Regulatory and Financial Framework for a Blockchain P2P Solution on the Walloon Energy Market

TABLE OF CONTENTS

LIST OF DIAGRAMS

LIST OF TABLES

List of abbreviations

CSC	Collective self-consumption
TDA	Territorial Development Agency
EC	Energy Community
REC	Renewable Energy Community
CEC	Citizens Energy Community
GC	Green Certificates
EMS	Energy Management System
DNO	Distribution Network Operator
TNO	Transport Network Operator
WG	Wallon Government
ESO	Energy Sharing Operations (ES: Energy Sharing)
PSO	Public Service Obligation
P2P	Peer-to-peer exchanges
EAP	Economic Activity Parc
PCN	Professional Closed Network
PN	Private Network
WR	Walloon Region
HV	High Voltage
LV	Low Voltage
CWaPE	Walloon Commission for Energy (Walloon Regulator)
CREG	Commission for Electricity and Gas Regulation (federal)
SO	Service Obligation
GO	Guarantee of Origin

Executive Summary

Energy sharing could be an opportunity for players in the construction and real estate sector. It can increase the range of services offered by these actors and, in a situation of high price increases, lower the energy bill.

The realization of this potential will depend on the choices made by the initiators of energy sharing: which mode of sharing? which configuration/organization? which energy source? which type of participant? which exchange price? ....

These choices will be strongly constrained by legislation. Energy is subject to numerous regulations which strongly constrain the possibilities of alternative modes of energy exchange. By way of illustration, there is a strong desire in our countries to share distribution and transport costs fairly among all network users. The introduction of a prosumer tariff and the planned end of the annual compensation system in Wallonia are part of this fair sharing objective. Except in very specific cases (closed professional network, private network), future energy sharing models will integrate this dimension.

Thinking about the possibility of multiplying the number of micro-grids disconnected from the network is illusory at this stage .

As the legislation governing the new energy sharing methods is still being drawn up by the Walloon Region, it is currently very complicated to establish a very clear business model. The experience of sharing projects in Wallonia informs us that, in any case, profitability will be difficult to achieve. In order to industrialize management and thus improve profitability, the initiators of sharing have an interest in turning to partners capable of accompanying them along the entire value chain via their services and products.

Indeed, although the concept of energy sharing is relatively simple to understand, its implementation relies on a set of IT tools designed to hide the complexity of sharing operations from managers and participants: billing, exchanges with the distribution network operator, dispatch optimization, flexibility activation, management of surplus production, information portal....

One of the objectives of the accompanying mission was to analyze the possibility of using blockchain technology for energy sharing. Given the regulated nature of the sector, its contribution should be concentrated into related activities: certification of electricity origin, consumption data and production in real or near-real time.

Introduction

The electricity sector has undergone major upheavals over the last few decades, whereas for most of the 20th century (and certainly since the Second World War) little has changed in its organization.

The first electricity networks were created on the initiative of individuals/companies/local administrations. These first local networks were vertically integrated: production, distribution and sales were carried out by a single player.

The growth in the number of networks and technological developments bringing about an increasingly intense capitalization of the sector led to a concentration movement in generation to meet capital needs and in distribution and transmission to ensure network coherence and interconnection.

This model of the electricity network persisted until the early 2000s. Regulatory and technological developments have radically changed the structure of the sector.

At the regulatory level, the sector has been liberalized with the introduction of competition in the production and sale of electricity.

From a technological point of view, the fall in the production cost of renewable energy sources and increasing digitalization have made alternative models for the distribution and sale of electricity possible.

Unthinkable just a few years ago, the sharing of energy between individuals and professionals is now a real possibility. It is within this framework of energy sharing models that the European Blockchain For Prosumers project, for which Cap Construction is the Walloon referent, fits in.

The rest of the document is structured as follows.

Chapter 1 presents the alternative models of energy distribution and sale currently (or soon to be) authorized in the Walloon Region: peer-to-peer exchanges, private network, direct line, energy community,.... A few configurations of energy sharing operations (ESO) will be presented and evaluated according to their relevance/feasibility.

Chapter 2 will specify the regulatory framework applying to ESO. In particular, the Walloon decree of May 2019 (known as the Crucke decree, which is still in force) and the draft decrees will be detailed. The tariff structures and support mechanisms for prosumers in Wallonia will also be presented.

Chapter 3 will make an inventory of existing and past ESO projects in the Walloon region. These different projects will be presented from the following angles

- Year

- Number of participants

- B2B - B2C

- Tariff reduction granted

- Use of blockchain

- Balance sheet: self-consumption rate, coverage rate, economic balance sheet

Chapter 4 will present the impact of the Walloon decrees currently being negotiated on prosumers and ESOs. The possibility of using blockchain technology to support these developments will also be discussed.

Chapter 5 will conclude this report by presenting the list of products/services that a ESO would need to operate.

Chapter 1

Even if all the models presented below are not only applicable to the case of prosumers, we thought it would be useful to present all the alternative electricity network configurations authorized in the Walloon Region.

As a reminder, the standard case is

1. transmission guaranteed by the Transmission Network Operator: ELIA, which has a geographical monopoly in Belgium

2. distribution guaranteed by a Distribution Network Operator: RESA and ORES in the Walloon Region, which also have a monopoly on their network

3. sale of electricity by a supplier with a supply licence in the Walloon Region: ENGIE, Luminus, MEGA, Energie2030,....

Direct Line

This is an electricity line not connected to the network of a network operator that :

- connects an isolated production site to an isolated customer;

- allows an electricity producer or electricity supply company to supply its own buildings and premises, subsidiaries and eligible customers directly.

The direct line is an exception to the obligation to connect to the public grid, as every customer must in principle be supplied with electricity from a network operated by a grid operator.

The main advantages of a direct line are 1) the possibility to avoid a significant part of the distribution/transport costs which represent almost 35% of the electricity bill, 2) to sell electricity to the customers supplied by the direct line and 3) to benefit from the green certificate quota exemption.

To benefit from these advantages, it is necessary to be authorized by the regulator and, except in the case of self-generation, to hold a supply license for the sale of electricity to downstream customers. The application for authorization is a relatively heavy and complex administrative process.

Example of a direct line

A producer of frozen vegetables generates a lot of by-products that are used to produce biogas by a company located on the same site. The two companies have created a new entity whose purpose is to pool resources and operate several cogeneration units, which provide both partners with electricity and heat.

As the electrical cables connecting the cogeneration facilities to the company's facilities cross a public road, a direct line permit was requested and granted.

The direct line model can be financially very attractive but the authorization procedure, the exception regime and the obligation to hold a supply license will limit the cases of use to the professional sector. There are relatively few direct lines in the Walloon Region (max 20), none of which include residential users.

Professional Closed Network (PCN)

This is a network connected to the local distribution, transmission or transport network that distributes electricity at a voltage of up to seventy kilovolts within a geographically limited industrial, commercial or service-sharing site, which may incidentally supply a small number of residential customers employed by the network owner (except incidentally, to a small number of customers employed by the network owner: caretaker, guard...).

As in the case of direct lines, this is an exception to the obligation to connect to the public grid, as every customer must in principle be supplied with electricity from a network operated by a distribution system operator

A PCN operator in fact replaces the distribution network operator and charges downstream customers for the use of its network. This is the main potential financial advantage of a PCN. Downstream customers retain their right to choose their supplier unless the PCN operator has been given a mandate to exercise their eligibility on their behalf and for their account.

The creation of a PCN is subject to authorization by CWaPE. Unlike direct lines, the production and sale of energy are not included in the scope of the PCN. The number of PCNs in the Walloon Region (WR) is very low (< 10) and is decreasing.

Conclusion

The PCN only concerns the distribution of electricity to business customers. It is therefore not likely to be of interest to prosumers.

Private Network (PN)

We speak of a private network when a natural or legal person, connected to the public distribution or transport network, redistributes electricity or gas via its own private installations to one or more customers (the legislation uses the term "downstream customers") established on the site which it manages: university campuses, campsites, leisure parks, etc.

This is undoubtedly the model which is theoretically the closest to micro-grids, as a PN assumes a single point of connection with the public distribution networks.

As in the other cases of alternative networks, this is a regime of exception. The basic principle is that private networks are prohibited in WR. Permission is nevertheless granted for the following situations:

- private networks with temporary consumption by downstream customers: markets, events, fairs, ... ;
- private networks where the consumption of downstream residential customers is only a component of an overall service offered to them by the site manager, such as the rental of garages, student rooms, rooms in a rest home or the rental of a holiday home ;
- permanent housings ;
- private networks located within the same office building.

The responsibility for the operation, maintenance and safety of the private network lies in any case with the PN operator.

As with PCN, the potential financial benefit lies in the possibility of lower distribution costs associated with the private network. As in the case of PCN, downstream customers are free to choose their supplier unless they have mandated the PN operator to negotiate a supply contract on their behalf.

Conclusion

The model is quite comparable to the PCN, only the distribution of electricity is concerned. Sales and production are outside the scope of the PN.

Peer-to-peer renewable energy exchange (P2P)

(Note: this new system, which stems from the European directives, still has to go through a third reading in the Walloon government)

This type of exchange is specifically aimed at prosumers, as it authorizes the sale of their surplus, non-autoconsumed electricity produced from a renewable production facility. However, this sale must be made in the immediate vicinity or within an energy community.

Production and consumption is required to happen simultaneously for the exchange.

Energy exchange between active customers acting collectively within a building

(Note: this new measure, which stems from European directives, still has to pass its third reading in the Walloon Government)

This refers to production facilities (PV panels, quality cogeneration) installed within a building and whose energy is shared between the building's occupants, without participation in the CSC operation being mandatory.

The sharing is done according to the distribution keys decided contractually and communicated to the DNO. The latter applies the keys to the production recorded for each quarter of an hour. The result is communicated to the CSC manager who uses it to invoice if necessary.

The operation **is virtual** ➔ no requirement for simultaneity between generation and local consumption.

Energy Communities

Renewable Energy Community (REC)

(Note: there is a scheme in RW that currently covers this type of exchange. However, it will be significantly modified when the Henry Decree goes through its third reading)

REC's operate on the same principle as CSC transactions: need for a REC manager, use of allocation keys, renewable generation, use of the public distribution network, virtual transaction.

Unlike a CSC operation, a REC can store unconsumed generated energy, can participate in flexibility services, perform aggregation, provide electric charging station services, etc.

The range of possible services is wider than in a CSC or P2P operation. A REC can exchange other fluids than electricity between its members: gas from renewable sources, heat, cold.

Citizens Energy Community (CEC)

(Note: this new measure, which stems from European directives, still has to pass its third reading in the Walloon Government)

The CEC only concerns electricity-related activities/services. The CEC shares most of the characteristics of the RECs. However, the following elements are specific to it:

- No technical or geographical constraints on the perimeter: a CEC could in theory group together a producer in Liege and a consumer in Tournai;

- No limitation on the type of companies: unlike the RECs, large enterprises can participate

- There is no constraint on the origin of the production: a CEC trading electricity from fossil fuels is possible.

Alternative Electricity exchange Models : Summarizing Table

The table below shows the main characteristics of the alternative networks/exchange modes presented in the previous chapters. We have also added the individual self-consumption model (last row) as an illustration.

	Production Origin	Distribu-tion	Sale	B2B/ B2C	Advantages	Constraints	Prosumer
Direct Line	All types	Yes	Yes	B2B	Distribution, sales price, free of PV panels quotas	Authorization, scope, supply licence	Yes
Professional Closed Network	-	Yes	No	B2B	Lower Distribution Costs	Authorization	No
Private Network	-	Yes	No	B2C	Coûts de distribution réduits	Authorization	No
P2P	Renewable	Public Network	Yes	B2C	Sales Price	Simultaneous Production and Consumption Authorization by CWaPE, No compensation	Yes
CSC	Renewable	Public Network	Self-consumed part	B2C – B2B	Sales Price, Notification No Supply License	Allocation Key, CSC Manager, No compensation	Yes
REC	Renewable	Public Network	Self-consumed Part	B2C – B2B	Sales Price, many services, No Supply License, Heat,	Geographical, technical scope Authorization DNO + CWaPE,	Yes

					cold, gaz exchange allowde	Company creation, big companies not allowed, No compensation	
CEC	All types	Public Network	Self-consumed Part		No technical /geographical limit / No supply license, Open to big Cies, Possible services	Authorization DNO + CWaPE, Company creation, limited to Electricity, No compensation	Yes
Individual Autoconsumption	All types	Yes	Surplus	B2C	Energy Price Compensation	Max 10KVa Capacity-based Price	Yes

Table 1 Energy Sharing Models

Conclusion

Besides the current model of reselling surplus production via purchase contracts, there are alternative models for using the surplus. In these models, prosumers are required to play a more active role in "real" (direct line, P2P) or "virtual" (CEC, REC, SCS) energy sharing operations and impose the abandonment of the prosumer compensation scheme.

Without adequate support measures and given the constraints associated with the different models analyzed, it is not at all certain that current PV installation owners will be willing to participate in these new trading modes....

One thing that is certain is the near impossibility of creating private micro-grids in which energy sharing would take place outside the rules of the energy market. Although attractive in theory, this model does not meet the wishes of the regulators and authorities.

➔A micro-grid whose exchanges would be organized around a blockchain is inconceivable today.

Note

For the following chapters, alternative models outside the scope of the BC4P project (direct line, professional closed network, private network) will be taken out of the scope of the analysis.

Chapter 2 : Regulatory Framework, , Tariff Structure and Support Measures

Regulatory Framework

Walloon Decree May 2, 2019 ("Crucke" Decree)

Adopted shortly after the Clean Energy Package directive, which introduced the principle of RECs, this decree placed Wallonia at the forefront of regions that have legislated on energy sharing in 2019. The decree created the RECs and presented the principles governing them. Among these, we note the following:

1. The obligation to set up a legal entity to support the activities of the REC
2. Establishment of a local geographical and technical perimeter
3. The possibility of specific pricing with a tariff advantage that varies according to the rate of self-consumption
4. The door is open for the participation of large companies in a REC operation
5. The exclusion of the qualification of supply of the quantities of electricity collectively self-consumed with the effect of an exemption from the obligation to return green certificates

However, this decree did not deal with CECs, P2P exchanges and CSC within the same building.

Changes in the political majority in the WR have suspended the drafting of decrees implementing the Crucke decree pending a new decree.

Although the decree was passed and applied in WR until the next decree, it was never really applied. It has, however, been a source of food for thought for the players in the sector.

Walloon Decree of ../../2022 (« Henry » Decree)

This decree, currently in its third reading in the WG, aims at the partial transposition of Directives 2019/944/EU of 5 June 2019 concerning common rules for the internal market in electricity and 2018/2001/EU of 11 December 2018 on the promotion of the use of energy from renewable sources.

When passed, it will replace and complement the Crucke Decree currently in force.

Legislative process

A first draft of the decree was approved by the WG at the end of 2020 and then submitted to the sector's stakeholders for comments before going through a second reading.

This first version was rather restrictive because, among other things, it imposed full ownership of the means of production to the ESOs and prohibited the integration of existing renewable production.

A second version incorporating some industry comments was approved by the WG in September 2021. This version corrects some restrictive aspects of the first version and adds other elements. Amongst these, the absence of reference to a tariff incentive but the obligation for the WG to

create a support mechanism, the charging of the network fees of the self-consumed part by the balance provider and the obligation to hold a supply license for the prosumer who wishes to sell the surplus of his photovoltaic installation to a ESO.

The industry, via the Tweed Cluster, submitted remarks/comments to Minister Henry's office in November 2021. The text is now awaiting its third reading at the WG and will then be voted on before the end of June 2022.

Implementing decrees will then have to be drafted to specify the operating rules, including the support mechanism.

Conclusion

While the WR was a pioneer with the Crucke decree, the WR has fallen behind in its obligations to transpose the EU directives. Although the operating principles of the ESOs have been clarified, there are still uncertainties, the most important of which concerns the support mechanism that WG will put in place for these ESOs.

In terms of timing, it is reasonable to assume that a complete regulatory framework will not be available before 01/01/2024. This corresponds to the start date of the new tariff period. Before this date, only projects benefiting from a tariff derogation from the regulator and "virtual" pilot projects will be allowed.

Flemish Region

The decree transposing the European directive on energy communities was approved on 9 July 2022. The Flemish government opted for a literal transposition of the directive and a gradual implementation of the energy sharing concepts:

- 01/01/2022: sharing within residential buildings
- 01/07/2022: peer-to-peer sales
- 01/01/2023: energy communities
- 01/01/2024: extension of the scope of action of energy communities
- 01/01/2026: energy sharing allowed on the local transmission network

No reduction in distribution and transport costs is foreseen.

Brussels Region

Brussels Region

The decree is currently being approved by the Brussels Government. It will add the additional notion of Local Energy Community which will allow to get out of the restrictive framework of the European directives.

In terms of support measures, the SIBELGA DSO applies a differentiated distribution cost tariff according to the location of the EPO on the network: same building (58% reduction), same low-voltage cabin (26%), same HV cabin (no transport cost). This incentive pricing system is currently only applied to pilot projects.

Components of the final consumer price

Below is a list of the components of an electricity bill for a residential consumer.

Energy Costs

They are the only costs on the bill that are subject to competition.

They include :
- the energy valued at the contractual rate (fixed or variable, single or dual hour)
- a fixed charge depending on the supplier and
- the renewable energy contribution[2]

Transport Costs

These include the cost of transmission, i.e. the costs associated with the infrastructure for transporting the electricity from its place of production to the distribution network, as well as the various public service obligations and surcharges incumbent on the transmission system operator.

Distribution Costs

These are also regulated costs: they are monitored and approved by the regulators. These distribution costs cover the following items:
- charges related to the use of the distribution network
- regulatory balances of the DSOs
- public service obligations of the network operator, of a social and environmental nature, in terms of maintaining public lighting, supporting renewable energy and facilitating the market
- various taxes and surcharges, including the municipal road tax and the support for renewable energies, which makes it possible to partially finance the green certificates in the Walloon Region.

The current distribution tariffs are broken down as follows:

1. For withdrawal:

1.1 A capacity charge based on the historical power peak and the current month (€/KW/month)
1.2 A fixed term (€/year)
1.3 A proportional term invoiced according to the consumption recorded (€/KWh/month)

2. For injection

2.1. a capacity charge depending on the power of the installation (€/kVA)
2.2. a fixed charge (€/year)

Taxes and surcharges

In addition to the 21% VAT, the **federal levies** are also included in the electricity bill:

- the energy levy: allocated to the fund for the financial balance of social security
- the special excise duty, including the following elements: the federal contribution (CREG operating costs, denuclearisation, 'OSP (CPAS-social care organization)', protected customers, Kyoto) and the surcharges integrated into the transmission tariffs (surcharge for connecting offshore wind farms, surcharge for offshore green certificates and surcharge for "financing strategic reserves")

and ***regional levies***

- electricity grid connection fee: paid to the Walloon Region's Energy Fund, which is used to finance the CWaPE, environmental protection or energy efficiency actions, the promotion of renewable energy and social energy guidance by the CPAS (social care).

<u>Illustration</u>

Below is a breakdown of the final bill of a residential consumer between the different components. In the case of a prosumer, the prosumer's contribution to the costs of the distribution network

should have been added (= prosumer tariff shown below).

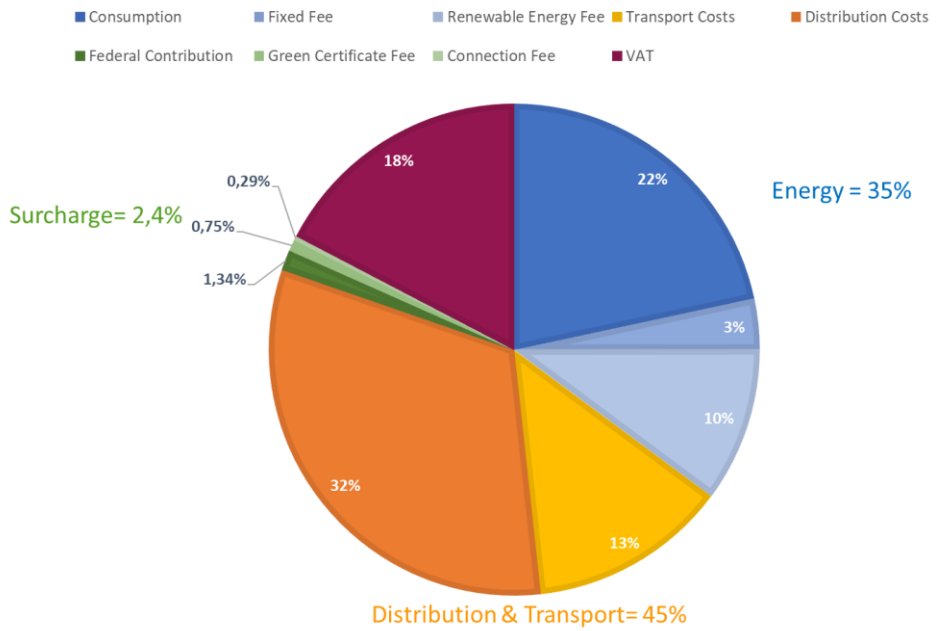

Diagram 1 : Electricity Final Price Components (residential consumer)

Prosumer Tariff

It aims to make prosumers contribute to the costs of the grid either via a capacity tariff applied to the net developable power of the PV installation (in 2022= 72,23 €/KWe) or by applying the distribution and transmission tariffs to the amount of gross energy taken from the grid.

Supporting Mechanisms for Prosumers

Preliminary Note

Whatever the type of support, production support mechanisms are intended to temporarily compensate for the production cost differential between traditional energy sources (fossil, coal and nuclear) and new sources: PV, wind, biomass, etc.

Technological and market developments tend to reduce this cost differential in the long term. This is what we can observe on the market since a few months in Europe : the rise of prices on the electricity markets automatically improves the profitability of alternative energy sources.

Green Certificates

Principle :

These certificates are a support of the WG to the different renewable energy production sectors. Each year, the WG determines the number of green certificates allocated to each sector. After having determined the number of green certificates that his installation allows, the producer must then reserve certificates with the administration. If the decision is positive, the producer will be paid €65 per certificate obtained.

It is an organized market whose attractiveness for a producer depends on the number of green certificates allocated to his sector (= envelope) and the number of producers in this sector.

Current situation:

Below, the expected evolution of the green certificate envelope per sector.

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Technology												
Hydro-Electricity	45.000	15.000	3.100	3.000	2.800	7.200	2.500	2.400	2.300	2.200	2.100	2.000
Wind Power	312.070	162.600	130.000	123.000	117.000	111.000	106.000	100.000	95.000	91.000	86.000	82.000
Photovoltaic <10 kW	70.000	67.500	67.400	60.700	54.600	49.100	44.200	39.800	35.800	32.200	29.000	26.100
Geothermal Energy	0	0	0	0	0	0	80.000	0	0	0	0	0
Solid Biomass	92.000	100.000	100.000	100.000	44.000	44.000	44.000	44.000	43.000	43.000	43.000	43.000
Biogas & Biomethane	80.000	105.000	105.000	105.000	5.300	5.300	5.300	5.200	5.200	5.200	5.200	5.200
Fossil co-generation	20.000	15.880	12.000	10.000	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
TOTAL	619.070	465.980	417.500	401.700	224.900	217.800	283.200	192.600	182.500	174.800	166.500	159.500

Table 2 : Green Certificates Budgets 2019 - 2030

We can note:
1) a significant decrease in the number of GCs allocated per sector
2) the disappearance (since 2018) of the Photovoltaic < 10kw sector
These developments are mainly due to technological progress which has led to a significant drop in the production cost of certain sectors (PV among others).
Below the current budget situation on 01/09/2021 → the number of available green certificates is 0 and many file claims are waiting for an answer.

	Initial # of Green Certificates	Reserved Files 2021	Reserved GC in 2021	Reserved files other technologies	Reserved GC other technologies	Remaining GC	# waiting files 1/1/2022
PV panels >10 kW	67.400	238	67.370	150	16.546		131 files (87.293 GC)
Wind Power	150.845	17	150.845	0	0		22 files (376.961 GC)
Hydro-electricity	3.100	2	945	0	0		1 file (97 GC)
Biogas	105.000	4	89.678	0	0		2 files 32.245 GC)
Biomass (liquid & Solid)	210.000	2	210.000	0	0		0
Fossil co-generation	12.000	6	9.803	2	912		3 files (8.370 GC)
TOTAL	548.345	269	528.641	152	17.458	2.246	159 files 504.966 GC)

Table 3 : Green Certificates Budget Situation (September 2021)

Conclusion
Even if the amount allocated per GC is still very attractive, the probability of reserving one from the administration is increasingly low. In addition, PV installations with a capacity of less than 10 KWp have been excluded from this system since 2018.
Basing your business model on obtaining GC is complicated, to say the least...

Compensation premium

The annual compensation is applicable to production units with a capacity of 10 kW or less. Under this system, the solar electricity that has been fed into the grid is deducted from the consumption bill, both in terms of the purchase of the electricity and the costs of using the grid.
Self-generation and consumption are aggregated on an annual basis. Any self-generation not consumed at one time is used to compensate for a production deficit at another time on an annual basis. This very advantageous regime allows maximum profitability of PV production by using the grid as a "virtual battery".
It was introduced in all Belgian regions to encourage the development of PV production. It is now being phased out. In the WR, PV installations commissioned before 01/01/2024 will continue to benefit from the compensation until 31/12/2033.
The current draft decree requires the abandonment of the principle of compensation by the prosumer who wishes to participate in a ESO.

Other support measures

This chapter presents the measures under discussion in the different regions and in neighbouring countries.

Walloon tariffs 2024
The tariff methodology for the period starting in 2024 is currently being developed by the regulator in consultation with the DSOs. It is therefore not known at this stage. Nevertheless, it can be assumed that the low-voltage tariffs will be adapted to introduce a flexible capacity component.

The power considered at a participant in a ESO could be reduced if another nearby producer can activate capacity at times when the participant needs it. This possible "mutualization" of capacity has not yet been approved.

Green certificate quota exemption
In order to encourage the emergence of renewable electricity production, the regions require suppliers to surrender a quota of GC calculated by applying the current quota (2022 = 39.33%) to the total consumption of the supplier's customers. If the supplier is unable to deliver the calculated number of GC, a penalty will be applied to the missing number of GC.
This "penalty" is then re-invoiced by the supplier to its final customers, and represents around 26€MWh.

This obligation to return GC does not apply to self-producers of renewable electricity. By extension, the possibility of considering an ESO as a self-producer is envisaged. This would avoid a cost of 26€/MWh for self-consumption.

Industry agreements
These agreements concern industrial companies that commit to reducing their CO2 emissions and improving their energy efficiency in exchange for financial benefits from the RW. New branch agreements from 2024 onwards could consider participation in an ESO as a CO2 reduction.

New type of Green Certificates (GC)
Another possibility is the creation of new GC specific to ESOs with an improved level of support (Keco coefficient). The deadweight effects of the previous GC mechanism make this option unlikely.

Direct support to the ESO
Since 2019, discussions have focused on the benefits that the ESOs would bring to the networks (peak reduction implying an avoidance/deferral of investments). It is on this basis that the promoters of ESOs believe they are entitled to appropriate network tariffs.
This discussion on the estimated benefits of the ESOs to the grids is particularly complex to substantiate as we do not yet have enough feedback.

Via the French regulator's collective self-consumption tenders, France has decided to neutralize this debate - the participating ESOs are granted a significant reduction in grid tariffs (+/- 60€/MWh) on the self-consumed part. This reduction paid by the State via EDF is fed by a carbon tax and a part of the contribution to the public service of electricity.
The advantage of this mechanism is that the system of remuneration of network operators is not modified.
Other types of direct support can be imagined.... This is certainly an interesting avenue for ESOs.

Reduction in network tariffs
Even though this is no longer on the agenda in the texts voted in Flanders and in the draft decrees in Wallonia, the Brussels Region is planning a reduction in the form of a variable coefficient to be applied to the distribution costs of the self-consumed part:
- Same building 43%
- Same LV cabin 74
- Same HV cabin 100%.

France also has a specific scheme for collective self-consumption:
- Self-consumption (covered by the ESO): 30% reduction in the tariff for use of the public electricity network
- Allo-consumption (not covered by the ESO): 15% increase in the tariff for use of the public electricity network

Tax reduction
The Netherlands has introduced a tax reduction to be applied by the supplier on the bill of consumers participating in an energy cooperative.
Many other mechanisms exist in other countries and could be applied in the WR. We believe that direct support is the most promising avenue.

Chapter 3 : Review of ESO Projects in Wallonia

In this chapter, we will distinguish between real projects, i.e. those benefiting from one (or more) derogation granted by the Walloon regulator, and pilot or virtual projects that cannot actually operate on the market.

At the end of the chapter, we will also present a few configurations of ESOs and assess their relevance.

Projects benefitting from the Regulator's Derogation

Mery-Grid

Presentation
Mery-Grid is a research project involving industrial and academic partners funded by the WR.
The objective is to build a microgrid in order to offer services to users (sale of local production) and to the grid (reduction of peak demand, sale of surplus production).
(Extract from CWaPE agreement, 07/02/2019)

The basic objectives of the project can be summarized as follows

- to test an optimized real-time collective self-consumption model;
- to develop an artificial intelligence that allows for the optimization of flows of :
    - o production (flexible or not),
    - o consumption (flexible or not),
    - o storage,
    - o reserve (service),
    - o peak (penalty);
- test a storage system in a real situation;
- Determine the optimum for the energy community and for the community at large

To achieve these objectives:

- An EMS (Energy Management System) software has been developed. This tool allows the control/piloting of energy flows within the micro-grid.
- A battery container was installed

Participants received two monthly bills: one from the micro-grid and one for the balance of consumption produced by the supplier registered on the access point.
Project Characteristics

Period	01/03/2018 – 28/02/2021
Main Partners	CE+T, ULiège, Merytherm, Nethys, Resa, SPI
E. S. Type	REC
Energy Type	Electricity
Production	- Hydro-electric : 1.200 MWh

	- Photovoltaic00KWc) : 51 MWh
Storage	Battery 600 kVA, 300 KW
Number of Participants	3
Type of participants	B2B
Transport/distribution Tariffs	No
Use of a blockchain	No
Other	n/a

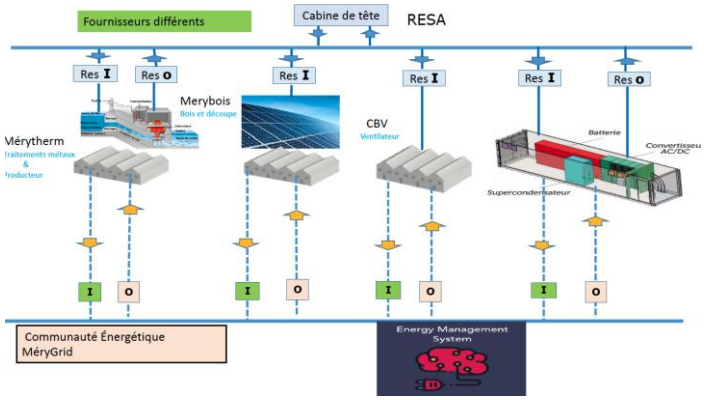

Diagram 2 : Mery Grid Scheme

Project summary

Without battery
Self-consumption rate 82 %
Coverage Rate of 60 %
Economic gains: 9.000 €

With a battery
Self-consumption rate 88 %
Rate of coverage 65 %
Economic gains: 9.200 €

The excellent results of the ESO are due to the presence of a hydroelectric plant on the Ourthe river and the use of a battery.

E-Cloud

Presentation
This project, which was submitted to the regulator in 2017, was very innovative at the time because it anticipated energy sharing operations. Indeed, local production of renewable origin is sold to companies within a business park without the latter owning the production assets.

The distribution of the local production is carried out according to fixed allocation keys per participant that the distribution network operator applies to the local production recorded.

The choice of a fixed allocation key brings certain constraints because it requires each participant to contract an energy buy-back with a supplier when the production allocated to them according to the fixed key is greater than their consumption for the quarter of an hour in question. In order to limit this risk of "surplus", E-cloud encourages participants to shift their consumption by providing them with "surplus" forecasts.

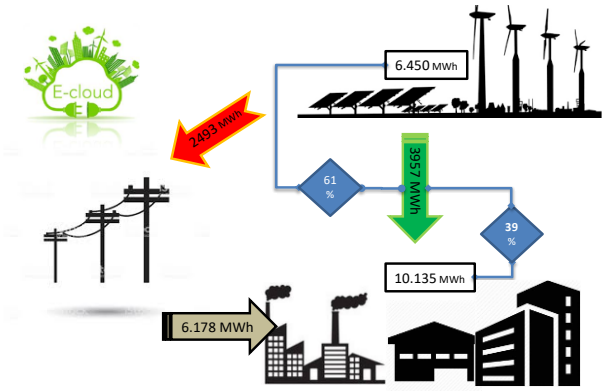

Diagram 3 : E-Cloud Scheme

Project Characteristics

Period	01/07/2019 – 01/07/2020
Main Partners	IDETA, ORES, LUMINUS
E.S. Type	REC
Energy Type	Electricity
Production	- Wind turbine : 6.450 MWh - Photovoltaic : 150 KWc
Storage	Was considered at the start, then abandoned
Number of participants	12 companies on 18 sites → consumption= 10.135 MWh
Types of participants	B2B
Transport/distribution Tariffs	- No transport tariff, but PSO and linked taxes - Distribution : ○ Volume reduction, ○ Capacity term cancelled ○ Variable management cost added according to self-consumption rate
Use of a blockchain	No
Other	Exemption from the GC obligation for the self-consumed part

Project Summary

Self-consumption rate: 61 %
Coverage rate : 39%
Economic gains : 45.000 €

The network operator also found that the E-Cloud had no measurable effect that would lead to a reduction in future investments and a reduction in network maintenance costs (apart from losses).

HOSPIGREEN

Presentation

HOSPIGREEN includes hospitals, care centers and companies in the Tournai West business park in a renewable energy community (REC). This REC is powered by wind and photovoltaic production.

Operational since 01/11/2020, the REC created by the HOSPIGREEN project comprises several phases. The first phase is characterized by fixed local production distribution keys, but which differ according to the period considered: day, night or weekend.

Each participant has a different allocation according to the period of the week.

The second phase started in November 2021 and differs from the first by adding participants to reduce the surplus of production and using dynamic proportional keys calculated a posteriori.

In line with the provisions of the Crucke decree, the participants in the CER are grouped together in a non-profit organization. According to the rent principle, this association buys the entire production. As such, it can be considered a self-producer and benefit from the exemption from green certificate quotas.

On the other hand, what has not been consumed by the participants (the surplus) must be returned to the network. A feed-in tariff for this surplus at the ELIA imbalance price has been negotiated with the producer Luminus, the difference between the cost of the self-produced MWh and the selling price of the surplus is on average 40€/MWh. The production risk is supported by the REC, which has every interest in minimizing the surplus via an appropriate choice of keys, correct sizing, and recruitment of additional participants.

Characteristics of the project

Period	01/11/2020 – 01/11/2023
Main Partners	IDETA, ORES, LUMINUS, HAULOGY, CERWAL
E.S. Type	REC
Energy Type	Electricity
Production	- Wind turbine - Photovoltaic : 150 KWc
Storage	No
Number de participants	Phase 1 : 4 participants, 6 sites Phase 2 : 6 participants, 10 sites → Yearly consumption = 14.707 MWh
Participants Types	B2B
Transport/distribution Tariffs	Distribution : - Phase 1 : reduction by 0,33€/MWh - Phase 2 : no reduction
Use of a blockchain	No
Others	Exemption from the GS obligation for the self-consumed part

Project Summary (11 months)

Self-consumption rate : 89,4 %
Coverage rate : 34,3 %
Economic gains : 145.000 €

The wind conditions during phase 1 were not favourable. The originally estimated production of almost 6 GWh was only 5.1 GWh, which improved the balance sheet of the REC by reducing the surplus.

ABC Project – approval ongoing

Presentation

This project has already been the subject of several meetings at CWaPE and is awaiting a final decision. The objectives are:

1. To test a new grid pricing structure proposed by the DNO ORES to CWaPE based on sunshine hours and load curves, and promoting the consumption of local renewable energy in short circuits;

2. Measure the impact of this new grid pricing structure on consumption profiles in order to verify demand flexibility;

3. To test methods of supporting SMEs in the energy transition to help them better synchronize their consumption with intermittent local solar energy production

The scope is composed of 5 consumers grouped together in the framework of an energy sharing within the same building model of energy exchange between active customers acting collectively (CSC).

Diagram 4 : Projet ABC Scheme

The incentive tariff grid proposed by the DSO is differentiated according to the time slot in order to encourage a shift in consumption to times when solar energy is abundant. A multiplier is applied to less favourable time slots according to the following logic:

- From 22:00 to 6:00: multiplier = 2
- From 6 to 11am: multiplier = 4
- From 11 to 17:00: multiplier = 1 (most favourable time slot)
- From 17 to 22:00: multiplier = 5

Characteristics of the project

Period	01/04/2022 – 01/04/2025
Main Partners	IDETA, ORES, ENGIE, HAULOGY
E.S.Type	CSC
Energy Type	Electricity
Production	Photovoltaic
Storage	No
Number of participants	5 participants

Type of participants	« Small » B2B
Transport/distribution Tariffs	Discount variable according to comsumption hours
Use of blockchain	No
Others	n/a

Project Summary

No yet approved by the regulator

Projets Without Regulator's Derogation

These projects are initiated by a whole series of actors who wish to anticipate the arrival of the decrees and implementing orders governing the EPOs. Below is a selection of pilot or R&D projects in progress.

CERWAL

CERWAL is a company created by the vast majority of Walloon Territorial Development Agencies (TDA) and by private companies (Haulogy, Nova Wallonia). Its aim is to serve as a one-stop shop for all ESO initiatives in Wallonia's business parks.

Through its member TDAs, CERWAL also wishes to position itself as an interlocutor for municipalities in support of energy sharing initiatives on their territory.

The services offered by CERWAL include the role of delegate, administrative management (invoicing, portal, allocation keys, accounting, payments, etc.), optimization of the ESOs through the use of flexibility, grouping of purchases, management of the balance....

CERWAL currently has about 40 projects ready to start when the regulatory framework is set. In the WR, CERWAL is likely to be a key player in the majority of ESO projects.

COLECO

Launched at the initiative of IDETA and municipalities in Picardy Wallonia (Western Hainaut), the COLECO (Eco-responsible Local Communities) project aims to use the surplus PV production available on public buildings or similar (town hall, municipal workshops, schools, sports centre, swimming pool, etc.) to share green energy with the neighbourhood. COLECO has received funding from Digital Wallonia to develop a set of tools to manage the EPOs.

The other main partners are ORES, the University of Mons and the company Haulogy.

The ambition is to create a hundred COLECOs in Picardy Wallonia by 2026.

AMORCE

The AMORCE project (Analyse Macro et micro-économique pour l'Optimisation et la Réplicabilité des Communautés d'Energie = Macro and Micro Economic Analysis for the Optimization and Replicability of Energy Communities) aims to study the societal gain linked to the development of new energy exchange modes, and to propose pricing/protocol/security schemes and models that are coherent for all the actors, and above all, understandable for citizens and end users.

INTEGCER

This R&D project, financed in the framework of calls for projects from the Mecatech cluster, aims to develop all the software tools to support ESOs.

This concerns solutions for DNOs (dimensioning, network impact) and ESO managers (administration, optimization, virtual power plant, energy management system).

At the end of the project, a REC be created on the Hauts-Sarts business park.

SmartACC

This R&D project on the territory of the DNO of Wavre aims to create an ESO in a residential / tertiary environment. In addition to developing the ESO administrative management tool, the project connects the ESO's sources of flexibility (heat pump, charging stations, stationary battery, boiler) in order to use them to optimize the ESO's results - improving self-consumption and coverage rates.

Project	Target Group	Objective	Main Partners	Period
CERWAL	Residential and professional	One stop Shop for ESO	ADT, haulogy, Nova Wallonia	2020 - tbd
COLECO	Residential	Share the production surplus with the neighbours	IDETA, UMons, local admin, WAPI, haulogy	2019 - 2026
AMORCE	All	Evaluation of ESO Social gain Evaluation	HEC Liège, ULiège, Tweed, Laborelec,	2020-2024
INTEGCER	Professional	• Develop ESO Softwares • REC in the 'Hauts Sarts'	ENGIE, ULiège, Haulogy	2020 - 2024
SMARTACC	Residential, services	Administration Management Software, use flexibility	MEMOCO, REW (DNO Wavre), Haulogy, ULB	2021 - 2023

Table 4 : ESO Projects without tariff derogation

Other projects

There are other projects in WR. A CERACLE working group dedicated to ESOs has been created within the Tweed cluster. All projects should normally be listed there.

A trans-regional initiative (Flanders - Brussels - Wallonia) worth mentioning is the OPTIMESH project which aims to create a combined electricity and thermal REC. This project starts in April 2022 and will last for 3 years.

ESO Configurations

Haulogy has been active in the ESO sector for several years and is therefore able to evaluate the relevance/feasibility of different ESO configurations according to subjective and objective criteria.

Evaluation Criteria

Local Production with enough Volume

For a ESO to be attractive enough to enroll participants, it must be able to provide sufficient coverage. An ESO is a relatively complex operation that involves adding a second source of energy flow for the participant (and an additional monthly bill), abandoning the prosumer offset, and installing quarter-hourly meters.

Attracting participants requires a minimum coverage rate which are estimated at 20-25%, otherwise the financial benefits of the ESO will be too small compared to the costs incurred by the complexity.

Availability of local production

In addition to the quantity of production, it is necessary to guarantee its availability. The equilibrium of the ESO can be disrupted if a prosumer chooses to electrify his consumption in order to absorb his surplus rather than sell it to the ESO, a prosumer moves and his replacement stops sharing energy.

An ESO depends on the producer's choice between individual optimization of his production or sharing it.

ESO Stability

The success of the EPO will be more easily achieved if it avoids too frequent changes in its composition, which would weaken its energy/financial balance, particularly for EPOs resulting from collective investment in production facilities

Diversity of production profiles

Combining several production sources makes it possible to smooth the production profile and improve the profitability of the ESO.

Diversity of consumption profiles

In the same way, multiplying the consumption profiles reduces the risk of too large a surplus.

Neutrality of the ESO manager

The membership of the participants and the day-to-day management will be facilitated if the ESO manager acts for the collective well-being and not for particular interests. In our opinion, this is a fundamental criterion for the success of an ESO.

ESO Configurations

The following configurations will be assessed using the criteria presented in the previous chapter.

Prosumer surplus

In this model, a group of prosumers sell their accumulated surplus energy to an ESO which shares it among the participants. This model is more suitable for consumers in a residential area.

Collective investment

A group of participants invests collectively in a renewable generation asset. This is a rather closed model because the co-investors are also the participants. It can be in the residential or business sector.

Building management

The management of energy sharing is delegated to a building syndic who will play the role of ESO manager. The available production will be strongly constrained by the roof surface ready to host PV.

Business park (EAP)

A park manager will invest in production facilities and act as an ESO manager.

The diagram below shows the different ESO criteria and configurations.

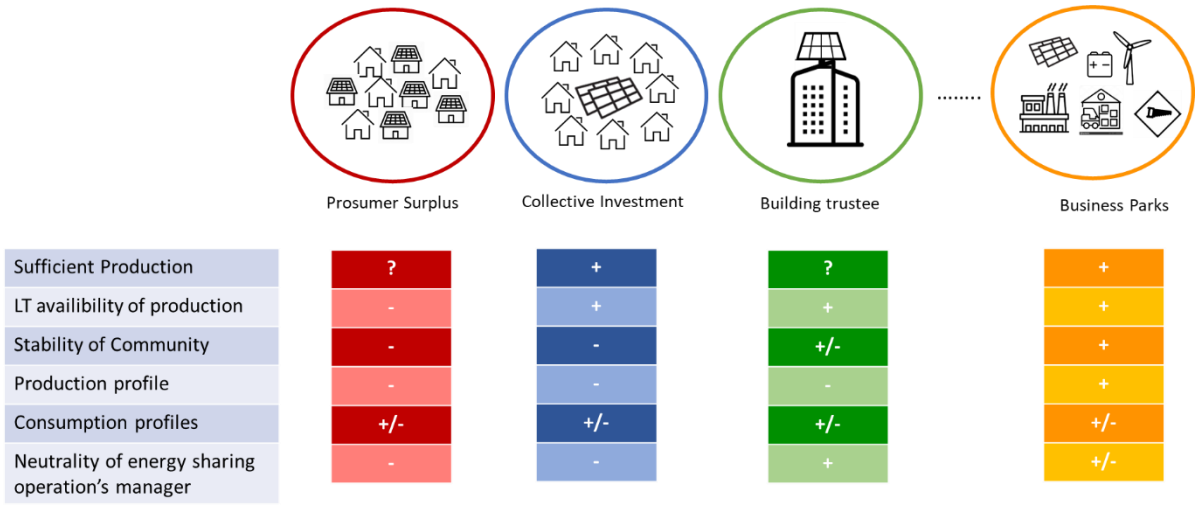

Diagram 5 : ESO Configurations

According to our analysis, the configuration that meets the most criteria is the EAP.

Regarding the model of selling surplus by a prosumer collective, we believe that it will be the most difficult to apply in the current framework. Indeed, the cancellation of the annual compensation for new PV installations from 1/1/2024 and the introduction of a prosumer tariff from 1/10/2020 reduce very strongly the interest to oversize an installation.

The surplus available for an ESO will therefore be limited per prosumer, implying a need to have a large number of prosumers so that the production available for an ESO is substantial.

In addition, the ESO will have to share a part of the expected gain with the prosumers in order for them to commit to the ESO on the long term.

Chapter 4 : Impact of the new Regulatory Framework

The new decree currently under discussion in the WG brings important changes compared to the "Crucke" decree. These changes are presented below and do not apply universally to all types of ESOs

Note

These developments are not yet official and can still be modified by the WG, the Parliament or the executive authorities.

ESO Characteristics

Balance responsibility

The active customer is financially responsible for any imbalances he causes. He is therefore obliged, either himself or via a balance responsible person, to respect the balancing rules.

This obligation to use a balance responsible represents an additional cost for the ESO.

Supply license

By way of derogation from the general regime, which requires a supply license for the sale of electricity to final customers, the ESOs are exempted from this. However, there is still a doubt

about the sale of surplus production by a prosumer for certain SOs: the current version of the texts requires a license to be obtained.

Annual Compensation

All ESOs imply a move away from the annual compensation scheme.

Legal status of the OPE

Depending on the type of ESO, it may be a simple association or a company.

Authorization/notification

Notification is a simple process for approving a ESO. It often takes the form of an online form to be filled in by the promoter of the EOS.

An authorization is a more complex file to compile and therefore represents a cost.

Public Network

All the ESOs envisaged in WR require that they take place on the public distribution network.

Simultaneity of production and consumption

The P2P exchange mode imposes simultaneity, unlike other ESOs where the distribution of production is based on keys communicated by the ESO to the DNO (virtual operations).

Type of participants

Some ESOs prohibit the participation of certain types of players depending on their size or sectoral specialization. The principle is to prohibit large companies or companies whose main activity is energy.

Origin of electricity

Electricity of renewable origin imposed or not.

Geographical" limits

Depending on the type of ESO, limits are imposed on energy sharing.

Ownership of generation assets

Either full ownership of the ESO is required in order to benefit from the special regime, or a right of use is considered equivalent to ownership. This is important because the acceptance of the right of use increases the possibilities for the ESO. With this provision, a producer external to the ESO could grant a right of use to an ESO which would treat this production as if it were its own.

Authorizing pre-existing Production Assets

This is also important because the integration of existing assets will accelerate the development of the ESOs.

Summary table

The table below summarizes the developments by type of ESO.

	P2P	CSC	REC	CEC
Balance Responsibility	Yes	Yes	Yes	Yes
Supply License	No	No	No	No

Annual Compensation	Abandoned	Abandoned	Abandoned	Abandoned
Company required	No	No	Yes	Yes
Autorization/notification	Autorization from CWaPE	Notification	Autorization CWaPE & DNO	Autorization CWaPE & DNO
Use of Public Network	Required	Required	Required	Required
Production & consommation are simultaneous	Yes	No	No	No
Participants Types	All active customers	All active customers	No big Companies	All active customers
Electricity Origin	Renewable	Renewable	Renewable	All types
Geographic scope	Neighbours	Building	Surrounding area	WR
Owner of Production Assets	Yes	Right of use is authorized	Right of use is authorized	Right of use is authorized
Production Assets	Authorized	Authorized	Authorized	Authorized

Table : Expected Regulatory Evolutions for each ESO-type

Supporting Measures

The draft decree does not provide specific tariff incentives for the ESOs, which will benefit from the general tariff incentives provided for in the 2024 tariff methodology. According to the latter, the Low Voltage tariff will be separated into 2 parts:

- Proportional depending on Belpex[3] and renewable generation among others with the introduction of 4 time bands based on historical generation

- Flexible dynamic capacity: the power considered at the member of an ESO can be reduced if another producer in the vicinity can activate capacity at the times the member needs it

In discussions with Minister Henry's office at the end of 2021, we were told that a budget will be allocated to support the creation of 35 ESOs as part of the recovery plan.

Blockchain

Blockchain is a technology for storing and transmitting information without a centralized control body. Technically, it is a distributed database in which the information sent by users and the links within the database are verified and grouped at regular intervals into blocks, all of which are secured by cryptography, thus forming a chain. It is thus a distributed and secure record of all transactions made since the start of the distributed system.

One of the major responsibilities of the energy sector is to ensure balance, i.e. acceptable levels of frequency and voltage to avoid blackouts. To achieve this balance, the sector is organized as follows:

1) Suppliers (via their balance responsible) make nominations, i.e. they announce to the entity responsible for the balance (in Belgium = ELIA) how they will cover the consumption of their customers for each quarter of an hour on D+1 by own or purchased production.

[3]Belpex is licensed by Ministerial Decree since 2006 to operate the Belgian spot electricity market under the oversight of the Belgian Minister in charge of Energy, CREG and FSMA.

2) On day D, the suppliers adjust their position per quarter hour according to their observations. ELIA does the same and activates generation/storage units in case of imbalance

3) On D+1, ELIA compares the nominations of D-1 with the actual consumption and production data of D+1. In case of imbalance, ELIA charges a "penalty" to the responsible supplier.

As opposed to the principles of blockchain, the sector has a centralized control body (ELIA) which is based on quarter-hourly production/consumption data collected and validated by the players with this responsibility: transmission and distribution system operators (TNO-DNO).

In Belgium, there is a monopoly for validating and calculating consumption/production data which, in addition to their function in managing the balance, are also used by suppliers to invoice their customers. A priori, there is no place for blockchain technology in the regulated energy sector. However, we have identified some possible cases.

"Green" Electricity Certification

The current system is based on guarantees of origin (GO): a producer of electricity from renewable sources is granted GOs per MWh produced. He can sell them on a market organized at European level (European Energy Certificate System). A Belgian operator can very well buy GOs of Norwegian origin and combine them with the sale of electricity in Wallonia.

Thanks to this system, suppliers can "green" their energy mix without being electricity producers themselves.

More and more consumers are looking for real traceability of the origin of their renewable electricity (Companies Social Responsibility policy, citizen's choice, communal choice, etc.) by being able to identify the source of production precisely: dam X at 09:15 on 22/02/2022, PV of Mrs. Y at 11:00 on 24/02/2022, ... This service could be provided by the blockchain.

Production/Consumption Data in real (or quasi real) time

In spite of their interest to better manage forecasts, flexibility, feed optimization algorithms, display real flows within an ESO,...DNOs/TNOs should not provide consumption and production data at time steps shorter than a quarter of an hour.

The Blockchain could offer a service for certifying data per minute, second, ... especially by guaranteeing consistency between the sum of data validated within a 1/4 hour and the official quarter-hourly data communicated by the DNO/TNO.

Daily / Weekly Production/Consumption Data

The frequency of data communication by the DNO/TNOs and the level of detail depend on the type of meter installed and the measuring regime chosen by the customer.

It may be interesting for a player to have data at a higher rate and with greater accuracy. The blockchain could also fulfill this service knowing that **1)** a reconciliation will have to be done with the available official data and **2)** that a comparable service is offered by the P1 port of smart meters.

Chapter 5 : Products and Services for ESO

The need for services and products for ESO will depend on the type of ESO, the positioning in the ESO value chain and the size of the ESO.ESO Value Chain

The simplified ESO value chain shown below provides a comprehensive list of products and services that may be involved in an ESO.

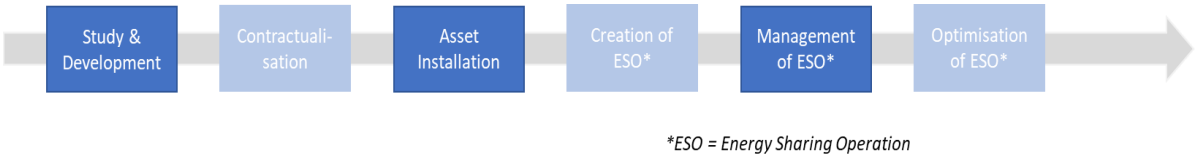

Diagram 6 : ESO Value Chain

Study & Development

This element includes all activities upstream of the creation of a ESO: feasibility studies, sizing, recruitment of participants, ESO potential study, support for the implementation of the renewable energy project (permits, authorizations, specifications, etc.), application for regulatory and/or DNO authorization.

Products and Services

- Software for simulating the coverage and self-consumption rates of ES from production and consumption profiles;
- Technical and economic analysis software;
- Project management assistance (PMA)

Contracting

ESOs require the signing of numerous contracts:

- Mandatory :
  - o Balancing responsibility,
  - o Internal management agreement,
  - o contract with the DSO,
  - o contract for the purchase of local production,
  - o access to participants' data,
  - o contract for the sale of surplus production

- Optional :
  - o Balance supply via buying group
  - o external management services
  - o purchase/maintenance of new production facilities
  - o purchase/maintenance of an IT platform

Consultancy assistance may be required.

Installation of Production Assets

A project management assistance for the ESO manager may be necessary. Third party investment services could also be used to finance the purchase of the assets.

If the ESO decides to invest in optimization tools, software such as an Energy Management System will be needed to monitor the ESO's assets.

ESO Creation

This activity includes all administrative tasks (company creation, account opening) and IT tasks in case an ESO management solution is chosen: setting up and integration of the solution.

ESO management

The day-to-day management of an ESO includes the role of delegate, exchanges of messages with the DNO (new keys, adding/withdrawing participants, network charges, distributed measurements), registration of participants and their contracts, choice of distribution keys, invoicing, payments collection, accounting management, updating of information in a portal for participants.... With the exception of small, isolated ESOs, these activities require an IT solution that automates ESO management to the maximum extent possible.

The ESO could go further by delegating complete management to an external player in a Business Process Outsourcing type contract.

ESO optimization

For large-scale operations or those with significant load shifting/clearing potential, investing in optimization software enables the operation to be enhanced: improvement of the internal balance sheet (coverage and self-consumption rates) or external balance sheet (sale of flexibility to external players).

The implementation of this optimization requires the use of Energy Management System and Virtual Power Plant tools.

In the case of external optimization, signing contracts with an aggregator, supplier or balance responsible will be necessary.

ESO Type

Except for P2P exchanges, the regulation requires the other ESOs to exchange many messages with the DNO. These ESOs will have to be able to send/receive these messages in a standardized format and to organize a follow-up of these messages: handling of errors, deadlines check. These activities are particularly important as it is these messages that serve as triggers for many of the ESOs' activities.

Having an automatic processing tool and/or the support of a specialized actor will be very useful for large ESOs or for actors wishing to serve many ESOs jointly: building managers, business park managers, contractors, developers....

The following table summarizes the product/solution needs according to the type of ESO and its size. We consider isolated operations, i.e. those carried out by a single player whose sole ambition is to manage a single small-scale ESO, and multiple operations where the manager wishes to industrialize the management of ESOs in order to preserve the profitability of the model.

Functionalities	P2P (Peer to peer)		CSC (Collective self-Consumption)		REC (Renewable Energy COmmunity)	
	Single	Multiple	Single	Multiple	Single	Multiple
Studies and Development	-	-	-	Simulator	-	Simulator
Contracting	-	-	-	Advice	-	Advice
Assets Installation	-	-	-	PMA EMS	-	PMA EMS
ESO Creation	-	-	-	IT Integration	-	IT Integration
ESO Management *DNO Exchanges* *Invoicing* *Portal* *Payments /Bookkeeping*	-	Invoicing tool	DNO Exchange Services	All tools	DNO Exchange Services	All tools
ESO Optimization *EMS* *VPP*	-	-	EMS	EMS + VPP	EMS	EMS + VPP

Table 5 : Services & Products for ESO

In short, isolated ESOs can in most cases be managed "manually" (e.g. Excel file). On the other hand, if many exchanges have to be made with the DNO (CSC and EC) and if the manager intends to manage many ESOs, software and services enabling the management to be industrialized will be essential.

Conclusion

In addition to an inventory of energy sharing and projects in the Walloon Region, CAP Construction's support mission aimed to answer several questions:

1. What are the possible modes of energy sharing in Wallonia for residential prosumers?
Chapter 1 identified the direct line, P2P, CSC, CEC and REC models as energy sharing possibilities for prosumers. These models each have their specific conditions and are in any case more complex to implement than a simple individual self-consumption operation coupled with the compensation scheme.
Chapter 3 has presented some typical ESO configurations, from which it can be seen that the neutrality of the ESO operator will be an important criterion for long-term viability. Past and current ESO projects show that a positive economic balance can be achieved. However, general conclusions should not be drawn from these projects, as they have benefited from specific conditions and a very high level of investment by the project partners.

2. Are there any tariff reductions or other support measures for sharing modes?
There are no plans to reduce distribution and transport costs for the ESOs in Wallonia. On the other hand, the draft decree does include an obligation for the Walloon government to put in place support measures for the ESOs. An inventory of these possible measures was made in chapter 2, but it is impossible to know the future orientations today.

3. Could blockchain technology facilitate the implementation of energy sharing?
The regulated nature of the energy sector reduces the scope for using blockchain. However, use cases have been identified outside the regulated framework: certification of origin, production and consumption data < 1/4h,...

If this report had been written 6 months ago, the conclusion would have been that there is currently no clear economic model for prosumers wishing to share their surplus energy: regulation pending in Wallonia, maintenance of compensation until 2031, introduction of a prosumer tariff.

The very sharp rise in energy prices in recent months may strengthen the economic balance sheet and the attractiveness of ESOs, provided that it continues and that prosumers choose to share their surplus production rather than use it to electrify their consumption. It is this aspect that future support measures should address.