InterFlex

Unlocking the barriers to accelerate and scale up residential flexibility in Belgium

Work Package 2 Accelerated practical action on the ground

T2.1 Dynamic pricing

Deliverable 2.1.2.

POC dynamic tariff v2.0 is live

Partner responsible: Ecopower
Partners involved: UGent

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Contents

List of acronyms

API	Application Programming Interface
BRP	Balance Responsible Party
DA	Day Ahead
POC	Proof of Concept
PV	Photovoltaic
EV	Electric Vehicle
VNR	Vlaamse Regulator voor de Energie- en Gasmarkt
CREG	Commission de Régulation de l'Électricité et du Gaz
REScoop	Renewable Energy Sources Cooperative
kWh	Kilowatt-hour
MWh	Megawatt-hour
EPEX DA	European Power Exchange Day Ahead

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1. Introduction

The InterFlex project aims to address and overcome the barriers to accelerating and scaling up residential flexibility in Belgium. This report is part of Work Package 2, *Accelerated Practical Action on the Ground*, and specifically contributes to Task 2.1 on dynamic pricing. It focuses on the development and integration of dynamic pricing strategies and tools in project year 2 by Ecopower, a cooperative supplier and producer of green electricity, in collaboration with Ghent University (UGent).

In the first year of the project, Ecopower researched and launched a dynamic pricing formula that was accessible to all customers - versions 2.0 and 2.1. In the second year, the focus shifted to evaluating and refining the formula, resulting in the development of version 3.0, which will be further explored in year three.

Rolling out a new product like the dynamic price formula requires supporting tools that help customers determine whether switching to a dynamic price is suitable for their consumption profile. For those who opt in, these tools also enable effective monitoring and management of their energy performance. To meet this need, Ecopower developed and launched the Dynamic Price Monitor and Dynamic Price Simulator in project year one. These tools help customers understand the pricing structure and assess its impact. The Dynamic Price Simulator, in particular, laid the groundwork for more advanced analysis. In year two, Ecopower continued research to expand the tool's capabilities, aiming to account for flexible assets such as batteries, electric vehicles, and heat pumps. In the third year, this research will transition into actual development in collaboration with EnergieID.

In 2025, Ecopower introduced two additional end user tools: the *Stroomplanner* and the *Budget Monitor*. The Stroomplanner is a smart energy planning tool that visualizes moments of surplus or shortage within the cooperative. It was designed to help customers better understand the time-based value of electricity. Even customers not yet on a dynamic tariff can use it as a guide to shift consumption to periods with the lowest societal cost. This helps build awareness and prepares users for a potential switch to dynamic pricing in the future.

Finally, with the introduction of the dynamic tariff, tracking one's electricity bill has become increasingly important. To support this, Ecopower developed the Budget Monitoring tool in collaboration with EnergieID. This tool alerts customers when their spending exceeds a predefined threshold, helping them stay in control of their energy expenses.

2. Dynamic pricing research and implementation

2.1. Dynamic price v1.0

Dynamic price v1.0 was the first real-life implementation of a dynamic price formula by Ecopower, the POC (proof of concept) was launched between July 2022 and October 2023. The pilot involved 235 households, of which 24 opted into dynamic billing and 146 shared data for analysis.

The pricing formula was based on day-ahead market prices and designed to reflect actual supply costs and customer responsiveness. Participants were encouraged to shift consumption to lower-priced periods, with some using automated systems or manual adjustments. While a subset of users achieved modest financial benefits, especially those with batteries or electric vehicles, the pilot revealed that dynamic pricing was generally less favorable for households with solar panels due to quarter-hourly billing disadvantages.

Key lessons included the importance of accurate forecasting, the impact of imbalance costs, and the need for tailored customer guidance. These insights informed the development of dynamic price v2.0.

2.2. Dynamic price v2.0

Dynamic price v2.0 was introduced by Ecopower in September 2023 as a refined and scalable successor to the pilot version of the dynamic price (v1.0). Drawing on lessons from this initial proof of concept, this version aimed to offer a transparent and cost-reflective pricing formula to all Ecopower customers. The formula is based on the EPEX day-ahead market price, with differentiated multipliers and fixed adjustments for both offtake and injection, designed to account for imbalance costs and operational realities.

Since customer guidance appeared to be key during the pilot project, Ecopower launched a dedicated communication campaign including a webinar, website updates, and newsletter articles. The pricing logic was adjusted to avoid skewing customer profiles and to ensure that non-energy costs were covered through a fixed monthly fee rather than embedded in the energy price. Special provisions were also added to accommodate energy sharing in Flanders, with tailored surcharges reflecting the administrative and imbalance-related costs.

Despite cautious uptake initially, interest grew steadily. By the end of September 2024, 462 customers had adopted the dynamic tariff. Ecopower also discontinued its proprietary API, recognizing that public APIs provided sufficient functionality for most users.

2.3. Dynamic price v2.1

In 2024 we evaluated the dynamic price formula for cost reflectiveness. There were two effects we did not anticipate, with some effects on this parameter. First off, with injection increasingly occurring at times with low to negative electricity prices, the 85% factor on the EPEX DA price has a very low impact in reality. At the same time, these low prices can occur at times with high average market prices (in the absence of solar production). 2024 also saw very high imbalance costs for solar even though both average market prices and solar market prices were relatively low.

Secondly, the 85% factor lead to perverse effects with negative prices. When the price is negative, the 85% factor actually increases the price customers can inject electricity at. This effect was partially taken into account when setting up the formula. The increasing amount of negative price moments and their depth (in euro/MWh) however also increased the impact of this phenomenon. In the formula, any price below -27 euro/MWh meant customers actually got more than the EPEX DA price for injection.

To solve these problems, more weight was put onto the fixed term of the injection formula, changing the formula to:

0,98* EPEX DAh – 15 euro/MWh

Looking back the formula seems to be performing quite close to market reality, with imbalance costs and formula add-ons staying within 1 or 2 euro/MWh from each other. We did however get some interesting feedback from our network of cooperants who are engaging with this price formula.

Many do not initially understand the 15 euro/MWh deduction on the EPEX prices, and confuse it with a markup intended as a margin on reselling the electricity by Ecopower. It takes some time explaining imbalance and the difference between the momentary effect of imbalance and the more general balance on the net (with excess or shortage of renewable electricity).

We've also gotten some questions on the logic of imbalance costs in relation to the time when electricity is injected. Indeed some of our cooperants have invested heavily in storage, allowing them to inject at times of high prices, and avoiding injection at the solar peak times. As imbalance costs are very much correlated to times with high solar, these cooperants might indeed have very different imbalance costs. We have not taken up these issues in the dynamic price V3.0 but see some interesting research potential afterwards on this topic.

The curve in *Figure 1 Evolution of dynamic price contracts Ecopower* shows that the number of dynamic contracts (y-axis) increases proportionally over time (x-axis). On 9th of October 2025, 1.487 customers adopted Ecopower's dynamic price formula v2.0. This means 2,12% of Ecopower's customers opted in for a dynamic price, which is significantly higher than the average in Flanders (0,67% in September 2025).

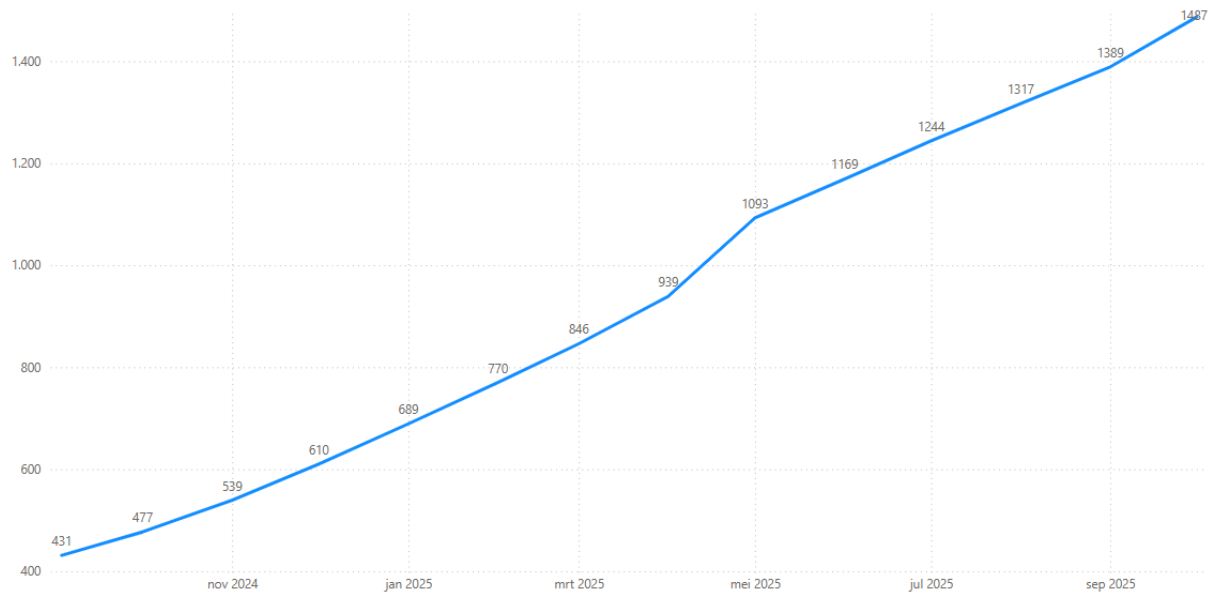


Figure 1 Evolution of dynamic price contracts Ecopower

2.4. Dynamic price v3.0

As a cooperative energy supplier, Ecopower does not simply buy its electricity from the market. Collective installations are built with the capital gathered by the cooperants. The electricity from these installations is then reserved for supply back to the cooperants. This reservation allows for the cooperative supply model where part of the price formula can stay fixed and independent from market prices. This supply model allows for much asked for stability, showing its true value in times of energy crisis when prices soar and cooperative supply can stay at reasonable price.

The dynamic price up until v2.1 does not account for this price stability. Indeed the entire formula is based on pure market costs and revenues. This was done on purpose. When setting up the dynamic formula there were some discussions modelling the dynamic price on the “normal” price formula, which at the time was half-fixed, half variable (with an index price changing every month). A half fixed dynamic electricity price formula however does not make much logical sense. If a cooperant changes the time at which he uses electricity, the price difference between both times is simply cut in half with such a formula. This reduces even further the already quite limited incentive to shift electricity usage to more opportune times.

To avoid this, many other formulas were taken into account. A very complicated formula was considered, building on the work in the ETF Sea2Socket project where a direct PPA from offshore wind was constructed. Both from a regulatory perspective as from a communications perspective, this complicated formula would be very hard to explain. Also profile contracts were considered, as they are often referred to in academia to solve this type of problem. Also there some distorted market signals might occur. Moreover, also these types of formulas do not seem in tune to residential customers with very limited understanding of the electricity market.

The most suitable solution turned out to be the most simple one. The new cooperative dynamic price formula remains the same as the “regular” dynamic price formula on the per kWh basis. A separate buffer component is introduced, reflecting the real costs and revenues for the cooperative model. As average market prices go up, the cooperative installations are cheaper than the market for supply and can thus diminish the customer electricity invoice. As average market prices go down, the opposite happens. The cooperative installations then produce at a cost higher than market prices, and so the consumer in this model will have to pay some extra. A fixed term is introduced, to be paid monthly, which then reflects this reality by going up when prices are low and going down when prices are high.

Figure 2 Buffer component dynamic price v3.0 per market price level

This new component is the same for every customer, regardless of the amount of kWh they use. The buffer is thus divided equally among cooperants that are also customers. In extreme cases where prices are very high, this cost component can even become negative as displayed in *Figure 2 Buffer component dynamic price v3.0 per market price level*. It accounts for the buffer itself, as well as the administration cost which is also the same for very small and very big users alike.

This formula has 3 main intended effects. Firstly, running the formula back we see that it would provide an adequate buffer to high energy market prices. Indeed, in times of energy crisis customers would get money back every month to support their higher dynamic price invoices. At times with low prices, the subscription-type buffer cost would go up, elevating their very low dynamic price invoices.

Figure 3 Buffer component vs EPEX DA prices

Secondly, the buffer component also flattens invoices between the seasons (*Figure 4 Smoothed invoice effect*). In winter, traditionally, prices are higher and also invoices go up as also the amount of offtake goes up. In this season the buffer will then be likely to return money. In summer, with often low prices and offtake (and sometimes even a lot of injection), invoices will be low, giving more room for the buffer to fill up.

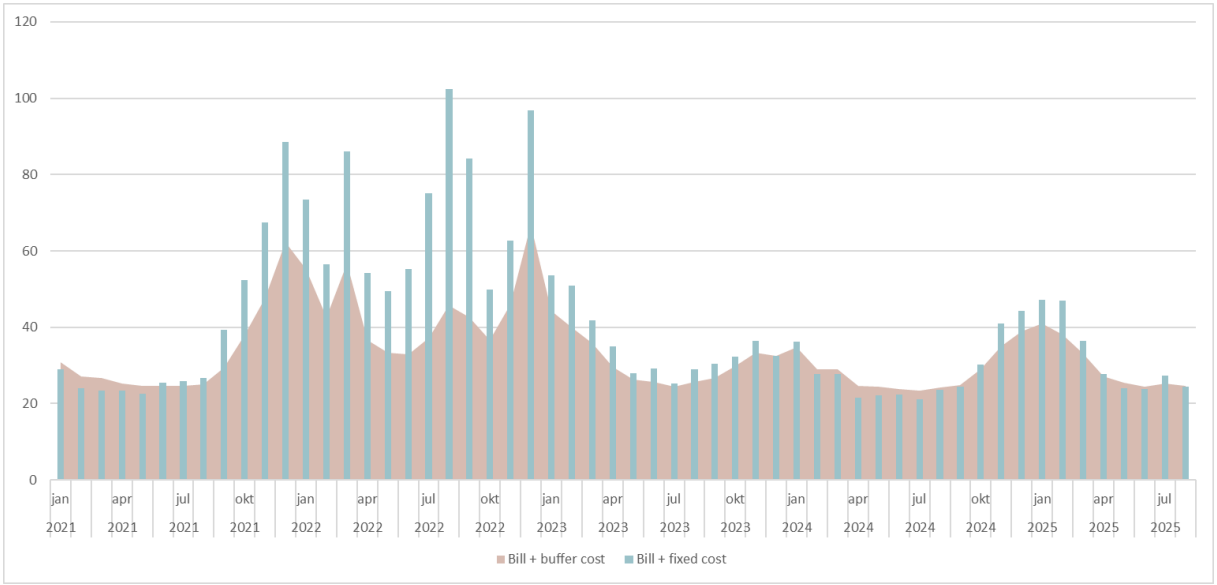


Figure 4 Smoothed invoice effect of buffer component

Lastly, this new type of buffer does not interfere at all with the incentives of customers to shift electricity usage and injection. Every shift gets fully remunerated to the customer making the effort. This gives maximal flexibility and thus maximal environmental benefits.

To conclude, we give an overview of the evolution of Ecopower's Dynamic price formulas that have been developed during the InterFlex project up until present:

	Period	**Offtake**[1]	**Injection**[2]	**Monthly fee**
Dynamic price v2.0	01/09/2023-31/12/2024	1,02 x $EPEX_{DA}$ + 4 EUR/MWh	0,85 x $EPEX_{DA}$ – 4 EUR/MWh	5 EUR/month
Dynamic price v2.1	Starting from 01/01/2025	1,02 x $EPEX_{DA}$ + 4 EUR/MWh	0,98 x $EPEX_{DA}$ - 15 EUR/MWh	5 EUR/month
Dynamic price v3.0	Expected Q1 2026	1,02 x $EPEX_{DA}$ + 4 EUR/MWh	0,98 x $EPEX_{DA}$ - 15 EUR/MWh	5 EUR/month – 0,15 * ($EPEX_{avg}$-100)

Table 1 Overview dynamic price versions Ecopower

[1] Excl. 21% VAT for businesses and 6% VAT for individuals.
[2] Excl. 21% VAT for businesses, VAT not applicable for individuals.

2.5. EPEX DA trading switch to quarterly hour values: analysis Ecopower

On trading day 30 September 2025 for delivery day 1 October 2025 the 15-minute Market Time Unit (MTU) has been introduced on all borders and in all bidding zones in Europe for Single Day-Ahead Coupling (SDAC). Many EU Member States, including Belgium, changed their day-ahead market granularity to 15 minutes[3]. This means there will no longer be one day-ahead price for every hour, but 4 different prices for every quarter-hour.

Since the Ecopower dynamic price formula refers to the day-ahead market, Ecopower informed its customers 2 months ahead of time that our price formula would henceforth be calculated on a quarter-hour basis. It seemed rather logical to follow this evolution wholly, as reverting to 1 hour averages means assuming some part of the risk (and thus charging risk premiums).

Ecopower also shared the expectation that this change would have very little practical impact. Indeed a smaller granularity should theoretically lead to smaller increments between the different time-steps. It was also expected that 15-minute based nominations would better allow for planning the ramping up and down daily solar output in the nominations, such as not to be confronted with these expected events in the form of imbalances.

As 1 October 2025 passed, it became increasingly clear that these expectations were wrong. Different processes still are based on hourly-based timesteps, even though the market itself now trades in quarter-hourly-based timesteps. These inconsistencies now lead to big differences between subsequent quarter-hour prices at the edges of each hour. Especially in the hours where solar is ramping up and down in all neighboring countries, within the hour prices rise or decrease as expected, but prices shoot back down or up (the opposite way) at the beginning of each next hour.

Most customers with a dynamic price contract use automated logic to steer their devices. For them these big differences at the edges of each hour might represent opportunities if they are accounted for correctly in their algorithms. They might, for example, allow for batteries to charge at the lowest hour price to use electricity in the subsequent quarter-hours, rather than only charging at low priced hours and discharging at high priced hours (limited by the volume in the battery). Some customers however manually look up prices to choose beneficial times to use certain appliances. For example, some customers with an EV might wait for low price times to plug in their EV and enjoy cheap charging. In these cases the quarter hour prices do require some attention as some “zones” are not homogeneously low or high priced. For them we issued an updated blog post[4] on the Ecopower website and sent out a new communication. Generally, people need not to worry too much about this. On average old strategies will still lead to lower prices. Some optimizations might however be possible to increase potential savings.

In addition, Ecopower also published a blog post about this event on its website to inform is customers.

[3] https://www.epexspot.com/en/15-minute-products-market-coupling
[4] https://www.ecopower.be/nieuws/dynamische-burgerstroom-een-blik-op-de-kwartierprijzen-sinds-1-oktober

3. End user tools

To help customers become familiar with the dynamic tariff in a reliable and effective way, Ecopower provides detailed guidance on its website, explaining how to enroll in the end-user tools and emphasizing their added value. In November 2024, following the initial rollout of the Dynamic Price Monitor and Simulator, Ecopower hosted a webinar to introduce these tools, mentioning the support of the InterFlex project. One year later, in October 2025, Ecopower placed the end-user tools - developed with support from InterFlex - at the centre of its annually recurring Ecopower Energy Cafés. By the end of October 2025, a total of 5.905 Ecopower customers had registered for EnergieID Premium, granting them free access to the tools described in this chapter.

3.1. Dynamic Price Monitor and Simulator

3.1.1. Introduction

Ecopower customers get full access to the EnergieID environment, where specific Ecopower analysis are available for them. Supporting the dynamic price, Ecopower and EnergieID developed two tools together. One tool is for customers who have a dynamic price, and want to follow up their performance (and maybe compare it to another price formula). The second tool is for customers who are considering a dynamic price and want to see if their usage profile is suitable for a dynamic price.

The Dynamic Price Monitor[5] is the former tool, used by people already tracking their dynamic price performance. This tool was launched with the full launch of the Ecopower dynamic price proposal. In this tool customers can trace costs for commodity back to the hourly (or quarter-hourly) granularity. The comparison with the “traditional” price formula provides some assurance that their efforts are useful and that they don’t spend excessively in the dynamic price scheme.

The Dynamic Price Simulator[6] is the latter, used by people contemplating a switch to a dynamic price scheme. Here only their profile is being compared to a “standard” profile. This “standard” profile is the one used in allocation for a non-dynamic customer, and thus gives some indication of the underlying cost of servicing a client of that nature. All else equal, a customer with a better-than-average profile should in the long run benefit from a dynamic price contract.

3.1.2. Components

In October 2025 with the transition to quarter-hourly-based day-ahead prices, some refinements were made to the Dynamic Price Monitor. All calculations now have to be made per quarter-hour,

[5] https://www.ecopower.be/tipsenkennis/energieid/monitor
[6] https://www.ecopower.be/tipsenkennis/energieid/simulator

as price differences within the hour do make a difference now. This change also impacted the granularity for much of the visuals, most of which became (increasingly) hard to read and interpret.

The standard view was therefore switched to a week of data. Views with longer stretches of time (e.g. month) now get a more summarized view with a daily maximum and minimum price, showing the potential spread (Figure 5 Dynamic Price Monitor).

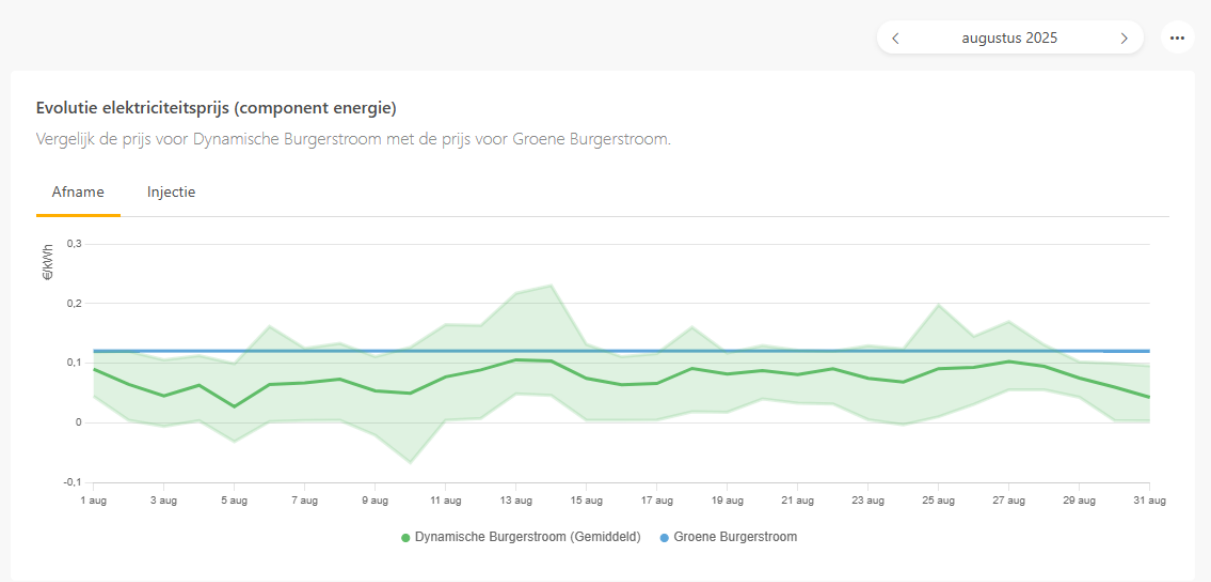


Figure 5 Dynamic Price Monitor

The Simulator tool gives users insight into their profile. It does not consider the pricing formula itself, but merely judges whether a consumer consumes electricity at above or below average times. It gives some indication as well of the potential extra cost or revenue to be earned from a switch.

This analysis is based on the comparison of the standard profiles used in the market for distributing offtake and injection, and the real profile of the customer. Both are valued at the dynamic price formula. If the result is favourable, this means more offtake is at cheaper times than an average household (and/or injection is at more opportune times). The basis for this analysis was used by EnergieID to support an analysis for the Flemish government, published here. It supported our early conclusion that the market at this moment favours customers in the “traditional profiles” when they have PV panels. It also underpins the assertion that large increasing electrification (batteries, heat pumps, EV’s) amplifies the potential deviation (good or bad) when applying smart steering. This study is yet to be published.

In 2026 the use of these standard profiles will be phased out completely. The simulator will thus have to be adapted to more accurately show the difference between an “average customer” and the actual profile of the customer. Developments are being made to account for this change.

For both tools extensive to-the-point documentation has been made available on the Ecopower website. Each tool gets its own page with a step-by-step explanation of how to use these tools and how to interpret their results.

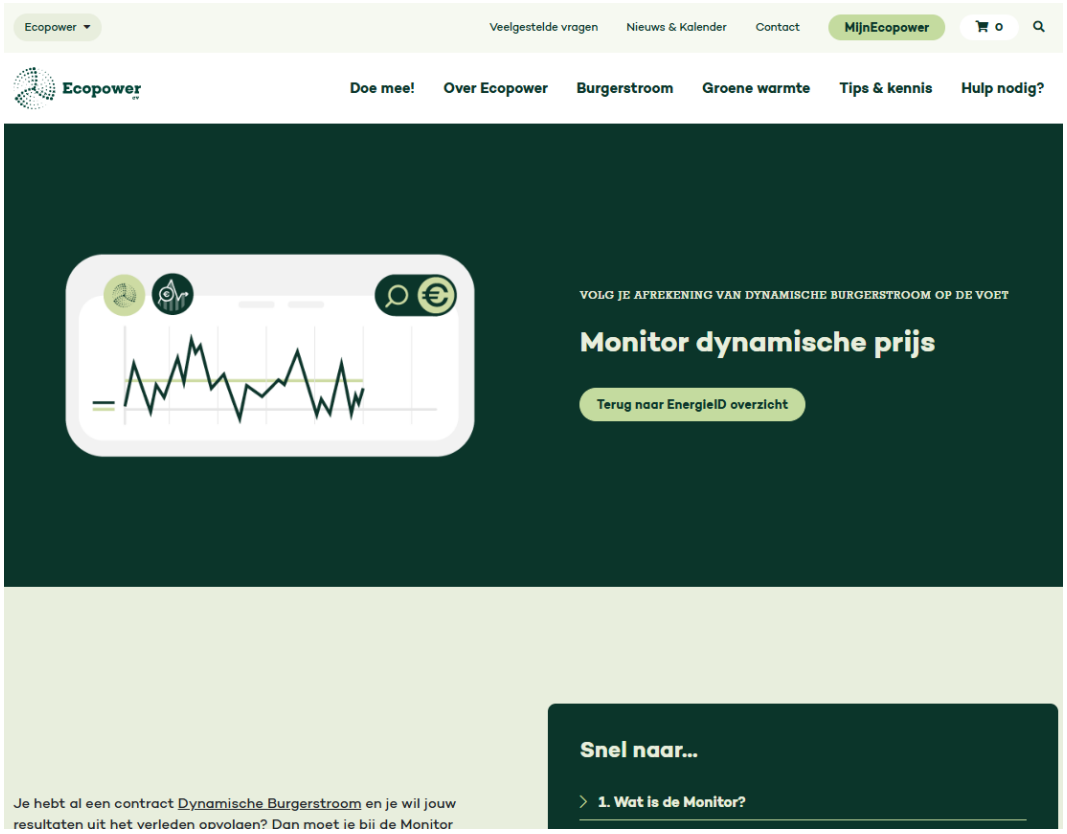


Figure 6 Dynamic Price Monitor - Ecopower webpage

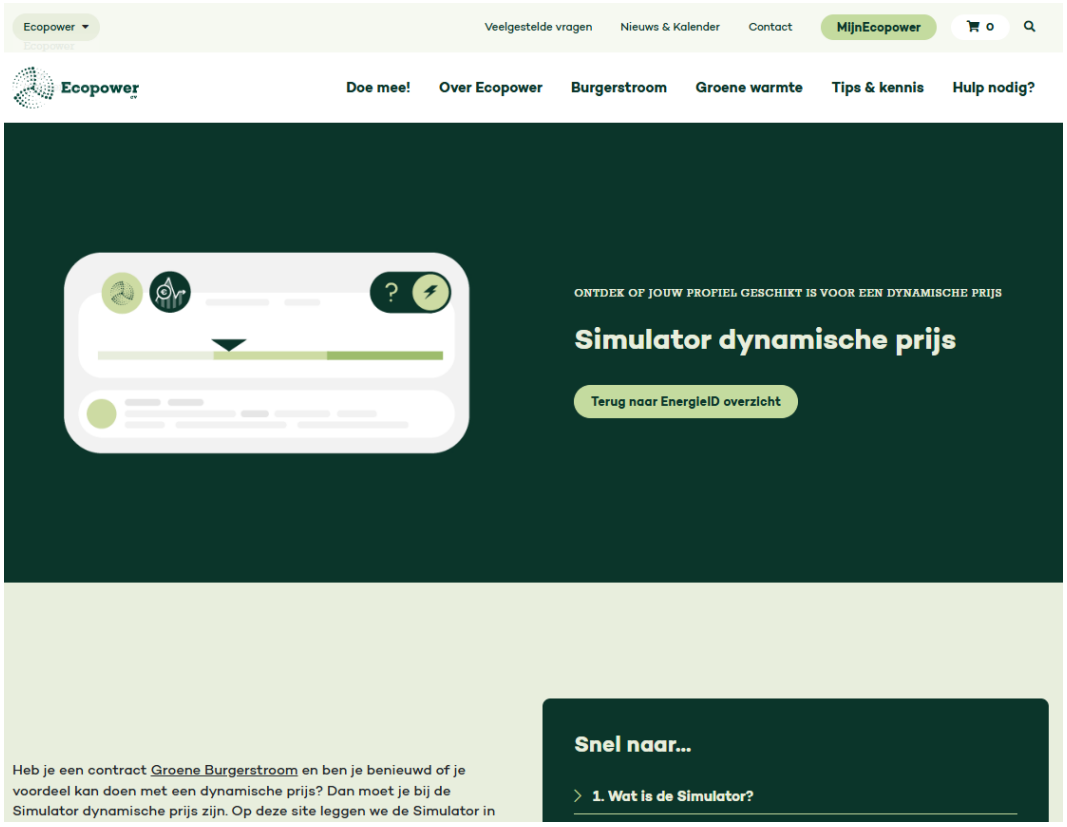


Figure 7 Dynamic Price Simulator - Ecopower webpage

3.2. Smart energy use planning tool (Stroomplanner)

3.2.1. Introduction

The Smart energy use planning tool 'Stroomplanner[7]' - in deliverable D2.1.1 referenced to as 'societal barometer' - is an end user tool developed by Ecopower in collaboration with EnergieID, aimed at empowering cooperative members to actively participate in the energy transition. It is a user-friendly planning and awareness tool that helps households align their electricity consumption with the availability of locally produced renewable energy.

Integrated into the EnergieID Premium platform, the Stroomplanner provides hourly forecasts of Ecopower's green electricity production—primarily from wind turbines and solar installations and the consumption of the energy community. These forecasts are visualized using a color-coded system (ranging from dark green to red), which indicates the most and least favorable times to consume electricity based on the expected balance between local production and cooperative demand.

The Stroomplanner was developed to strengthen the role of cooperative members in the energy transition by making energy use more visible, understandable, and actionable. Its primary aim is to raise awareness about electricity consumption and production within the cooperative, helping users better understand when their energy use aligns with locally generated renewable power.

By offering clear visual guidance, the tool encourages users to shift flexible consumption—such as running household appliances or charging electric vehicles—to times when local solar and wind production is high. This not only supports individual behavioral change but also contributes to the cooperative's overall self-sufficiency by reducing the need to purchase electricity from the market during periods of low production or high demand. In doing so, the Stroomplanner helps stabilize the grid and supports decarbonization efforts by promoting demand-side flexibility and reducing reliance on fossil-based electricity.

The tool is accessible via both desktop and mobile interfaces and is available free of charge to all Ecopower customers who use EnergieID Premium. It does not require smart meters or automated home systems, making it accessible to a wide audience. Users receive clear, actionable insights that allow them to make small but impactful adjustments to their daily routines.

The color codes are defined as follows:

- Dark Green – Very Good Moment

  Ideal time to use electricity. Local renewable production is high, and cooperative demand is well balanced. Users are encouraged to schedule as much of their flexible consumption as possible during these periods (e.g., running the dishwasher, charging an electric vehicle, doing laundry).

[7] https://www.ecopower.be/tipsenkennis/energieid/stroomplanner

- Light Green – Good Moment

  Still a favorable time to consume electricity. While not optimal, local production remains relatively high and supports sustainable usage.

- Grey – Neutral Moment

  Neither particularly good nor bad. Electricity consumption during these times has a neutral impact on the cooperative's energy balance.

- Orange – Poor Moment

  Less favorable time to consume electricity. Local renewable production is low, and the cooperative may need to purchase electricity from the market. Users are advised to postpone non-essential consumption if possible.

- Red – Very Poor Moment

  Strongly discouraged time for electricity use. The cooperative is likely relying on external electricity sources, potentially from fossil fuels. Users are urged to minimize consumption during these periods.

The Stroomplanner is embedded in Ecopower's broader strategy to foster citizen engagement, energy democracy and local energy resilience. By enabling cooperative members to act on real-time data, the tool bridges the gap between energy production and consumption, and lays the groundwork for future developments in flexibility services, dynamic pricing, and community energy systems.

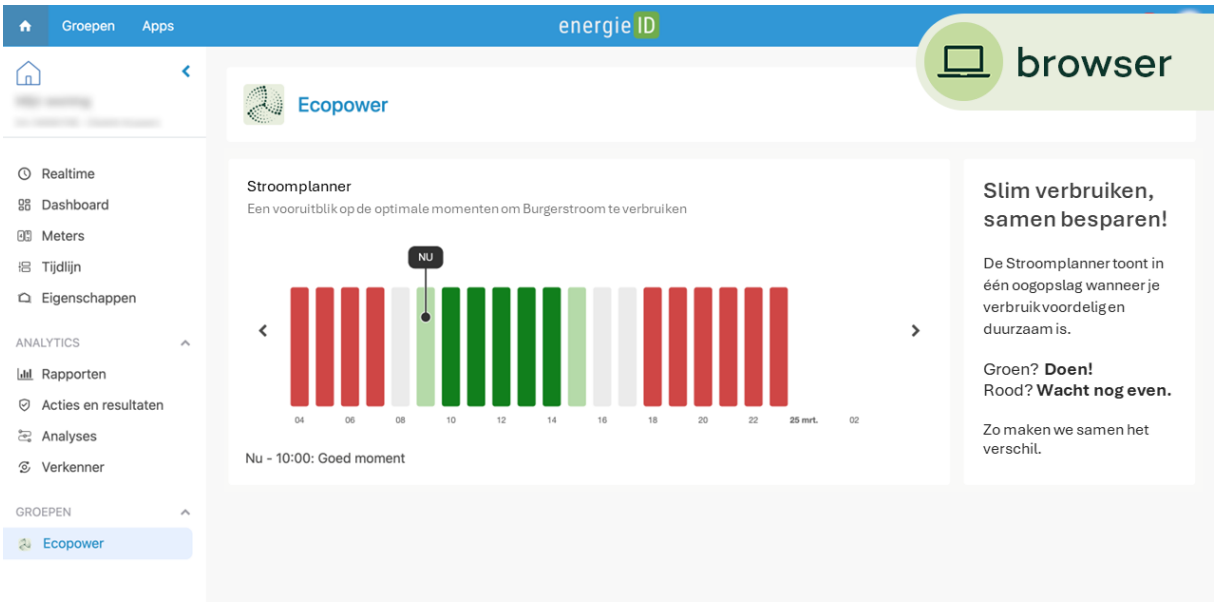


Figure 8 Stroomplanner - Desktop interface

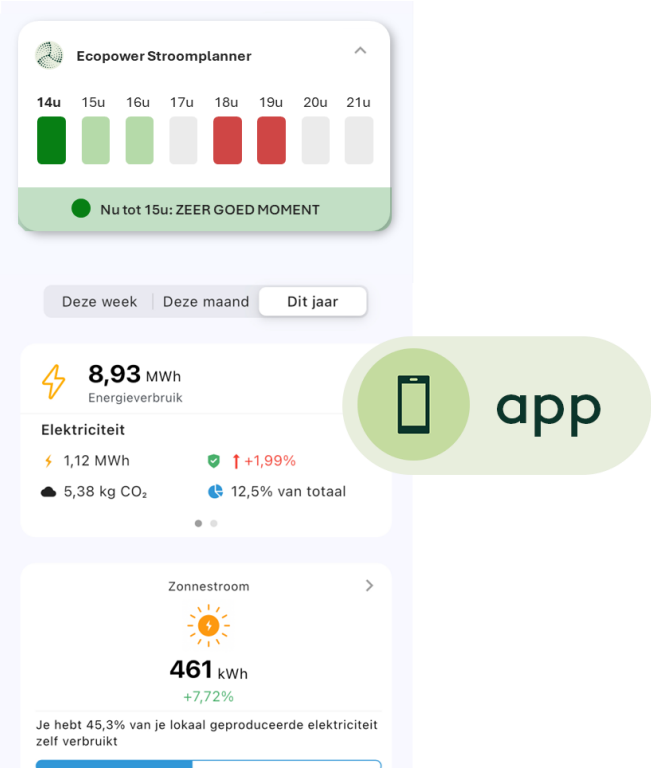


Figure 9 Stroomplanner - Application interface

3.2.2. Components

The Stroomplanner is based on the actual market forecasts made by Ecopower in collaboration with their balance responsible party (BRP). It contains all forecasted injection and consumption in the Ecopower portfolio, composed out of:

- The offtake of all customers. Specifically for net metering meters the gros consumption is even estimated, as such an estimation is also the basis for the allocation which the forecast tries to emulate.
- The injection of all customers with PV. Again the gros production of customers in a net metering scheme gets estimated as well. Moments with both production and consumption cancel each other out.
- The production of all community owned wind and solar parks. This also includes wind and solar parks that are owned by energy communities other than Ecopower (Flemish REScoops), whose clients also have access to community energy without having to have an Ecopower cooperative share.
- Some other production assets that have a shared ownership between the community and non-community investors.

This tool thus gives a very good insight in the balance of our portfolio at each hour step. In reality volumes will deviate (causing imbalance). However in the long term reactions of customers to this tool (e.g. shifting load to green moments) will be forecastable on the aggregate level and thus contribute to global balance between offtake and production (though not on a real-time basis).

In developing the tool Ecopower back-casted the analysis to see if promoting using this tool to shift load makes sense. Figure 10 below shows the Stroomplanner colours for every hour (x-axis) in a series of days (y-axis), with the numbers in the cells showing the day-ahead price at every time. The example shows that the colours of the Stroomplanner generally coincide with times when prices are high (red) and when prices are low (green). There is clearly not a one-on-one correlation between both. These inconsistencies however mostly follow the objectives of a renewable energy community:

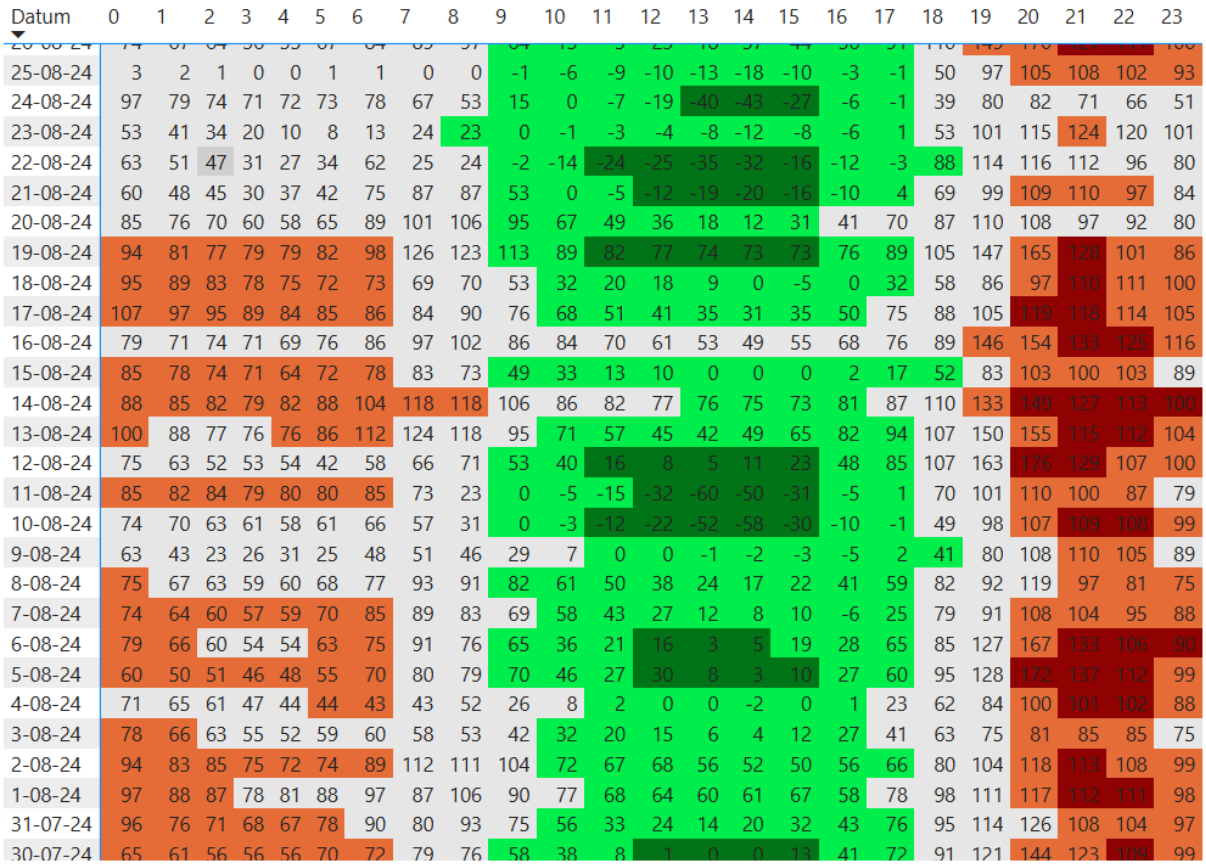
- **Nuclear is ignored**

Apart from wind, water and solar, nuclear also has a zero or negative marginal price in the market. Its behaviour thus influences market prices in a way similar to renewable availability. In periods with high nuclear availability and low offtake (but no or limited renewable availability, prices might be low with the Stroomplanner having only a grey colour. From a renewables point of view, this advice actually makes sense. Shifting electricity to moments with primarily nuclear availability only increases revenue of written-off assets at that time. Shifting electricity usage to times with renewable availability also increases the business case to build more and as such accelerate the energy transition.

- **Broader international context is ignored**

Some days prices are generally higher than others, mostly due to a broader context not captured by the availability of renewable production or by consumption of (mostly residential) consumers. This might be due to gas prices on the day-ahead market, or cooling needs in the south of Europe. This type of events can cause dark green times in days where market prices are ostensibly higher than other days with only light green colours. For example on 19/8/2024 the midday is dark green with high prices, whilst surrounding days have lower prices on midday without dark green colour schemes.

There are multiple perspectives to take for this inconsistency. It is almost exclusively limited to differences between days. As users only get to see a one day window at a time (with the exception of the time between when market results are published and midnight), they will generally not be compelled to act upon these. Here again from a renewables perspective most shifts within a 24-30h window still make sense. Moreover, if the underlying factors for prices between days are prices for non-renewable sources (fossil fuels), than differences in price do not necessarily reflect differences in emissions or pollution. A shift to a time with higher prices could make sense if the mix is less dirty at a green time.



Datum	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
25-08-24	3	2	1	0	0	1	1	0	0	-1	-6	-9	-10	-13	-18	-10	-3	-1	50	97	105	108	102	93
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18-08-24	95	89	83	78	75	72	73	69	70	53	32	20	18	9	0	-5	0	32	58	86	97	110	111	100
17-08-24	107	97	95	89	84	85	86	84	90	76	68	51	41	35	31	35	50	75	88	105	119	118	114	105
16-08-24	79	71	74	71	69	76	86	97	102	86	84	70	61	53	49	55	68	76	89	146	154	133	125	116
15-08-24	85	78	74	71	64	72	78	83	73	49	33	13	10	0	0	0	2	17	52	83	103	100	103	89
14-08-24	88	85	82	79	82	88	104	118	118	106	86	82	77	76	75	73	81	87	110	133	149	127	113	100
13-08-24	100	88	77	76	76	86	112	124	118	95	71	57	45	42	49	65	82	94	107	150	155	115	112	104
12-08-24	75	63	52	53	54	42	58	66	71	53	40	16	8	5	11	23	48	85	107	163	176	129	107	100
11-08-24	85	82	84	79	80	80	85	73	23	0	-5	-15	-32	-60	-50	-31	-5	1	70	101	110	100	87	79
10-08-24	74	70	63	61	58	61	66	57	31	0	-3	-12	-22	-52	-58	-30	-10	-1	49	98	107	109	108	99
9-08-24	63	43	23	26	31	25	48	51	46	29	7	0	0	-1	-2	-3	-5	2	41	80	108	110	105	89
8-08-24	75	67	63	59	60	68	77	93	91	82	61	50	38	24	17	22	41	59	82	92	119	97	81	75
7-08-24	74	64	60	57	59	70	85	89	83	69	58	43	27	12	8	10	-6	25	79	91	108	104	95	88
6-08-24	79	66	60	54	54	63	75	91	76	65	36	21	16	3	5	19	28	65	85	127	167	133	106	90
5-08-24	60	50	51	46	48	55	70	80	79	70	46	27	30	8	3	10	27	60	95	128	172	137	112	99
4-08-24	71	65	61	47	44	44	43	43	52	26	8	2	0	0	-2	0	1	23	62	84	100	101	102	88
3-08-24	78	66	63	55	52	59	60	58	53	42	32	20	15	6	4	12	27	41	63	75	81	85	85	75
2-08-24	94	83	85	75	72	74	89	112	111	104	72	67	68	56	52	50	56	66	80	104	118	113	108	99
1-08-24	97	88	87	78	81	88	97	87	106	90	77	68	64	60	61	67	58	78	98	111	117	112	111	98
31-07-24	96	76	71	68	67	78	90	80	93	75	56	33	24	14	20	32	43	76	95	114	126	108	104	97
30-07-24	65	61	56	56	56	70	72	79	76	58	38	8	1	0	0	13	41	72	91	121	144	123	109	99

Figure 10 Stroomplanner grid

In general, Ecopower found that the Stroomplanner supports societal goals in the best way, without giving consumers unreasonable advice from a financial standpoint (which would hurt Ecopower as well). The tool is of course not advised for dynamic price customers who generally try to optimise financially. As colours and prices generally match, they will generally also align with our societal goals.

The calculation for the Stroomplanner is made in the PowerMine, an internal energy data management system of Ecopower. It is then transmitted via API to EnergieID where it gets translated into a browser and desktop visual. Both have a simple setup with a scrollable timeline of hourly offsets with a colour. The actual time is indicated clearly. Hovering over a colour in the browser version gives the user an extra indication of what the colour means. This is replaced by a bar underneath the visual in the app version.

3.3. Budget Monitor

3.3.1. Introduction

The Ecopower Budget Monitor ('Budgetbewaker[8]') is an end user tool developed by Ecopower in collaboration with EnergieID, designed to help cooperative members monitor and manage their electricity expenses in real time. It is part of the EnergieID Premium suite and supports users in maintaining control over their monthly energy budgets, especially in the context of dynamic electricity pricing and variable consumption patterns.

The Budget Monitor enables users to set a monthly electricity budget, either automatically or manually. In automatic mode, the tool uses the previous month's electricity expenditure (in euros) as the reference budget for the current month. In manual mode, users can define their own monthly budget based on personal preferences or financial planning.

Throughout the month, the tool tracks actual electricity consumption and provides proactive alerts when spending approaches or exceeds the set budget. Notifications are delivered via email and/or push notifications through the EnergieID app, allowing users to take timely action to reduce consumption and avoid unexpected costs. The Budget Monitor offers a range of features designed to help users stay on top of their monthly electricity spending. At the heart of the tool is a clear and intuitive visual interface that displays the current month's expenditure alongside the user's set budget, marked by a red line. It also includes a forecast of expected costs for the remainder of the month, giving users a forward-looking view of their energy expenses.

To prevent budget overruns, the tool provides proactive alerts in three stages. The first alert is triggered mid-month if the projected spending is expected to exceed the budget by more than five euros, or ten percent if the budget exceeds one hundred euros. A second alert is sent immediately when the budget is actually exceeded. If the overspending continues and surpasses ten euros or ten percent of the budget, a third alert is issued to ensure the user remains informed and can take corrective action. Users can adjust their budget settings at any time, choosing between automatic mode—where the previous month's expenditure sets the current budget—and manual mode, which allows for personalized budgeting based on individual financial planning. This flexibility ensures the tool remains adaptable to different user needs and consumption patterns.

To use the Budget Monitor, users must be an Ecopower customer with a contract for Groene Burgerstroom, Dynamische Burgerstroom, or a social tariff. They need to have a digital electricity meter, activate a Premium account on EnergieID (which is free for Ecopower customers) and ensure that interval data (daily, hourly, or quarter-hourly) is enabled via Mijn Fluvius and linked to EnergieID.

The Budget Monitor contributes to Ecopower's mission of promoting energy awareness, financial transparency, and citizen empowerment in the energy transition. By providing real-time insights and encouraging proactive behavior, the tool helps users in three ways. The customers can avoid invoice shocks by staying within their monthly energy budget, they can adapt consumption habits in response to price fluctuations or increased usage and to above all they can engage more in actively in managing their energy footprint and supporting the cooperative's sustainability goals.

[8] https://www.ecopower.be/tipsenkennis/energieid/budgetbewaker

The tool in part wants to emulate the so called “budget meter”. Customers with severe payment arrears in Flanders get taken over by the distribution grid operator in their role of “social supplier”. They then change a functionality in the digital meter to act as a budget meter, only allowing usage to a prepaid level. This functionality should allow customers to not build up further debt, but also might trigger severe energy poverty with electricity deprivation when the meter is cut off. Still, a portion of customers with payment difficulties choose to stay in this system because it avoids invoicing surprises.

3.3.2. Components

The Budget Monitor mainly uses the real quarter-hourly measurements of the user to calculate a monthly budget ahead of time, and a daily estimated billing cost during the month. Whereas the quarter-hourly measurements are collected from EnergieID itself (with the Fluvius digital meter integration), meta information is delivered via the PowerMine system (a data system set up by EnergieID and Ecopower).

When starting up the application, a configurator asks if the user to verify its grid operator (useful to calculate grid costs) and its active price formula (useful to calculate budget and real costs of the energy component). In the configurator a user can also choose to override the automatic calculation (based on last month’s average daily costs) and set a fixed limit. In the configurator a user can also choose to be alerted via e-mail and/or via push notification in the app.

After the setup, the customer’s data is polled every night to recalculate the daily estimated billing cost. For the energy component in the dynamic price formula this estimate corresponds exactly to the actual cost. For the non-dynamic formula a generic estimate for the variable part of the formula is used and will thus not correspond exactly to actual costs. The difference is very limited. Most other components of the invoice are known ahead of time and are thus accurate. For the capacity tariff there is no running cost. The tool calculates the tariff based on the most recent highest capacity peak, that might still be surpassed on the last day on the month.

The tool not only calculated the estimated daily billing up until the moment data is available, but also extrapolates current daily costs to the end of the month. At the middle of the month, there is a onetime check if users are on course to surpass their budget by a reasonable margin (5 euro or 10% of budget, whichever is higher). This may also trigger a warning.

Figure 11 Budget Monitor visual

The system generally works well, though early usage has shown us a couple of shortcomings that will be fixed in a second version. These shortcomings can be summarized as follows:

- **Predictable seasonal changes:**

Offtake of customers follows predictable seasonal changes as it generally rises in winter times and declines in summer times. These changes are amplified in households with more season sensitive appliances such as heat pumps. When automatically calculating the budget based of last months' average volume, these predictable changes automatically make budgets tight when turning from winter to summer. This causes too many notifications in this period, and too little when the season changes the other way around.

- **The effect of PV production:**

As we are focusing on supplier invoices, it makes sense to also include injection and self-consumption into the calculation. PV production, however, follows a very predictable seasonal pattern and thus amplifies tremendously the seasonal effects described above. In our early testing, very little PV owners were in scope as focusing on the energy poor most often entails pure offtake households.

Ecopower has a lot of PV owners, reflected also in the users of the Budget Monitor. A new version of the Budget Monitor should thus take into account this seasonal expected effect as well.

- **The effect of batteries:**

Batteries create the unique condition that – depending on solar output – energy invoices can be very low or even negative (with customers actually receiving money). Even though negative budgets are forced to 0, extremely low budgets also lead to very sensitive triggers in the budgets. In months starting with a couple of cloudy days, alarms are already triggered in the first days. Even more than PV owners, battery owners are not the core target group for this tool. Nevertheless also for them the result should be more logical.

- **Advance payments:**

Many customers still use advance payments to even out invoices throughout the year, only settling the difference once in the final invoice. It would make sense to take these advance payments into account when calculating the budget, attempting to keep the expected final invoice at 0. The current version of this tool does not rely on data from the monthly installments. This is a potential improvement to the tool.

4. Conclusion

This InterFlex deliverable D2.1.2 reports on the significant milestones of Ecopower in developing and scaling dynamic pricing for residential customers in Belgium. Through a phased rollout - from the initial proof of concept (v1.0) to the refined and scalable versions v2.0 and v2.1 - Ecopower has demonstrated that dynamic pricing can be both technically robust and socially aligned with cooperative values. Version 3.0 introduces a new cooperative buffer component, designed to stabilize customer invoices while maintaining incentives for flexible energy use. This innovation reflects Ecopower's unique supply model, where electricity is sourced from community-owned installations rather than the wholesale market. The buffer ensures that customers benefit from price stability in times of market volatility, without compromising the environmental benefits of shifting consumption. Its launch is expected in Q1 2026, pending final evaluation.

To support customer engagement and understanding, Ecopower developed a range of end-user tools: the Dynamic Price Monitor, Simulator, Stroomplanner and Budget Monitor. These tools help customers assess whether dynamic pricing suits their consumption profile, track their performance, and align their behavior with cooperative production and societal goals.

Looking to the future, Ecopower will continue to refine its pricing logic and expand its digital end user tools in collaboration with EnergieID. The next phase of development will focus on integrating flexible assets such as home batteries, electric vehicles, and heat pumps, while also adapting to the emerging quarter-hourly market structure. These advancements will further empower cooperative members to actively participate in the energy transition and contribute to a more responsive and sustainable energy system.

The work carried out under InterFlex lays the foundation for a dynamic pricing model that is transparent, resilient, and community-driven - offering a scalable pathway for residential flexibility in Belgium and beyond.