RKP

CASE STUDY

SPIC PANZHIHUA

ENERGY STORAGE STATION

World's First FTM VFB with Leased Electrolyte Model



PHASE I

12 MW	60 MWh	5 h
POWER	CAPACITY	DURATION

PANZHIHUA, SICHUAN, CHINA

Commercial operation: 2024

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Project Overview

The SPIC Panzhihua Energy Storage Station is a 100 MW / 500 MWh vanadium flow battery project being developed in phases in Panzhihua, Sichuan Province, China. Phase I (12 MW / 60 MWh, 5-hour duration) was delivered by RKP and commissioned in June 2025, achieving commercial operation status in January 2026.

This project is recognized as the world's first front-of-the-meter (FTM) VFB energy storage system to adopt a vanadium electrolyte leasing model. By separating electrolyte ownership from the battery system ownership, this innovative commercial structure reduces upfront capital costs and creates a new pathway for financing VFB projects.

The project is located in the TuanShan area of the National Vanadium-Titanium High-Tech Zone in Panzhihua, leveraging locally produced vanadium electrolyte. It is one of Sichuan Province's first batch of emerging energy storage demonstration projects and the largest VFB project in Southwest China.

In Panzhihua, RKP went beyond supplying equipment — the company built a local electrolyte manufacturing facility that produces electrolyte on-site using vanadium recovered from locally generated steel slag. The Panzhihua project demonstrates how a VFB project can anchor local vanadium processing, electrolyte production, and system integration capabilities.

WORLD FIRST
FTM VFB with leased electrolyte

12 MW / 60 MWh
Phase I capacity

100 MW / 500 MWh
Total planned capacity

~25 YEARS
Design life

WHY IT MATTERS

Panzhihua combines utility-scale storage, electrolyte leasing and local vanadium processing, demonstrating a pathway to lower upfront project costs and regional industrial capability.

Key project information

Core configuration, delivery and lifecycle parameters

Project Name	SPIC Panzhihua Energy Storage Station (Phase I)
Location	Panzhihua, Sichuan Province, China (National Vanadium-Titanium High-Tech Zone)
Power / Capacity	Phase I: 12 MW / 60 MWh (5-hour duration); Phase II (planned): 88 MW / 440 MWh; Total planned: 100 MW / 500 MWh
Configuration	Outdoor containerized installation: 48 large battery containers
Technology	Vanadium Flow Battery (VFB) - RKP Proprietary
Developer	SPIC Sichuan Electric Power Co., Ltd.
Owner/ Operator	Project SPV established by SPIC
Technology Provider	RKP
Electrolyte Leasing Partners	Panxi Financial Leasing Co., Ltd. (Locally owned)
EPC Contractor	Sichuan Shangrui Construction Group
Commissioning Date	Grid connection: August 2025; Commercial operation: January 2026
Design Life	~25 years

Key Functions and Benefits

Peak Shaving

Shifts energy from off-peak to peak periods, supporting grid balancing in Sichuan Province.

Frequency Regulation

Provides fast-response frequency support to the provincial grid.

Renewable Integration

Enhances the grid's capacity to absorb and utilize renewable generation.

Power Quality Improvement

Smooths output fluctuations and improves power supply quality.

Emergency Backup Power

Serves as a strategic reserve for grid emergencies.

Electrolyte Leasing Model — A Financial Innovation

The Panzhihua project introduces a groundbreaking commercial structure with significant implications for VFB projects globally:

Electrolyte as a Separate Asset

In a VFB system, the electrolyte (containing recoverable vanadium) represents a significant portion of total system cost. By leasing rather than purchasing the electrolyte, the project owner can substantially reduce upfront capital expenditure.

Vanadium Value Retention

The vanadium in the electrolyte retains long-term intrinsic value and can be recovered, recycled, or redeployed at end of life. This makes electrolyte a financeable resource asset rather than a consumable.

Local Supply Chain Integration

The project uses locally produced vanadium electrolyte from locally generated steel slag, demonstrating how VFB projects can catalyze regional vanadium value chains from resource recovery and processing through to battery deployment.

Improved Project Economics

The leased electrolyte model increases the internal rate of return (IRR) from 9% to 11%, improving bankability by reducing upfront capital requirements.

Revenue Model

The project generates revenue through multiple channels:

01 Power Spot Trading

Participation in Sichuan's electricity spot market for energy arbitrage

02 Ancillary Services

Compensation for frequency regulation, peaking, and emergency backup services

03 Demonstration Project Support

Policy-supported revenue as one of Sichuan's first batch of emerging energy storage demonstration projects



PHASE I: 12 MW / 60 MWh | FTM VFB WITH LEASED ELECTROLYTE



A commercial reference for VFB deployment

Localized electrolyte production using RKP's solvent extraction technology

Why this project matters globally

The SPIC Panzhihua project is strategically relevant to VFB deployment and supply-chain development for the following reasons:

Electrolyte Leasing Model 01

Panzhihua provides a practical commercial reference for projects worldwide. The electrolyte leasing model can reduce upfront project costs, improve investment returns, and enhance bankability.

Vanadium Resource Strategy 02

Instead of exporting vanadium solely as raw material, the leasing model can allow vanadium resource owners, industrial investors, and local partners to retain long-term economic exposure to the vanadium value chain while enabling the project owner to access a lower-capex battery solution.

Proven Localization Capability 03

The Panzhihua project is a concrete demonstration of RKP's localization strategy in action. RKP invested in a local electrolyte production facility, sourced vanadium from locally generated steel slag, and created local jobs and industrial capability. This "steel slag to electrolyte to battery" localization model is directly transferable to vanadium-bearing regions, where local vanadium resources can be processed into electrolyte locally, creating a true "ex-mine-to-battery" pathway.

Commercial Validation 04

As the world's first FTM VFB project with leased electrolyte, Panzhihua provides a proven commercial precedent that can be adapted to diverse market, financing, and regulatory conditions worldwide.

READY TO BUILD YOUR NEXT LONG-DURATION STORAGE PROJECT?

Let's discuss the right duration, system architecture and commercial pathway for your project.

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