

IMPLEMENTATION OF THE HOSPIGREEN PILOT PROJECT

Local renewable energy community in Tournai

from 1/11/2020 to 28/02/2023

PROJECT REPORT

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HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

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Introduction

The HOSPIGREEN pilot project involves the setup of a **renewable energy community (REC) situated in Tournai and establishing a collective self-consumption scheme among its members, based on local green energy sources.**

The CWaPE (Walloon energy commission) authorised this pilot project by granting the required deviations from the rules governing the operation of the electricity market and grid pricing.

The project fits into the larger framework of the EU Clean Energy Package, which promotes the use of energy produced from renewable sources and puts the consumer and decentralization at the heart of the energy strategy.

The collective consumption project within the Hospigreen REC started in November 2020 for a limited period of 25 months. The participants were the hospital CHWapi, the care facility Les Marronniers, the CPAS (public social welfare centre) of Tournai (nursing homes), the intermunicipal association IDETA and the enterprises established at the business park Vitrierie Landrieux-Leclercq SRL and Etablissements Glorieux SA. During the second phase, starting in November 2021, new members were welcomed to the REC and several methods for the distribution of energy and for pricing were tested.

This report will discuss the principles that were implemented during this experimental period and the results observed on technical, administrative, socio-economic and legal level.

1. Legal framework and authorisations for the Hospigreen pilot project

In accordance with the provisions of *article 27 of the decree of 12/04/2001 on the organisation of the regional electricity market (Electricity Decree and amending decree of 02/05/2019 establishing the RECs)*, the CWaPE can under certain conditions authorise pilot projects that make it possible to test alternative distribution networks and their pricing principles.

The CWaPE can also, in accordance with the provisions of *article 21 of the decree of 19/01/2017 on the pricing methodology applicable to grid operators (Pricing decree)*, periodically adopt specific pricing rules in order to enable the implementation of innovative and local pilot projects.

With reference to these legal texts, IDETA requested authorisation in June 2019 for the launch of the HOSPIGREEN pilot project with various project partners, i.e. the grid operator ORES, the CWaPE, Luminus, Haulogy.net (a company with expertise in the fields of energy and IT), CerWal SRL (Walloon delegate for self-consumption operations) and the members of the REC.

The authorisations of the CWaPE are included in *Decisions CD-20j15-CWaPE-0451 of 15/10/2020, amended by decision CD-20i17-CWaPE-0465 of 17/12/2020 for the first phase, and CD-21i30-CWaPE-0576 of 30/09/2021 for the second phase of the project* – (see annexes 1 to 3).

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542



2. Objectives of the Hospigreen pilot project

The objectives of the project are the following:

- To test the implementation, management, development and evaluation of a renewable energy community created on the basis of the provisions introduced into the Electricity Decree by the amendments of 02/05/2019 and the European guidelines
- To define and test a protocol for the exchange of data between the REC and the grid operator (distribution keys, metering, network costs...) and to adapt the technological tools of the grid operator to the energy communities.
- To analyse the optimisation of energy flows and the synchronisation of consumption and production by applying a dynamic distribution key and implementing technical tools that make it possible to control certain installations on participants' sites - with monitoring of coverage rates, self-consumption rates and peak power reduction.
- To acquire concrete and active experience that will provide a better understanding of the technical and socio-economic implications of collective self-consumption for all stakeholders in the energy market.

3. Modalities for the implementation of the pilot project

3.1. Phasing

The project was authorised for a period of 28 months, phased in 2 parts to allow for variation in hypotheses.

Phase 1 : from 01/11/2020 to 31/10/2021: 12 months

Phase 2 : from 01/11/2021 to 28/02/2023: 16 months

3.2. Creation of the legal entity

The renewable energy community HOSPIGREEN was incorporated as a legal entity in the form of a non-profit organisation on 30 October 2020.

The articles of association published in the Belgian Official Gazette have the form of a private deed drawn up by the founders and did not require a notarial authentic deed. The incorporation of the non-profit organisation did not require a start capital, either.

3.3. Appointment of the Delegate to the REC

The energy, contractual, administrative and financial management of the REC was delegated to CERWAL SRL, a service company the purpose of which is the development and operational management of renewable energy communities.

The delegate's fee is set at 5€/MWh of self-consumption by the community. This formula is inherent in this pilot project and is based on its initial scope.

3.4. Involvement and role of the grid operator

As the grid operator was appointed by the Walloon government as operator of the distribution network in its area of activity, ORES is responsible for the collection of metering data and their exchange with the different suppliers of the project.

3.4.1. Deviations

The CWaPE authorised ORES to **deviate from the usual metering rules** by providing the market suppliers designated for each EAN metering point with net indices of self-consumption flows established on a quarter-hourly basis (see below).

The implementation of specific grid tariffs is another major element of the project, meant to enable ORES and the market regulators to assess the impact of alternative pricing on the consumers' behaviour in terms of load shifting. Two specific pricing methods were tested during the project (see below).

The CWaPE allowed ORES to **deviate from the invoicing rules** by sending the invoices directly to the REC. Therefore, ORES draws up the self-consumption invoice and addresses it directly to Hospigreen, which in turn charges the relevant amounts to its members.

3.4.1. Implementation of a procedure for the exchange of information and verifications between Ores and the delegate for the pilot project

The delegate closely cooperated with the grid operator in order to enable the latter to **test its internal data collection and processing flows**. ORES delivered the meter data, including the quarter-hourly meter readings, for the different EANs concerned, on a monthly basis. The delegate compiled these data in order to carry out the verifications and calculate the different rates and the invoice amounts to be charged to the members.

3.5. Metering method used by ORES

The metering method implies the calculation of the setoff between the energy consumed and the energy locally produced in order to enable the monthly reports of self-consumption data to the REC on the one hand and of allo-consumption to the market suppliers on the other hand.

The measurement takes place on a quarter-hourly basis and is based on the metering data of the physical flows, as well as the definition of virtual EANs. The latter make it possible to take into account the local energy allocated to each member and to calculate the difference between the physical meter and the virtual measurement. ORES distributes the self-consumed volumes among the members of the community on the basis of the allocation keys previously defined and validated by CWaPE.

3.6. Method for the distribution of locally produced energy among the members of the REC**3.6.1. “Static” distribution of green energy in Phase 1**

A static key (%) per consumption period was defined for the distribution of the locally produced energy among the members. This key was derived ex-ante from the consumption history of the members during the periods day/night/weekend;

Members	Keys used			Contractual key for use by the REC
	Day (Monday to Friday from 7:00 a.m. to 10:00 p.m.)	Night (Monday to Sunday from 10:00 p.m. to 7:00 a.m.)	Weekend (Saturday and Sunday from 7:00 a.m. to 10:00 p.m.)	
Member 1	18.30	16.30	17.30	17.64
Member 2	1.70	1.20	1.20	1.44
Member 3	19.50	12.90	18.50	18.01
Member 4	54.90	66.50	59.30	58.31
Member 5	3.00	2.20	2.70	2.77
Member 6	2.60	0.90	1.00	1.83

This key is also used as a contractual basis by the delegate to invoice to each member the different costs (rental of green energy equipment etc.) and revenues (sale of green certificates, sale of the collective surplus) borne by the community as a whole.

3.6.2. “Dynamic ” distribution of green energy on Phase 1

On 1 November 2022 the static key was replaced by a “proportional dynamic” green energy allocation key. This key is determined by ORES at the end of each monthly settlement period on the basis of the measurement of the actual consumption of each of the participants. After each quarter of an hour, the electricity needs of each consumer are compared to the total needs of the community. The percentage thus obtained for each member is applied to the green energy produced that is put at the community’s disposal.

$$\text{allocation } \%_{\text{member}M} = \frac{\text{Total consumption } \text{member}M}{\text{Total consumption of all members}}$$

$$\text{Energy allotted } \text{member}M = \max(\text{allocation } \%_{\text{member}M} \times \text{green energy locally produced}; \text{total consumption } \text{member}M)$$

3.7. Indicators used for monitoring the performance of the REC

The self-consumption rate (%SCC) and the coverage rate (%COV) were defined as the main indicators for monitoring the performance of the REC. The first indicator encourages optimal consumption of the local green energy produced and reduction of the surplus that is not self-consumed, whereas the second indicator prevents the REC from being undersized.

$$\%SCC = Q(SCC) / Q(PROD)$$

$$\%COV = Q(SCC) / Q(Tcons)$$

Where

Q (SCC) : self-consumed volume (MWh)

Q(PROD) : volume produced by local installations (MWh) and allotted to each member of the REC

Q(Tcons) : total volume consumed by the REC and via the distribution network (MWh)

3.8. Derogation from the obligations relating to the supply of electricity

In this project, the locally produced and self-consumed electricity is not regarded as supply of electricity at regional level. This implies an exemption from the obligations resulting from electricity supply operations, in particular from the obligation to issue green certificates as stated in the *Electricity Decree*.

The status of electricity distributor, however, is maintained at federal level within the context of excise duties (see below).

3.9. Invoicing rules

3.9.1. Outgoing invoices

The members of the REC receive 2 energy invoices each month: the first invoice is issued by Hospigreen and relates to the energy self-consumed by the member within the REC; the second invoice relates to the allo-consumption and is issued by the traditional suppliers chosen by the members to meet their complementary energy needs.

In order to ensure that the non-profit organisation had sufficient cash flow, monthly instalments were invoiced to the members.

Every month, the non-profit organisation resold the surplus that was not self-consumed and was injected into the grid.

The non-profit organisation also invoiced the sale of the green certificates allocated within the context of the photovoltaic lease agreement with Ideta (see below).

The suppliers of the allo-consumption invoiced the complementary energy to the members without passing on the additional costs associated with the project: they did not adjust the prices set by contract to the degradation of the consumer profiles following the creation of the REC, nor did they pass on the administrative costs.

3.9.2. Incoming invoices

The incoming invoices relate to the lease of the local green energy production sites, the grid charges for the members' consumption, the injection fees and the costs of the occasional consumption of the photovoltaic sites, the delegate's fees.

By way of derogation from the legally applicable invoicing procedure, the costs relating to the distribution and transmission networks of each of the members of the REC are invoiced directly by ORES to the REC where the self-consumption is concerned.

3.10. Grid tariffs

3.10.1. Grid tariffs in phase 1

A specific tariff was applied in phase 1 of the project for the self-consumed energy, taking into account a setoff on a quarter-hourly basis. In line with the e-Cloud project, the purpose of this tariff

was to verify its incentive impact on self-consumption and the useful load shifting for the grid. The elements applied are the following:

- .1. Application of a proportional reduced tariff for self-consumption (applicable depending on peak / off-peak hours and setoff on a quarter-hourly basis) for the members connected to the same transformer substation as the production of green energy;
- .2. Application of a specific annual fixed tariff for all members of the REC (€ 440 exclusive of VAT) covering the metering costs, the adjustment and the lease of the IT environment;
- .3. Application of the proportional tariff for self-consumption for surcharges and public service obligations - similar to the statutory tariff;
- .4. Application of a bonus or penalty depending on the performance of the REC measured by the self-consumption rate (S_{conso}) and coverage rate (S_{cov}) indicators:

<p>Facteur d'autoconsommation collective $A_{conso} = \frac{\sum kWh_{autoconsommés}}{\sum kWh_{alloués}} \times 100$ [%]</p> <p>I. Si $A_{conso} \leq 35$: $(1400 - 40 * A_{conso})$ II. Si $35 < A_{conso} < 45$: 0 III. Si $45 \leq A_{conso} \leq 55$: $(1800 - 40 * A_{conso})$ IV. Si $A_{conso} > 55$: -400</p>	<p>Facteur d'autocouverture collective $A_{cov} = \frac{\sum kWh_{autoconsommés}}{\sum kWh_{consommation\ totale}} \times 100$ [%]</p> <p>I. Si $A_{cov} \leq 10$: $(400 - 40 * A_{cov})$ II. Si $10 < A_{cov} < 20$: 0 III. Si $20 \leq A_{cov} \leq 30$: $(800 - 40 * A_{cov})$ IV. Si $A_{cov} > 30$: -400</p>
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- .5. Application of a specific non-periodic tariff covering the processing costs incurred by the grid operator for the creation of the REC, the incorporation of new members or any changes in the distribution keys;
- .6. The capacity rates (peak consumption) for each member's consumption are exclusively invoiced by the supplier (for the total consumption), integrating the impact of the REC on the reduction of the synchronous peak consumption for the members connected to the same Elia transformation substation as the green production.

3.10.2. Grid tariffs in phase 2

For the 2nd phase of the project, the decision was taken to cancel the proportional reduced tariff for the self-consumed electricity under the same substation as the renewable energy (referred to in 1/ above).

The specific tariffs referred to in 2,/ 4/ and 5/ above were maintained.

The reduction of the synchronous peak consumption was no longer taken into account for the calculation of the capacity rate, as the same proportional rate was applied to all participants on the basis of the gross quarter-hourly consumption profile.

The tariff components are described in detail in the decisions of the CWaPE and their annexes, which include the specific application grids.

4. Scope and sizing of the REC

4.1. Participants

4.1.1. Phase 1

The founding members of the non-profit organisation confirmed their participation in the REC for 6 power consumption points:

Founding members of the REC		Annual needs MWh
CHWAPI asbl	Union site	
CHWAPI asbl	Notre Dame site	
CRP MARRONNIERS opi	Mercier site	
CPAS TOURNAI	Moulins à Cailloux site	
IDETA sc	Cité site	
IDETA sc	Negundo site	
TOTAL		14,600

4.1.2. Phase 2

A call for candidates was launched in March 2021 among the enterprises of the business park Tournai Ouest, presenting the HOSPIGREEN project to them.

At the end of this process, two enterprises that showed a genuine interest in being involved in the project were accepted.

In addition, 2 new sites (nursing home and hospital) of the founding members of the REC were added:

New members of the REC		Annual needs MWh
CRP MARRONNIERS opi	Kiwis-Fougères site	
CPAS TOURNAI	Benjamin Grugeon site	
Vitrierie LANDRIEUX-LECLERCQ srl	business park Tournai Ouest	
ETABLISSEMENTS GLORIEUX SA	business park Tournai Ouest	
TOTAL		982

The addition of the new participants was confirmed by the decision of the CWaPE of 30/09/2021 (CD-21i30-CWaPE-0576).

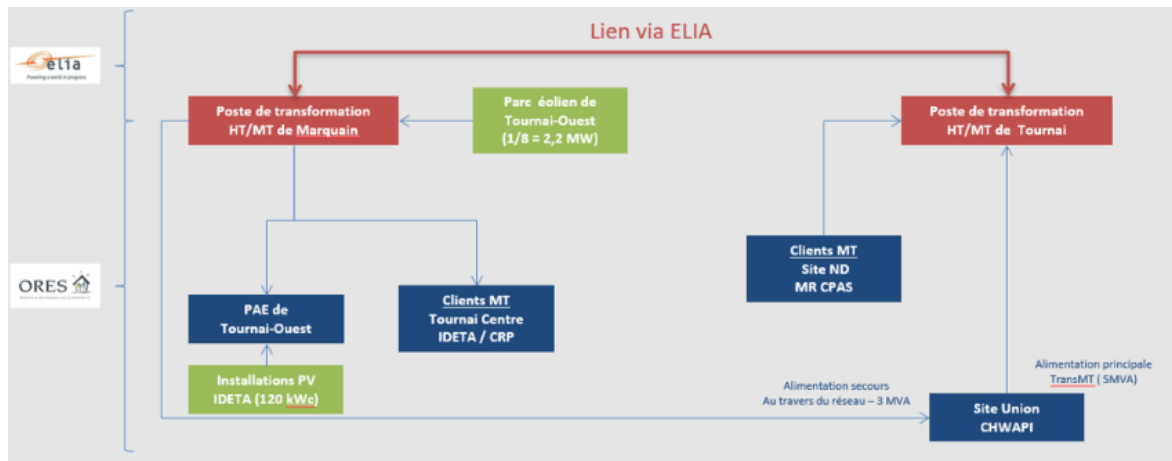
4.2. Electric scope and green energy sources of the REC

4.2.1. Electric scope and local energy sources

During the **first phase** of the project, the 6 sites supplied by 2 ELIA medium-voltage substations situated in Marquain and in Tournai were part of the REC. Their energy needs were estimated at 14,600 MWh/year. Five of the sites were powered with medium voltage, whereas the Hôpital Union site was powered with trans-MV.

Locally produced energy was supplied by wind turbines with an installed capacity of 2.2 MW (1/8th of the production of the 8 wind turbines at Tournai Ouest,) and by solar panels with an output of 120 kWp, generating 6 GWh/year.

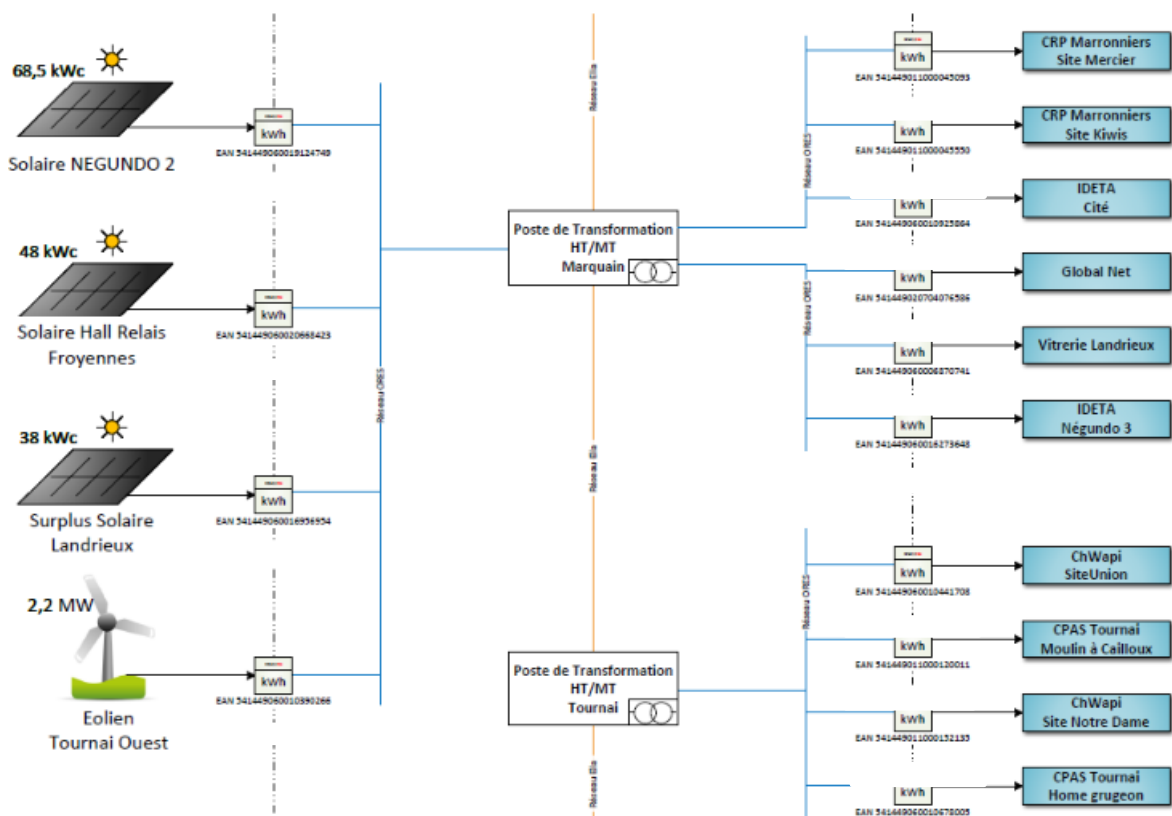
The remaining power needed was supplied at all times via the power grid by traditional suppliers, with whom the members of the REC have a power supply contract.



For the second phase of the project, the increase in the electrical consumption needs of the members (10) of the REC in its new configuration was estimated at 6-7 %. This figure did not justify the search for and addition of additional green energy sources.

Within the context of the pilot project, the REC distributed among its members the surplus that was not self-consumed generated by the photovoltaic installation of the ‘prosumer’ Vitrierie Landrieux (very small symbolic volumes).

All of the new sites were powered with medium tension. Three out of the four sites depended on the Marquain substation and one (Grugeon home of the CPAS) on the Tournai substation.



5. Contracts

Within the context of its assignment for HOSPIGREEN, CERWAL laid down the different purchase and sales relations in contracts.

5.1. Supply of green energy

The REC concluded contracts with e-NosVents SA (wind turbines) and Ideta (photovoltaic installation) for *“the provision of the entirety of the energy generated by the installations”* during the operational period of the pilot project.

A fixed annual price was determined depending on the expected production volumes and the “normal” market prices at the time at which the contract was signed (average price between 45 and 50 €/MWh). Given the short period, no indexation was considered.

The energy surplus of the “prosumer” was purchased by the REC at the same unit cost price as the energy supplied by the 2 other production methods.

5.2. Sale of Green Certificates

The contract signed for the photovoltaic generation of energy also implied the sale of green certificates. For this purpose a green certificate account had to be opened on behalf of the REC with the Walloon Public Services, and a contract had to be concluded with a supplier for the sale of the certificates (at a representative market price, slightly higher than the regional reference price for purchase by Elia at € 65/green certificate).

5.3. Sale of surpluses not self-consumed

The principle of collective consumption and sharing of locally produced energy does not prevent the injection of the surplus that is not self-consumed into the grid. The REC signed a contract for the purchase of energy surpluses (at a price linked to the positive imbalance price of Elia).

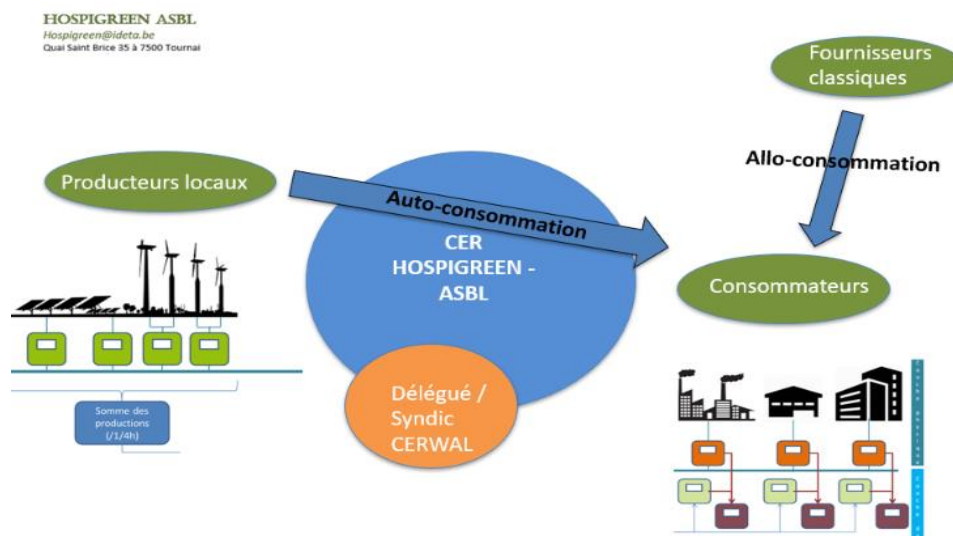
HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

6. Summary of the main operational elements of the REC



	PHASE 1 : 11/2020 to 10/2021	PHASE 2 : 11/2021 to 02/2023
Derogatory framework	CD-20j15-CWaPE-0451 amended by decision CD-20i17-CWaPE-0465	CD-21i30-CWaPE-0576
Local production of green energy	<ul style="list-style-type: none"> • 1/8th of wind farm of 17.6 MW • photovoltaic installations (120 kWp) 	<ul style="list-style-type: none"> • 1/8th of wind farm of 17.6 MW • photovoltaic installations (120 kWp) • surplus not self-consumed of the photovoltaic installation (38 kWp) of the member Landrieux : estimated at 12 MWh / year
Participants – Members of the REC	4 members – 6 EAN metering points <ul style="list-style-type: none"> • CHWAPI asbl, hospital of Wallonie picarde (2 EANs) • IDETA sc, Intermunicipal association for economic development (2 EANs) • CRP MARRONNIERS oip, psychiatric hospital (1 EAN) • CPAS DE TOURNAI, nursing homes (1 EAN) 	6 members – 10 EAN metering points <ul style="list-style-type: none"> • CHWAPI asbl, hospital of Wallonie picarde (2 EANs) • IDETA sc, Intermunicipal association for economic development (2 EANs) • CRP MARRONNIERS oip, psychiatric hospital (2 EANs) • CPAS DE TOURNAI, nursing homes (2 EANs) • VITRERIE LANDRIEUX-LECLERCQ srl (1 EAN) • ETABLISSEMENTS GLORIEUX sa (1 EAN)
Distribution of the energy produced among the members	Static distribution key based on the consumption history - predefined upon sizing the REC	Monthly variable “dynamic proportional” distribution key - calculated ex-post on a monthly basis by ORES
Total electricity needs of the members of the community	14,600 MWh	15,580 MWh
Specific grid tariff rules	<ul style="list-style-type: none"> • Invoicing 11th power peak from the start of the project – with impact of the measured reduction of synchronous peak consumption for self-consumption 	<ul style="list-style-type: none"> • Capacity rate: application of the same capacity rate to all members (11th peak) on the basis of a gross quarter-hourly consumption profile (not modified)

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

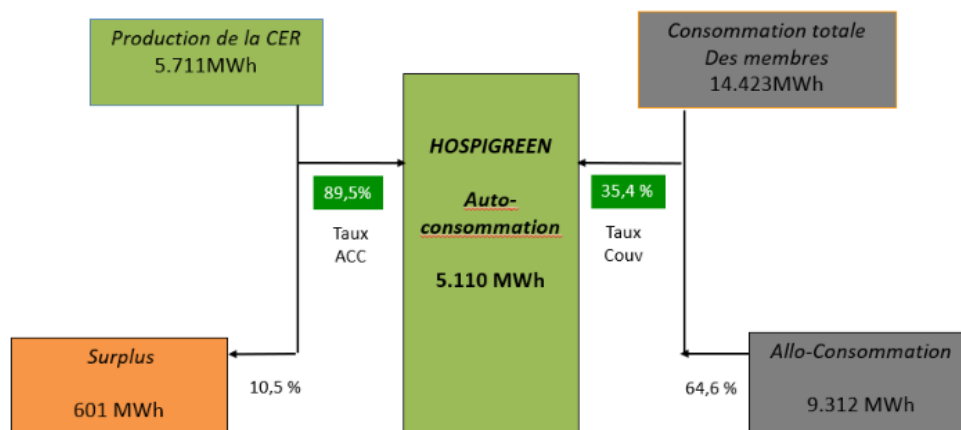
	<ul style="list-style-type: none"> Reduction of the grid tariff only for clients connected to the same substation as that of the renewable energy production Addition of a periodic rate per member for the cost of specific services Addition of a non-periodic rate for the creation of and changes to the REC Bonus and penalty system linked to self-consumption and self-coverage (target SCC > 55% and Scov > 30 %) 	<ul style="list-style-type: none"> Cancellation of the incentive proportional grid tariff for customers connected to the local substation for the production of green energy Continuation of the periodic rate per member for service fee Continuation of the non-periodic rate for the creation of and changes to the REC Continuation of the bonus-penalty system payable after each phase of the project (2 times in total)
Invoicing of the members	<p>Allo-consumption by traditional supplier Peaks by traditional supplier</p> <p>Self-consumption (convenience, cost of distribution and transmission networks, management fee) by Hospigreen</p>	<p>Allo-consumption and peaks by traditional supplier</p> <p>Self-consumption (commodity, cost of distribution and transmission networks, management costs) by Hospigreen</p> <p>Excise duties (from 2022 onward) by Hospigreen (see below)</p>

7. Energy-related results of the REC

7.1. Consumption of the REC - phase 1

Between 1 November 2020 and 31 October 2021, the REC consumed 14,423 MWh, of which 5,110 MWh as self-consumption and 9,312 MWh from the traditional power grid. In terms of production, the year 2021 was a relatively windless year, with a total production of the wind farm that was 17% lower than the average of the 3 previous years. 5,711 MWh of green energy was made available to the REC, of which 601 MWh was injected into the grid, i.e. more than 10% on average.

At the end of phase 1, the REC had a self-consumption rate of 89.5% and a coverage rate of 35.4%.



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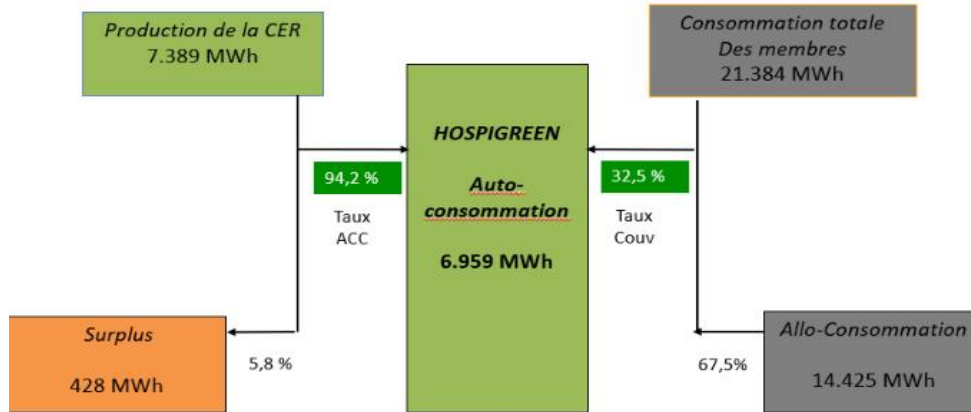
Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

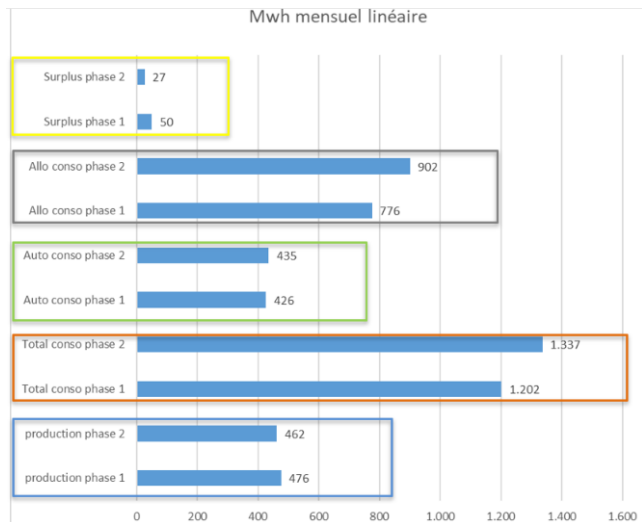
7.2. Consumption of the REC - phase 2

Between 1 November 2021 and 28 February 2023, the REC consumed 21,384 MWh, of which 6,959 MWh as self-consumption and 14,425 MWh as allo-consumption. In terms of production, there was less wind in the period than expected, causing a total production of the farm of 86% of its capacity. The REC had a self-consumption rate of 94.2 % and a coverage rate of 32.5%. 7,389 MWh of green energy was made available to the REC, of which less than 6% was injected into the grid.



Given the change in the initial assumptions and the unequal periods of the 2 phases, the evolution of the indicators can only be assessed by comparing the elements on a monthly (linear) basis, and bearing in mind the non-negligible effect of climatic conditions and changes in the number of members.

	Mwh	Mwh mensuel linéaire	Variation
production phase 1	5.711	476	-3%
production phase 2	7.389	462	
Total conso phase 1	14.423	1.202	11%
Total conso phase 2	21.384	1.337	
Auto conso phase 1	5.110	426	2%
Auto conso phase 2	6.959	435	
Allo conso phase 1	9.312	776	16%
Allo conso phase 2	14.425	902	
Surplus phase 1	601	50	-46%
Surplus phase 2	430	27	



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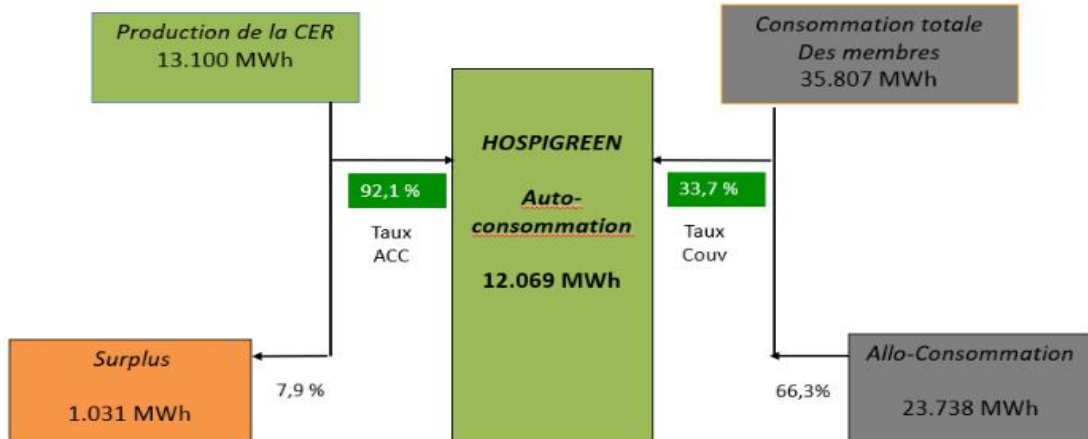
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7.3. Consumption of the REC - total pilot project period

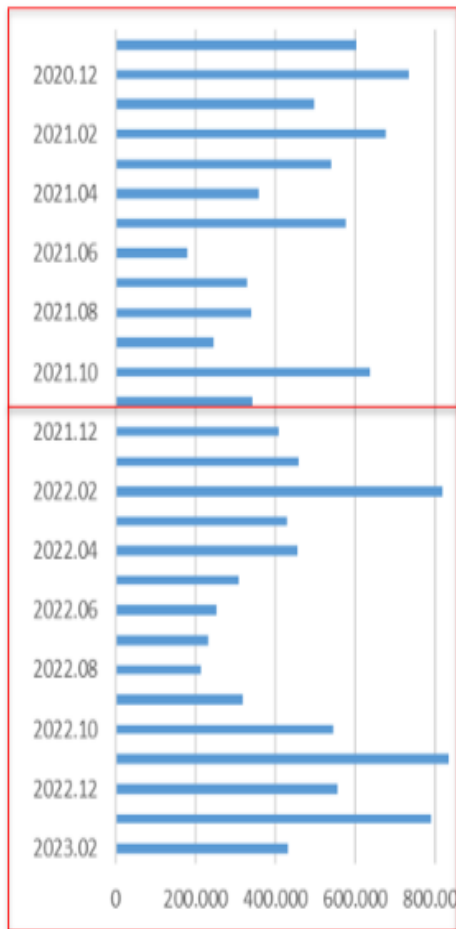
During the 28 months of the pilot project, the REC consumed 35,807 MWh, of which 12,069 MWh as self-consumption and 23,738 MWh from traditional suppliers. The REC had an average self-consumption rate of 92.1 % and a coverage rate of 33.7%. 13,100 MWh of green energy was made available to the REC, of which 8% was injected into the grid.



7.4. Monitoring of parameters and indicators – total period

The monthly evolutions and correlations between the indicators are represented in the graphs and tables below. The performance of the REC is highly dependent on the energy production of the wind farm, which has a significant influence on the coverage rate (R-COV), given the sizing of the REC. If production is low, the coverage rate declines and the self-consumption rate (R SCC) improves. As a whole, the self-consumption rates remain high between 85% and 100%.

Monthly local production - kWh



Evolution of production and indicators

Production and consumption in kWh

	TOTALconso	PRODUCTION	AUTOconso	ALLOconso	TX-COUV.	TX ACC.
2020.11	1.105.591	601.942	522.592	582.999	47%	87%
2020.12	1.154.859	733.198	624.472	530.387	54%	85%
2021.01	1.177.968	497.074	441.062	736.905	37%	89%
2021.02	1.051.985	676.852	576.426	475.559	55%	85%
2021.03	1.128.401	539.995	464.546	663.856	41%	86%
2021.04	1.047.736	358.666	342.596	705.140	33%	96%
2021.05	1.109.676	577.608	501.421	608.255	45%	87%
2021.06	1.379.177	177.899	177.009	1.202.167	13%	99%
2021.07	1.424.759	329.440	320.396	1.104.364	22%	97%
2021.08	1.331.415	338.720	328.864	1.002.551	25%	97%
2021.09	1.325.630	244.301	238.737	1.086.893	18%	98%
2021.10	1.185.381	635.678	571.983	613.398	48%	90%
Total général	14.422.579	5.711.368	5.110.105	9.312.474	35,4%	89,5%
2021.11	1.256.330	341.563	328.525	927.804	26%	96%
2021.12	1.308.630	407.634	375.186	933.444	29%	92%
2022.01	1.317.097	459.211	417.901	899.196	32%	91%
2022.02	1.184.267	817.172	731.337	452.930	62%	89%
2022.03	1.280.607	428.326	404.815	875.792	32%	95%
2022.04	1.183.377	456.156	433.276	750.102	37%	95%
2022.05	1.317.436	306.713	304.056	1.013.380	23%	99%
2022.06	1.395.438	253.035	251.109	1.144.329	18%	99%
2022.07	1.442.920	230.877	230.828	1.212.092	16%	100%
2022.08	1.561.564	212.204	212.204	1.349.360	14%	100%
2022.09	1.335.573	319.491	314.475	1.021.098	24%	98%
2022.10	1.336.309	544.712	517.288	819.021	39%	95%
2022.11	1.367.963	835.418	772.188	595.775	56%	92%
2022.12	1.450.530	554.022	514.516	936.014	35%	93%
2023.01	1.463.355	790.237	737.171	726.183	50%	93%
2023.02	1.182.751	432.049	414.184	768.567	35%	96%
Total général	21.384.146	7.388.820	6.959.058	14.425.088	32,5%	94,2%

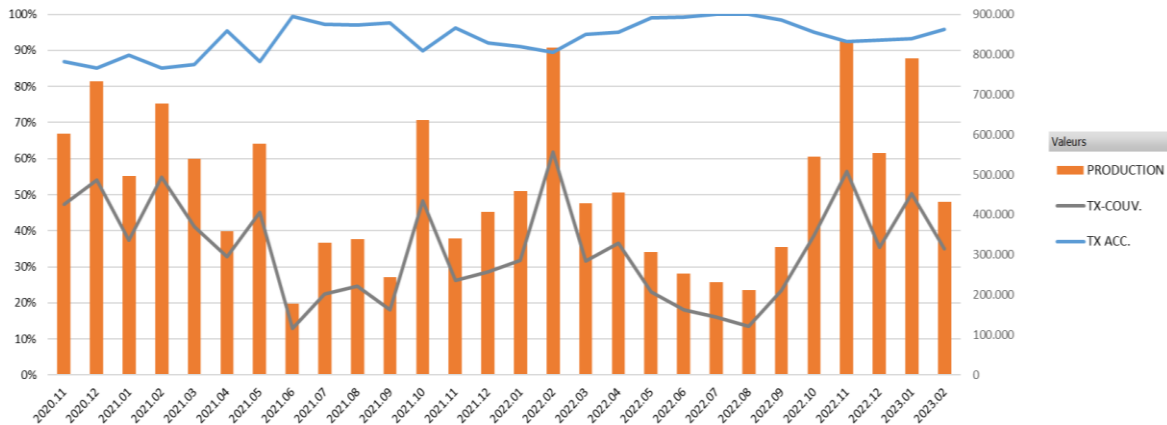
HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai
BCE 0757.672.542

The lowest self-consumption rates were registered in December 2020 and February 2021, at 85% for the REC as a whole. In the second phase, even in periods of strong winds (February 2022), the rate did not significantly drop and remained at a level that was improved by the new configuration of the REC and the assumptions for the allocation of energy. The rate reached a level of 100% in periods of limited local production. The highest coverage rate of 62% was registered in February 2022. It dropped to 13-14% in June 2021 and August 2022.

Coverage rate and self-consumption rate versus local production



The performance of the REC improved in the second phase of the project. A large number of consumers reduces the risk of non-synchronisation of the needs with the renewable energy produced. The mechanism of proportional dynamic allocation also has an influence on the performance.

Result per consumption site:

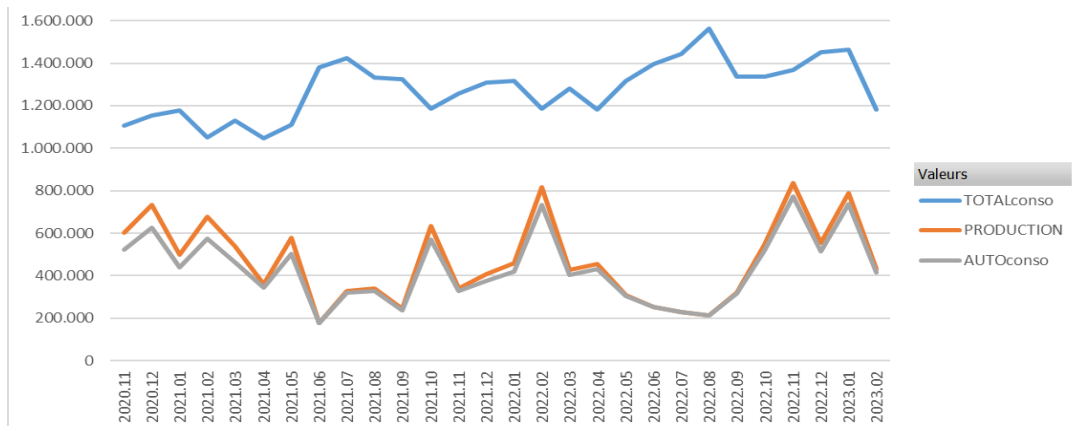
TOTALconso	PRODUCTION	AUTOconso	ALLOconso	TX-COUV.	TX ACC.	TX SURPLUS
6.195.300	2.230.266	1.999.915	4.195.385	32,3%	89,7%	10,3%
19.768.964	7.308.321	6.743.148	13.025.817	34,1%	92,3%	7,7%
432.845	152.287	141.602	291.243	32,7%	93,0%	7,0%
666.505	220.142	205.253	461.252	30,8%	93,2%	6,8%
5.704.299	2.113.897	1.974.143	3.730.155	34,6%	93,4%	6,6%
730.383	292.219	264.073	466.310	36,2%	90,4%	9,6%
517.396	190.156	178.226	339.171	34,4%	93,7%	6,3%
1.424.741	485.606	458.988	965.753	32,2%	94,5%	5,5%
43.057	14.080	13.407	29.650	31,1%	95,2%	4,8%
323.235	93.213	90.409	232.826	28,0%	97,0%	3,0%
35.806.725	13.100.187	12.069.164	23.737.562	33,7%	92,1%	7,9%

The total consumption needs (kWh) of the community increase during the summer periods, when the production of wind energy is usually the lowest. During these periods, the coverage rate was the lowest and the self-consumption rate the highest. These needs are essentially linked to the high energy-consuming cooling systems in hospitals.

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai
BCE 0757.672.542



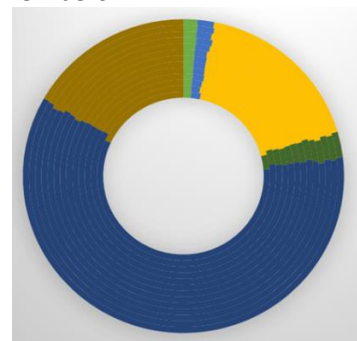
This graph also shows the decrease in the surpluses injected into the grid of phase 2 compared to phase 1. The gap between the available energy produced (orange) and the energy that is self-consumed (grey curve) decreases in summer due to the decline of the coverage rate and remains insignificant in winter as from late 2021.

7.5. Distribution of green energy among the members

In the first phase of the project, the delegate verified the relevance of the preset static key for the actual evolution of the allocation of the energy produced, all the more because this key was used to distribute the costs among the members.

The contractual key is represented by the central ring, whereas the distribution of the energy produced each month among the members is represented by the successive sections of the outer ring, each member being represented by a specific colour.

Evolution of the distribution of the energy produced in PH1 among the members



Thanks to the monitoring, a fair and, above all, stable distribution of the energy among the members of the REC was possible.

Phase 1 : table relating to the monitoring of the distribution of the locally produced energy among the members of the REC

		Clé réelle mensuelle selon les périodes de consommation (jour/nuit/week-end)											
Affectation de la production	Clé forfaitaire	nov-20	déc-20	janv-21	févr-21	mars-21	avr-21	mai-21	juin-21	juil-21	août-21	sept-21	oct-21
Different sites and members	1,44%	1,38%	1,42%	1,45%	1,42%	1,41%	1,41%	1,39%	1,44%	1,47%	1,42%	1,45%	1,42%
	1,83%	1,55%	1,65%	1,75%	1,68%	1,62%	1,64%	1,57%	1,73%	1,84%	1,66%	1,78%	1,67%
	17,64%	17,28%	17,35%	17,40%	17,36%	17,35%	17,40%	17,32%	17,38%	17,50%	17,42%	17,42%	17,35%
	2,77%	2,62%	2,64%	2,65%	2,64%	2,64%	2,67%	2,64%	2,64%	2,69%	2,67%	2,66%	2,64%
	58,31%	60,46%	60,14%	59,94%	60,14%	60,10%	59,74%	60,20%	60,06%	59,42%	59,66%	59,87%	60,18%
	18,01%	16,70%	16,80%	16,80%	16,76%	16,88%	17,15%	16,88%	16,75%	17,08%	17,17%	16,83%	16,74%

The implementation of the proportional dynamic key in the second phase of the project led to the concern that the largest consumer within the REC would have a consumption of green energy that would be out of proportion. This was not the case.

HOSPIGREEN ASBL

Hospigreen@ideta.be

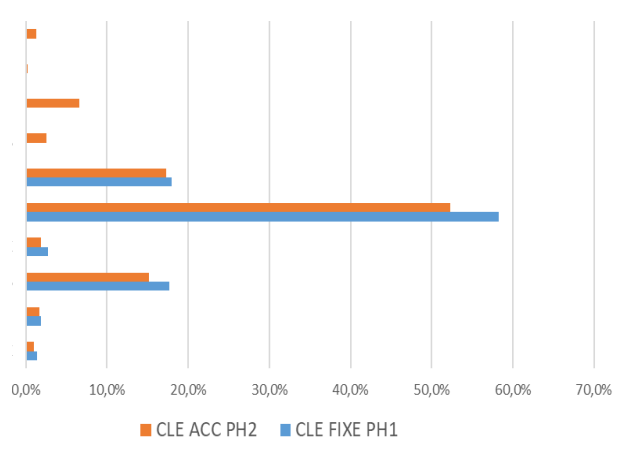
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BCE 0757.672.542

During the first few months, it was observed that the site with the highest surplus rate in phase 1 of the project immediately gave up the most allocated energy to the new members of the REC. This effect was then attenuated in the following months.

The consolidated monthly figures of the energy allocation keys are the following:

Repartition between Members ph1/ph2 (self-consumption ph2 versus Fixed repartition ph1)

	STATIC PH1	DYNAMIC KEY PH2
Member	1.4%	1.0%
Member	1.8%	1.7%
Member	17.6%	15.2%
Member	2.8%	1.9%
Member	58.3%	52.3%
Member	18.0%	17.3%
Member		2.6%
Member		6.6%
Member		0.2%
Member		1.3%

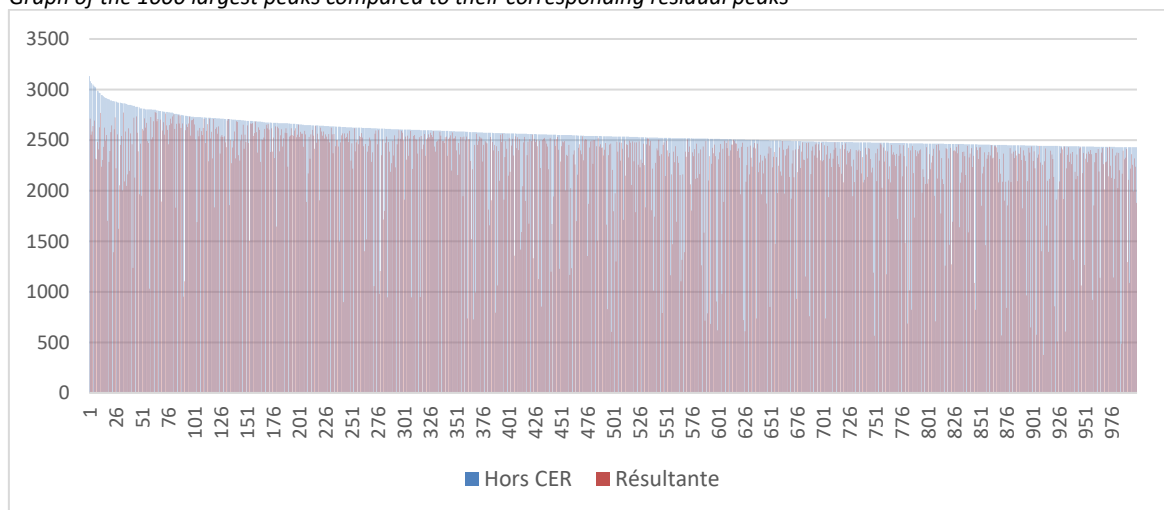


7.6. Analysis of the impact of the REC on the measurement of consumption peaks

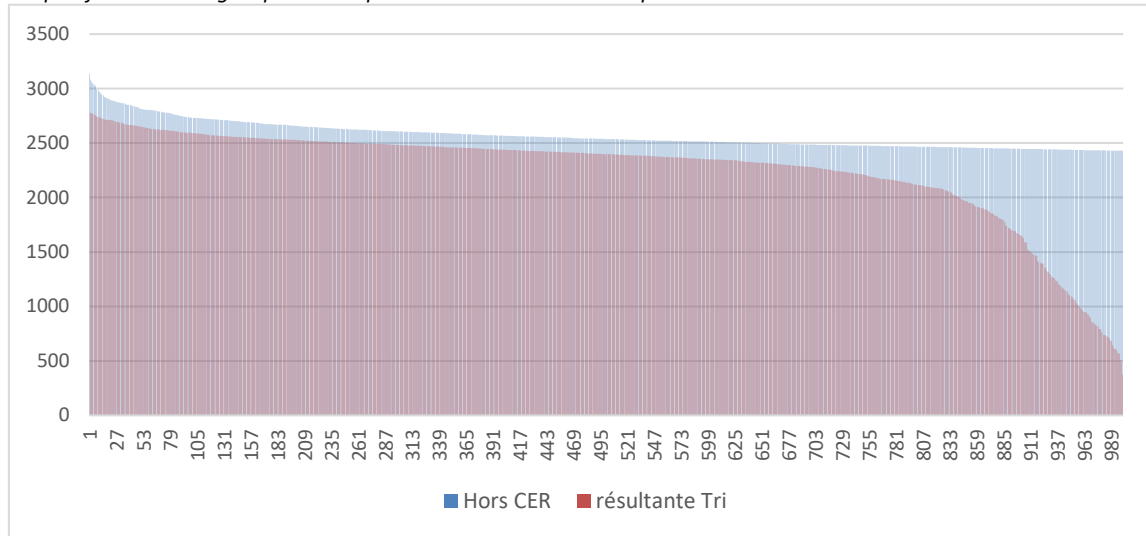
The analysis of the impact of the REC on the peak consumptions requires an overview of the aggregate consumption of the participants. Therefore, two distinct phases were analysed. The first relates to the data of 6 participants in the period from November 2020 to October 2021. The second relates to the data of 10 participants in the period from November 2021 to February 2023. The analysis was carried out on the basis of the first 1000 peaks in each period.

7.6.1. Phase 1 : 6 participants

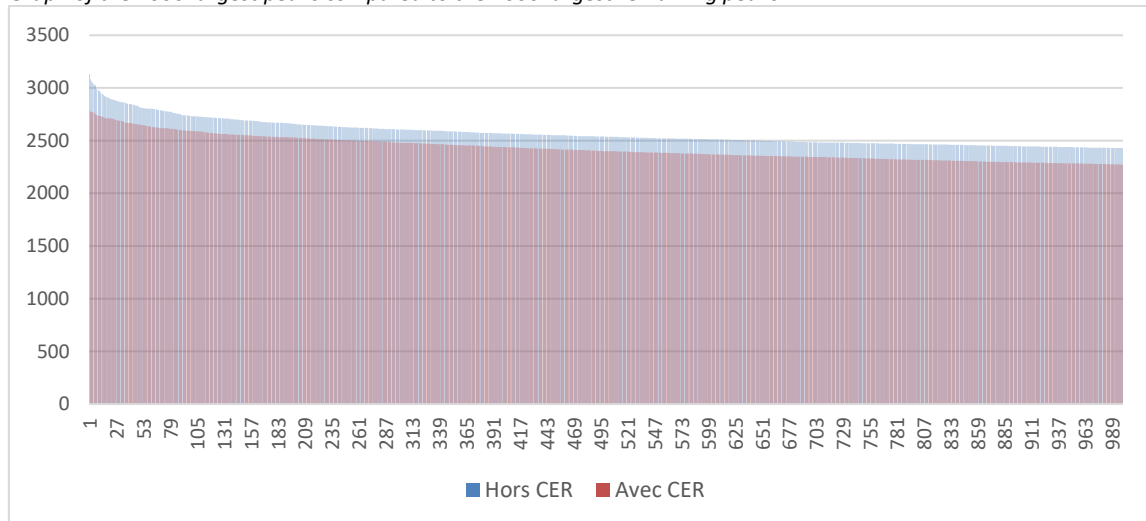
Graph of the 1000 largest peaks compared to their corresponding residual peaks



Graph of the 1000 largest peaks compared to the sorted residual peaks

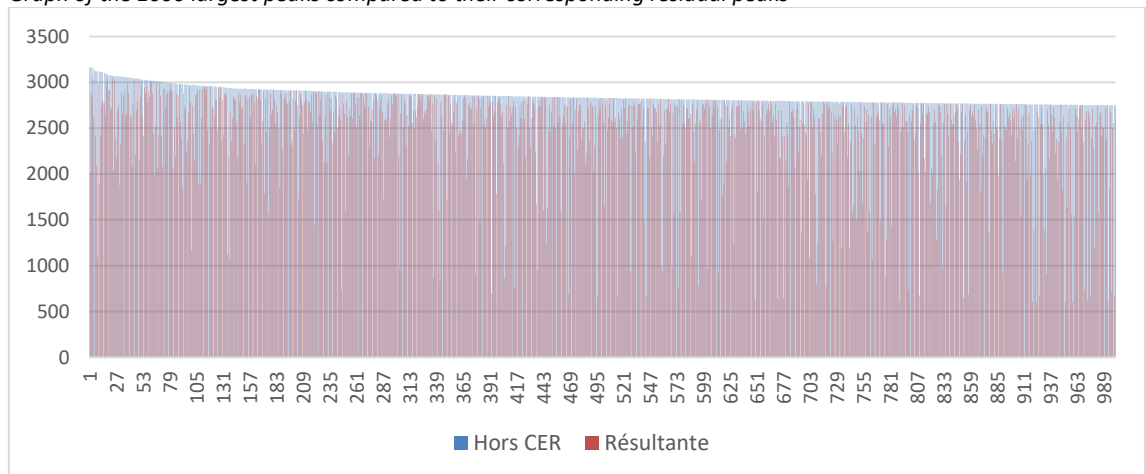


Graph of the 1000 largest peaks compared to the 1000 largest remaining peaks

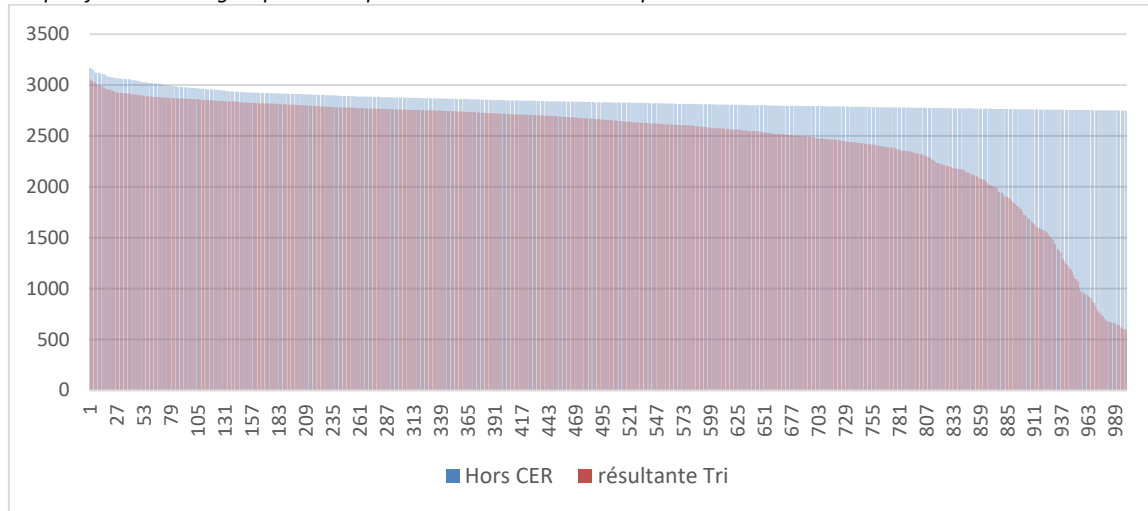


7.6.2. Phase 2 : 10 participants

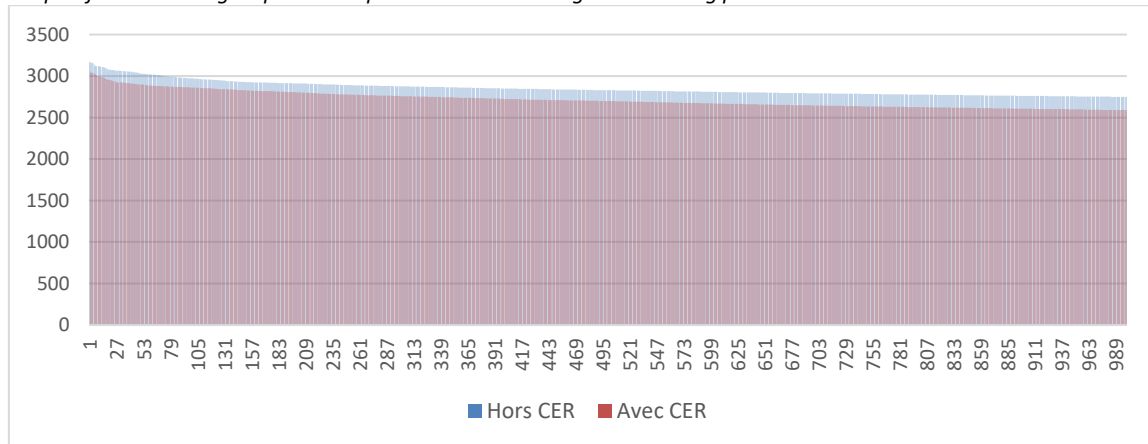
Graph of the 1000 largest peaks compared to their corresponding residual peaks



Graph of the 1000 largest peaks compared to the sorted residual peaks



Graph of the 1000 largest peaks compared to the 1000 largest remaining peaks



7.6.3. Observations

In general, the impact of the REC on the peaks is similar in the 2 analysed phases.

It was noted that the 1000 highest peaks were attenuated on average by 12 to 13%. The attenuation in these 1000 peaks varied between 0 and 85%. More in detail, the comparison between the largest peak during the entire project (3,167.9 kW) and the largest remaining peak during the entire project yields a **delta of 3.6%**.

In this REC, which was supplied by a mix of wind and solar energy, the average attenuation (12 to 13%) of the peaks calculated after self-consumption was fairly high.

8. Financial results of the REC

The energy crisis of 2022 interfered with the results of the project. It did not lead to changes in the price of the self-consumed energy but made it more competitive compared to the prices set by contract on the market. Therefore, the economic results are presented per phase in order to better assess the actual impact of the distribution on the economic gains of the project.

However, some members continued to benefit from a fixed tariff that had been reserved prior to the surge in the market prices and was in line with the initial assumptions of the project. The impact of the prices on the results of the second phase is mainly caused by the fact that the largest member of the REC renewed its contract with effect from January 2022.

8.1. Commodity cost and management costs

The **cost of the local green energy** is calculated on the basis of the lease of the production equipment and the actual MWh generated.

Moreover, the REC sells the green certificates granted for the photovoltaic installation as well as the surplus not self-consumed by the members. The net commodity cost for the self-consumption therefore consists of the following elements:

monthly "lease"	+	small fees of the injection of the photovoltaic surpluses	-	sale of the collective surplus	-	sale of green certificates linked to the energy produced by the leased installation	+	Purchase of the surplus of the "prosumer" that was not self-consumed in phase 2 (negligible impact)
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This cost was invoiced by the REC to its members on the basis of the key applicable to each of them. It was increased by the fee paid to the delegate for the **management services** at a rate of €5/MWh self-consumed (increased by bank costs, insurance etc.).

Cost of self-consumed energy	Phase 1	Phase 2
Net purchase cost of self-consumed commodity - k€	$274 + 1 - 22 - 11 =$ k€ 242	$383 + 1 - 34 - 15 + 1 =$ k€ 333
Management fee of the REC - k€	k€ 25.5	k€ 333
Local self-consumed production - MWh	5,110 MWh	6,959 MWh
Net unit cost of self-consumed energy with management fee - €/MWh	€ 52.3/MWh	€ 53.4€/MWh

Inclusive of bank costs, costs of publication of the accounts, insurance etc.

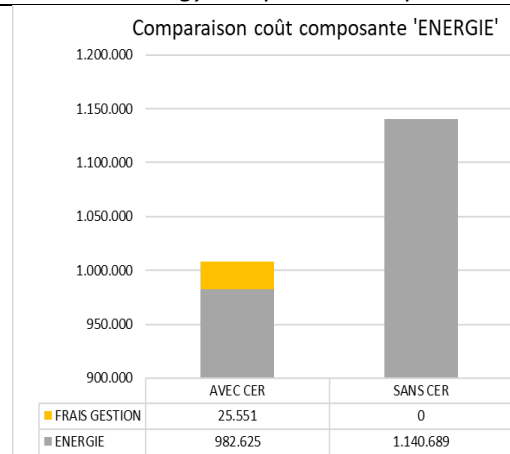
Only the seasonal variation in production has an influence on this price in the two periods.

For the calculation of the monetary gain as stated below, the total of these 2 items (electricity and management) is compared to the prices of the item "Energy" on the invoices for allo-consumption, depending on the individual contracts of each member (including peak and off-peak hours and contribution to renewable energy).

The **calculation of the gain achieved by the REC** (on the commodity) is carried out on the basis of the cost and the total consumption of the members, as self-consumption is regarded as an occasional and partial alternative to cover the energy needs.

Net cost price (€) of purchase of energy and management costs – with and without the existence of the REC - TOTAL consumption (allo+auto)

Phase 1 : energy component comparison



Benefit “Energy and management costs” = +/- k€ 133

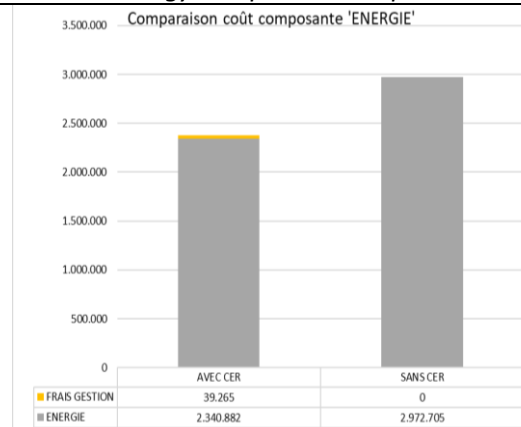
Average electricity price for allo-consumption = € 80 MWh

Average electricity price for self-consumption = € 52 MWh

Average price all consumptions = € 70 MWh

Gain REC = € 9.2 /MWh total consumed

Phase 2 energy component comparison



Benefit “Energy and management costs” = +/- k€ 599

Average electricity price for allo-consumption = € 139 MWh

Average electricity price for self-consumption = € 53 MWh

Average price all consumptions = € 111 MWh

Gain REC = € 27.7 /MWh total consumed

These figures should be interpreted with caution.

The impact of the energy crisis on the electricity price is visible when comparing the average prices in phases 1 and 2. The price of the locally produced green energy was negotiated and laid down in a contract before the crisis. During this period, the producers and the prosumer were not able to resale the energy at higher market prices. The participants are aware of the discrepancies observed and of their very specific nature. During this period, the REC also sold the surpluses that were not self-consumed at a lower price on the market, but these volumes were very small. The global electricity price is also influenced by the time when certain members changed their supply contracts and their weight in the REC (ChWapi).

As indicated in the assumptions of the project, the suppliers did not adjust the prices of the allo-consumed energy to the degradation of the consumer profiles due to the existence of the REC, nor did they pass on the administrative costs. In this context, the conclusion of the e-Cloud project implied an additional cost of between 1 and 7 €/MWh for allo-consumed energy (with a forward price for the energy of 40-50 €/MWh). After the surge in the market in 2022, it can be reasonably assumed that this additional cost would be higher within the context of this project.

It seems to be difficult for the suppliers to mitigate this price increase, as the variations in local consumption, the presence of several suppliers and the flexible distribution keys that were defined

ex-post complicate the forecasts relating to allo-consumption of the suppliers and increase the costs to restore the equilibrium on the market.

Furthermore, according to the assumptions of the project, the component “Energy” of the allo-consumed electricity includes the green energy levy (26-28 €/MWh), whereas that of self-consumed energy does not.

8.2. Network costs, surcharges and excise duties

8.2.1. Network costs

During phase 1, only the sites connected to the same transformation substation as the equipment for the production of renewable energy generated gains as regards the proportional and capacity rates (i.e. Ideta Negundo, Ideta Cité, CRP Marronniers). The specific tariffs applied for the self-consumed volumes has a limited impact on the economic results of the REC.

The deviations granted as to the capacity rates and the proportional rates did not constitute a sufficient incentive for load shifting in the REC at the end of the first year. At the end of the pilot project, the members were fully aware of the required behavioural changes. However, such changes are not always feasible in the short term, given the requirements and obligations associated with the area of activity.

During the second phase, the impact of the grid tariffs was insignificant as a result of the cancellation of the incentive tariff for the proportional rate and the measurement of peaks in consumption in gross volumes.

Furthermore, the periodic metering tariff was applied to all sites and the REC paid the non-periodic cost associated with the creation of the REC. These items gave rise to an incremental cost that does not constitute an incentive. As these are fixed costs, they have a disproportional impact on the different members of the REC.

These effects could be cancelled by the bonus granted by ORES on the basis of the good performance of the CER.

	Phase 1	Phase 2
Gains on the proportional rate	€ 4,331	€ 0
Gains on the capacity rate	€ 2,034	€ 0
Periodic metering costs	€ -2,633	€ -5,846
Non-periodic costs (creation of/change in REC)	€ -534	€ - 180
Total	€ 3,198	€ -6,026
Bonus	€ +4,800	€ +8,000
Total	€ 7,999	€ 1,974
Unit costs	1.5 €/MWh	0.28 €/MWh

In the presentation of the global financial results of the REC, the amounts relating to the network costs are consolidated with the excise duties (introduced to replace certain surcharges on transmission costs) - see below.

8.2.2. Special excise duties on electricity

As from 2022, ORES's invoice was reduced by a series of surcharges linked to the public service obligations initially included in the transmission network tariffs, which were replaced by a special excise duty on electricity.

The question of whether the REC is subject to excise duties for the consumption of renewable energy was submitted to the federal authorities (in October 2022) with a view to confirming the community's status as "electricity distributor".

The Programme Act of 27 December 2004 (CHAPTER XVIII. - Taxes on energy products and electricity) specifies that electricity and natural gas are subject to taxes and that excise duties are payable by the distributor at the moment of the supply to the consumer (art. 424 § 1). HOSPIGREEN therefore has the following obligations:

- the obligation to declare and pay the excise duties
- obligations linked to invoicing
- the obligation to keep accounts of stocks and movements
- the obligation to submit to audits, if applicable

The delegate performed the registration formalities by submitting a request form for a permit for *Energy products and electricity* on 13 December 2022. The "electricity distributor" certificate was issued in January 2023 after a check of the deposit paid (deposit equivalent to 2 representative months of excise duties (€ 8,622)).

The special excise duty is calculated on the basis of degressive rates applied to consumption brackets established on an annual basis.

The excise duties were calculated by the delegate for each month and for each participant as from 1 January 2022, within the context of the internal invoicing to the members. The amount of € 51,960 (€ 8.3/MWh on average - including 5 months at a reduced rate) was paid to the Treasury.

These elements lead to several observations:

1. The need for training in order to acquire expertise in the matter;
2. The administrative burden of calculations and declarations in the absence of a dedicated software for RECs;
3. The deposit caused a cash deficit for the REC, requiring a contribution by the members to prefinance their share in the deficit;
4. The exemptions provided for in the Programme Act for renewable energy do not apply to this project;
5. The method of degressive rates by brackets and the division of the excise duties into excise duties for the self-consumption by HOSPIGREEN on the one hand and excise duties for the supply of energy by the traditional supplier on the other hand gives rise to a disadvantage for the consumers of the REC. The sum of the two calculated excise duties may seem to be

disadvantageous, as the consumptions taken together would have caused a shift to a lower bracket.

On the other hand, given the application of considerably lower rates to the first brackets as from November 2022 (government measures taken as a result of the energy crisis), a gain was generated. Generally speaking, the impact on the results of the CER is considered to be neutral (an amount of € 5,000 at most is insignificant when compared to the total financial volumes).

8.2.3. Partial refund of the surcharge for green certificates of ELIA

Within the context of the system of “portage” of the green certificates of Elia, the Walloon Public Services publishes and updates every three months the reference list of end consumers who are eligible for partial exemption from this surcharge. As hospitals can benefit from a 50% exemption, the REC can obtain a refund of the amounts invoiced via ORES.

As refunds require a credit note issued by the traditional supplier, the members concerned only obtained a refund for the consumption of energy supplied by a traditional supplier.

An agreement was reached between the REC, the Walloon Public Services and the two suppliers concerned, who agreed by way of exception for this pilot project to refund an amount calculated on the basis of the total consumption.

8.3. Overall economic result of the REC

Considering the coverage rate of 33.7% for the 28 months of the pilot project, the total consumption of the REC and the different tariffs applicable during the 2 phases, the project as a whole gave rise to an average cost of € 137/MWh for all members and all consumptions combined. If the REC had not existed, the estimated cost would have been €157/MWh.

The invoice paid by the members amounts to k€ 4,894 (for 35,807 MWh). If the REC had not existed, the participants would have paid k€ 5,634 k€. The 13 % savings (k€ 740) are almost exclusively attributable to the effect of the electricity price and the exemption from the green energy levy.

We stress the importance of the impact of certain assumptions of the project on the results and of the required cautious interpretation (see especially the remarks under item 8.1 above).

Total consumption cost WITHOUT REC – k€ :	5,634
Total consumption cost WITH REC – k€ :	4,894
Coverage rate:	33.7%
Gain % :	13% (of which 12.8% from the item Energy)
Gain - €/MWh :	20.7
Total consumption price €/MWh WITHOUT REC :	157
Total consumption price €/MWh WITH REC :	137
Price of self-consumed energy €/MWh :	86
Price of allo-consumed energy €/MWh :	163

As the results are influenced by the impact of the energy crisis during phase 2, the presentation per phase is relevant in order to obtain an insight into the incentives required for a REC to maintain the cost of locally consumed energy below that of the traditional supply of electricity.

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai
BCE 0757.672.542

Phase 1	Phase 2																								
Total consumption cost WITHOUT REC – k€ : 1,769 Total consumption cost WITH REC – k€ : 1,629	Total consumption cost WITHOUT REC – k€ : 3,865 Total consumption cost WITH REC – k€ : 3,265																								
Coverage rate: 35.4%	Coverage rate: 32.5%																								
Gain % : 8% (of which 7.5% from the item Energy) Gain - €/MWh : 9.7	Gain % : 15.5% (of which 15.3% from the item Energy) Gain - €/MWh : 28																								
Total consumption price €/MWh WITHOUT REC : 123	Total consumption price €/MWh WITHOUT REC : 181																								
Total consumption price €/MWh WITH REC : 113 Price of self-consumed energy €/MWh : 87 Price of allo-consumed energy €/MWh : 127	Total consumption price €/MWh WITH REC : 153 Price of self-consumed energy €/MWh : 85 Price of allo-consumed energy €/MWh : 186																								
Total consumption – MWh : 14,423	Total consumption – MWh : 21,384																								
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These global indicators are the result of monthly statements including the volumes, the consumption types (self-consumption and allo-consumption, peak and off-peak hours), the pricing conditions and the contracts with suppliers of each participant.

Summary of the consolidated amounts (€) per phase, type of consumption and financial item:

PHASE 1									
REEL k€ avec CER	auto-consommation	allo-consommation	Total	REEL k€ sans CER	auto-consommation	allo-consommation	Total	Gain k€	Gain €/MWh
énergie	242	741	983	énergie	400	741	1.141	158	11,0 €
gestion	26	0	26	gestion	0	0	0	-26	-1,8 €
réseaux, OSP, accises	177	444	620	réseaux, OSP, accises	183	446	628	8	0,55 €
	444	1.185	1.629		582	1.187	1.769	141	9,7 €

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

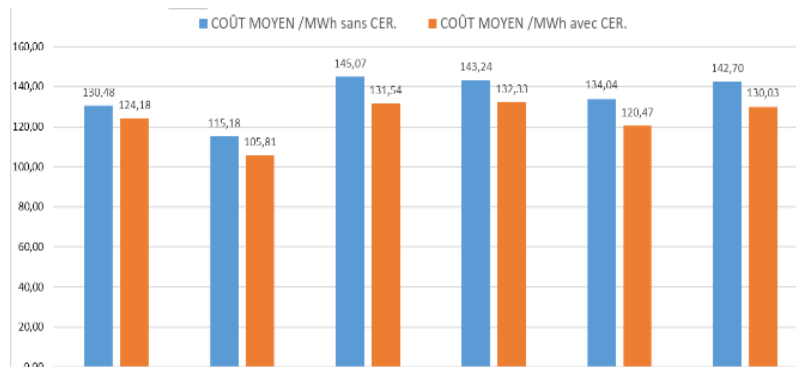
PHASE 2									
REEL k€ avec CER	auto-consommation	allo-consommation	Total	REEL k€ sans CER	auto-consommation	allo-consommation	Total	Gain k€	Gain €/MWh
énergie	333	2.008	2.341	énergie	965	2.008	2.973	632	29,5
gestion	39	0	39	gestion	0	0	0	-39	-1,8
réseaux, OSP, accises	216	669	885	réseaux, OSP, accises	223	669	892	7	0,32
	588	2.677	3.265		1.188	2.677	3.865	599	28,0

GLOBAL									
REEL k€ avec CER	auto-consommation	allo-consommation	Total	REEL k€ sans CER	auto-consommation	allo-consommation	Total	Gain k€	Gain €/MWh
énergie	574	2.749	3.324	énergie	1.364	2.749	4.113	790	22,1
gestion	65	0	65	gestion	0	0	0	-65	-1,8
réseaux, OSP, accises	393	1.113	1.505	réseaux, OSP, accises	406	1.115	1.520	15	0,42
	1.032	3.862	4.894		1.770	3.864	5.634	740	20,7

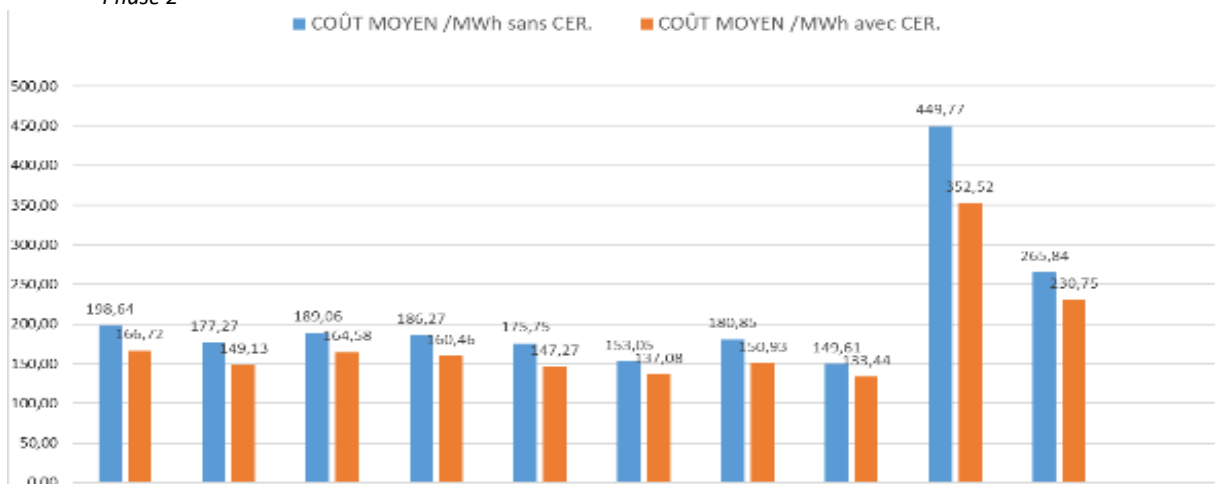
These costs and indicators are the result of the gains achieved by the different members, it being understood that the results of the REC are to a considerable extent determined by the largest consumer. However all members benefited from the project:

REC impact on average price MWh per member – with and without REC

Phase 1



Phase 2



9. Achievement of the objectives, strengths and weaknesses of the pilot project

The pilot project enabled the creation of a REC representing 15GWh of consumption needs on an annual basis of up to 10 members, its operation during a period of 28 months and its evolution in 2 phases. The lessons learned from this project are multiple.

- From a legal point of view,
 - creation of a non-profit organisation with the content of its articles of association being an important consideration, as well as the organisation of its operations, the management bodies and the compliance with the obligations resulting from the Belgian Code of Companies and Associations;
 - various contracts with third parties for the supply and sale of energy - with determination of well-balanced contractual prices that make it possible for the REC to be viable;
 - test of the system for the recruitment, acceptance and validation of new members;
- From an administrative and financial point of view,
 - The role of the delegate was strengthened by this experiment, given the degree of expertise required in the field of administration, management, analysis of energy-related results and preparation of individual reports for the members;
 - Determination of the actual content of the management services
 - The project made it possible to determine and clarify the invoicing flows to be automated between ORES, the REC and the suppliers, as well as the content of the invoices issued by each of them;
 - Implementation of a method to calculate the gains in order to verify the incentive effects and the financial results;
 - Basis for functional analysis with a view to the development of integrated management tools for RECs;
 - Necessity of integrating underlying mechanisms of CERs into the exchange platforms and the automated management tools of the stakeholders of the market;
 - Difficulty for suppliers to have clear forecasts as to allo-consumption, which may give rise to higher balancing costs;
 - Evaluation by ORES of the burden and the possible disproportion of fixed metering costs that may be charged to the members of a REC;
 - Identification of the difficulties encountered in the cash management of a REC;
- From a technical point of view, the project specifically made it possible
 - to highlight the importance of the prior sizing of the community in order to generate viable results
 - to raise the matter of the degradation of the “typical profile” of allo-consumers with their suppliers, implying the risk of less favourable tariffs and invoicing of additional costs;
 - to test 2 systems for the distribution of electricity for self-consumption by the members and to decide in favour of the proportional dynamic distribution key, which optimises the consumption flows of locally produced energy;
 - for ORES and the market regulator to test various grid tariffs in order to identify the required incentive level and the time required for load shifting;

- to confirm the indicators, i.e. the self-consumption rate and the coverage rate, to monitor the REC;
- to prove the impact of the REC on the calculation and measurement of peak consumption;

Define and test a protocol for the exchange of data between the REC and the grid operator (distribution keys, metering, network costs...) and to adapt the technological tools of the grid operator to the energy communities.

The transmission of the quarter-hourly data took place through the exchange of files that are convertible to the csv format, made available to the delegate.

This method worked perfectly within the context of this project but needs to be further developed for the industry via the market process/platform between suppliers, grid operators and delegates.

Analyse the optimisation of energy flows and the synchronisation of consumption and production by applying a dynamic distribution key and implementing technical tools that make it possible to control certain installations on participants' sites.

The distribution on the basis of the proportional dynamic distribution key could be tested in the second phase of the project. New technical tools that make it possible to regulate the consumption flows within the community were not implemented. However, the recovery of the volumes of the "prosumer" in phase 2 was an interesting experiment to determine the payment methods and the technical operation methods for the management of the EANs.

To acquire concrete and active experience that will provide a better understanding of the technical and socio-economic implications of collective self-consumption for all stakeholders in the energy market.

Many lessons can be learned from this pilot project by the self-consumers, by the delegate and by the partners of the project (suppliers, producers, grid operators, IT enterprises, regulator), who monitored the implementation and the evolution of the results and who contributed to the resolution of certain difficulties.

Regular meetings of steering committees on the one hand and of boards of directors on the other hand enabled the follow-up and the variety of exchanges between the delegate and the partners and the members.

Other elements to be highlighted include:

The underlying administrative burden associated with the distribution of energy among the members

The multiplicity of the information received by the end customer (of the REC, of the supplier)

The satisfaction of the participants in the pilot project, who want to continue the system in the new legal framework.

HOSPIGREEN ASBL

Hospigreen@ideta.be

Quai Saint Brice 35 at 7500 Tournai

BCE 0757.672.542

10. Annexes

- 10.1. Decision of the CWaPE CD-20j15-CWaPE-0451 of 15 October 2020
- 10.2. Decision of the CWaPE CD-20l17-CWaPE-0465 of 17 December 2020
- 10.3. Decision of the CWaPE CD-21i30-CWaPE-0576 of 30 September 2021