
11. Electrical energy tariff rating

11. ELECTRICAL ENERGY TARIFF RATING

There is no universal system for billing electrical energy. Each country generally adopts its own method, taking into account the nature of its production resources and the behaviour of consumers.

The analysis of billing methods in force throughout the world nevertheless shows that there are common general principles. To give the reader a basic idea, and as an example, we shall in this chapter describe in detail the tariff rating method adopted in France by the French electricity authority EDF.

Whatever the country being considered, the cost of electrical energy is always closely linked to the means implemented in order to produce it and to the demand. It thus varies during the day and throughout the year.

To deal with this problem and in order to guarantee each of its customers billing that reflects their actual consumption, EDF has set up three types of electrical energy tariffs:

- the Blue tariff
- the Yellow tariff
- the Green tariff.

Each tariff has options and tariff periods allowing each customer to choose the formula the most suited to his needs and guaranteeing him optimum billing.

11.1. Choice of tariff

■ choice of colour

Choosing between the three different tariffs is usually done in relation to the customer's power needs:

- maximum power from 0 to 36 kVA : Blue category
- maximum power from 36 to 250 kVA : Yellow category
- maximum power above 250 kW : Green category.

■ choice of option

For a **given consumption structure**, the customer chooses the option that keeps his bill to a minimum. For example:

- A Blue tariff customer having installations consuming a large quantity of electricity (hot water, heating, etc.), which may operate during the night, would probably be advised to choose the off-peak hours option
- secondary residences with requirements exceeding 6 kVA would undoubtedly be advised to choose the EJP option or the Tempo option
- an industrial customer with requirements falling mainly during the summer may be advised to choose the Modulable option.

The customer may move on from this first approach if he decides to **modify his behaviour** in order to benefit from tariff opportunities, for example:

- by modifying his production and storage capacities which would enable him to eliminate consumption in real time
- by replacing electrical supplies by other sources of energy, e.g. wood, natural gas, fuel, autonomous production source, etc., during certain periods of the year

In both of these examples the customer chooses the EJP or Modulable option.

Table 11-1 gives an outline of the tariff structure and people concerned.

Tariff	Size of customer	reference supply voltage (1)	Number of seasonal time-of-day periods	Number of customers concerned on 31.12.93
Blue				
- small supplies	≤ 3 kVA		1	4 650 000
- Basic option	6 to 36 kVA		1	12 836 000
- Off-peak period option	6 to 36 kVA	LV	2	9 450 000
- EJP option	12 to 36 kVA		2	542 000
- Tempo option	9 to 18 kVA		6	800
Yellow				
- Basic option	36 to 250 kVA	LV	4	151 000
- EJP option			4	4 800
Green A5				
- Basic option	250 to 10 000 kW	MV	5	137 000
- EJP option			4	6 100
Green A8				
- Basic option			8	700
- EJP option	250 to 10 000 kW	MV	6	400
- Modulable option			4	200
Green B				
- Basic option			8	200
- EJP option	10 to 40 MW	HV: 63 and 90 kV		100

- Modulable option			4	50
Green C				
- Basic option			8	40
- EJP option	40 MW and above	HV: 225 kV	6	40
- Modulable option			4	20

Table 11-1: tariff system structure

11.2. Blue tariff

■ Basic option and Off-peak period option

The Blue tariff basic option includes an energy price and a standing charge depending on the subscribed demand, going in steps of 3 to 3 kVA from 6 kVA to 18 kVA, then in steps of 6 to 6 kVA from 18 kVA to 36 kVA. The off-peak period option (8 off-peak hours every day of the week) has two energy prices and a standing charge depending on the subscribed demand.

The 8 off-peak hours may not be consecutive, depending on the time periods defined by the EDF regional centre in relation to the local conditions. The customer cannot choose his time period.

The energy prices satisfy two requirements:

- identical values for the Basic option and the peak periods of the Off-peak period option; the customer can thus choose the Off-peak period option with his consumption during off-peak hours being the only criterion
- identical values for the different levels of subscribed power. The customer is thus little aware of the cost of the power.

■ small supply tariff

Limited to a power of 3 kVA, this tariff replaces all the old tariffs for subscribed powers lower than or equal to 3 kVA. It does not comprise an option and is characterised by:

- a standing charge below management and metering costs (the latter being for the purchase, renewal and maintenance of the meter) for which these customers are responsible
- an energy price above that of the Blue tariff Basic option so that this tariff really only concerns small domestic customers consuming less than 2 500 kWh per year.

■ EJP option

The Blue tariff EJP option includes two energy prices and a standing charge depending on the subscribed power.

□ two time periods

- the peak period (moving peakperiod), lasting approximately 400 hours (more specifically $18 \times 22 = 396$ hours); these are spread on the basis of 18 hours per day between 7 a.m. in the morning and 1 a.m. on the following day for a period of 22 days, spread each winter between the 1st November and the following 31st March and defined by the EDF national operating centre; a signal is emitted half an hour before the beginning of each period: the price of the kilowatt-hour thus especially reflects the marginal cost of the electricity produced during this period
- the off-peak period (normal hours) covers all other hours; the price of the kilowatt-hour is close to the price of the Blue tariff off-peak hours.

□ four power levels (only for domestic or farming customers)

12, 15, 18 and 36 kVA have been chosen; the standing charge is:

- for 12 kVA, that of the Off-peak hours option 6 kVA standing charge
- for 15 kVA, that of the Off-peak hours option 6 kVA standing charge
- for 18 kVA, that of the Off-peak hours option 6 kVA standing charge
- for 36 kVA, that of the Off-peak hours option 18 kVA standing charge.

Power levels 12 and 15 kVA should disappear in the long term; only two standing charges will be offered corresponding to the Blue tariff power: 18 kVA and 36 kVA.

For professional customers, there are already only two power levels.

■ Tempo option

The Tempo option has six energy prices and an annual standing charge to match the power required by the customer. At the moment only two single-phase power supply levels are defined:

9 kVA or 12 - 15 - 18 kVA, (a three-phase electronic meter for powers above 18 kVA has yet to be designed).

Tempo days of the year are classed according to three colours and each day is divided into off-peak and peak hours:

- **300 blue days**, which are the most advantageous, correspond to the periods of the year when electricity production costs are the lowest
- **43 white days** correspond to a slightly more strained situation based on the adjustment of the offer to the demand: EDF must implement more costly production means; the prices are close to the off-peak hours option.
- **22 red days** when EDF uses the most costly production means; the price of electricity is at its highest during this period, both during off-peak and peak hours; red days are spread each year between 1st November and 31 March.

Whatever the colour of the day customers pay less for electricity during the night since this is where the off-peak hours are situated:

- on blue and white days from 10 p.m. to 6 a.m.
- on red days from midnight to 6 a.m.

Taking into account changes in climate and the availability of production means, EDF programmes production means for the following day on the previous evening. It is therefore not possible to plan blue, white and red days ahead of time. The customer is informed of the following day's colour at 8 p.m., through information which is transmitted to a signal monitoring box with which he is provided free of charge, as well as through his electronic meter. The signal box also gives the current day's colour and time period; it is connected to a simple power outlet.

The duration of the six periods is given in table 11-2.

Tariff period	300 blue days	43 white days	22 red days
off-peak hours	2 400 h	344 h	132 h
peak hours	4 800 h	688 h	396 h

(1) For a yearly average of 8 760 h (365 days - 52 Sundays)

Table 11-2: Duration of Tempo option time periods (1)

11.3. "Yellow" tariff

The "Yellow" tariff was created in 1985 for supplies delivered in low voltage. The customer group for this tariff option comprises customers subscribing to a power between 36 and 250 kVA and customers subscribing to a power below 36 kVA, for whom the Blue tariff is not suitable.

11.3.1. Taking power requirements into account

For this tariff, power standing charges are carried out in apparent power, i.e. in kVA in steps of 6 kVA from 36 to 108 kVA, in steps of 12 and above. They therefore already take into account the installation power factor and hence there is no actual billing for reactive energy. But the customer group is advised to maintain its power factor within reasonable limits in order to avoid too great an apparent power standing charge on which the calculation of the standing charge is based.

Under certain conditions, one additional power, and only one, can be subscribed.

This tariff offers two options: Basic and EJP.

11.3.2. Tariff periods

Each option is above all characterised by a seasonal time-of-day breakdown.

■ Basic option

In this option, the tariff comprises two seasonal periods and two time-of-day periods.

□ seasonal periods

- winter (5 months) : November to March inclusive
- summer (7 months) : April to October inclusive.

□ time-of-day periods

- peak hours : 16 hours a day, 7 days a week
- off-peak hours : 8 hours a day, which may not be consecutive, 7 days a week

The time of day of off-peak hours is fixed by the EDF regional centre. The customer cannot therefore choose his off-peak hour time period.

The tariff thus includes four tariff periods which are broken down as shown in table 11-3.

Order	Tariff period	Duration (1)
1	winter peak hours	2 416 h
2	winter off-peak hours	1 208 h
3	summer peak hours	3 424 h
4	summer off-peak hours	1 712 h
(1) For an average year of 8 760 h (365 days - 52 Sundays)		

Table 11-3: Breakdown by decreasing cost of tariff periods for the Yellow tariff in the Basic option

■ EJP option

The seasonal breakdown (winter/summer) and the summer time-of-day breakdown are the same as the Basic option. The winter period is broken down differently:

- moving peak period: 18 hours per day, 22 days per winter; a signal is emitted half an hour before the beginning of each period
- winter hours excluding moving peak period.

The EJP option thus includes four tariff periods broken down as shown in table 11-4:

Order	Tariff period (1)	Duration (2)
1	moving peakperiods	396 h
2	winter hours excluding reduction	3 228 h

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3	summer peak hours	2 935 h
4	summer off-peak hours	2 201 h
(1) Structure also valid for the A5 Green tariff (2) For an average year of 8 760 h (365 days - 52 Sundays)		

Table 11-4: Breakdown by decreasing cost of tariff periods for the Yellow tariff in the EJP option

11.3.3. Taking into account the duration of use: tariff versions

■ Basic option

This comprises two versions, according to the customer's duration of use:

- an average use version for an annual duration of use below 2 400 hours
- a long use version for durations above 2 400 hours a year for customers who can modulate their consumption:
 - . between high peak and off high peak periods (Green tariff period defined in paragraph 11.4.1.1.)
 - . between winter peak and off-peak hours
 - . between winter and summer.

The threshold between these two versions will be progressively brought to 2 000 h between now and 1998.

For the average use version in the Basic option, there is only one power level possible. On the other hand, for the long use version, only one difference in power level (two power levels depending on the time-of-day periods) is authorised, the minimum power being subscribed for the high peak period. In this case, and for an additional subscribed power excluding periods of high demand, there is a rebate on the standing charge:

- 50 % for additional power during winter peak hours in relation to the high peak period power (the high peak period, at which time a power below that of the subscribed demand for the rest of the year can be subscribed, comprises 2 hours in the morning and 2 hours in the evening from December to February inclusive)
- 66 % for additional power during winter off-peak hours in relation to the power during winter peak periods
- 80 % for additional power during the summer in relation to the power during winter peak hours (subscribed powers for peak and off-peak hours during the summer are necessarily the same).

These percentages should change slightly between now and 1998.

■ Yellow tariff EJP option

For a single power level difference, this is accompanied by a rebate on the standing charge:

- 65 % for additional power during winter hours in relation to the moving peak power
- 80 % for additional power during the summer in relation to the winter period power (same subscribed power during summer peak hours and off-peak hours).

The EJP option only comprises a long use version.

11.3.4. Billing excesses in subscribed demand

The customer chooses the method of checking his subscribed power(s):

- either by one or two power monitors which authorise excesses in subscribed demand(s): these devices measure the mean of the three phases, which **allows the customer to better control his subscribed power**; they record the subscribed power excess time; associated with an automatic re-adjustment procedure of the level of subscribed demand(s), the excess is billed at a unique price in proportion to the excess time whatever the tariff version or time-periods monitored
- or directly using the new electronic Yellow meter
- or by one or two circuit-breakers, any excess leading to an interruption in the supply; the latter solution is not recommended due to ill-used power margins leading to additional cost for the customer.

The subscribed power is automatically adjusted to the threshold immediately above if the power required during a time period exceeds the subscribed power:

- by 6 kVA or more for a standing charge below 36 kVA
- by 12 kVA or more for a standing charge between 36 and 108 kVA
- by 24 kVA or more for a standing charge above 108 kVA.

11.4. Green tariff

The Green tariff comprises three sub-categories A, B and C, each offering three options: Basic, EJP and Moduable. Each sub-category/option combination is above all characterised by a **seasonal time-of-day breakdown**. A customer can subscribe to different powers in each period.

The following can be calculated using these different powers:

- the size of the supply, using formulae which enable it to be placed into sub-category A, B or C; for sub-category A, two seasonal time-of-day breakdowns are offered: 5 or 8 periods
- the reduced power, used to calculate the annual standing charge
- possible excesses in subscribed power each month.

11.4.1. Tariff periods

11.4.1.1. Basic option

■ A5 sub-category

This tariff comprises two seasonal periods and three time-of-day periods.

seasonal periods

- winter (5 months) : November to March inclusive
- summer (7 months) : April to October inclusive.

time-of-day periods

- high peak period: four hours a day from Monday to Saturday inclusive during the months of December, January, February
- off-peak hours; eight hours a day from 10 p.m. to 6 a.m. from Monday to Saturday and all day Sunday
- peak hours: all other hours.

These seasonal and time-of-day periods make up five tariff periods. They are classed in order of decreasing cost price in table 11-5.

Order	Tariff period	Duration (1)
1	high peak period	309 h
2	winter peak hours	1 762 h
3	winter off-peak hours	1 553 h
4	summer peak hours	2 935 h
5	summer off-peak hours	2 201 h
(1) For an average year of 8 760 h (365 days - 52 Sundays)		

Table 11-5: Breakdown by decreasing cost of tariff periods for the Green A5 tariff in the Basic option

EDF regional centres are in charge of defining high peak periods. These are fixed for each customer through a contract but may be different from one customer to another depending on the local situation of the network.

■ sub-categories A8, B and C

These tariffs comprise four seasonal periods and three time-of-day periods.

□ seasonal periods

- winter : December, January, February
- mid-season : March and November
- summer : April, June, September and October
- July and August.

□ time-of-day periods

- high peak period: four hours a day from Monday to Friday inclusive, excluding public holidays and the like, throughout the winter period; the morning peak period is from 9 a.m. to 11 a.m. and the evening peak from 6 p.m. to 8 p.m.
- off-peak hours: six hours a day from 1 a.m. to 7 a.m. from Monday to Friday, plus all day (from 2 a.m. on the first day considered) for Saturdays, Sundays, public holidays and the like and all of July and August
- peak hours: all other hours.

Seasons and times of day make up eight tariff periods, classed in order of decreasing cost price as shown in table 11-6.

Order	Tariff period	Duration (1)
1	high peak period	249 h
2	winter peak hours	872 h
3	mid-season peak hours	745 h
4	winter off-peak hours	1 039 h
5	mid-season off-peak hours	719 h
6	summer peak hours	1 870 h
7	summer off-peak hours	1 778 h
8	July - August	1 488 h

(1) Estimated duration for a year of 8 760 h (variable number of public holidays and the like)
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*Table 11-6: Breakdown by decreasing cost of tariff periods for Green A 8, B or C tariffs
in the Basic option*

It should be noted that high **peak periods can**, without a change in the duration of time periods, **be modified** by EDF which must then advise the customer with a six month notice.

11.4.1.2. EJP option

The seasonal (winter/summer or winter/summer/mid-season) and summer time-of-day breakdowns are the same as those for the Basic option.

■ A5 sub-category

The winter time-of-day breakdown is as follows:

- moving peak period: 18 hours per day, 22 days per winter, signal sent half an hour before the beginning of each period
- winter hours: other winter hours.

The EJP option therefore comprises four tariff periods broken down as shown in table 11-4 (identical as that of the Yellow tariff, EJP option).

■ A8, B and C sub-categories

The winter and mid-season time-of-day breakdown is as follows:

- moving peak period: 18 hours per day, 22 days spread over the winter and mid-season
- winter hours: other winter hours
- mid-season hours: other mid-season hours.

The EJP option therefore includes six tariff periods broken down as shown in table 11-7.

Order	Tariff period	Duration (1)
1	moving peak period	396 h
2	winter hours excluding moving peak	1 880 h (2)
3	mid-season hours excluding moving peak	1 348 h (2)
4	summer peak hours	1 870 h
5	summer off-peak hours	1 778 h
6	July-August	1 488 h

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(1) For an average year of 8 760 h (365 days - 52 Sundays)

(2) These times are only approximate, since a random number of moving peak days are spread over the winter and mid-season

Table 11-7: Breakdown by decreasing cost of tariff periods for the Green A8, B or C tariffs in the EJP option

11.4.1.3. Modulable Option

The basic duration is one week (beginning Tuesday at 7 a.m.). The announcement is given at least 12 hours before, i.e. EDF announces the type of coming week on Monday before 3 p.m. and at the latest by 5 p.m.

The tariff year for this option goes from the 1st Tuesday of September to the 1st Monday of September in the following year. The option includes four tariff periods defined in real time:

- the high peak period, 18 hours per day, 22 days between 1st November and 31 March (see EJP option, § 11.4.1.2.)
- moving winter period, lasting 9 weeks, all hours of the seven days of the week which do not fall during moving peakperiods
- moving mid-season peak period, lasting 19 weeks, all hours of the seven days of the week which do not fall in moving peakperiods
- moving off-peak season period, the rest of the year, i.e. roughly 24 weeks.

The Modulable option therefore includes four tariff periods broken down as shown in table 11-8.

Order	Tariff period	Duration (1)
1	high peak period	396 h
2	moving winter hours	1 170 h (roughly)
3	moving mid-season hours	3 138 h (roughly)
4	moving off-peak season hours	4 056 h (roughly)
(1) For an average year of 8 760 h (365 days - 52 Sundays)		

Table 11-8: Breakdown by decreasing cost of tariff periods for the Green A8, B or C tariffs in the Modulable option

It should be noted that high peak days can be fixed indifferently over the moving winter or moving mid-season periods, the signal being emitted half an hour before. Furthermore, it is possible to alternatively fix different tariff weeks, for example, a moving off-peak week can be inserted between two moving winter weeks and entirely at random.

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11.4.2. Taking into account power requirements

The choice of tariff is determined by the power needs according to the tariff periods. These requirements, in the form of subscribed power, allow firstly the tariff sub-category to be determined then, once this choice has been made, the power to be billed. It is important to note that the subscribed powers must comply with the following breakdown:

$$P_1 \leq P_2 \leq P_3 \dots$$

P_1 being the subscribed power in the period when prices are highest, P_2 being in the next period, etc.

■ choice of tariff sub-category: size

The size S is calculated using the following formulae:

- Basic option

$$S = P_{WOPH} + 0.3(P_{SPH} - P_{WOPH})$$

where:

P_{WOPH} : subscribed power during winter off-peak hours

P_{SPH} : subscribed power during summer peak hours

- EJP option

$$S = P_{WH} + 0.3(P_{SPH} - P_{WH})$$

where:

P_{WH} : subscribed power during winter off-peak hours excluding high peak periods

P_{SPH} : subscribed power during summer peak hours

- Modulable option

$$S = P_{MW} + 0.3(P_{MOPS} - P_{MW})$$

where:

P_{VW} : power subscribed during moving winter period

P_{VOPS} : power subscribed during moving off-peak season period

The tariff sub-category is determined using the correspondences given in table 11-1.

Sub-category A8 is recommended for heavy summer supplies.

The size of **tariff C** customers is considerable (above 40 MW). For this tariff, EDF publishes a price list for guidance. Indeed, the specific conditions of sale for this tariff currently depend on the location of the customer in relation to the interconnection network. In the long term (probably in 1998), this distinction will be removed. When prices were changed on 20 February 1993, the first steps towards a national price list were taken.

■ Billing power

For the Green tariff, power billing is more complex than for the Yellow tariff. It involves the active power (in KW) and no longer the apparent power (in kVA). It is subscribed in different tariff periods and represents the cost of supplying and conditions of use of electricity. Indeed, the same power consumed in winter or in summer has a different cost price and a different effect on EDF investments.

In general, the power subscribed is the same in all the tariff periods. However, the customer can be remunerated for his reductions in power during the most heavily-loaded periods, notably during high peak periods and winter peak hours. The power billed is the **reduced power**. It is calculated using the power subscribed during the high peak period (P_1) and additional power possibly subscribed during other periods, given the following coefficient:

$$P_R = P_1 + K_1 \times (P_2 - P_1) + K_2 \times (P_3 - P_2) + \dots$$

Coefficients K_i are called **reduced power calculation coefficients**.

11.4.3. Taking duration of use into account: tariff versions

Depending on the option chosen, two or four tariff versions are offered customers. Each version corresponds to a range of duration of use of subscribed power. The versions currently offered are shown in table 11-9.

Option	Versions
Basic	short uses average uses long uses very long uses
EJP and Moduable	average uses very long uses

Table 11-9: Tariff versions for the Green tariff

For a given option and sub-category, the versions have an identical structure including a standing charge and energy prices per tariff period. The values of these prices change depending on the duration of use: the standing charge increases from short uses up to very long uses; inversely, energy prices decrease between these two tariff versions.

In order to choose the most advantageous version, the yearly expenses corresponding to each version should be calculated. Note that the customer's choice for whichever of the tariff versions offered applies to his entire supply (one take-over point, a single contract lasting three years, or six years as an option): it is thus not possible to cumulate several tariff versions.

■ four tariff versions

These are offered **Basic option** customers. The ranges for the annual number of hours of use of subscribed power, for a supply with no power reduction (i.e. the same power during different time periods) are roughly as follows:

- short use version: less than 2 000 hours
- average use version: from 2 000 to 4 000 hours
- long use version: from 4 000 to 6 000 hours
- very long use version: above 6 000 hours.

■ EJP and Modulable options

Only the long use and average use versions are available. Indeed, the important parameter for the choice of version is the load factor during moving peak periods (i.e. the ratio in % of the duration of subscribed power used by the customer during moving peak periods to the number of total moving peak hours, i.e. 396 h). Now, this parameter is difficult to assess due to the random nature of the moving peak hours period. The introduction of other versions would make the choice even more difficult.

11.4.4. Reactive energy billing

At the same time as active energy, EDF supplies reactive energy free of charge:

- to the amount of 40% of the active energy consumed ($\tan \mathbf{j} = 0.4$) during high peak periods in December, January, February and peak hours in November, December, January, February and March
- without limitation during off-peak hours in November, December, January, February and March and throughout the months of April, May, June, July, August, September and October.

During periods subject to limitation, the reactive energy consumed for $\tan j \geq 0.4$ is billed monthly at the tariff indicated on the price lists in force.

This method of billing reactive energy is independent of tariff options and sub-categories.

11.4.5. Billing excesses in subscribed power

■ General

EDF is not bound to meet non-subscribed power demands and can in theory ask the customer to install in his supply substation a circuit-breaker preventing any excess above 10 % of the subscribed power. This is not possible in certain installations, notably for high powers. This billing is not an end in itself. Its purpose is to urge the customer to subscribe to the power that he really needs. Thus, excesses are tolerated as long as the customer pays an extra charge calculated according to the following provisions.

The old billing system for excesses was based on the maximum power reached. This formula charged the same price for an accidental excess lasting a short time and the use of the same power over a long period in the course of the same month.

The system used since 1980 implements progressive billing of excesses which takes into account not only their magnitude but also their frequency in order to better match the more or less costly nature of the supply. Excess billing must enable the customer to be guided in his choice of standing charge level; not too high and not too low.

Excesses for a tariff period are billed by applying a unit price to a number of excess units. The number of units is determined by the square root of the sum of squares of each excess (as for any power measured, this involves an average power in kilowatts over 10 minutes) in subscribed power of the tariff period considered. The formula is different depending on whether the customer has the Basic option, the EJP option or Modulable option.

Excesses are billed **monthly** and **independently of each tariff period** of the month considered. Their total is the sum of amounts corresponding to each tariff period.

■ Basic option

For customers having **electronic metering** or **metering with cassette recorder**, the price of excesses for each tariff period of a given month is given by the following formula:

$$XS = k_3 \sqrt{\Sigma (\Delta P)^2}$$

where:

excess : amount due for excesses during the period concerned

$\Sigma (\Delta P)^2$: sum of squares of all excesses in subscribed power during the period considered

k_3 : unit price for an excess of power equal, during the **high peak** period, to 3 % of the standing charge basic rate of the very long use tariff version; this value is identical whatever the tariff version chosen by the customer (very long use, long use, etc.) not taking into account any increase or decrease; for the C tariff, this is the basic rate of the EDF price list guide

In the event of an increase in subscribed power during month $M + 1$, the customer can benefit from a rebate of 50 % off the price of excesses *excess* for month M that this increase would have prevented.

■ EJP and Modulable options

For these options, the random nature of the moving peak period is taken into account which means specifically checking that there is indeed a reduction in power used on the customer's behalf during the moving peak period. For customers with **electronic metering** or **metering with cassette recorder**, the price of excesses for each tariff period of a given month is given by the following formula (for other types of metering see "EJP option" paragraph):

$$excess = k_3 \sqrt{\Sigma (\Delta P)^2} + tE$$

where:

excess : amount due for excesses during the period concerned

E : excess energy during the moving peak

t : excess billing unit price

The first term of the second member of the equation is the sum of squares of all subscribed power excesses observed during the period considered except in the case of the moving peak period, where the reference subscribed power is that of the winter hours or the moving winter week.

The definition of k_3 is given in the "Basic Option" paragraph .

In the event of an increase in subscribed power for the month $M + 1$, the customer can benefit, as for the Basic option, from a rebate of 50 % off the excess price amount for month M , for the part incurred by the power being exceeded. As for the term relating to the energy consumed when the power is exceeded during the moving peak period, this remains unchanged.

■ **temporary arrangements** (for the A5 tariff only)

□ **Basic option**

For A5 tariff customers who do not have the new electronic metering which has been progressively offered customers since September 1989, the formula described in the "Basic option" paragraph has been temporarily simplified to take into account existing measuring devices.

• **metering with maximum indicator**

For customers having metering with a maximum power indicator, the formula per tariff period is:

$$XS = k_1 \Delta P_{\max}$$

where:

ΔP_{\max} : difference between the maximum power reached and the subscribed power

k_1 : unit price of the excess equal, during the **high peak** period, to 25% of the standing charge of the A5 tariff very long use version

The price of excesses for other tariff periods is calculated by applying to k_2 the corresponding coefficient given for k_3 in the "Basic option" paragraph.

- **metering with power recorder**

For customers with this type of metering, excesses are billed taking into account the maximum magnitude and the number of excesses in each tariff period:

$$excess = k_2 N \Delta P_{\max}$$

where:

ΔP_{\max} : difference between the maximum power reached and the subscribed power

N : number of excesses for the period

k_2 : equal, during the **high peak** period, to 1 % of the standing charge basic rate of the A5 tariff very long use version

The price of excesses for other tariff periods is calculated by applying to k_2 the corresponding coefficient given for k_3 in the "Basic option" paragraph.

- **EJP option**

As for the Basic option, the excess price formula figuring in the "EJP and modulable options" paragraph has been simplified to take into account metering devices.

- **metering with maximum indicator**

- if there is no possibility of recording the energy consumed during moving peak periods above the subscribed power, excess billing is carried out per tariff period with the formula:

$$excess = k_1 \Delta P_{\max}$$

where:

ΔP_{\max} : difference between the maximum power reached and the subscribed power in each tariff period

k_1 : defined in "Basic Option" paragraph

- in the case where the energy consumed above the subscribed power during the moving peak period is recorded, the excess is calculated using the following formula:

$$excess = k_1 \Delta P_{\max} + tE$$

where:

ΔP_{\max} : difference between the maximum power reached and the subscribed power per tariff period, except in the case of the moving peak period where the reference subscribed power is that of the winter hours

t, E : defined in the "EJP and modulable option" paragraph

k_1 : defined in "Basic Option" paragraph

In both cases, the unit prices for other tariff periods are given in the "Basic Option" paragraph (A5 tariff customers with this type of metering are the only ones concerned).

• metering with power recorder

Excess is calculated using the formula:

$$excess = k_2 N \Delta P_{\max} + tE$$

The definitions of parameters $k_2, N, \Delta P_{\max}$ are the same as those in the "Basic Option" paragraph.

E , excess energy during the moving peak period can be estimated using excesses in power:

$$E = \frac{1}{6} \Sigma dm$$

where:

Σdm : sum of average power excess magnitudes for 10 minutes during the moving peak period

11.4.6. Voltage classes

EDF chooses the physical take-over voltage of each customer, i.e. the actual supply voltage (in relation to the normal voltage linked to the tariff). This choice takes into account the local characteristics of the network, the power demand and, considered as a requirement, the specific conditions of inrush power.

Table 11-10 defines the voltage classes.

There is thus no strict link between a type of tariff and the take-over voltage.

Taking into account the actual take-over voltage, a **decrease-increase system**, based only on the standing charge, can be used to make sure that all customers are charged with the actual cost of their supply; it is defined in table 11-10.

Voltage class	Physical voltage U range kV	Power class		
		Tariff A	Tariff B	Tariff C
MV	$1 \leq U < 40$	A	B increase	
63 and 90 kV	$40 \leq U < 130$	A decrease	B	C increase
HV 225 kV	$130 \leq U < 350$	B increase	C
400 kV	$350 \leq U < 500$	C increase

Table 11-10: Correspondence between power class and voltage class

Increases are applied to the maximum subscribed power. Decreases are applied to the reduced power. These decreases are reduced by 50% for short uses.