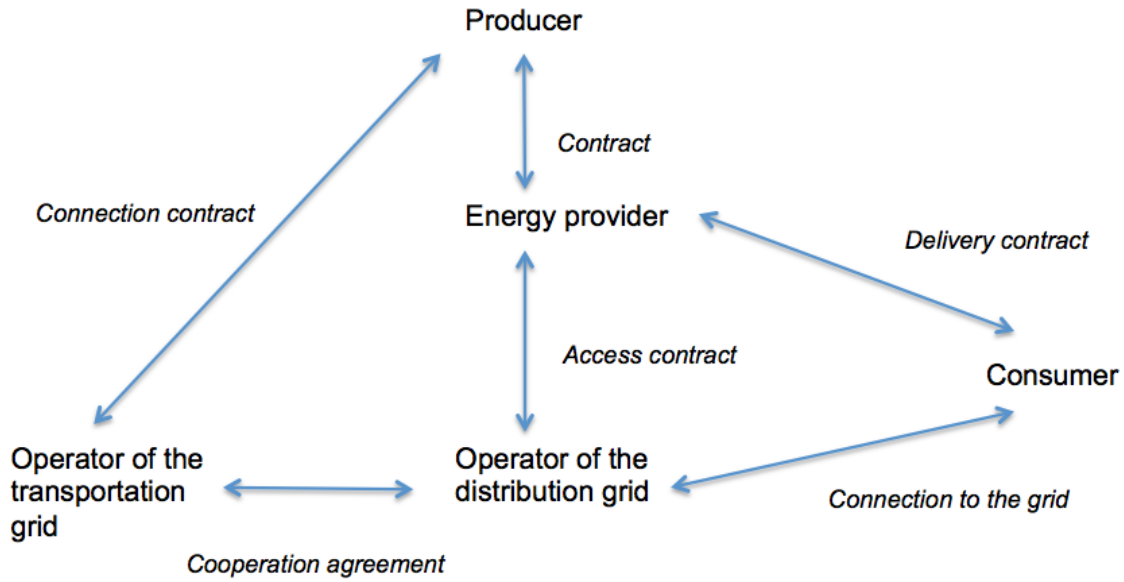

Figure 4: Figure Overview of the relations of the different actors on the Belgian energy market (C. Lermyte, 2012)

2.2.1.b. Organisational Aspects

In all three regions, residential prosumers of renewable energy are entitled to benefit from a compensation mechanism for the difference between the amount of electricity taken from the grid and the amount of electricity fed into the grid (net-metering). The set-off between energy consumed from and energy injected into the grid takes place at a yearly basis. Prosumers are using a meter that goes backward when PV produces more than the consumption of electricity. In case the annual net consumption goes below zero kWh, the surplus is not paid.

Furthermore, in the whole country, prosumers with an installation >10kW must sign a contract with the entity responsible for the balancing of the grid prior to producing energy and delivering it to the grid. They don't benefit from the net-metering system but use self-consumption.

Flanders

Prosumers with a PV installation below 10 kW have to pay an annual grid fee (see below). The Flemish government established a capacity based tariff for prosumers, the so-called “prosumer tariff”. The rationale behind this fee is that, according to the Flemish government, prosumers make use of the grid not only for consumption, but also for injecting energy. This argument is, however, arguable. According to the PV stakeholders, the reason behind the prosumer tariff is that the electricity bills were going down to zero, as a result of net-metering. Accordingly, energy providers and DSOs lost revenues, which they are compensated for in the form of the prosumer tariff, without taking into account the benefits for the grid that prosumers are generating. It is unclear whether the shift to self-consumption that could occur in the coming months or years in Flanders will see that prosumer tariff being abandoned. Every prosumer with PV panels equal to or smaller than 10 kW and with an inverse meter must pay the prosumer tariff. The height of the tariff differs per grid area and depends on the power of their solar inverter. The more power, the higher the tariff is. To calculate how much a prosumer must pay, one multiplies the AC capacity of the solar inverter (kW-capacity) with the tariff in the region where the prosumer is living (Neubourg, 2016).

Prosumers with a PV installation with a maximum AC capacity exceeding 10 kW are using PV under pure self-consumption, with green certificates. They must apply for separate connection to the grid and a separate meter with the grid operator for the purchase of electricity on the one hand and injection of electricity on the grid on the other. This must be done prior to the installation of the PV plant (ODE, n.d.a). In addition, these prosumers are bound to sign a contract with the entity responsible for the balanced use of the grid: the access responsible party. This party collects all data on the production and consumption of a client to estimate the demand and supply of energy to the electricity grid. These estimates are communicated with Elia in order to keep informed the grid operator on the demand of the electricity grid (VREG, n.d.b). Only prosumers with an installation exceeding the 10 kW capacity, are eligible for green electricity certificates. Requirements for these certificates are as follows:

- The roof or attic floor must be adequately insulated, meaning the heat resistance (R-value) of the whole roof and/or attic floor must at least be $3m^2K/W$.
- *After* the PV system has been installed and *before* it can be used, the installation must be inspected to ensure its safety (VREG, n.d.c; Vlaanderen, n.d.a).

Wallonia

PV installations below 10 kW, installed on or after 1 March 2014 are eligible for the Qualiwatt subsidy (SPW Énergie, n.d.). This will end on July 1st 2018. A prosumer tariff is under discussion for years but has not been applied yet.

PV installations with a capacity equal to or larger than 10 kW are eligible for green certificates (SPW Énergie SPW, n.d.). Such installation must ask a grid study before connecting the installation. The rest is similar to Flanders.

Brussels Capital Region

In Brussels Capital Region, all PV installations are eligible for green certificates (RES Legal, 2017). Accordingly, all PV installations must have a Green Certificates Meter, which measures the amount of green electricity produced by the installation (in kWh).

2.2.1.c. Technical Aspects

Belgian prosumers need an additional electricity meter. The requirements for this meter differ between the regions.

In Flanders, owners of PV installations smaller or equal to 10 kWp are obliged to install a production meter allowing to subtract the energy injected in the grid from the energy consumed from the grid. These prosumers can also install a bi-directional meter that counts separately the amount of energy injected and the amount of energy taken from the grid. Prosumers with an installation larger than 10 kWp cannot benefit from a meter allowing for the subtraction of energy injected from the amount of energy taken from the grid. Instead they must ask from the grid operator a separate access point and a separate measurement for the purchase and injection of energy from/to the grid

In Wallonia PV plants larger than 10 kWp need to install a GPRS monitoring device in order to receive green certificates.

Finally, in Brussels, installations have a meter monitoring the production of the PV installation.

2.2.1.d. Impacts and Potential

Prosumers in Belgium can connect their PV system to the electricity grid, so they can deliver excess energy to the energy provider. However, as the Belgian laws are lacking many details, many prosumers must sign contracts with the DSOs before they can inject energy into the grid. On days with little sun, when prosumers do not produce enough energy to meet their demand, they can consume electricity from the grid.

In Belgium, prosumers must notify their grid operator when they install a PV installation, so grid operators have an overview and monitor the total installed capacity in their region (Vlaanderen, n.d.b, CWaPE, n.d.b). For installations below 10 kVa, the prosumer must notify the DSO. Moreover, the responsible DSO must realise a study before the prosumer is granted to right to connect his installation to the grod.

In a study conducted by BFP-FPB, ICEDD and VITO in 2013 (Devogelaer et al., 2013), it was shown that solar technologies are likely to play a major role in achieving the 100% renewable energy target in 2050. The potential roof surface that can be used to install PV panels equals approximately 250 km^2 in the whole country. In 2017, PV installations with a total capacity of 264 MWp were installed in Belgium. This was an increase of 50% compared to the previous year. Small installations (<10kWp) represented 86% of this new power (APERe, 2018).

In 2017, the transmission grid operator Elia conducted a study in which they assessed three different scenarios: the “base case” scenario, the “decentral scenario” and the “large scale RES” scenario. They found that in the decentral scenario the energy transition is on track and led by prosumers. In this scenario, the cost of PV and batteries is dropping rapidly. Prosumers also switch to electric vehicles that can be charged at home, as there is a surplus of renewable energy produced. The decentral scenario assumes that installed photovoltaic capacity will increase to 11.6 GW in 2030 and 18 GW in 2040. Moreover, the gain in consumer surplus in the decentral scenario is expected to be €1020 million, compared to the base case scenario in the same year). (Elia, 2017).

2.2.2 Relevant Regulatory Framework

The three Belgian regions each have their own regulations, policies and support schemes for prosumers of solar energy. The main support schemes in Belgium are net-metering schemes for household installations and self-consumption for industrial and commercial installations.

Industrial and commercial PV prosumers are allowed to self-consume. These prosumers can also attract revenues by selling the excess electricity to energy suppliers through negotiated long-term power purchase agreements.

In addition, PV installations > 10 kWp in Flanders and Wallonia and all PV installations in Brussels are eligible for green certificates (but the level is different by region and the certificates are not exchangeable between regions). This section will discuss the relevant regulatory framework with regards to green electricity certificates, subsidies and net-metering for each of the three regions.

2.2.2.a. Quota system and green certificates

Under a quota system, a defined number of green certificates is granted for each MWh produced by an installation that uses renewable energy sources. The producer can then sell these certificates to an electricity supplier, who has the obligation to purchase every year a certain quota of green certificates (RES Legal, 2017).

In Flanders, the Flemish Regulator of the Electricity and Gas Market (VREG) issues green certificates for some installations. The amount of electricity to be produced for one certificate is based on a PV-specific banding factor. Thus, one certificate is not necessarily equal to 1 MWh. The grid operators are obliged to meet their quota obligations every year (RES Legal, 2017). Since 2015, newly installed PV installations with a capacity smaller than 10 kW are not eligible for green certificates any more. PV plants that were installed before June 2015 are, however, still eligible for these certificates, the support of which depends on the start date of the installation (ODE, n.d.b).

In Wallonia, the total amount of green certificates available per technology is determined on a yearly basis by the Walloon Government, according to a trajectory aiming at reaching a total electricity production from renewable energies of 8,000 GWh by 2020. The quota of renewable energies to be reached in 2018 is 35.65%. This percentage is to be increased every year until 2024. If utilities do not fulfil the annual quota, they shall pay a fine of €100 per missing certificate (RES Legal, 2017). At the time of writing this report, only PV installations with a capacity equal to or larger than 10 kW are eligible for green certificates for a period of 10 years. In the past green certificates were granted for small installations and prosumers were entitled to receive these certificates for a period of 15 years (see section 2.2.4 for further details on this reduction). Moreover, household installations that were registered prior to 2013 are also eligible to green certificates for a period of 5 years (RES Legal, 2017).

In Brussels Capital Region, every producer of green electricity is eligible for green energy certificates. Brugel, the regulator for the gas and electricity market in Brussels, must first certify the installation before prosumers can receive these certificates. The certificates support the production of renewable energy in Brussels and in that way help to meet renewable energy targets set by the regional government. The basic grant rate for green certificates in Brussels is 1.81 green certificate per MWh. PV installations up to 5kWp and commissioned after 1 February 2016 are entitled to receive 3 green certificates per MWh produced (Brussels Environment, n.d.). The certificates are awarded during a period of ten years for each inspected PV installation (Decree of 17 December 2015).

2.2.2.b. Subsidies

The regional governments in Flanders and Brussels do not have any subsidy schemes for prosumers within concept 1, but some municipalities do provide financial support to individuals who want to install PV panels. The Walloon Government currently had a subsidy scheme in place: the Qualiwatt subsidy which ended in July 2018. The precedent of this subsidy existed next to green certificates and tax breaks for small prosumers, but all were abolished a couple of years ago when the prices of PV dropped significantly. The Qualitwatt subsidy was then introduced, in order to avoid oversubsidising PV installations which price was

going down fast. The subsidy is available for PV installation equal to or smaller than 10 kW that were installed on or after 1 March 2014. The distribution system operators allocate the subsidy for a period of five years. The amount of subsidy allocated depends on the amount of installed capacity (Décret du 23 janvier 2014). The Qualiwatt subsidy has ended in June 2018 (SPW Énergie, 2017) and no new subsidy schemes are scheduled,

2.2.2.c. Net-metering

PV systems below 10 kWp in Flanders and Wallonia and below 5 kWp in the Brussels region are eligible for net-metering. Prosumers feed the excess electricity into the grid when they have an oversupply. For every unit of electricity injected they can consume one unite of electricity from the grid, paying only the net difference. The time during which the electricity in access can be consumed is called “netting precision” and varies from one hour to one year according to the different regulations.

In Flanders, all PV installations with a capacity equal to or smaller than 10 kW are eligible for the net-metering scheme. Prosumers that produce excess electricity can inject it into the grid and deduct this from the electricity consumed from the grid. The Flemish Minister of Budget, Finance and Energy has proposed an amendment to the Energy Decree stating the obligation to purchase electricity injected into the grid and produced from PV installations with a capacity of up to 10 kVA and installed after 1 January 2021. The Flemish Government has still to decide who will be obliged to buy this electricity and for which prices (Draft decree of modification of the Energy Decree of 8 May 2009). There are discussions in Flanders to limit the time period during which financial support is given to PV installations to 15 years. In addition, there is an ongoing debate about the prosumer tariff, which prosumers believe is a barrier to the development of small PV installations (see 2.2.1.b)

In Wallonia, prosumers producing electricity through a PV installation with a capacity of ≤ 10 kVA and connected to the distribution grid, are eligible for net-metering. In order to receive this benefit, their installation must be certified and registered as a green electricity production plant by the Commission wallonne pour l’Energie (CWaPE) (Arrêté du 3 Mars 2011). The prosumer is entitled to compensation only during the technical life span of the PV installation (Arrêté du mars 2006).

2.2.3 Economics of the PVP Concepts

All over Belgium, self-consumption for household PV installations is incentivised through net-metering schemes, allowing prosumers to compensate production and consumption within a one-year time framework. Larger installations profit from self-consumption, rather than buying electricity from the grid. In

addition, they are allowed to sell excess electricity to energy suppliers through long-term power purchase agreements.

PV installations can reduce the electricity bill of consumers, especially since prices of PV modules have dropped substantially over the past years, from €6000 in 2010 to €1500 in 2017, all costs included. Consumers' organisation Test-Achats/Test-Aankoop organised a group purchase of PV systems in 2017. The price for a basic installation ranged between €1100 and €1500 per kWp, inclusive 6% VAT. The returns differ in the three different regions. In Flanders, the payback time varies between 6 to 14 years. In Wallonia the payback time varies between 7 and 15 years. In Wallonia the revenue source comes from the Qualiwatt subsidy, which will end in June 2018. Finally, in Brussels the payback period is quite short due to the green electricity certificates: 7 years (Test-Aankoop, 2018).

There are also costs associated with PV panels In Flanders prosumers pay the so-called prosumer tariff to the DSOs (see section 2.2.1.b). These tariffs range between €87.14 and €121.46 in 2018. The individual using the energy at the address where the installation is located pays the tariff. This is not necessarily the owner of the PV installation (Vlaanderen, n.d.c). If the prosumer decides to install an additional bidirectional meter, he is not eligible for net metering any more. The costs of instalment differ, but are around €300 excluding VAT and €400 excluding VAT in case the current meter is replaced (Futech, 2016; VREG, 2015).

In Wallonia, the costs associated with the changing the metering, including the installation of a new meter, are borne by the distribution operator. However, the cost for the instalment of an additional meter shall be borne by the prosumer if they request this meter in order to value its excess electricity production. (Arrêté du 30 novembre 2006).

From 1 January 2020 onwards, a prosumer tariff will be implemented for all prosumers of renewable energy, including PV electricity. Each prosumer will have the choice between payment of a fixed price based on the capacity of their installation or the instalment of bidirectional metre, which will measure the quantity of electricity taken from the grid. The tariff will be based on this consumption (Portail de la Wallonie, 2017).

2.2.4 Barriers for implementation

In Belgium, there are a number of barriers for single direct use in the different regions.

In Flanders the prosumer tariff for installations up to 10 kW imposes additional costs to prosumers under the net metering scheme (see section 2.2.1.b). All prosumers should pay this tariff to their DSOs, to compensate for the losses DSOs and energy providers faced after the net-metering scheme was

introduced. However, the prosumer tariff is a significant barrier to the development of PV in Flanders. For this reason, the government would like to remove the tariff by changing the net-metering scheme to a self-consumption scheme for small-size installations. This new regulatory requires has not been legally approved yet. Consequently, there is a lot of regulatory uncertainty in Flanders, because (potential) prosumers do not know what will happen to the prosumer tariff and when these changes would take place.

In Wallonia, there are plans to implement grid fees. It is still discussed whether these grid fees will only apply to newly constructed PV installations or also to installations that were installed under the old net-metering scheme. As it is not clear when and how fees will be implemented, actors in the PV sector are currently uncertain about the consequences for their investments in PV. Moreover, the reduction of the payment of green certificates from 15 years to 10 years in Wallonia has generated regulatory uncertainties. The Walloon government decided on this reduction quite suddenly, which caused a lot of protests and uncertainty amongst actors in the PV sector. As a result, a powerful PV owners association (Touche Pas à Mes Certificats Verts) was created, which has currently almost 20000 members. In general, the PV sector in Wallonia is doubtful about more investments in PV, because there is large uncertainty about the government's future actions.

In Belgium, no support schemes like Feed-in-Tariffs or Feed-in-Premiums for large prosumers who intend to sell their excess energy are in place. Consequently, there is no obligation to buy electricity from large installations in the commercial and industrial sector. Prosumers in these sectors should thus find an energy purchaser autonomously. Furthermore, in Belgium it is generally complex to identify the key stakeholder in the PV sector and the relevant regulations in place.

2.2.5 Good-practice Examples

Within Belgium, Flanders is performing exceptionally well: 73% of the installed PV capacity in Belgium is located in that region (APERe, 2018). Flanders has 221 Wp per inhabitant, which equals one PV panel per capita (ODE, 2018). Most of the PV installations in Flanders belong to individuals (Huart and Neubourg, 2017).

2.3 PV Prosumer Concept 2-3

2.3.1 Description of the PVP Concept

Collective self-consumption (concept 2) is not yet implemented in Belgium due to the lack of regulatory framework. Apart from a few exceptions to the rule, collective self-consumption is still not possible. In an apartment complex for instance, solar panels can be installed on the shared roof and used for the shared facilities (e.g. elevator) in the building. However, such a construction falls within concept 1, as there would be solely one legal entity responsible for the panels.

In the case of District Power Models (concept 3), besides one initiative in an industrial zone in Wallonia (Becquerel Institute, 2018), this model does not exist in Belgium.

As with single direct use, the relevant key partners in concept 2 and 3 would be: the prosumer, the energy provider and the grid operator.

2.3.2 Barriers for implementation

The barrier for local collective use and district power models is a legal one. The necessary legal framework for these concepts simply lacks in Belgium.

2.3.3 Good-practice Examples

In Brussels, the first project with a PV installation shared by multiple inhabitants of an apartment complex was realised in 2009. In total 24 co-owners living in 12 apartments participated. They installed 23 solar panels with a total capacity of 4.945 kWp. 4.200 kWh is produced annually, which is 10% of the total energy usage. This project, however, is the exception to the rule and rather unique in Belgium (Energuide, n.d.)

3 Table of Figures

4 List of Acronyms

AC	Alternating Current
CREG	Commissie voor de Regulering van de Elektriciteit en het Gas / Commission de Régulation de l'Électricité et du Gaz (Commission for Electricity and Gas Regulation)
CWaPE	Commission wallonne pour l'Energie (Walloon Commission for Energy)
DSO	Distribution System Operator
ODE	Organisatie voor Duurzame Energie (Organisation for Renewable Energy)
PV	Photovoltaic
VREG	Vlaamse Regulator van de Elektriciteits- en Gasmarkt (Flemish Regulator of the Electricity and Gas Market)

5 Bibliography

APEREe (5 February 2018). Le photovoltaïque en 2017: 264 MWc installés, relance confirmée. http://lsjo.r.ca.d.sendibm2.com/8q9wm4irdnf.html (accessed on 22 May 2018)..

Arrêté du 30 novembre 2006 du Gouvernement wallon relatif à la promotion de l'électricité produite au moyen de sources d'énergie renouvelables ou de cogénération (Decree 30 November 2006 of the Walloon Government on Support for Renewable Energy and Combined Heat and Power Generation) (entered into force 1 January 2007). https://wallex.wallonie.be/index.php?doc=8946&rev=8067-21034 (accessed on 9 April 2018).

Arrêté du 3 mars 2011 du Gouvernement wallon approuvant le règlement technique pour la gestion des réseaux de distribution d'électricité en Région wallonne et l'accès à ceux-ci – Arrêté du 3 mars 2011 (Decree of 3 March 2011 of the Walloon Government approving the grid code for the distribution grids in the Walloon region) (entered into force 21 May 2011) https://wallex.wallonie.be/index.php?doc=19977 (accessed on 20 March 2018).

Becquerel Institute (2018). Personal communications.

Brussels Environment (n.d). Groenestroomcertificaten. http://www.leefmilieu.brussels/themas/energie/groene-energie/groenestroomcertificaten (
accessed on 17 March 2018).

CREG (n.d.a). Wie zijn we en wat doen we? http://www.creg.be/nl/over-de-creg/wie-zijn-we-en-wat-doen-we (accessed on 29 March 2018).

—- (n.d.b). Wie doet wat op de energiemarkt? http://www.creg.be/nl/consumenten/energiemarkt/wie-doet-wat-op-de-energiemarkt (accessed on 29 March 2018).

CWaPE (n.d.a). Liste des GRD désignés en Région wallonne. https://www.cwape.be/?dir=4.1.03 (accessed on 29 March 2018).

—- (n.d.b). Procédures à suivre. https://www.cwape.be/?dir=6.1.01 (accessed 13 April 2018).

Decree of 17 December 2015 of the Government of the Brussels Capital Region concering the promotion of green electricity (17 december 2015 - Besluit van de Brussels Hoofdstedelijke Regering betreffende de promotie van groene elektriciteit / 17 décembre 2015 - Arrêté du Gouvernement de la Région de Bruxelles-Capitale relatif à la

promotion de l'électricité verte) (entered into force 1 February 2016). http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=nl&la=N&cn=2015121728&table_name=wet (accessed on 17 March 2018).

Décret du 23 janvier 2014 modifiant le décret du 12 avril 2001 relatif à l'organisation du marché régional de l'électricité (Decree of 23 January 2014 modifying the decree of 12 April 2001 concerning the organisation of the regional electricity market) (entered into force 1 March 2014). https://wallex.wallonie.be/index.php?doc=27177 (accessed on 20 March 2018).

Draft of decree of modification of the Energy Decree of 8 May 2009, concerning the deployment of digital meters and modification of article 7.1.1, 7.1.2, 7.1.5 and 13.2.1 of the same decree" (Ontwerp van decreet tot wijziging van het Energiedecreet van 8 mei 2009, wat betreft de uitrol van digitale meters and tot wijziging van artikel 7.1.1, 7.1.2, 7.1.5 en 13.2.1 van hetzelfde decreet). https://www.vlaanderen.be/nl/nbwa-news-message-document/document/090135578021f92d (accessed 10 April 2016).

Devogelaer, D., Duerinck, J., Gusbin, D., Marenne, Y., Nijs, W., Orsini M. and Pairon M. (2013). "Towards 100% renewable energy in Belgium by 2015." Online: https://www.icedd.be/I7/mediatheque/energie/renouvelable/130419_Backcasting_FinalReport.pdf (accessed 17 March 2018).

Elia (2017). Electricity Scenarios for Belgium towards 2050: Elia's quantified study on the energy transition in 2030 and 2040.

Energuide (n.d.). Can I place solar panels on the roof of a co-owned property? https://www.energuide.be/en/questions-answers/can-i-place-solar-panels-on-the-roof-of-a-co-owned-property/1217/ (accessed on 22 May 2018).

Futech (2016). Bidirectionele meter maakt thuisbatterij extra interessant in Brussel. https://www.futech.be/nl/bidirectionele-meter-maakt-thuisbatterij-extra-interessant-brussel/ (accessed on 4 April 2018).

Huart, M. and Neubourg, G. (14 February 2017). Le photovoltaïque en 2016 : un marché en croissance dans les trois Régions. *Renouvelle.* http://www.renouvelle.be/fr/statistiques/le-photovoltaique-en-2016-un-marche-en-croissance-dans-les-trois-regions (accessed on 22 May 2018).

Lermyte, C. (2012). De bescherming van de consument bij de verwerving van elektrciteit. *Masterproef van de opleiding "Master in de rechten".* Online: https://lib.ugent.be/fulltxt/RUG01/001/891/919/RUG01-001891919_2012_0001_AC.pdf (accessed on 29 March 2018).

Neubourg, G. (APERe) (2016). National Survey Report of PV Power Applications in Belgium: 2016).

ODE (n.d.a). Regelgeving. https://www.ode.be/zonnestroom/regelgeving (accessed on 7 March 2018).

—- (n.d.b). Steunmaatregelen. https://www.ode.be/zonnestroom/praktische-gids/steunmaatregelen (accessed on 17 March 2018).

—- (22 May 2018). Het geïnstalleerde PV-vermogen in Vlaanderen, Wallonië en Brussel. https://www.ode.be/ode/publicaties/nieuwsbrief/11-zonnestroom/774-het-geinstalleerd-pv-vermogen-in-vlaanderen-wallonie-brussel-en-europa (accessed on 30 March 2018).

Portail de la Wallonie (17 July 2017). Nouvelle méthodologie tarifaire gaz/électricité. http://www.wallonie.be/fr/actualites/nouvelle-methodologie-tarifaire-gazelectricite (accessed on 8 May 2018).

RES Legal (2017). Belgium. http://www.res-legal.eu/search-by-country/belgium/ (accessed on 27 June 2018).

SPW Énergie (n.d). Tout savoir sur la prime QUALIWATT. https://energie.wallonie.be/fr/installations-photovoltaiques-qualiwatt.html?IDC=8797 (accessed on 9 April 2018).

—- (21 December 2017). Fin de la prime Qualiwatt. https://energie.wallonie.be/fr/21-12-2017-fin-de-la prime-qualiwatt.html?IDC=8187&IDD=126999 (accessed on 22 May 2018).

Test-Achats/Test-Aankoop (12 February 2018). Zonneprijzen: alles wat je moet weten - Prijzen en financieel rendement. https://www.test-aankoop.be/woning-energie/hernieuwbare-energie/dossier/zonnepanelen-nog-interessant/prijzen-en-financieel-rendement (accessed on 30 March 2018).

Vlaanderen (n.d.a). Groenestroomcertificaten voor zonnepanelen. https://www.vlaanderen.be/nl/bouwen-wonen-en-energie/elektriciteit-aardgas-en-verwarming/groenestroomcertificaten-voor-zonnepanelen (accessed on 7 March 2018).

—- (n.d.b). Zonnepanelen aanmelden bij de netbeheerder. https://www.vlaanderen.be/nl/bouwen-wonen-en-energie/elektriciteit-aardgas-en-verwarming/zonnepanelen-aanmelden-bij-de-netbeheerder (accessed 13 April 2018).

—- (n.d.c). Prosumententarief voor eigenaars van zonnepanelen, windmolens en WKK-installaties (kleine installaties met terugdraaiende teller). https://www.vlaanderen.be/nl/bouwen-wonen-en-energie/elektriciteit-aardgas-en-verwarming/prosumententarief-voor-eigenaars-van-zonnepanelen-windmolens-en-wkk-installaties-kleine-installaties (accessed on 16 March 2018).

VREG (n.d.a). Overzicht netbeheerders. https://www.vreg.be/nl/overzicht-netbeheerders (accessed on 29 March 2018).

—- (n.d.b). Energie in evenwicht – evenwichtsverantwoordelijke en bevrachter. http://www.vreg.be/nl/wat-met-de-stroom-die-u-produceert (accessed on 6 March 2018).

—- (n.d.c). Vergoeding overtollige elektriciteit? http://www.vreg.be/nl/vergoeding-overtollige-elektriciteit (accessed on 6 March).

—- (2015). Veelgestelde vragen prosumententarief. http://www.vreg.be/sites/default/files/formulieren/veelgestelde_vragen_prosumententarief.pdf (accessed on 4 April 2018).


PVP
4Grid