

RESERCH, DEVELOPMENT, INVESTMENT CENTER

ADAMANT CTC LTD

Central Asian Production for VFB

International Flow Battery Forum

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Table Of Content

03. About Us

04. 20 years growth

05. Where Advantages?

06. Competitiveness

07. Vanadium in Central Asia

08. Project in Tajikistan

09. VRFB in Global

10. VRFB Market Distribution

11. Steps to Development

About Us

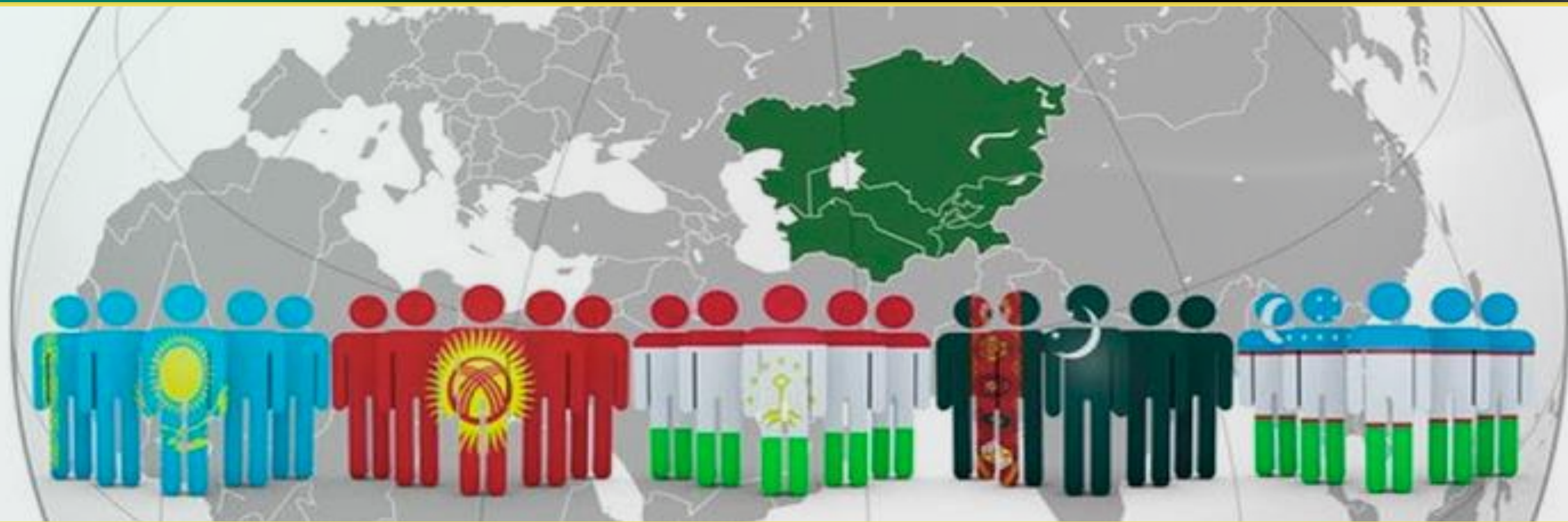
R&D Investment Center (RDIC, Tajikistan) – Adamant CTC LTD (Cyprus)

Support to international companies entering the Central Asian markets, as well as to local enterprises seeking to develop their facilities and projects. Driving innovation and sustainable growth across the region.

Mission

- Sustainable and Green waste and ore refinery, production of oxides and ferroalloys;
- Getting license for mining rare earth elements.





Central Asia - 20 years growth

From post-Soviet transformation to a growing role in global logistics, energy, and investment flows.

9x \$B GDP

**1.5x mln
Population**

17.2x \$B FDI

8.4x FTTG

Where advantages?



STRATEGIC SUPPLY

- Middle corridor between Asia and Europe
- Infrastructure modernisation
- Regional integration

RICH IN CRITICAL MINERALS

- Diverse range of critical minerals
- Strategic alternative sources
- Broad opportunities
- Vast untapped mineral tailings and slags



LOW COST INPUTS

- Cost-efficient environments
- Attractive electricity and labor costs
- Domestic hydropower

EMERGING AND UNDERUTILIZED MARKET

- Low-cost green energy
- State support
- Low asset entry cost
- Industrial infrastructure



Competitiveness



Production Cost

<\$7,800/t

- Tajikistan processes steelmaking slags

Energy Cost

~\$48/MWh

- Tajikistan generates over 95% of its electricity from hydropower, ~\$48/MWh. By contrast, mainland China's avg. is ~\$64/MWh, Germany ~\$273/MWh, Spain ~\$130/MWh.

Tax Regime

- Mining projects tax breaks (exemptions on corporate income tax, VAT, customs duties)
- Free economic zones

Vanadium in Central Asia

Kazakhstan and Tajikistan developing vanadium ore processing technologies and pilot projects for tailings and slag recycling to diversify raw material sources.

KASAKHSTAN

Substantial vanadium resources (Balasausky & Kyzylorda deposits with 33 million tonnes of ore). A phased project aims to reach an annual output of 55,000 tonnes of V₂O₅ by 2030.



TAJIKISTAN

Former Soviet production sites have been successfully reactivated for V₂O₅ and FeV production.

- Project for transforming facilities into modern processing sites.
- Intra-regional project.



UZBEKISTAN

2–3 Kt of waste generated annually + multi-million-ton tailings stockpiles (Navoi: ~3 Mt); + large legacy dumps from mining and chemical plants – All rich in critical elements including vanadium.



Project in Tajikistan

Soviet Industrial Legacy have been brought back into operation, forming the foundation for a vanadium recovery project based on existing hydrometallurgical infrastructure. Even without major capital investment, the facility is already capable of produce about 5,500 tonnes of V₂O₅ annually, with potential for expansion.



● INFRASTRATION AND STRATEGIC LOCATION

The largest uranium ore processing facility in the USSR, giving it we have a hydrometallurgical capacity and power infrastructure. Located near the borders of Kazakhstan, Uzbekistan, and China, the site benefits from short logistics routes for raw material imports and vanadium product exports.

● CROSS-REGIONAL AGREEMENTS WITH KASAKHSTAN AND UZBEKISTAN FOR RAW MATERIALS ANS WASTE PROCESSING

Project builds on growing regional cooperation. Existing agreements with partners in Kazakhstan and Uzbekistan allow secure access to vanadium raw materials and enable joint solutions for industrial waste recovery. This regional integration strengthens supply chain resilience and supports the development of shared value-added processing across Central Asia.

VRFB in Global



2019

100 OPERATIONAL VRFB

- Small-scale pilots (100–500 kWh) and a few megawatt-class projects
- The market is still niche but rapidly evolving

800 MWH OF VRFB GLOBALLY

- Cumulative installed capacity of VRFBs exceeded 800 MWh, led by large-scale Chinese projects like Rongke's 100 MW / 400 MWh system in Dalian

2030

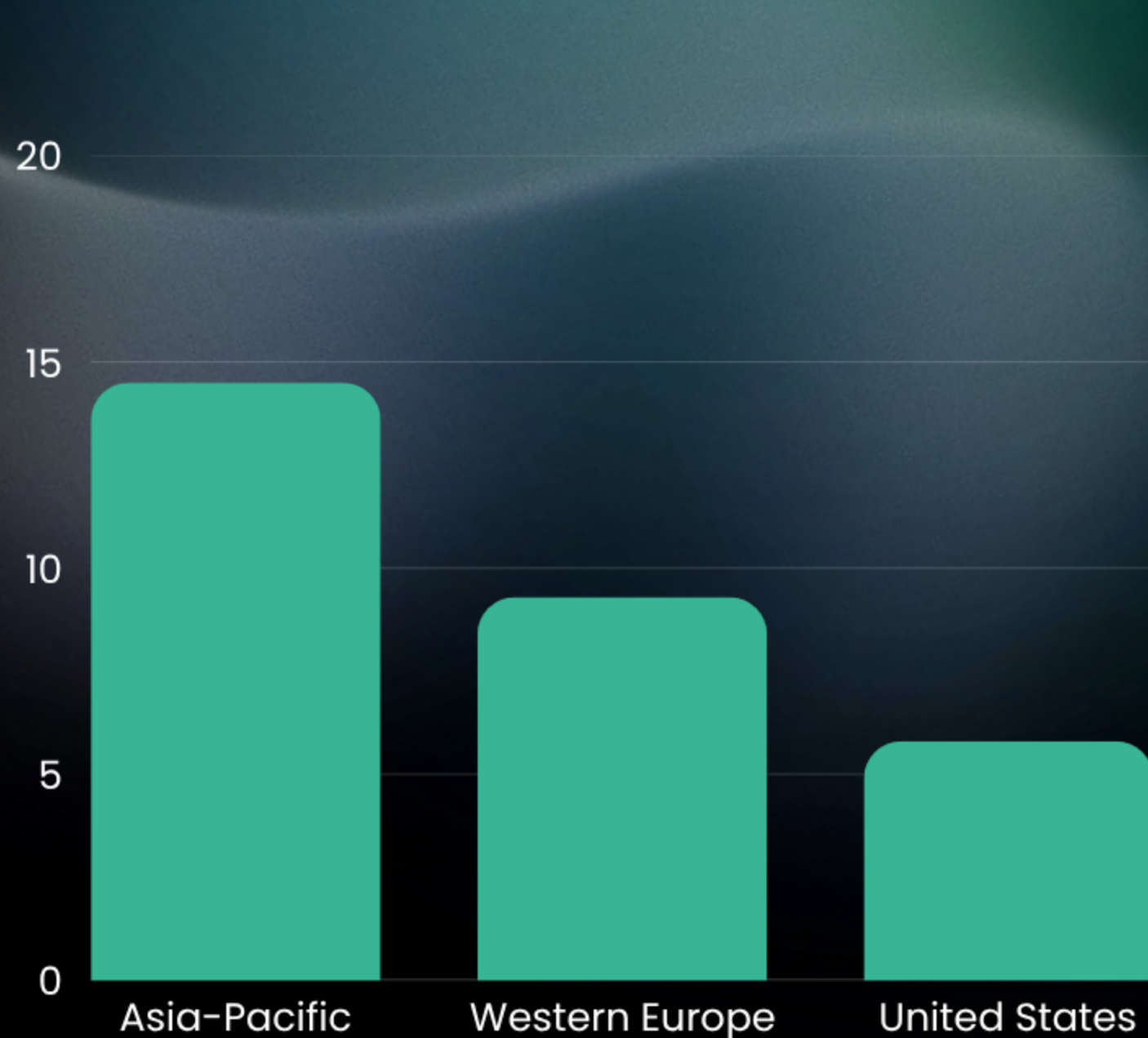
~32–33 GWH GLOBALLY

- The global VRFB market is projected to grow from just over 800 MWh in 2022 to 32–33 GWh by 2030 – 2031, representing a 40% CAGR

2022



VRFB Market Distribution



The Asia-Pacific region is expected to lead the market, reaching about **14.5 GWh/year by 2030**, followed by Western Europe with approximately **9.3 GWh**, and the United States with around **5.8 GWh**

CENTRAL ASIA INTEGRATION

● STRATEGIC SUPPLY

Immediate proximity to China, India and Southeast Asia makes a natural supply base for the growing VRFB markets across the Asia-Pacific zone.

● DEVELOPMENT NEW TECHNOLOGY

Electrolyte (VO_2) plans: Building on local V_2O_5 , Kazakhstan aims to start vanadium sulfate (VO_2) production for flow-battery electrolyte. R&D partnerships are in place: the project works with local expertise (e.g. Satpayev University) in vanadium battery tech.

Steps for Development



EXPAND PILOT- SCALE PRODUCTION

Ramp up vanadium recovery at existing sites and optimize processing of ores, ash and catalysts.



ATTRACT ADVANCED TECHNOLOGIES

Technological improvements, equipment modernization and process optimization. Cross-border initiative between Tajikistan and Kazakhstan to co-develop a technology platform for vanadium-based electrolyte production.



INTEGRATE INTO THE VFB SUPPLY CHAIN

Position Central Asia as a qualified upstream contributor to the global VRFB production ecosystem, from raw materials to electrolyte supply.

A little fun motivation...

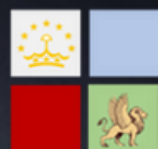


The equipment may be vintage – but our vision is cutting-edge 😊

From rust to results...

A long, narrow, dimly lit tunnel with stone walls and a bright light at the end. The tunnel is made of rough-hewn stone blocks. The floor is paved with large, flat stones. The walls are uneven and show signs of age. At the far end of the tunnel, there is a bright light source, possibly a window or an opening, which creates a strong contrast with the dark interior. The overall atmosphere is one of mystery and anticipation.

Innovation is never glamorous at the start. But keep walking – that light at the end is green, and it's sustainable!




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Thank You

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