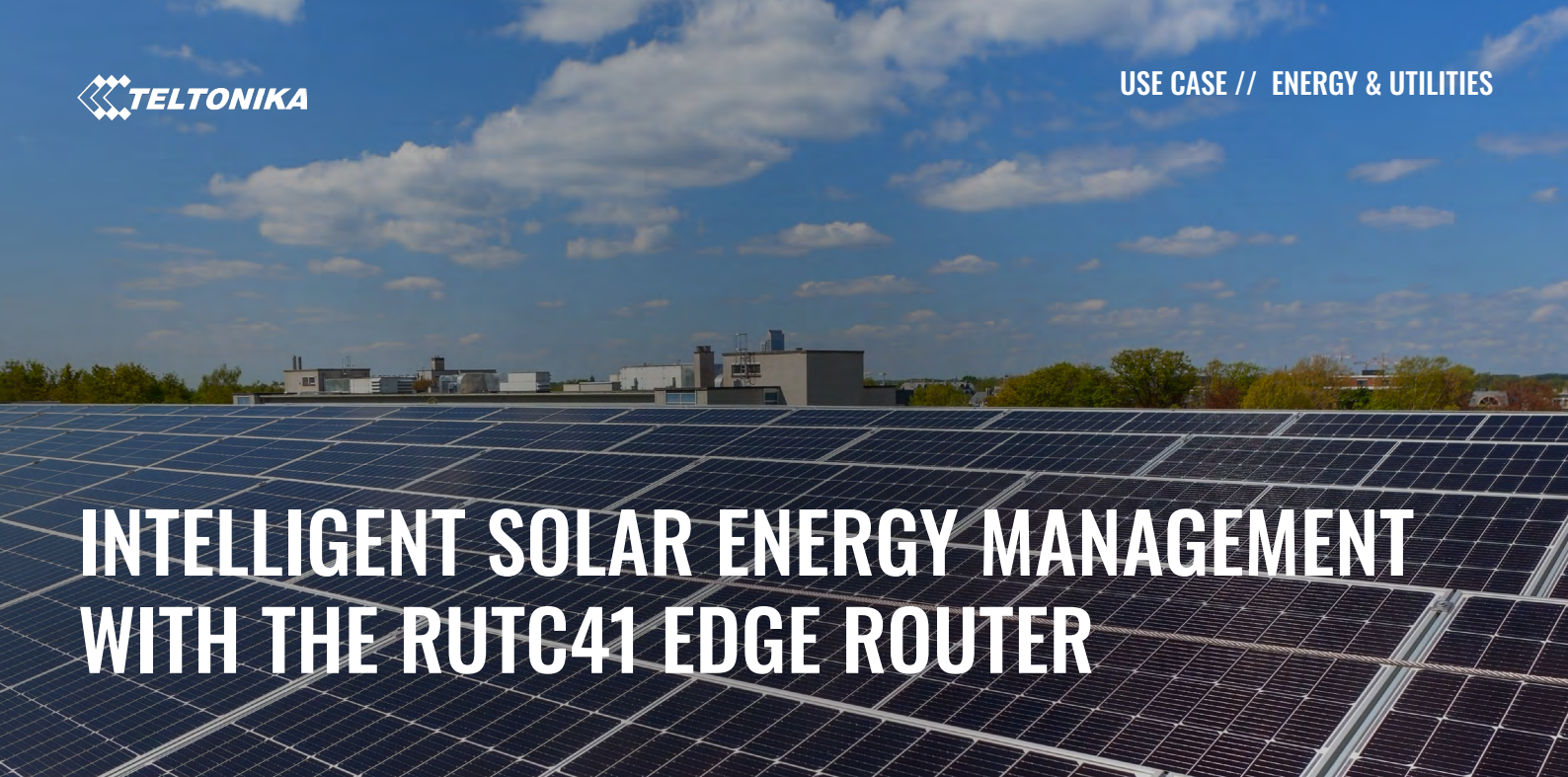




INTELLIGENT SOLAR ENERGY MANAGEMENT WITH THE RUTC41 EDGE ROUTER

HIGHLIGHTS

- ✓ Solar energy systems must react to rapidly changing electricity prices and fluctuating production conditions, yet traditional inverter logic and cloud-dependent platforms cannot make timely or reliable optimisation decisions.
- ✓ The [RUTC41 4G edge router](#) provides a stable on-site control layer capable of interpreting real-time data, maintaining autonomy during connectivity loss, and enabling intelligent optimisation without relying on the cloud.
- ✓ With its dual-core processor, Docker container support, and wired communication, the RUTC41 enables direct data exchange with the inverter and securely forwards operational information to remote analytics platforms.

SOLAR ENERGY MANAGEMENT REQUIRE SMARTER, REAL-TIME DECISIONS

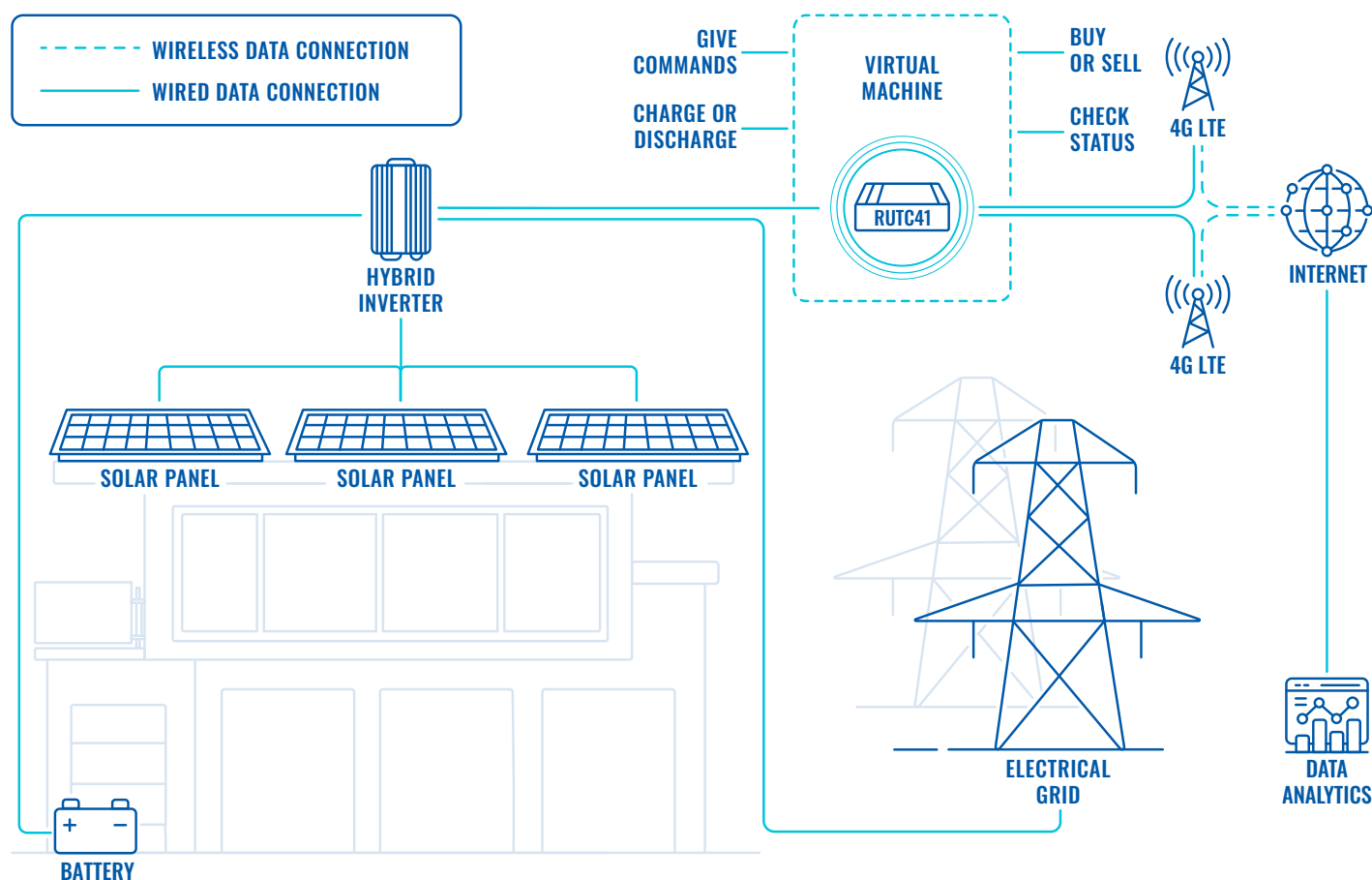
Electricity pricing is shifting from fixed to dynamic tariffs where the price can change [every 15 – 60 minutes](#), depending on country and supplier. For owners of solar and battery systems, it creates both an opportunity and a problem: there is clear financial value in charging, discharging, buying, and selling at the right moment – but doing this manually or with simple time-based rules is no longer enough.

Efficiently coordinating solar production, battery storage, and electricity trading requires continuous monitoring and instant, well-informed decisions. [Hybrid inverters](#) are designed to manage power flows, but they cannot interpret hourly pricing, consumption patterns, or rapid changes in solar availability.

These limitations become even more visible when connectivity is unstable. Many optimisation platforms rely on the cloud to calculate ideal charge and discharge behaviour, but any interruption in the connection breaks that link. When it happens, the system reverts to fixed operation with no awareness of pricing or demand, creating periods of inefficient storage and missed opportunities for savings or revenue.

To overcome this obstacle, solar installations need a control layer that continuously track production, battery levels, grid status, and price signals, and then make autonomous decisions based on real-time conditions. At the same time, operators still require remote monitoring option for long-term data analytics, meaning data must be forwarded securely without disrupting on-site logic.

TOPOLOGY



PROVIDING EDGE INTELLIGENCE WITH TELTONIKA RUTC41 4G ROUTER

The [RUTC41](#) edge router brings intelligent control to the installation by hosting a virtual machine, implemented through Docker containers, performing all core decision-making on-site. With its dual-core 1.3 GHz CPU and 1 GB of RAM, the device provides sufficient computing power to analyse live production data, battery state of charge, pricing signals, and consumption patterns while evaluating conditions and acting on them instantly.

Within the virtual machine, the optimisation logic continuously evaluates solar availability, battery state of charge, building demand, and current market prices to determine the most efficient operating mode. Based on these inputs, it decides whether to store energy, supply local loads, export power to the electrical grid, or charge the battery during low-cost periods. Processing this logic locally allows the system to react immediately to changing conditions and maintain optimal performance.

Featuring five Gigabit Ethernet ports, the RUTC41 4G router maintains a wired connection to the hybrid inverter, ensuring stable and low-latency telemetry and control. The inverter provides continuous operational data such as solar power flow, battery state of charge, and system status, which the virtual machine uses as inputs for its optimisation logic. Complementing its wired interfaces, the router supports [Wi-Fi 6](#) with dual-band user MIMO and includes one PoE-in and one PoE-out port, enabling flexible networking and simplified installation.

If connectivity to external platforms is temporarily lost, the system continues operating autonomously. Once its available again, pricing data, remote monitoring, and data synchronisation resume automatically, allowing to maintain consistent performance even during temporary network outages.

For long-term optimisation, the edge router forwards operational data to remote analytics platforms, so operators can review performance trends, assess system behaviour over time, and adjust control strategies as needed.

In addition to this, the RUTC41 4G router integrates an advanced [firewall](#) and supports a comprehensive suite of security protocols, including IPsec, L2TP, DMVPN, OpenConnect and more, enabling secure remote access and protected data exchange across diverse network environments.

Despite its powerful processing capabilities, the RUTC41 comes in an exceptionally compact [aluminium housing](#) form factor measuring just 130.4 × 42.6 × 104 mm. Its small footprint allows it to be installed almost anywhere, even in tight electrical cabinets or space-constrained enclosures, making it suitable for both new installations and retrofits.

Take your solar optimisation to the next level and experience the benefits of edge-driven control. Contact us now to secure your [RUTC41](#) edge router sample!

