

Piano keys to handle exceptional floods

Releasing water during floods is a crucial issue for dam safety. EDF is therefore innovating to adapt its hydropower fleet to handle the consequences of climate change. In particular, there is a need to factor in the recurrence of heavier, more frequent and even exceptional rainfall. PKW, or Piano Key Weir, is the name given to this innovation in reference to its unique design in the form of piano keys. The “keys” are in fact inlet and outlet tanks. Their crenelated form provides greater surface area for water flow for minimum transversal width, a distinct advantage for dams located deep in narrow gorges.



Such is the case of the Malarce dam on the Chassezac River, an affluent of the Ardèche, in France. Here, the piano keys are in the form of 12 inlet tanks that alternate with 12 outlet tanks. This innovation increases the dam's discharge capacity by almost 600 cubic metres of water a second, from 4,000 to 4,600 cumecs. That's enough to handle a once-in-a-thousand year flood, or in other words, a flood that has a one-in-a-thousand chance of occurring in any given year. The sixth dam in France to be equipped with a PKW system, Malarce now has the highest potential discharge capacity of all EDF's hydro dams. This world-renowned innovation further increases the interest of hydropower, which already offers storability thanks to dams and reservoirs and is a carbon-free renewable⁽¹⁾. Hydro also has the advantage of being able to adapt to the consequences of climate change, which include heavier and more frequent flooding.

(1) Excluding life cycle analysis (LCA).



KEY FIGURES

2013: year the new spillway was commissioned
42.5 m weir width
4.9 m high
350 linear metre crest
4,600 m³/s maximum spill capacity
 (an additional 600 m³/s)

HOW DOES IT WORK?



BENEFITS

- The crenelated form provides additional weir crest length for a limited width.
- No human intervention required.
- Improved dam safety for an acceptable cost.

In the event of flooding, the PKW additional spillway acts as an extended crest. If the water level exceeds that in the inlet tanks, the flow automatically spills over into the outlet tanks. It then runs down the right bank spillway channel and into the river downstream from the dam. For flow rates greater than 200 m³/s, the dam's valves are also opened.

See all our solutions on:
edf.fr/en/cop21

**50 SOLUTIONS
 FOR THE CLIMATE**

