Energy Efficiency Is Europe's Best Defense Against High and Volatile Energy Costs

By Juan Pinto, Senior Director, Global Water Sales OEM, Energy Recovery, and Stephane Kessaci, Business Development Manager, Europe, Energy Recovery

The power stations that keep Europe cool spent this summer struggling to cool themselves. The heat was continent-wide: Spain, Portugal, Greece, and Italy bore the worst of it, and even Germany, the Netherlands, and Belgium saw heat waves as early as June. As heat wave followed heat wave and France endured record temperatures, the continent reached for air conditioning while parts of the power system came under strain. At Golfech, in southern France, a nuclear reactor throttled back because the Garonne had grown too warm to take on more discharge heat within environmental limits. The strain there spread well beyond the grid: some schools closed, train traffic was disrupted, and rising use of air conditioning pushed summer electricity demand sharply higher. Data centers and the rapid growth of artificial intelligence will soon add to the load, competing for the same water and energy that cooling already claims. For the utilities that treat Europe's water, this was not someone else's crisis. It was a preview of their own.

Water and power have always depended on each other. A thermal plant cannot run without water to cool it; a treatment plant cannot run without power to push water through its membranes. For decades that dependence sat in the background, reliable enough to ignore. Heat is dragging it into the foreground. The same weeks that warm a river past a reactor's limit can also deepen the drought that pushes a region to find new water. As conventional sources become more constrained, utilities increasingly turn to advanced reuse and desalination, both of which can add significant electricity demand. Scarcity in one now arrives as scarcity in the other.

Energy has stopped being a line item in Europe's water plans and has become a design decision. Although electricity prices have retreated from the peaks of the 2022 energy crisis, European industrial consumers continue to face high costs, large regional differences, and significant exposure to volatility. Into that market the recast Urban Wastewater Treatment Directive now lands, pushing utilities toward advanced treatment for micropollutants, wider reuse, and energy neutrality by 2045, each of which asks the sector to do more work with power it can no longer take for granted. A plant's exposure to the next volatile summer is largely written into its design.

The operators we work with across Europe have noticed what the spreadsheets took a while to show. In desalination, reuse, and zero-liquid-discharge plants, the reverse osmosis stage is usually the largest consumer of power, often more than 60 percent of the total, and the part a designer can most influence. An energy recovery device captures the pressure in the reject stream that a system would

otherwise throw away and hands it back to the incoming feed, so the pumps, and the grid behind them, do far less work. What was once an efficiency nicety is now scored in tenders, where lower energy per cubic meter increasingly decides who wins.

None of this is theoretical. In Hofstade (Aalst), Belgium, one of Europe's first direct potable reuse plants produces 400 million liters of drinking water a year for 12,000 people. The plant runs at low pressure, and adding our PX® Pressure Exchanger® technology, proven over three decades in seawater desalination, cut that stage's electricity by about 23 percent and paid for itself in three years. Far higher up the pressure scale, a plant in Hubei, China, that makes battery materials for electric vehicles drives its wastewater toward zero liquid discharge at 120 bar, where energy recovery reduced electricity consumption in the highest-pressure stages by roughly 51 percent. A Flemish town and a Chinese factory could hardly be further apart. The physics is identical.

For the engineering firms that build these systems, the shift is already commercial. They are increasingly asked to demonstrate lifecycle energy performance alongside initial capital cost. As energy efficiency gains weight in specifications and tender evaluations, designing recovery into the process from the beginning can be a competitive advantage. Firms that treat efficiency as central are better positioned than those that treat it as an extra. It is a quiet reordering of what keeps a bid competitive.

The utilities that will come through the next hot summer with the least drama are already behaving differently. They write energy per cubic meter into specifications and weigh it when awarding contracts. They evaluate energy recovery from the start wherever pressure, flow, and operating conditions make it technically and economically attractive, rather than treating it as the first thing cut when budgets tighten. And they judge a project over its life, not at the moment of purchase, because the capital-cost difference is usually small while the exposure compounds every volatile year.

The advantage in all this is quiet, the kind that never makes the news: fewer surprises, steadier costs, water that keeps flowing when the grid is stretched thin. Efficiency has always been the most understated form of risk management, and this summer it stopped being optional. Across European water, the line now runs between those who treat it as the specification and those who still treat it as the extra. The next heat wave will test which choice they made.