New Tariff Structure for Low Voltage Electricity Network

Explanation Guide

Version 03.12.2024

Contents

Introduction

A fair new tariff structure, anticipating future needs, has been defined by the Luxembourg Regulatory Institute (ILR) and all network operators and will be applied from January 1, 2025.

The goal is to meet the evolving use of the network within the context of the energy transition. The reduction of fossil fuels will lead to electrification, particularly in the fields of mobility and heating, as well as the decentralization of electricity production, creating new challenges for the electric grid. The new tariff structure is fairer and will, in time, encourage consumers to adopt greater flexibility in using networks to optimize usage and reduce necessary investment costs, which will be beneficial for all.

What does the price of electricity consist of?

Firstly, it is important to distinguish between the **price of electricity** and the **electricity network use tariff** which, together with **taxes**, make up the final price paid by the consumer. It is the network use tariff which is affected by the change in tariff structure. The price of electricity itself is the main variable in the final price paid by consumers. It is not affected by this tariff change and is independent of it.

Why do we need to change the network use tariff?

In the first instance, **network power flows are increasing** now, and will increase further in the future, **as is simultaneous use** (oven, washing machine, electric vehicle charging, heat pump, etc.), also increasing the risk of peak loads or even network congestion.

In the second instance, **the current system is unfair**, because it does not reflect actual network use costs. And so now, and even more so in the future, some users should pay less, and others more, for their network use, depending on their consumption behaviour. That's why network operators wanted to look to the future and find **a fair and complementary solution to this change in network use**, as well as continuing with ongoing network expansion.

In practical terms, what will change?

Applicable from 1 January 2025, the new network use tariff simply places greater emphasis on the concept of power. Please note that power is expressed in watts (W) or, more commonly, in kilowatts (kW, 1 kW = 1,000 W). It is an instantaneous value representing the intensity of the action, comparable to the speed of a vehicle or the flow of a river.

In future, the impact of each user, and each use, will be reflected in the tariffs applied and, therefore, in the costs billed for network use. **Each network user will be assigned a reference power among 9 categories, calibrated based on the most common usages and profiles. The network operator will assign the power level based on the customer's consumption history** to optimize network costs for them.

What impact will this have on private consumers? Will the average consumer have to pay more?

The transition will be very smooth, and **the change will have little impact on the average consumer or on the vast majority of consumers**. Only the billing arrangements will change, with greater emphasis on the concept of power. For the vast majority of people, no action will need to be taken either before, or after, the change.

In future, all consumers will pay a fair price for their network use, including those whose consumption and network use patterns generate peak loads that then have to be absorbed by the network. The current tariff does not yet reflect the actual costs of these users. Finally, it should be pointed out that the price of electricity (not the network use tariff) is the main variable in the final price billed to the consumer.

How do I know my category, my reference power level?

From January 2025, **each consumer's power level will be shown on their bill**. Ahead of application, these power levels will initially be allocated based on consumption history, with the aim of identifying the optimal category from a financial perspective.

Once applied, the categorization will be checked on a monthly basis by an automated mechanism. In some rather exceptional cases, a customer's request to change categories may be justified, particularly where there have been significant changes in consumption behavior, such as when installing an electric vehicle charging point or a heat pump.

Are there good practices to adopt starting today?

All network users, regardless of their reference power level, can contribute to more efficient network use, make better use of the existing networks as a whole and help maintain tariff stability. Here are two good tips: be flexible in your consumption by extending it over time and by limiting simultaneous use.

For the remainder of the document, it is important to distinguish between electrical power and electrical energy:

Power is expressed in Watts (W) or, more commonly, in kilowatts (kW, 1 kW = 1,000 W). It is an instantaneous value representing the intensity of action, comparable to the speed of a vehicle or the flow rate of a river.

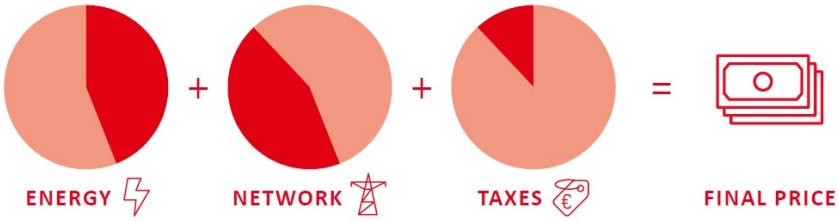
The amount of energy is expressed in Watt-hours (Wh) or kilowatt-hours (kWh, 1 kWh = 1,000 Wh). It is the result of applying power over a certain period of time (power x duration). It is cumulative over time, like the distance traveled by a car (speed x time) or the amount of water flowing (flow rate x time). The longer the duration, the greater the quantity. Therefore, both the duration and the intensity of action determine the amount of energy.

Example: A LED bulb has a power of 5 W (compared to a halogen bulb of 50 W that produces the same light intensity). If this LED bulb is on for 10 hours, it will consume 50 Wh of electrical energy (the halogen bulb will consume 500 Wh).

In this guide, "drawn energy" refers to the energy consumed and drawn from the network, as opposed to "self-consumed energy," which refers to the consumption of energy produced on-site.

Components of the Network Usage Tariff

In the electricity market, it is important to distinguish between the price of electrical energy (paid for the supply of energy) and the network usage tariff (paid for the use of the energy distribution infrastructure), which, together with taxes, make up the final electricity price paid by the consumer.



This guide focuses solely on the aspect of the network usage tariff. Electricity metering tariffs are also not included in this document.

The new low-voltage network usage tariff, applicable to most low-voltage clients with a smart and communicating meter, consists of the following elements:

- A fixed component:
  - **Fixed charge (in €/month)**: It varies depending on the reference power category assigned to the customer and is defined by the network operator based on the customer's behavior over the past 12 months, thus depending on their consumption behavior.
- A variable component:
  - **Volumetric charge (in €/kWh)**: Applied to the total volume of electricity drawn from the network.
  - **Exceedance charge (in €/kWh)**: An additional charge for electricity drawn above the reference power.

In the new tariff structure effective from January 1, 2025, the rates for the fixed and variable components are as follows.

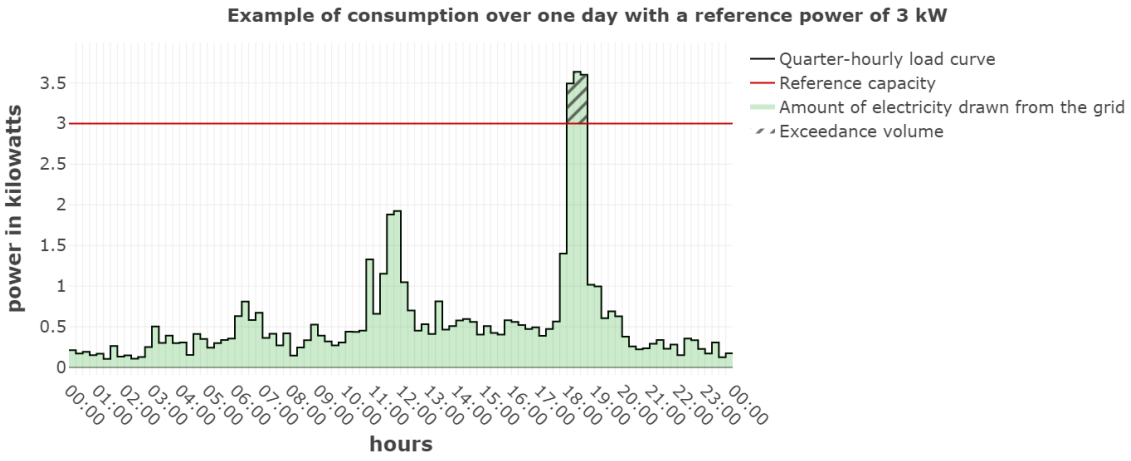
	Reference Power Categories							
Kilowatts (kW)	**3**	**7**	**12**	**17**	**27**	**43**	**70**	**100**
Fixed charge (€/month)	11.11	19.27	29.46	39.65	60.03	92.64	147.66	208.80
Volumetric charge (€/kWh) *	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759
Exceedance charge (€/kWh) **	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139

* applied to the total volume

**additionally applied to the volume that exceeds the reference power

Clients with an analog or smart, but non-communicating, meter will continue to be billed according to the classic network usage tariff structure.

The diagram below shows the components used to calculate network usage costs under the new low-voltage tariff structure, applied to one day's consumption.



What is the reference power?

The reference power, expressed in kilowatts (kW), is a threshold defined by the network operator, above which a surcharge applies. This surcharge is applied to the amount of energy in kilowatt-hours (kWh) exceeding this limit. The following two cases must be distinguished:

- **All kilowatt-hours drawn** will be billed at the volumetric rate.
- **All kilowatt-hours drawn above the reference power**, i.e., above the red line, will be billed additionally at the surcharge rate for exceeding.

The client is therefore encouraged to limit exceedances above their reference power, in other words, to limit the simultaneous usage of electrical devices.

However, it is perfectly normal to temporarily exceed the reference power. It is not to be understood as the maximum allowed power.

The available reference power levels are as follows: 3 kW, 7 kW, 12 kW, 17 kW, 27 kW, 43 kW, 70 kW, and 100 kW. A higher level entails a higher fixed charge but allows for reduced excess volume.

In the example from the previous graph, the client has their financial optimum with a reference power of 3 kW. The fixed charge to be paid is €133.32/year compared to €231.24/year in the 7 kW category. The volumetric charge is the same for all power categories, so even if this fictional client pays a surcharge for exceeding, the total costs are lower than in the 7 kW power category.

How is the reference power calculated?

The reference power is calculated monthly based on the client's historical consumption data from the past 12 months, to best reflect their consumption behavior. From a technical point of view, it is an iterative calculation using the client's quarter-hour load curves over a maximum period of 12 months. This process compares the tariff results obtained by successively applying different reference power levels, starting from the lowest and moving to the next, to determine the most financially advantageous reference power for the client.

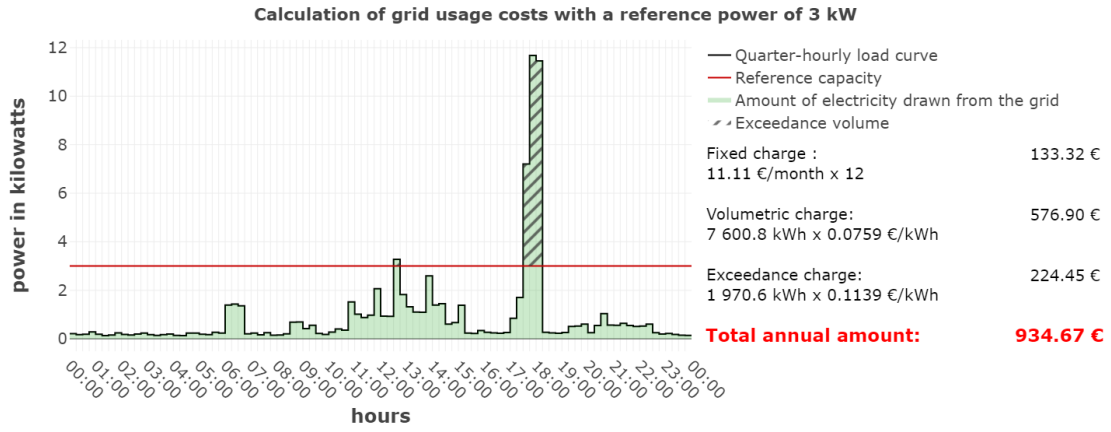
If at least one complete month of historical data is not available, for example in the case of a new client, a standard reference power for the supply point in question will be used until the next recalculation, which will take into account one month of consumption (see Table 1: Standard reference power in case of missing load curve on page 9).

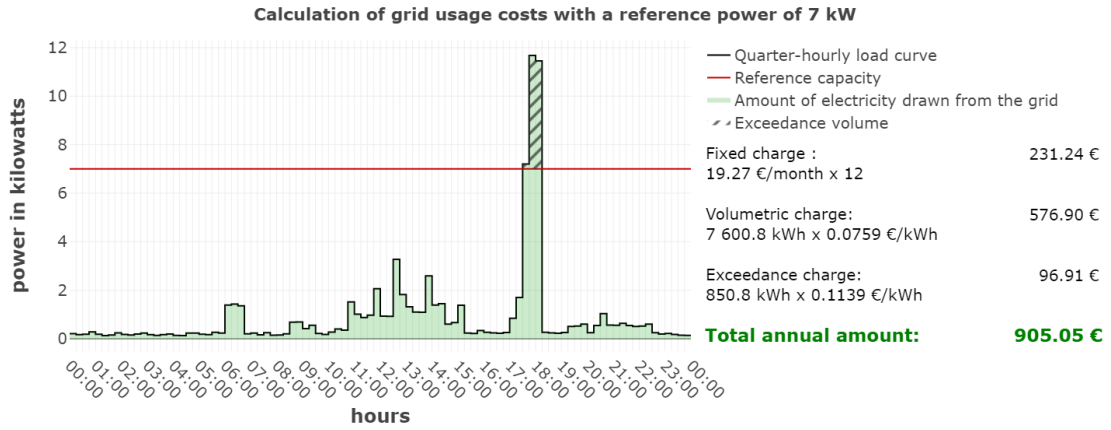
The reference power takes into account the client's consumption and behavior. It therefore depends both on the total amount of electricity drawn and on how the electrical network is used (simultaneous use of energy-consuming equipment, which may or may not lead to consumption peaks).

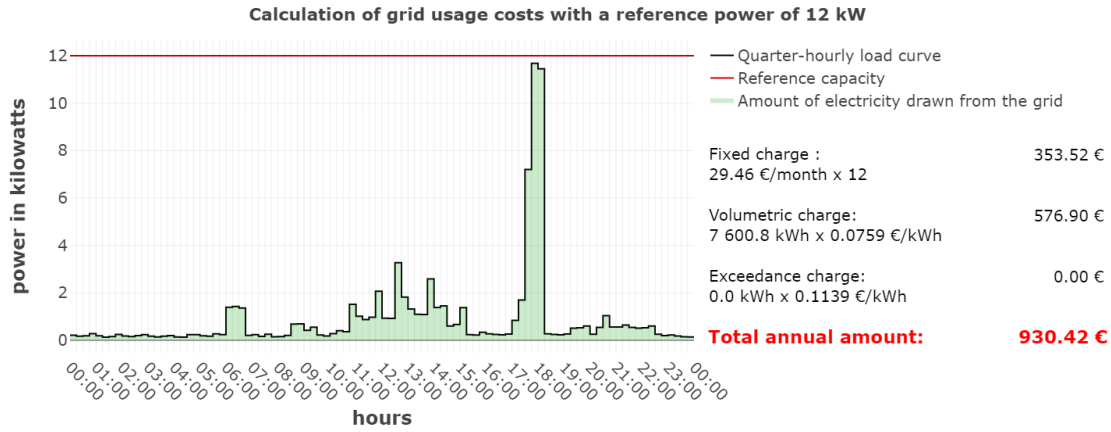
The network operator determines the reference power optimally according to the following principles:

- For clients with consumption data for a period between one and twelve months, the reference power applied is the one that minimizes costs for the client (this is the billing optimum). Subsequently, each month, the network operator updates the reference power using the data from the last 12 months to account for any changes in the client's consumption and behavior, thereby ensuring the billing optimum once again. The 12-month calculation period makes it possible to consider the influence of certain equipment whose usage varies seasonally, such as a heat pump or air conditioning unit.

  The following diagrams illustrate the process for determining a client's reference power. To simplify the graphical representation and the explanation, only one day of a client's consumption is represented, assuming that they have the same behavior throughout the year. The total annual volume is calculated by multiplying the daily volume, represented below, by 365. In reality, the calculation takes into account the actual consumption over the last 12 months and thus incorporates the variability associated with clients' real behavior.







The different reference power categories are then applied to this total consumption to calculate the annual network usage costs. The client in this example has an optimized cost in the 7 kW reference power category. Indeed, the total cost in this category amounts to €905.05. This is the lowest amount compared to those calculated for the other reference powers (3 kW and 12 kW). It is unnecessary to calculate the total amount for higher levels of 17 kW, 27 kW, 43 kW, 70 kW, and 100 kW, as these levels would result in a total cost higher than that of the 7 kW category.

- For clients without consumption data at the supply point in question, a standard reference power is determined based on the connection capacity. The table below shows the statistically most likely reference power for the different categories:

Connection Capacity	Standard Reference Power
40 A	3 kW
50 A	7 kW
63 A	7 kW
80 A	12 kW
100 A	12 kW
120 A	27 kW
> 120 A	43 kW

Table 1: Standard reference power in case of missing load curve

It should be noted that this standard reference power is, in principle, only used for billing during the period for which data is not available.

Adjustment of the reference power in case of a planned change in behavior

When the customer suddenly and significantly changes their behavior (for example, by installing an electric vehicle charging station), Creos offers a simulation tool on its myCreos portal (the myCreos site is also available for customers of the Ettelbruck and Diekirch networks)[1], and provides the customer with the possibility of requesting an adjustment of their reference power if they wish to anticipate the following automatic adjustment.

This tool uses the customer's actual load curve (if available) and adds a synthetic ("artificial" but representative) curve of the added installation to simulate the impact of a behavioral change:

Scenario 1: The client has a load curve:

- The client simulates their current situation with their own data if they wish to verify the reference power assigned to them,
- The client simulates their future situation by superimposing one or more of the available synthetic load curves:
    - PV installation
    - Charging station
    - Heat pump

A simulation based on a hypothetical situation and behavior is also possible.

Scenario 2: The client simulates exclusively based on synthetic load curves:

Synthetic load curves for the following scenarios are available for residential clients:

- Family (a household with 2 adults and 2 children)
- 2 adults working part-time

[1] The simulation tool can be accessed via the following link:
https://my.creos.net/
Clients of the Sudstroum network can also perform simulations on the myCreos website, but only using synthetic load curves.

- 2 adults working full-time
- 2 adults working remotely
- 1 retired person

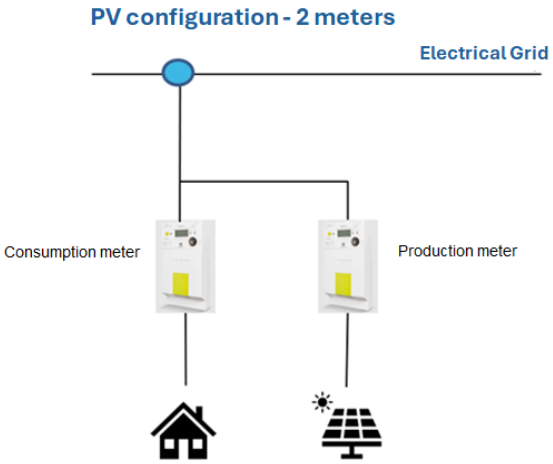
Description of the manual reference power adjustment processes:

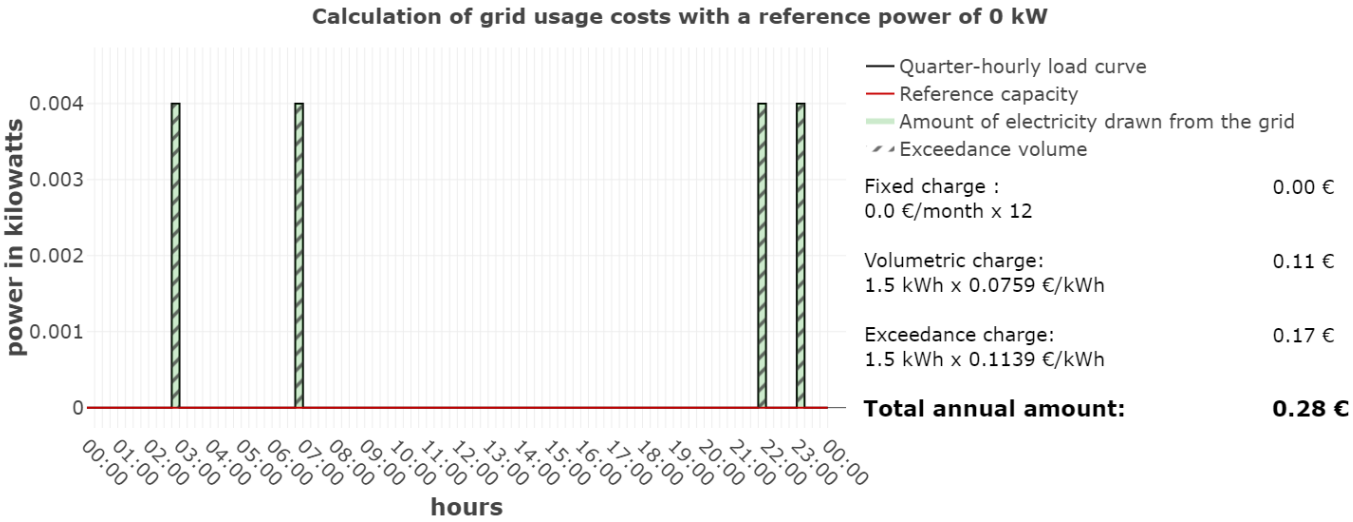
The categorization is re-evaluated monthly by an automated mechanism that considers potential changes in behavior. Manual adjustment of the reference power is only necessary when the client suddenly and significantly changes their behavior.

Exception for the reference power calculation

A **first exception** concerns clients with two meters connected in parallel to the same network connection point (see illustration below), where the 1st meter measures the electrical energy drawn from the network (consumption) and the 2nd meter measures both the production and consumption of a photovoltaic installation. The meter concerned by this exception is the 2nd meter related to the production installation, which is located on the right in the illustration below.

The iterative calculation to determine the optimal reference power for the production meter will be performed in this exception starting from the power level of 0 kW. If the production meter is optimized at the 0 kW power level, the fixed charge will be €0. The volume drawn by the production installation (which is generally the consumption of the PV inverter, and is very low) will be billed at the volumetric rate, with an additional surcharge for exceeding added (see example below).





If the production meter has an optimized network usage cost in a higher power category (3 kW, 7 kW, 12 kW, 17 kW, etc.), the exception no longer applies, and the client will pay the fixed fee corresponding to their reference power.

This exception does not apply to the configuration with a single smart meter, which can be used for production installations intended for self-consumption ("one meter").

The **second exception** applies to clients equipped with night storage heating systems and a Smarty meter with a schedule or receiver. These clients are required to use their heating between 10:00 PM and 6:00 AM, as the necessary power is only available during this period.

For these clients, the night-time excess charge from 10:00 PM to 6:00 AM will be applied instead of the standard excess charge, as indicated in the following table.

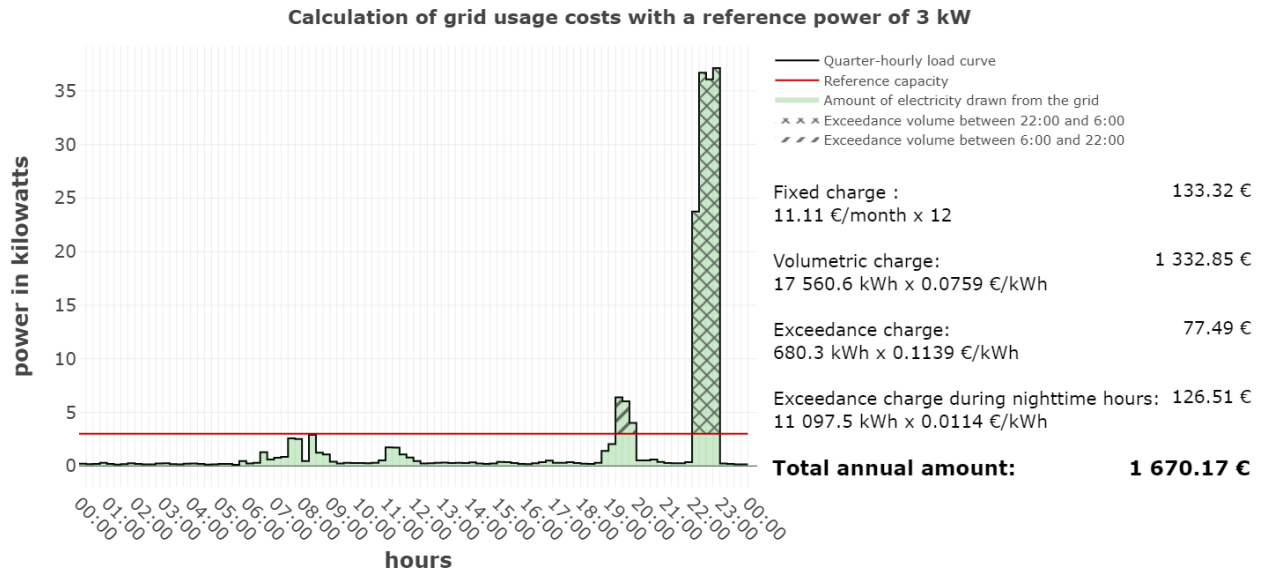
	Reference Power Categories							
Kilowatts (kW)	**3**	**7**	**12**	**17**	**27**	**43**	**70**	**100**
Fixed charge (€/month)	11.11	19.27	29.46	39.65	60.03	92.64	147.66	208.80
Volumetric charge (€/kWh) *	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759	0.0759
Exceedance charge between 6:00 AM and 10:00 PM (€/kWh)**	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139	0.1139
Exceedance charge between 10:00 PM and 6:00 AM (€/kWh)**	0.0114	0.0114	0.0114	0.0114	0.0114	0.0114	0.0114	0.0114

* applied to the total volume

**additionally applied to the volume that exceeds the reference power

The reference power will therefore be determined by including an additional component: the exceedance charge during nighttime hours. The iterative calculation principle, explained in the section "How is the reference power calculated?" remains unchanged for these clients.

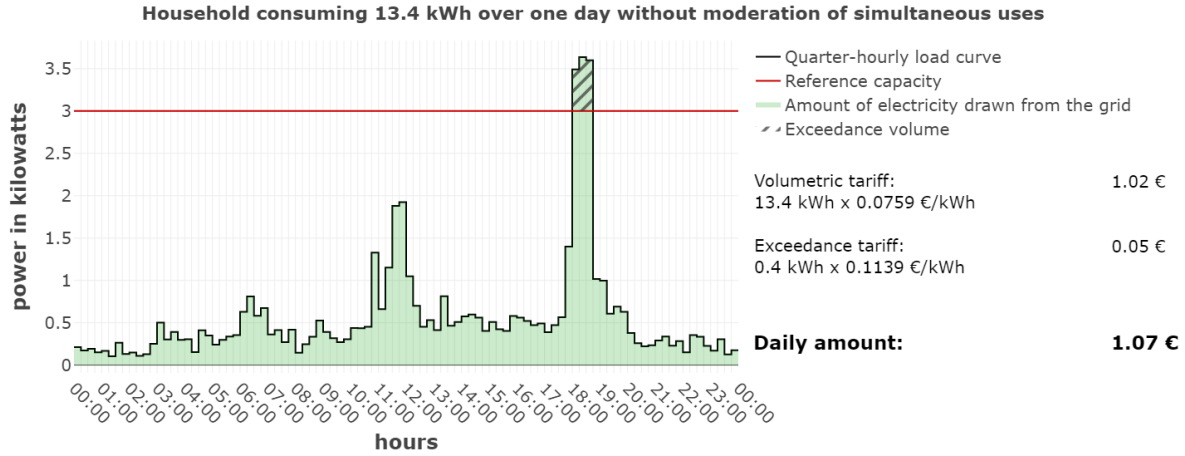
The diagram below illustrates the components considered in the iterative calculation for this exception. The consumption peak above 35 kW in the following figure corresponds to the use of a storage heating system.



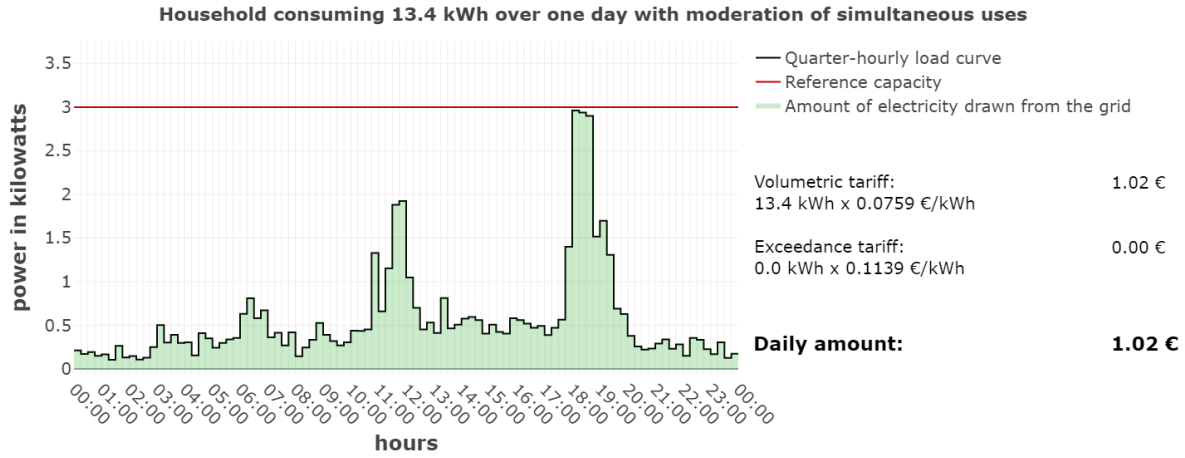
Influence of user behavior on the billed amount

Smoothing energy usage beyond the reference power, while maintaining the same overall consumption volume, will always have a positive impact on the bill. This can be achieved by reducing simultaneous usage of electrical devices, for example, by scheduling household appliances to operate at staggered times.

Indeed, smoothing energy usage can lead to a reduction or even elimination of the volume consumed above the reference power, for which an exceedance charge would otherwise be applied. To illustrate this, consider the example of a household consuming 13.4 kWh in a day with a reference power of 3 kW. This household does not have a photovoltaic installation or an electric vehicle and uses several household appliances simultaneously between 6:00 PM and 7:00 PM.

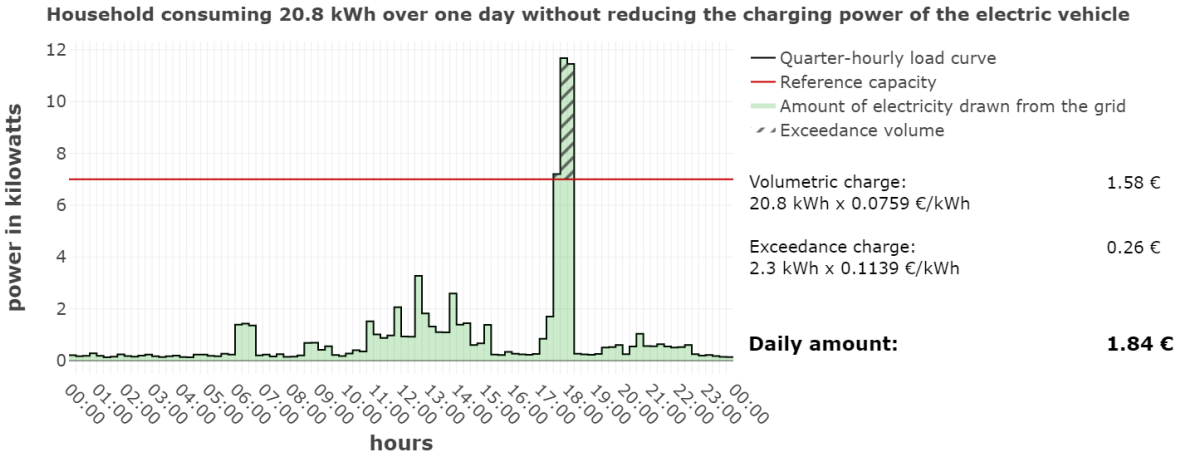


The cost of network usage amounts to €1.07, excluding the fixed fee. A reduction in simultaneous usage could be achieved by delaying some activities until after 7:00 PM. This behavioral adjustment is illustrated in the figure below.

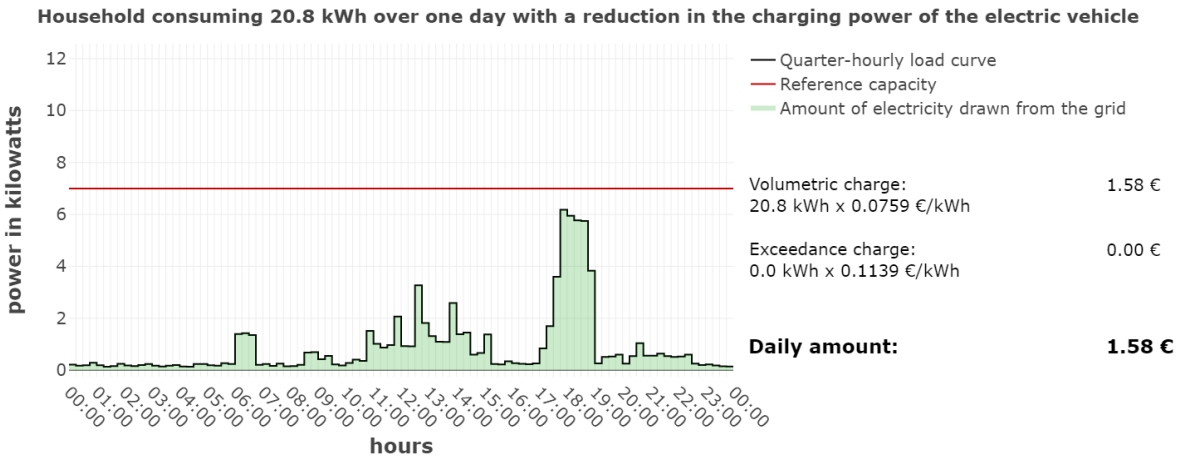


The exceedance electricity volume is reduced from 0.4 kWh to 0 kWh. This behavioral change is beneficial for the grid and allowed the user to save €0.05, representing 4.7% of the daily network usage costs, excluding the fixed charge.

We now consider the example of a household consuming 20.8 kWh in a day, within the 7 kW reference power category. This household does not have a photovoltaic installation and uses a charging station between 5:30 PM and 6:15 PM, with a charging power of 11 kW.



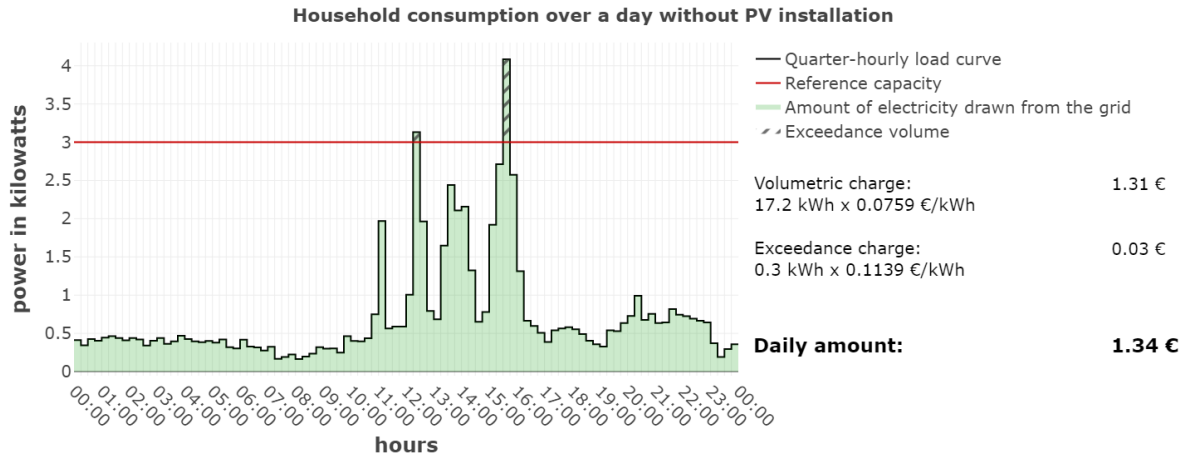
The cost of network usage amounts to €1.84, excluding the fixed fee. The excess electricity volume is entirely caused by charging an electric vehicle. A change in behavior, which would benefit the grid and be financially advantageous for the client, would be to reduce the vehicle's charging power. This reduction can be implemented either through the car settings or the charging station, depending on the specific capabilities of the station and the vehicle. The vehicle will now be charged at a power of 5.5 kW, resulting in the charging process finishing at 7:00 PM instead of 6:15 PM.



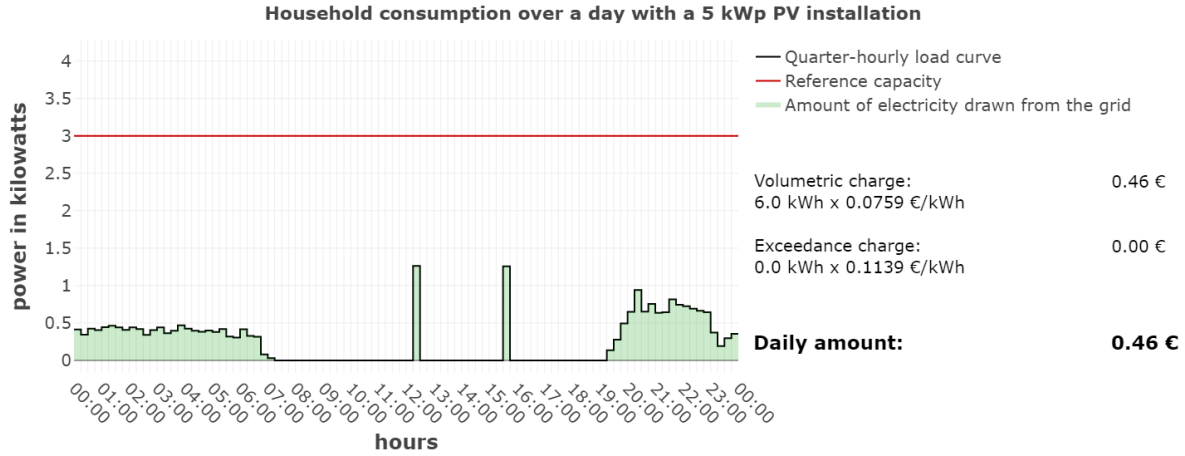
The excess electricity volume has been reduced from 2.3 kWh to 0 kWh. This behavioral change benefits the grid and allows the user to save €0.26, representing 14% of the daily network usage costs, excluding the fixed charge.

Another solution to reduce network usage costs for the client is self-consumption through a photovoltaic installation. Indeed, self-consumed energy is not included in network usage costs.

The graph below illustrates the daily load curve of a household without a photovoltaic installation.



By adding a small 5 kWp photovoltaic (PV) installation to this household, the amount of electricity drawn from the grid decreases. The following example illustrates a sunny summer day.

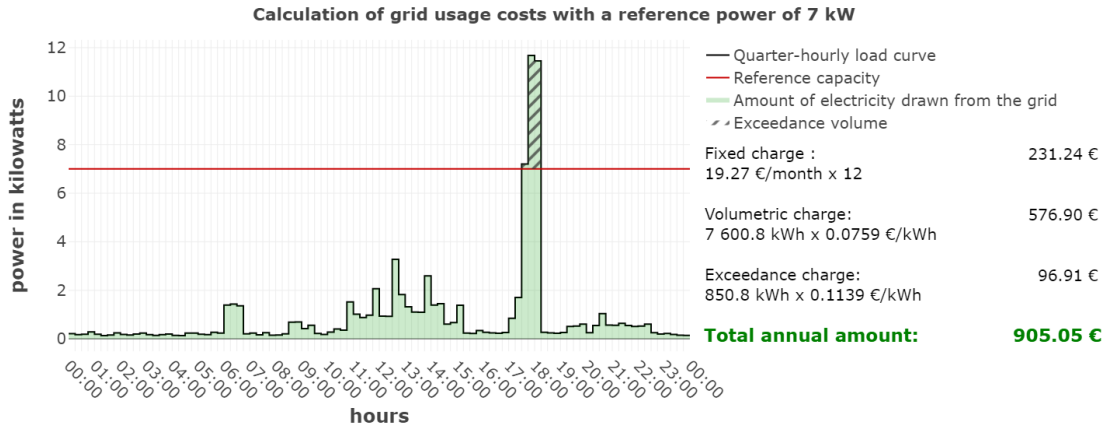


The volume of electricity drawn from the grid decreased by 11.2 kWh, leading to a reduction in network usage costs of €0.88, representing a 66% decrease, excluding the fixed fee.

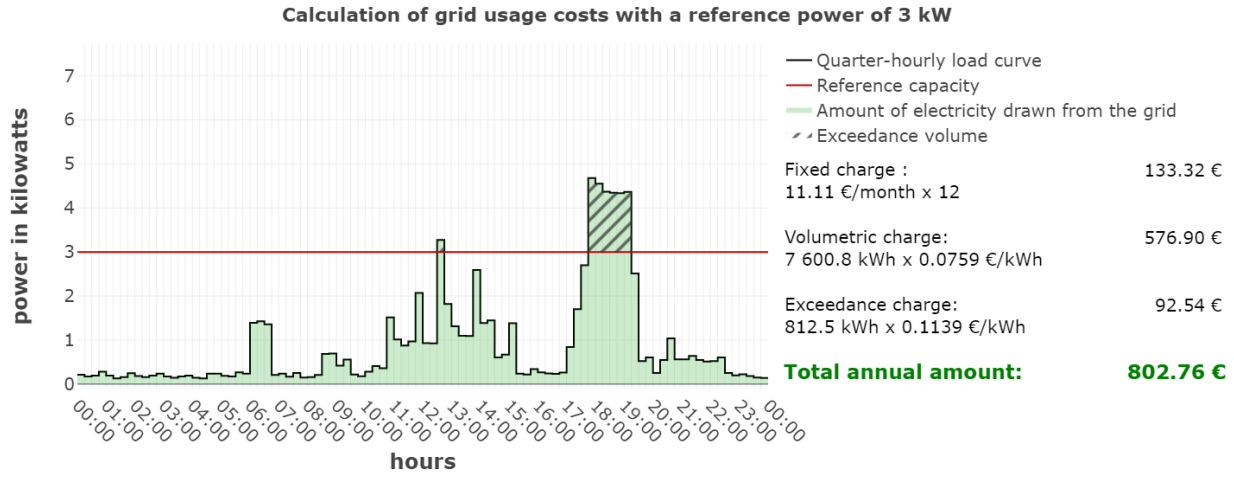
Influence of user behavior on the future reference power

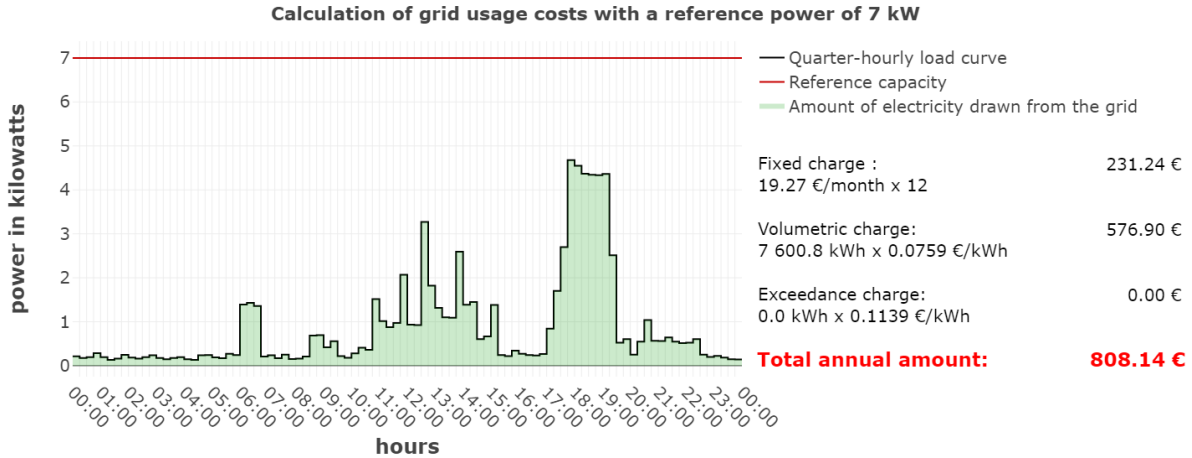
The reference power is recalculated monthly based on the consumption history of the past 12 months (if available). The following example illustrates how user behavior can influence the future reference power. To simplify the graphical representation and explanation, only one day of consumption for a fictional client exhibiting the same behavior throughout the year is shown. The daily volume illustrated below is multiplied by 365 to calculate the total annual volume.

We refer to the load curve example from the section "How is the reference power calculated?". In this example, the electric vehicle was charged at a power of 11 kW, resulting in a reference power of 7 kW being assigned.



This same fictional client will now charge their vehicle at a power[2] of 4.1 kW. After a full year with this new behavior, while maintaining the same total electricity consumption volume, the calculation for determining the reference power yields the following result





The household is now optimized with a reference power of 3 kW, resulting in an annual network usage cost of €802.76.

[2] The IEC 61851 standard sets the minimum current required for charging an electric vehicle at 6 amperes. In the case of three-phase charging, the corresponding minimum power is 4.1 kW, calculated as follows: 6A x 230 V x 3 phases = 4140 W, approximately 4.1 kW.

In summary, consumption habits play a key role in determining the reference power, as an identical annual consumption volume of 7,600.8 kWh in the two previous cases resulted in different reference powers: 3 kW and 7 kW.

Conclusion

The network operator assigns each client a reference power that is financially optimal. This reference power may vary depending on the power drawn and the client's consumption behavior, but it is always calculated to minimize the client's network usage costs.

Changes in consumption behavior, especially for high-power consumers, can lead to savings in network usage costs. The same applies to self-consumption of electricity produced by the client's photovoltaic installation.

Feel free to test the simulation tool and adjust your consumption accordingly. Sign up at https://my.creos.net for more information.