

Market Data and Projections — Green Hydrogen UAE

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Sector KPIs, Installed Capacity, Project Pipeline and Confirmed Investments

1. Key Sector KPIs

1.1 National Hydrogen Targets (Source: UAE National Hydrogen Strategy 2050)

- **2031:** 1.4 million tonnes per year (MTPA)
 - 1.0 MTPA green hydrogen
 - 0.4 MTPA blue hydrogen
- **2040:** 7.5 MTPA total
- **2050:** 14.9 – 22 MTPA total
 - ~50% blue hydrogen (with CCUS)
 - ~45% green hydrogen
 - ~5% pink hydrogen (nuclear)

1.2 Target Market Share

- 25% market share in key markets: India, Japan, Germany
- Estimated global market value: USD 300 billion annually by 2050
- Projected global demand: 530 Mt by 2050

1.3 Committed Investments

- Estimated total: USD 163 billion (AED 600 billion) through 2050
 - ADNOC: USD 15 billion in low-carbon solutions
 - XRG (ADNOC platform): USD 80 billion for low-carbon energies
 - Masdar target: 1 million tonnes annually by 2030
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2. Installed Renewable Capacity

2.1 Total Renewable Energy Capacity (2024)

- UAE total: 6.3 GW (MENA regional leader)
- 2024 growth: +800 MW (Mohammed bin Rashid Al Maktoum Solar Park)
- Current capacity at MBR Solar Park: 3,427 MW (after 2024–2025 expansion)

2.2 Major Solar Projects

Mohammed bin Rashid Al Maktoum Solar Park (Dubai)

- Current capacity: 3,427 MW

- Final target: 5,000 MW by 2030
- Phase 5: 900 MW total (300 MW completed 95%)
- Phase 6: 1,800 MW total (500 MW completed 92%)

Al Dhafra Solar Park

- Capacity: 2,000 MW
- Record LCOE: USD 0.0135/kWh (lowest in the world)
- Status: Operational, dedicated to electrolysis projects

Sweihan Solar Park

- Capacity: 1,177 MW
- Status: Operational since 2019

2.3 Nuclear Capacity (Pink Hydrogen)

- Total capacity: 5.6 GW (4 units)
- Status: Last unit operational 2024–2025
- Application: 24/7 electrolysis for pink hydrogen

3. Installed Hydrogen Capacity and Pipeline

3.1 Current Electrolysis Capacity (2024–2025)

- Total installed: ~1.25 MW (pilot projects)
- Masdar City pilot: 300 kW
- DEWA pilot project: First MENA pilot plant powered by solar
- Demonstration projects: Various pilots for mobility and industry

3.2 Projects with Confirmed FID

ADNOC Hail and Ghasha Project (FID: October 2023)

- Investment: USD 17 billion
- CCUS capacity: 1.5 MTPA CO₂
- Blue hydrogen: Production to replace fuel gas
- Timeline: Operational 2027
- Contractors: National Petroleum Construction Company, Saipem S.p.A, Technimont S.p.A

ADNOC–Fertiglobe Ruwais Blue Ammonia Plant (FID: 2024)

- Capacity: 1 MTPA blue ammonia
- Investment: >USD 2 billion (EPC contracts)
- Technology: 50% lower carbon intensity
- Operation: 2027
- CCUS: Integrated in Phase 2

TAQA–Abu Dhabi Ports Green Hydrogen Hub (FID expected: Q4 2025)

- Solar PV: 2 GW dedicated

- Output: 200,000 TPA green ammonia
- Investment: USD 1 billion
- Timeline: Construction 2026, operations 2028
- Export: Pipeline to Khalifa Port

3.3 Announced Projects Pipeline (Pre-FID)

Helios Industry Green Ammonia Project (KIZAD)

- Investment: ~USD 1 billion (two phases)
- Capacity: 40,000 T green H₂ → 200,000 T green NH₃
- Dedicated solar: 800 MW
- Technology: Multi-MW Thyssenkrupp electrolyzers
- FID expected: 2025–2026

Masdar Green Falcon Project

- Masdar–Siemens Energy–TotalEnergies–Marubeni–Etihad
- Focus: Green hydrogen and sustainable aviation fuels (SAF)
- Status: Advanced development, FID expected 2025

Masdar–Engie Strategic Alliance

- Investment: USD 5 billion
- Capacity: 200 MW electrolysis → green ammonia
- Status: MOU signed, development underway

BP–ADNOC–Masdar Collaboration

- Initial capacity: 2 GW low-carbon hydrogen
- Location: UK and UAE hubs
- Expansion: Scalable based on demand
- Timeline: Phases from 2025

4. Confirmed Investments by Entity

4.1 ADNOC (Abu Dhabi National Oil Company)

- Total commitment: USD 15+ billion in low-carbon solutions
- Hail and Ghasha: USD 17 billion (includes CCUS)
- Fertiglobe acquisition: USD 3.6 billion
- Ruwais Blue Ammonia: >USD 2 billion
- CCUS capacity target: 10 MTPA CO₂ by 2030

4.2 Masdar (Abu Dhabi Future Energy Company)

- Target: 1 million tonnes of green H₂ annually by 2030
- Green Falcon project: Investment TBD
- Engie alliance: USD 5 billion

- International partnerships: Multiple bilateral agreements

4.3 TAQA (Abu Dhabi National Energy Company)

- Green hydrogen-to-ammonia: USD 1 billion
- Supporting solar PV: 2 GW installation
- Khalifa Port integration: Infrastructure investment

4.4 ADQ (Abu Dhabi Developmental Holding Company)

- Renewable energy total: USD 54 billion (Masdar deputy chairman)
 - Strategic ventures: Investment in hydrogen ecosystem players
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5. Renewable Energy Market: Context

5.1 Market Valuation

- Market size 2024: USD 4.8 billion
- Projected 2033: USD 12.0 billion
- CAGR 2025–2033: 10.80%

5.2 MENA Regional Growth

- UAE renewable capacity: 6.3 GW (regional leader)
 - Egypt: 4.6 GW
 - Saudi Arabia: 4.5 GW
 - Total MENA solar PV: 22.3 GW
 - Projects in pipeline: 700+ projects >5 MW
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6. Capacity Projections by Technology

6.1 PEM Electrolysis (Proton Exchange Membrane)

- Efficiency: ~70%
- Estimated CAPEX: USD 1,500–2,500/kW (2024)
- Target CAPEX: <USD 1,000/kW (2030)
- Main suppliers: Siemens Energy, Nel ASA, ITM Power

6.2 SOEC Electrolysis (Solid Oxide Electrolyzer Cells)

- Efficiency: ~80%
- Estimated CAPEX: USD 2,000–3,500/kW (2024)
- Application: Continuous operation, industrial integration
- Suppliers: Thyssenkrupp, Bloom Energy

6.3 Blue Hydrogen with CCUS

- CAPEX: USD 1–2/kg H₂ production capacity
- CCUS efficiency: >90% CO₂ capture
- Leverage: Existing natural gas infrastructure

7. Implementation Timeline and Incremental Capacity

7.1 Phase 1: 2024–2027 (FID Projects)

- Hail and Ghasha: 1.5 MTPA CCUS + blue hydrogen
- Ruwais Blue Ammonia: 1 MTPA ammonia
- Electrolysis capacity: ~500 MW installed

7.2 Phase 2: 2026–2030 (Confirmed pipeline)

- TAQA Green Hub: 200,000 TPA green ammonia
- Helios KIZAD: 200,000 TPA green ammonia
- Masdar projects: 1 MTPA green H₂ equivalent
- Electrolysis capacity: 2–3 GW cumulative

7.3 Phase 3: 2030–2035 (Scale-up)

- National target: 7.5 MTPA total
- Electrolysis capacity: 8–12 GW
- CCUS capacity: 10+ MTPA CO₂

7.4 Phase 4: 2035–2050 (Consolidation)

- National target: 14.9–22 MTPA
- Electrolysis capacity: 20–30 GW
- Export capacity: 80% of production

8. Regional Competitiveness Analysis

8.1 Installed Capacity Benchmarking (2024)

País	Renewable Capacity	H ₂ Target 2030	Investment Committed
UAE	6.3 GW	1.4 MTPA	USD 163B
Arabia Saudí	4.5 GW	4 MTPA	USD 110B
Egipto	4.6 GW	1.4 MTPA	USD 89B
Omán	0.5 GW	1 MTPA	USD 50B

8.2 Comparative LCOE

- UAE Al Dhafra: USD 0.0135/kWh (world record)
- Saudi Arabia Sakaka: USD 0.017/kWh
- Egypt Benban: USD 0.024/kWh

- Global average: USD 0.048/kWh (2024)

8.3 Structural Factors

The UAE hydrogen sector is characterized by the following structural factors:

Resource Availability

- Solar irradiation: 3.6 kWh/m²/day average across ~350 days/year
- Natural gas reserves: Support transitional blue hydrogen production
- Land availability: Designated zones for hydrogen oases (Ruwais, KEZAD)

Infrastructure Base

- Ports: 12 commercial trading ports, including specialized energy terminals
- Pipelines: Existing oil and gas network (4 oil, 10 gas pipelines) available for adaptation
- Industrial integration: Established refining and petrochemical facilities providing potential offtake

Regulatory Framework

- Licensing timeline: 60–90 days for projects ≥100 MW
- Fiscal regime: 0% corporate tax for qualifying projects (up to 50 years in designated zones)
- Investment protection: Bilateral investment treaties with 50+ countries

Financial Access

- Sovereign backing for strategic projects aligned with National Hydrogen Strategy
- Access to international capital markets through Abu Dhabi sovereign vehicles (ADQ, Mubadala, ADIA)

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