

# TAIYO YUDEN Supercapacitors Ensure Maximum Uptime in Smart Meters

Global energy consumption has experienced a sustained uptrend over the last few decades. Technological innovation, higher industrial production, rapid urbanization, and population growth are a few of the many trends driving the need for more energy. According to the EIA, global energy demand now outpaces overall population growth. As energy infrastructure becomes increasingly digitized, there is a need to accurately quantify energy supply and relay the information to consumers and administrators in real-time.

## Smart Devices Enable Accurate Energy Metering

Smart meters are portable electronic devices used in capturing energy consumption or the quantity of a substance supplied by utility companies. Electricity meters track power consumption while monitoring current, voltage, and power factors. Gas meters measure gas volumes (e.g., liquefied petroleum gas and natural gas), and water meters track the water volume consumed by households or industrial facilities. Information obtained from smart meters allows industrial, commercial, industrial, and residential clients to track their energy usage, typically on an LCD screen. Smart metering helps promote transparency, enables more accurate billing, and allows utility companies to monitor the quality of supply and quickly identify problems in a given network. The sensitivity (metering accuracy), portability, and ease of using smart meters have all greatly improved with advancements in sensor and IC technology.

## Supercapacitors Ensure Maximum Uptime in Today's Smart Meters

Real-time clocks (RTCs) are an essential element of electricity



meters that enable continuous monitoring of power consumption. RTCs consist of ICs for keeping track of the current time that must continue to function even when the meter is powered down. They usually interface with microcontrollers and utilize oscillator circuits to detect transitions and time intervals to a high level of precision.

Because an RTC must be functional at all times, a constant power supply is critical. Many smart meters utilize a primary battery; however, charged supercapacitors can serve as a sole energy source or combine with batteries to ensure the highest uptime. Similarly, gas and water meters can utilize supercapacitors in combination with primary batteries to discharge massive electricity for communication or shifting heavy loads. Unlike batteries, supercapacitors are immune to thermal runaway issues due to temperature rise. Supercapacitors provide reliable power with minimal degradation over thousands of charge/discharge cycles and help lower cell count in battery-operated systems.

TAIYO YUDEN's RS, RH, and RL lithium-ion (hybrid) supercapacitors comprise superior materials for reliable energy storage in all kinds of smart meters. Compared to standard electric double-layer capacitor (EDLC) types, lithium-ion supercapacitors reduce the cell count, achieve higher capacitances, and are extremely reliable at higher temperatures with low self-discharge. The RS (standard) supercapacitors offer capacitances ranging from 20 to 270 F with operating temperatures from -30°C to +85°C. The RH (high-temperature) series offers an even wider operating temperature range with excellent stability from -30°C up to +105°C. The RL (low-temperature) series supports operating temperature from -40°C to +85°C.