

CASE STUDY ON THE LOIRE BASIN

IMPROVING THE MONTPEZAT HYDROELECTRIC COMPLEX



ERN France
8 rue Crozatier,
43000 Le Puy-en-Velay

June 2026



LOCATION

Department : Ardèche (07)

Watershed of the Loire :

The water intake of the Grange on the Veyradere - Natural Lake of Issarlès - Gage Dam at the confluence of the Tauron and Gage - Lapalisse Dam on the Loire

Watershed of Ardèche :

Montpezat-sous-Bauzon powerplant - Pont-de-Veyrières on the Fontaulière Dam powerplant



KEY NUMBERS

Commissioned in : 1954

Underground galleries and penstock :

25 km long galleries + 1.4 km penstock,
3 metres in diameter

Average annual production : 290 GWh

Installed capacity : 150 MW

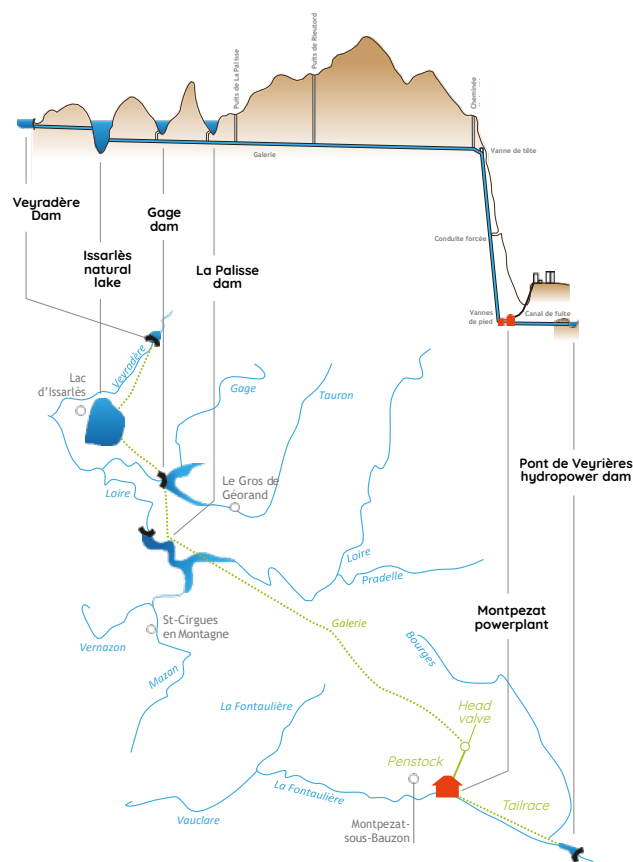
Drop height : 636 metres

Volume of water transferred to the Ardèche:

On average, 220 million (Mio) cubic meters of water are transferred each year, with annual variations ranging from 80 Mio cubic meters to as much as 345 Mio cubic meters.

Storage capacity : 40.8 million m³

Overview of the complex



↑ Balancing chimney in the foreground at the centre. Montpezat-sous-Bauzon in the valley

Developments

The Montpezat hydroelectric complex, a remarkable achievement of post war engineering, was designed to respond to the energy shortages of the time. The power plant is located 120 metres underground beneath the village of Montpezat sous Bauzon.

The guiding principle behind this development was to divert large volumes of water from the Loire and its tributaries toward the Ardèche downstream, creating a significant drop in elevation that could be used to generate electricity during peak periods of high demand. At the same time, the installation helps secure the operation of the Cruas nuclear power plant on the Rhône. Beginning in the 1990s, a new function was added: regulating the low-water flow of the Ardèche, and more recently, that of the Loire.

The Montpezat complex includes three structures on the Loire side: the Grange intake on the Veyraderre, the Gage dam, and the Lapalisse dam, as well as the natural Lake Issarlès. All of these sites are located only a few kilometres from the source of the Loire and are all interconnected. Together, they form a usable water reserve of 40.8 million cubic metres.

To link the reservoirs, the lake and the power plant, a gallery was excavated beneath the mountain. On the Loire side, water can circulate in both directions through this gallery, allowing multiple operating configurations; whether filling the reservoirs or sending water to generate electricity.

With a total length of 25 kilometres, the gallery crosses the watershed between the Mediterranean and the Atlantic and ends in a 1.4 kilometre pressure tunnel that delivers the water to the underground Montpezat power station after a drop of 636 metres. Once it has passed through the turbines, the water flows into the Fontaulière and then to the Pont de Veyrières dam, where it is used again for hydropower production.

DID YOU KNOW ?

Legally, transferring water from one watershed to another required a decision by Parliament. This is why, on March 21st 1949, two years after construction had begun, Parliament passed a law (Law No. 49-399) authorizing EDF to divert water from the Loire to the Ardèche.

The concession for the project was granted to EDF in 1949 for a period of 80 years, which means it is scheduled to end in 2028.

Three-step management

March 7 through June 14: This is the filling period : water is collected and stored, and normally no electricity is produced during this period.

From June 15 to September 15: This is the period during which the reservoirs are used for low-flow support (mandatory): As a general rule, on the Ardèche side, this begins almost immediately in mid-June (8.4 Mio m³ on average), and on the Loire side, it begins in late July/early August (with successive increases from 0.5 Mio m³ between 1988 and 2014 to 2 Mio m³ since 2022). The total volume available for low-flow support is fixed at around 12 Mio m³. However, this does not take into account the usable volume of Lake Issarlès, which must maintain its "natural" level until September 15 (for tourism purposes).

From September 16 to March 6: this is the run-of-river period during which peak electricity is generated for a few hours each day. Reservoir volumes are utilized, as is



↑ Source of the Loire at the Mont Gerbier-de-Jonc (Ardèche department)

all the fall and winter precipitation flowing into the structures, with a required minimum flow of 0.4 m³/s for the Loire River.

An equation to solve

Water is transferred from the Loire River watershed (Atlantic Ocean) to the Fontaulière, a tributary of the Ardèche (Mediterranean Sea), and even though a small amount is returned to the Loire during the summer, the river clearly lacks water.

The impacts are well-documented and numerous (disruption of ecological continuity due to dams, reduced sediment transport, fewer morphogenic floods, and decreased flow in the Loire). Over the past thirty years,

the annual flow at Pont de la Borie (in the municipality of Lac d'Issarlès) is -80%, and -33% near the town of Chadrac (at the confluence with the Borne River, 2 km from Le Puy-en-Velay). On the one hand, this transferred water is beneficial for the Ardèche as the river suffers from low water levels during the summer. However, the increased levels have encouraged significant new uses, particularly for agriculture and tourism.

To a new Montpezat

At the end of 2028, the Montpezat concession will expire. Following a recent law passed in 2026 that ends the concession system, it will be replaced by a permit. This therefore offering a valuable opportunity to design a collective project built on shared knowledge and co-operation. As part of this process, the Intersage Loire Amont Ardèche group has been mobilised to work on the issue and has launched in 2024 studies to improve understanding of hydrology and environmental impacts.

Since 2025, the Prefect of Haute-Loire has been appointed as the point of contact for the project and will serve as the local representative during the drafting of the future of the hydroelectric complex. In early 2026, the work of a task force—including the ERN association—led to several proposals that found common ground on certain aspects of future operations. Despite constructive dialogue, differences remain on key issues. However, all members of InterSage are in favor of resuming the dialogue.

As things stand, there are two main orientations and approaches. For the government—and consequently for EDF—the complex must primarily serve the production of hydroelectric power; for others, this priority is incompatible with the future, and natural environments cannot systematically be treated as an adjustment variable.

However, the balance to be struck is already defined by the Environmental Code: Water management must first and foremost guarantee drinking water needs, then leave enough water for the natural environment and the proper functioning of ecosystems, and finally satisfy all remaining uses.

The Montpezat of tomorrow will therefore need to better address the challenges of climate change, reduce its impact on ecosystems, and ensure a fair and sensible distribution of water between the two watersheds.

The growing scarcity of water—whether seasonal or not—will inevitably force us to reduce water withdrawals. Considering a 10 to 20 percent reduction in hydroelectric production during the fall and winter should not be off-limits; this would help us approach the minimum biological flow rates and better ensure, in the long term, the preservation of aquatic life in the Loire River along its first 80 km up to Le Puy-en-Velay. This would not, however, compromise low-flow support for the Ardèche and Loire basins during the summer season.

Negotiations regarding water sharing between two watersheds—which also involve energy issues—serve as a model at the European level. It seems all the more imperative to devise and implement a governance model capable of addressing the challenges we will face in Europe as a result of climate change.



↑ Montpezat Loire and Ardèche Working Group

FEATURES OF THE DEVELOPMENTS

> The water intake of the Grange on the Veyradeyre

This dam is not used for reservoir but supplies a water intake that feeds Lake Issarlès. Standing 12.5 metres high and 45 metres long, it has a useful storage capacity of 0.05 million cubic metres for a surface area of 0.48 hectares. It was commissioned in 1954.



↑ Grange Water Intake on the Veyradeyre

> The Issarlès lake

Lake Issarlès is a natural lake located at an elevation of 1000 metres. It is 138 metres deep, covers an area of 90 hectares and has a useful storage capacity of 30 million cubic metres. It is used as a transitional reservoir prior to turbine operation outside the summer season. Water is directed into the lake and then sent back to Montpezat through a conduit located 50 metres below the surface. In the summer, a “natural water level” is maintained; otherwise, hydroelectric production causes significant fluctuations in the lake’s water level.



↑ Natural lake full during the summer season



↑ The lake at the end of winter

> The Gage dam

The Gage dam is located on two right-bank tributaries of the Loire: the Tauron and the Gage. Standing 39.6 metres high and 156 metres long, it has a useful storage capacity of 3.3 million cubic metres for a surface area of 32.4 hectares. Filling began in 1954. Since 2018, it has been equipped with a new floodgate capable of handling millennial floods.



↑ Floodgate on the Gage dam

> The Lapalisse dam

The Lapalisse dam is located directly on the Loire and is the largest structure in the entire complex. Its watershed covers an area of 130 square kilometres. Standing 55.8 metres high and 195 metres long, it has a useful capacity of 7.5 million cubic metres for a total surface area of 46.8 hectares. Like the other structures, it was commissioned in 1954 and was upgraded in 2019 to withstand a millennial flood.



↑ The Lapalisse dam

> The Montpezat powerplant

The Montpezat power plant is carved directly into the Ardèche mountainside at a depth of 120 metres. The penstock extends over 636 metres. The average turbine flow rate is 7 cubic metres per second, and it can reach a maximum of 24 cubic metres per second during peak demand, producing 290 gigawatt hours of electricity each year. After passing through the turbines, the water is released into the Pont-de-Veyrières Dam (on the Fontaulière River) through a 2.6-kilometre underground gallery.



↑ Interior of the Montpezat powerplant

> The Pont-de-Veyrières dam

The Pont de Veyrières dam is located downstream of the complex on the Fontaulière, a tributary of the Ardèche. It stands 35 metres high and was commissioned in 1985. This dam serves as a demodulation structure for the releases from the Montpezat plant, smoothing out the flow downstream.



↑ Overflow discharge from the Pont-de-Veyrières dam