MIDDLE EAST 2030 · RELIABLE POWER & GRID RESILIENCE PROGRAM

CRYOCCS® Middle East – Saudi Arabia Program for Weak Grid Segments

2026–2030

Modular 1 MW CRYOCCS® power hubs designed for weak grid segments and critical loads across Saudi Arabia. The program targets regions with unstable electricity supply, recurring outages, voltage drops, and high dependency on diesel generators.

Each hub combines firm power, cryogenic carbon capture, and usable cold/heat. This enables resilient supply islands for healthcare, water infrastructure, small industries, public services, and data/telecom nodes — with lower emissions and predictable cost of power.

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Phase 1 (2026–2027): Pilot clusters in 3–5 priority regions
Phase 2 (2028–2030): Scaling to ≥ 150 hubs across Saudi Arabia

PILOT SCALE	PROGRAM ROLL-OUT	PEOPLE REACHED	CO_2 IMPACT
5–10 MW	**≥ 150 MW**	**> 500,000**	**> 150,000 t/yr**
Initial hubs in 3–5 weak-grid regions (2026–2027)	≥ 150 × 1 MW hubs by 2030	Across weak grids & critical infrastructures	Diesel displacement & CO_2 capture

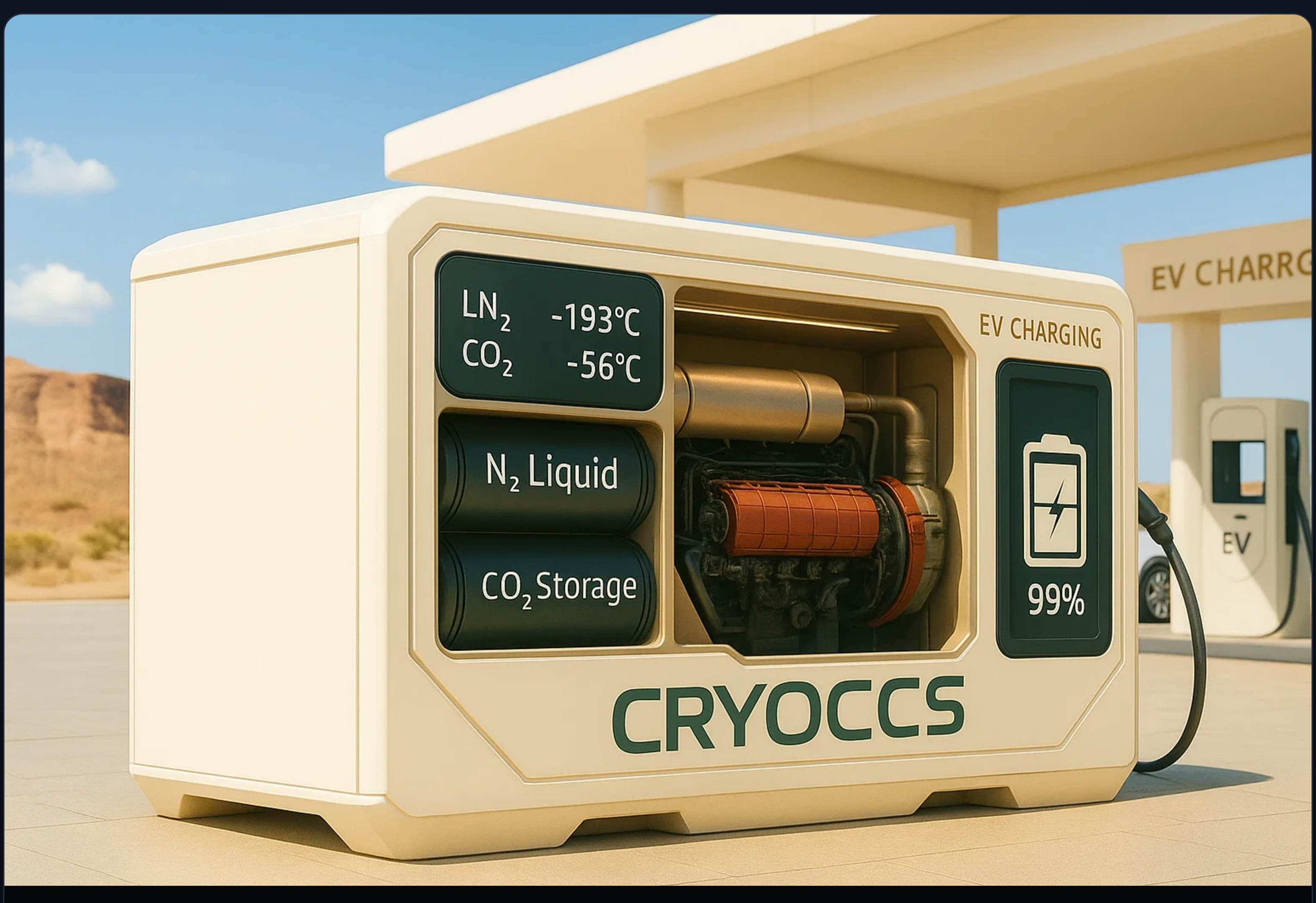
Why Saudi Arabia – Weak Grid Segments & Diesel Dependence

While Saudi Arabia operates a highly developed national power system, numerous local grid pockets face instability, voltage fluctuations, peak-load stress, or insufficient redundancy. Many facilities still rely on diesel generators as primary or backup supply.

Current reliability and quality gaps

- Voltage drops and outages in stressed or remote grid feeders.
- Diesel gensets powering hospitals, water infrastructure, data nodes, small industries.
- High cost of diesel-based electricity (fuel, logistics, maintenance).
- Emissions inconsistent with climate and sustainability goals.

CRYOCCS® hubs at these weak points deliver **predictable, 24/7 firm power** while significantly lowering emissions and enabling climate-financing mechanisms.



Indicative locations in Saudi Arabia: weak-grid feeders, industrial clusters, water/health infrastructure with diesel dependency.

How CRYOCCS® Hubs Operate in Saudi Arabia

- 1 MW natural-gas engine with integrated cryogenic CO_2 capture.
- Grid-connected to reinforce weak segments and secure priority loads.
- Cold/heat co-products for cooling, HVAC, water, cold chains, data centers.
- Fully modular — single hubs or scalable multi-hub clusters.

One hub typically supplies **2,000–4,000 household equivalents** or a mix of households, public services, and industrial loads.

Difference vs. Africa: Africa programs target broad energy access. Middle East focuses on quality + resilience in specific weak-grid nodes, with higher investment per kW and higher-value applications.

Economic Model – Reliable Power with Climate Finance

1. Firm Power for Weak Grids & Critical Loads

- Annual output: 7,000–8,000 MWh per 1 MW hub.
- Target tariffs: 0.11–0.20 €/kWh depending on fuel and location.
- Hybrid integration with PV/wind to reduce fuel cost.

Structure resembles long-term distributed PPA models — replacing diesel with predictable 24/7 supply.

2. CO_2 Value & Climate Finance

- 700–1,000 t CO_2/yr avoided or captured per hub.
- Access to carbon markets, climate funds, and concessional capital.
- Portfolio structuring for impact-linked infrastructure investments.

3. Optional LCO_2 Utilisation & Cold

- Use of captured CO_2 for local industries (food & beverage, processing).
- Cold for cooling chains, HVAC, pharma, or data centers.

Difference vs. Africa: Middle East includes high-value cooling & data-center applications due to extreme climate.

Illustrative 1 MW Case (Saudi Arabia)

Annual electricity revenue	≈ €1.0–1.5 M
Additional CO_2/climate value	€0.10–0.25 M
Target LCOE to end-users	0.11–0.20 €/kWh

Values depend on fuel price, integration, location, and available climate instruments.

Pilot & Scale-up – From 3–5 Clusters to ≥ 150 Hubs

Pilot Phase (2026–2027)

Package	Clusters in weak-grid regions
Regions	3–5 priority regions
Hubs per region	2–4
Total capacity	5–10 MW
Sectors	Health, water, data, small industry

Scale-up (2028–2030)

Program vision	≥ 150 × 1 MW hubs
Total capacity	≥ 150 MW
CO_2 impact	> 150,000 t/yr
Population reached	> 500,000

Comparison with Africa: Africa 2030 targets ≥ 500 MW and > 2 M people. Saudi Arabia's program is intentionally focused at ~20–30% of Africa's scale, but with higher investment per kW and more demanding applications.

Cooperation with Authorities, Utilities & Partners

Saudi Stakeholder Roles

- Identification of priority weak-grid segments.
- Land, permits, and grid interconnection.
- PPP structures and local operator models.
- Integration into resilience, energy & climate strategies.

International Partners

- Climate funds and development banks for co-financing.
- Impact investors for diesel-replacement portfolios.
- Capacity-building and regulatory assistance.

Next Steps – Building the Middle East Program

This page summarises the Middle East 2030 briefing for utilities, regulators, investors, and development partners. Technical & financial documentation can be provided under NDA.

Please reach out via the main contact form and include the reference: **"CRYOCCS Middle East Program 2026–2030 – Saudi Arabia"**.

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