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Indonesia’s archipelago, home to over 17,000 islands and diverse terrains, presents significant challenges for powering telecom infrastructure. Many base transceiver stations (BTS) in remote areas struggle with unreliable grid access. Traditionally, diesel generators have served as the backup, but increasing fuel costs, maintenance challenges, and environmental issues are pushing operators toward more sustainable, efficient solutions.

Where telecom, mobility, and renewable energy meet, **HighJoule** offers smart lithium energy storage solutions now being complemented by **Gojek’s battery swapping technology**—offering a robust, efficient, and cutting-edge solution for Indonesian off-grid BTS sites.

The Off-Grid BTS Power Challenge in Indonesia

Three major challenges face telecom operators in powering off-grid BTS infrastructure:

- **High Operational Costs:** Diesel supply chains in remote areas are unreliable and expensive.
- **Low Energy Efficiency:** Older lead-acid batteries possess low conversion efficiency and short cycles.
- **Environmental & Regulatory Pressures:** Indonesia targets a 23% renewable energy mix by 2025 and reducing carbon emissions by 29% by 2030.

With nearly a third of Indonesia’s population without the reliability of grid electricity, telecommunication operators are in need of sustainable and resilient solutions. Intelligent lithium batteries—specifically those enabled for battery swapping and solar charging—will soon be the standard solution.

Gojek Battery Swapping: A New Telco Energy Model

Originally designed to power electric two-wheelers, Gojek’s battery swapping network is now being adapted for off-grid BTS applications. The model offers strong benefits:

- **Operational Efficiency:** Batteries are swapped quickly via Gojek’s existing logistics infrastructure—no on-spot charging or diesel fueling is involved.
- **Cost Efficiency:** Leveraging shared infrastructure with Gojek reduces both CAPEX and OPEX for telecom operators.
- **Environmental Impact:** Lithium battery swapping eliminates generator emissions, in line with national sustainability initiatives.

HighJoule is rendering its lithium battery systems swapping-compatible, using standardized connectors and light-weight modular designs that natively integrate into the infrastructure of Gojek.

HighJoule’s Smart Lithium Energy Solutions

HighJoule designs lithium energy solutions for telecom and off-grid applications in Southeast Asia. Key offerings are:

- **HJ-SG-D01 Outdoor communication single cabinet**
  – Ideal for distant BTS installations, with solar input supplemented by intelligent lithium storage. Includes EMS to enable efficient power flow.

- **HJ-SG-R01 Communication container station energy storage systems**
  – Weather-proof, temperature-controlled cabinets containing $LiFePO_4$ cells capable of more than 6,000 cycles—perfect for Indonesia's tropical climate.
- **HJ-ZB Site Battery Cabinet**
  – Designed for rapid battery swaps via plug-and-play connections and space-saving design to support Gojek's battery management infrastructure.

Case Study: Telecom-Gojek Maluku Pilot

In 2024, a pilot project was launched in Indonesia's Maluku province to test a swapping-enabled smart lithium system for off-grid BTS applications. The concept explored integration between HighJoule's modular lithium solutions and third-party battery swapping logistics, inspired by Gojek's delivery network model.

System Description:

- 20kW solar array
- 60kWh lithium battery bank
- HJ-ZB swap-ready battery cabinets
- Gojek drivers trained to perform routine battery swaps

Outcomes:

- Diesel fuel usage reduced by 78%
- Uptime rose from 88% to 95%
- Monthly downtime decreased from 12 to

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