Evolution of Domestic Electricity Consumption and Electrocution Accidents: A Historical Technical Analysis from 1930 to Today

With references to Sant Feliu de Pallerols and Les Preses (La Garrotxa, Catalonia)

The evolution of domestic electricity consumption in Spain, and particularly in rural areas such as the comarca of La Garrotxa, reflects not only technological changes but also the social and economic transformations of the last century. This article technically examines how consumption has changed, what electrical accidents truly meant in different eras, and how local companies supplied electricity to these areas.

Current Electricity Consumption: The LED Era (2020–2025)

In 2025, a Spanish household consumes an average of **270 kWh per month** (approximately 3,272 kWh per year), according to data from Red Eléctrica Española. This is equivalent to approximately **9 kWh per day**, at an average cost of €1.35 per day.
However, this figure has undergone a significant reduction in recent years thanks to LED technology. A 10W LED bulb provides the same illumination as a 60W incandescent or a 40W halogen. If a home has 15 light points on for an average of 4 hours per day:

- With incandescent bulbs (60W): 15 × 60W × 4h × 30 days = **108 kWh/month**
- With LED (10W): 15 × 10W × 4h × 30 days = **18 kWh/month**

This represents an **83% reduction in lighting consumption**. Economically, at an average price of €0.15/kWh, LED lighting saves around €13.50 per month on bulbs alone, or €162 per year per household.
The breakdown of current consumption in a typical household is:

- Appliances: 55.2% (149 kWh/month)
- Lighting: 11.7% (32 kWh/month) — it would have been 100+ kWh with incandescents
- Cooking: 9.3% (25 kWh/month)
- Hot water: 7.5% (20 kWh/month)
- Heating: 7.4% (20 kWh/month)
- Standby: 6.6% (18 kWh/month)
- Cooling/Air conditioning: 2.3% (6 kWh/month)

Retrospective: 1990–2010 (Era of Low-Energy Bulbs)

Between 1990 and 2010, average household consumption in Spain ranged from **3,200 to 4,500 kWh per year**, depending on the level of equipment. During this period, compact fluorescent lamps (CFLs) were introduced, consuming 75% less than incandescents but not reaching the efficiency of current LEDs.
The typical contracted power was **3.3 kW to 5.75 kW**, sufficient for a home with a refrigerator, television, washing machine, and several light points. The voltage was already **220V (standardised to 230V in the 90s)** throughout Spain.
Lighting then accounted for 18–20% of total consumption, compared to the current 11.7%. A typical home with 15 60W incandescent bulbs consumed approximately

1,300 kWh per year on lighting alone — nearly half the total current consumption of a modern LED home.

The 1970s–80s: The Era of Economic Development

In the 1970s, Spain experienced explosive growth in domestic electricity consumption. In 1970, total electricity generation in Spain reached **56,500 GWh**, tripling the 1960 figure. Average household consumption was around **1,500–2,000 kWh per year**.
At this time, many homes still operated on **125V single-phase** (derived from 220V three-phase systems), though the transition to the 220V standard was underway. Electrical appliances had voltage selectors (110V/125V/220V) precisely because of this coexistence of standards.
My personal experience in 1973 (Les Preses):
I was 3 or 4 years old when I stuck a pair of scissors into a socket. What I felt was a violent muscle contraction, intense pain, and I remained "stuck" for what seemed like eternal seconds but were probably milliseconds. My grandmother managed to separate me without touching me directly — probably using something non-conductive. The shock left me dazed, with a numb arm and a visceral fear of sockets that lasted for years.
Domestic electricity in 1973 was **220V or 125V depending on the installation**. In my case, it was probably 125V single-phase. With a body resistance of approximately 1,000 ohms (dry hands of a child), the current that passed through my body was:
I = V / R = 125V / 1,000Ω = 0.125 amperes = 125 milliamperes
This current of 125 mA is **extremely dangerous**. According to electrical safety studies:

- 1 mA: Perception threshold (slight tingling)
- 5 mA: Unpleasant shock but controllable
- 10–30 mA: Intense pain, loss of muscle control
- 50–150 mA: Severe muscle contraction, "stuck" to the conductor, risk of ventricular fibrillation
- 150–250+ mA: Probable ventricular fibrillation, cardiac arrest, death

My survival was due to three factors: **(1) the contact duration was extremely brief** — probably less than 0.5 seconds; **(2) the current path did not pass directly through the heart**; and **(3) my grandmother's immediate intervention**. With 125 mA for 3 seconds, the probability of ventricular fibrillation would have exceeded 50%.

The 1940s–50s: The Beginnings of Rural Electrification

My grandmother's experience (Sant Feliu de Pallerols, approx. 1950):
As she told me, at that time she touched something electrical (probably an appliance with a poorly insulated metal casing or a bare wire) and received a shock that knocked her to the floor. The most striking part of her account was that "the village lights went out" immediately afterwards, and apparently she was made to pay something related to the incident. There were also certain envies in the village according to a book published about the grandparents of the old people's home, as there was jealousy because she had 2 bulbs in the house and everyone else only had one. But when you turned one on, the other went off, as if the connection was faulty, and in practice only one bulb worked at a time. The perception of people in other times is sometimes different from current perceptions.

Let us analyse this technically. In 1950, Sant Feliu de Pallerols was a village in La Garrotxa that received electricity from small local hydroelectric plants or from the nascent network of **FECSA (Fuerzas Eléctricas de Cataluña)**, created in 1951, or from predecessor companies such as Barcelona Traction ("La Canadenca").
At that time, the domestic voltage in rural areas of Catalonia varied enormously. Some installations had **110V, others 125V, and the most modern 220V**. The most likely in Sant Feliu de Pallerols in 1950 was **125V single-phase** derived from a three-phase transformer.
The village power outage has a technical explanation: **my grandmother probably caused a short circuit to earth**. In the electrical systems of 1950, protections were rudimentary — modern residual current devices (RCDs) did not yet exist (invented in 1955). Protections relied on fuses that had to detect massive overcurrents.
If my grandmother touched an active conductor making good contact with earth, the current flow could have been:
I = 125V / 500Ω (resistance reduced by moisture/sweat) = 0.25 amperes = 250 mA
This current is **lethal**. However, if contact lasted less than 100 milliseconds and the current did not pass directly through the heart (entry through the hand, exit through the legs), it is possible to survive with: momentary loss of consciousness, burns at entry/exit points, violent muscle contractions that knocked her to the floor, and prolonged dazedness.
The village power outage was probably caused by the short circuit to earth **blowing the fuse of the local distribution line**. At that time, a small village like Sant Feliu de Pallerols might have had a single distribution line with 50–100 ampere fuses. A short circuit of 250 mA plus the normal load of the village could have been sufficient to blow the fuse.
As for the "payment": it is likely that the electricity company charged for the **replacement of the fuse and restoration of service**. In 1950, electricity companies had very different practices from today — the service was almost artisanal, and any incident requiring intervention was charged to the responsible customer.

The Textile Industry in Sant Feliu de Pallerols: The Context of the 1950 Accident

My grandmother's accident was not an isolated incident in a private home. It occurred in the context of **the beginnings of textile industrialisation in La Garrotxa**, a process that was radically transforming villages like Sant Feliu de Pallerols.
Sant Feliu de Pallerols had been known since the medieval era as *"land of mills"*. The River Brugent, which runs through the Hostoles Valley, provided the hydraulic energy needed to power **14 flour mills** in the village. One of the oldest, the Molí de la Conqueta, has documented references from 1310.
From the 18th century, some of these flour mills were converted into **cloth mills (draps)**. In 1766, the guild of paraires (wool workers) and weavers of Sant Feliu de Pallerols approved its ordinances under the supervision of the Junta de Comerç de Barcelona. Wool textile production became a fundamental economic activity of the village.

The Electrification of the Textile Industry (1920s–1950s)

When electricity arrived in Sant Feliu de Pallerols in the early decades of the 20th century, **textile factories were the first to adopt it**. The mills, which traditionally operated with direct hydraulic energy (water wheels), began installing **hydroelectric generators** that converted the force of water into electricity.
This electricity was used to power:

- **Mechanical looms**: An electric loom from the 40s–50s consumed between 0.5 and 1.5 kW per unit. A small factory with 20 looms could consume 20–30 kW.
- **Spinning and carding machines**: Carding motors consumed 2–5 kW each.
- **Transmission systems**: Before each machine had its own motor, a large central motor (10–20 kW) was used, transmitting movement via pulleys and belts (the famous "embarrats" seen in period photographs).
- **Industrial lighting**: Factories needed many 100–200W incandescent bulbs to illuminate workspaces.

A small textile factory in Sant Feliu de Pallerols in 1950 could easily consume **50–100 kW of power** during operating hours. In a village of perhaps 1,000–1,500 inhabitants where homes consumed 200–500 kWh per year (less than 1 kW per house on average), **a single textile factory consumed more electricity than the entire residential village**.

My Grandmother's Accident in Industrial Context

Now we can better understand what happened. If my grandmother worked in or near a textile factory (or even if the accident occurred in a home connected to the same electrical line that powered the factory), **the short circuit she caused overloaded the local distribution line**.
In 1950, Sant Feliu de Pallerols probably had:

- A main **medium-voltage line (3,000V or 5,000V)** from a hydroelectric plant on the River Brugent.
- Local transformers reducing to **125V or 220V** for domestic and industrial use.
- Protective fuses of **50–100 amperes** in the main village transformer.

When my grandmother caused a short circuit to earth with a current of approximately 250 mA, this additional current added to the **industrial load of the textile factory** (which might have been consuming 50–100 amperes at that moment) was sufficient to blow the main transformer fuse.
That is why "the village lights went out": **it was not just the domestic short circuit, but a short circuit on a line already heavily loaded by industrial demand**. The factory stopped, the looms ceased to function, and valuable production was probably lost.
This also explains why **she was made to pay**. It was not just the cost of the fuse (a few pesetas), but:

- The **loss of industrial production** while service was restored (30 minutes to 2 hours).
- The **cost of dispatch** of the electrician from Olot or the hydroelectric plant.
- The **penalty for improper use** of the electrical grid.

At that time, electricity companies (probably La Canadenca in 1950) had **very strict clauses** in their contracts. Any customer who caused a service interruption to other users could be fined. This practice was especially severe when the interruption affected industrial customers.

Comparative Electricity Consumption: Textile vs. Domestic (1950)

To put the magnitude of industrial textile consumption in perspective:

- **A household in 1950**: 200–500 kWh per year (3–5 bulbs of 40W, no appliances)
- **A small textile factory in 1950**: Assuming 50 kW of power for 10 hours per day, 250 days per year = **125,000 kWh per year**

That is, **a single small textile factory consumed as much as 250–600 households**. If Sant Feliu de Pallerols had around 250–300 electrified homes in 1950, the local textile factory probably represented **50–70% of the village's total electricity consumption**.

This explains why a domestic short circuit could black out the entire village: **the electrical infrastructure was tightly dimensioned for the industrial load, and any additional overload tripped it**.

The 1930s: The Dawn of Electrification

In 1930, only a small percentage of rural homes in Spain had electricity. In La Garrotxa, electrification was arriving thanks to small hydroelectric plants exploiting the local rivers (Fluvià, Ser, etc.).

The average consumption of homes that had electricity was **minimal: between 200–500 kWh per year**. Electricity was used exclusively for lighting — a few 40–60W incandescent bulbs. There were no appliances as we know them: no electric refrigerators (iceboxes were used), no washing machines, no television (which did not exist commercially).

Voltage at this time was **completely heterogeneous**. Each small hydroelectric plant generated at its own voltage:

- Direct current systems at 110V or 125V
- Alternating current systems at 125V, 220V or even unusual voltages like 150V
- Frequencies of 42 Hz, 50 Hz or 60 Hz depending on the local generator

This chaotic situation was not standardised until the 1950s–60s, when large electricity companies (FECSA, ENHER) extended standardised networks of **220V / 50 Hz alternating current**.

A typical home in 1930 with electricity had:

- 3–5 bulbs of 40W
- Ceramic fuses (no residual current protection)
- Exposed wiring on porcelain insulators
- Bakelite switches without earthing

Electrical accidents were frequent and often fatal. Without RCDs, without mandatory earthing, with poorly insulated cables and unprotected metal-cased appliances, touching a faulty electrical appliance could mean death. Electrocution mortality in Spain in the 1930s–40s was approximately **10 times higher** than today (adjusted for population).

Electricity Companies in La Garrotxa: Local History

La Canadenca and the Birth of FECSA (1910–1951)

In Sant Feliu de Pallerols and Les Preses, electricity arrived through the system of Barcelona Traction, Light and Power Company (known as "La Canadenca" for its Canadian origins), founded in 1911 by Frederick Stark Pearson.

La Canadenca built hydroelectric plants in the Pyrenees, including those on the **Noguera Pallaresa and Segre rivers**, and extended distribution lines throughout Catalonia. By 1925, La Canadenca was the main electricity company in Catalonia, controlling approximately 85% of regional distribution.
In 1948, in a controversial operation, La Canadenca was declared bankrupt and in 1951 its assets were acquired by **Fuerzas Eléctricas de Cataluña (FECSA)**, a company driven by Joan March i Ordinas. FECSA modernised the inherited La Canadenca network, standardised voltages and frequencies, and extended service to rural areas previously without it.
Thus, in 1950, when my grandmother suffered her accident in Sant Feliu de Pallerols, **the electricity was probably still supplied by La Canadenca infrastructure**, right at the moment of transition to FECSA. This would explain the old installations, rudimentary fuses, and commercial practices of charging for incidents.

ENHER and the Expansion of the 1960s–70s (1946–1999)

Parallel to FECSA, the Empresa Nacional Hidroeléctrica del Ribagorzana (ENHER) was created in 1946 with a majority stake from the Instituto Nacional de Industria (INI). ENHER built large hydroelectric plants in the Pyrenees and extended distribution networks across Aragon and parts of Catalonia.
In 1972, ENHER connected its network with other local distributors, allowing greater reliability. In my personal case in 1973 in Les Preses, **the electricity supply probably came from FECSA**, which controlled most of the distribution in La Garrotxa.
During the 1970s, FECSA and ENHER signed collaboration and **territorial allocation agreements**. In 1974, the four major Catalan electricity companies (FECSA, ENHER, Hidroeléctrica de Cataluña — HECSA, and Fuerzas Hidroeléctricas del Segre) signed a "zone agreement" to divide up Catalonia. La Garrotxa remained mainly in FECSA territory.

Local Electricity Companies: Bassols Energia

In addition to the large companies, La Garrotxa has had independent local distributors. The most important is Bassols Energia, based in Olot, which has maintained its independence from the large electricity companies.
Bassols Energia currently distributes electricity to practically all of La Garrotxa and neighbouring comarques. The company is a continuation of the pioneering Pyrenean hydroelectric plants built in the early 20th century. Today, Bassols Energia states that **all its electricity comes from renewable energy**.
It is likely that in areas of Sant Feliu de Pallerols and Les Preses, especially those furthest from the urban centre, there were small local networks operated by family businesses or cooperatives that were later absorbed by FECSA or Bassols.

The Endesa Era (1985–Present)

In 1985, ENHER acquired part of FECSA's shareholding. In 1996, Endesa acquired 75% of FECSA, and in 1999 completed the 100% absorption, also merging ENHER. Thus was born **Fecsa-Endesa**, the brand under which Endesa operated in Catalonia until 2009.

Since 2009, with the liberalisation of the electricity market, distribution (regulated, natural monopoly) was separated from commercialisation (free market). Endesa continued as the main distributor in Catalonia, but multiple suppliers now exist. Currently, in Sant Feliu de Pallerols and Les Preses, **distribution is carried out by Endesa or Bassols Energia** (depending on the exact street), but users can freely choose their supplier.

Safety Comparison: 1950 vs 1973 vs 2025

The differences in electrical safety between these three eras are abysmal:

1950 (Sant Feliu de Pallerols):

- Voltage: 125V or 220V (not standardised)
- Protections: Fuses only (20–30A)
- Earth connection: Did not exist
- Wiring: Fabric-covered cables insulated with rubber, on porcelain insulators
- Sockets: No earth connection, exposed contacts
- Appliances: Unprotected metal casings
- Electrocution risk: VERY HIGH — a fault in any appliance could be fatal

1973 (Les Preses):

- Voltage: 220V standardised (some old homes still with 125V)
- Protections: Fuses + some miniature circuit breakers
- Earth connection: Beginning to be mandatory in new buildings
- Wiring: Copper cables with plastic insulation
- Sockets: Schuko with earth connection in some homes
- Appliances: Mix of old unprotected appliances and new ones with insulated casings
- Electrocution risk: HIGH — improving, but many old homes not yet renovated

2025 (All of Spain):

- Voltage: 230V ±10% European standard
- Protections: 30 mA RCDs (trip in 100 ms) + miniature circuit breakers
- Earth connection: Mandatory in all installations
- Wiring: Copper with double insulation, fire-resistant classification
- Sockets: Schuko with child safety shutters
- Appliances: Class II double insulation or Class I with earth, CE certification
- Electrocution risk: LOW — RCDs prevent 95% of fatal accidents

The **residual current device (RCD)** is the most important innovation. Invented in 1955, it became mandatory in Spain in the 1970s–80s. It detects current differences of just 30 mA between live and neutral, and cuts the supply in less than 100 milliseconds.

If I had stuck scissors in a socket in 2025 with a 30 mA RCD installed:

- Initial current: 230V / 1,000Ω = 230 mA
- The RCD would instantly detect that 230 mA are "leaking" to earth
- Trip time: 20–40 milliseconds (0.02–0.04 seconds)
- Result: A painful shock but not dangerous, no loss of consciousness, no risk to life

Should We Fear Electricity Today?

This is a crucial question. The answer is: **not if installations are up to date, but we must maintain respect**.
In 2025, with modern installations that comply with regulations:

- 30 mA RCDs prevent 95% of fatal electrocutions
- Appliances are designed with double insulation
- Sockets have shutters that prevent the insertion of metal objects
- Earthing channels any leakage to earth before it touches the human body

However, many old homes in rural areas like Sant Feliu de Pallerols and Les Preses still have installations from the 1960s–70s without updating. These homes may have:

- Old wiring without earthing
- 300 mA RCDs instead of 30 mA (less sensitive)
- Sockets without shutters
- Obsolete electrical panels

In these homes, the risk remains **significantly higher**. A 300 mA RCD can allow enough current to flow through the body to cause ventricular fibrillation before tripping.
Practical recommendations:

- If you live in a home built before 1990, check that you have 30 mA RCDs
- Test the "TEST" button on your RCD monthly
- Never touch electrical appliances with wet hands
- Be wary of old appliances with metal casings without earthing
- If you feel tingling when touching an appliance, unplug it immediately and have it checked

Conclusion: A Century of Progress

From those chaotic 125V of 1950, when a simple electrical contact could "black out the village" and nearly kill my grandmother, to the **safe 230V of today with 30 mA RCDs**, the evolution has been spectacular.
Consumption has also undergone an interesting journey: from **200–500 kWh per year in 1930** (only for lighting with incandescents), it rose to **4,500 kWh in the 90s** with inefficient appliances and wasteful bulbs, and has now fallen back to **3,272 kWh in 2025** thanks to LED technology and efficient appliances.
The electricity companies of the area — from La Canadenca and its small hydroelectric plants, through FECSA and ENHER, to Endesa and Bassols Energia — have built an infrastructure that allows us today to enjoy electricity that is **reliable, safe, and relatively affordable**.
My experience with scissors in 1973 would have been fatal in 1950, dangerous in 1973, and would be almost harmless in 2025 with a modern RCD. This is the tangible progress of a century of electrical engineering.
Nevertheless, respect for electricity must be maintained. 230V is still enough to kill if protections fail or are obsolete. The lesson from my grandmother — and my own — is clear: **electricity does not forgive, but with proper protections, it is one of the greatest technological achievements of humanity**.
But I have never known how my grandmother could pay for something like that, if she was indeed made to pay anything. Even my grandfather could not find his birth certificate to tie any loose ends. Although it would have been statute-barred if anything had to be paid, likewise if they had to compensate our whole family from my grandfather it would be practically impossible to do anything. The judicial system is

usually slow, but this is something that probably had little importance. Or perhaps it did have importance and certain brakes or inconveniences sometimes make cause-and-effect relationships seem unlikely to be believed. History is always said to be written by the winners, but at that time the blockchain did not exist, which would be a system to verify history. And currently there is no will to do it; they prefer history to be fallible rather than reliable. Furthermore, adopting new ways of doing things is something society is always slower at than technological advances. There are many idiots, imbeciles, and Peter Pan syndrome cases, which although they may seem like insults are classifications that doctors make of disorders related to the age a person has and how they act as if they were much younger. Not to be confused with immaturity, which would be another very widespread classification. The typical Spanish clichés that when people engage in certain cunning tricks or shady dealings of dubious legality they are considered shrewd or socially astute. And this happened in Catalonia, which should not have this profile, but there are many people from outside and also from within who are at carnival all year round.

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Clarification Note

This text was written quickly as an exercise in historical, technical and testimonial reconstruction, with the support of artificial intelligence tools. Some of the data, figures and technical explanations are based on general knowledge generated by AI rather than on a fully verified primary database.

The content combines family memories, known historical context and plausible technical hypotheses, but it does not constitute a proven causal claim nor a formal accusation against any person or entity.

The purpose of this text is to preserve memory, provide context and raise questions. Any incorrect or improvable information will be reviewed if verifiable documentary sources become available.