REPORT SERIES | CLEAN HYDROGEN PROJECTS IN THE GLOBAL SOUTH

# **Opportunities for renewable hydrogen development in Africa:** Insights from an innovative country clustering analysis

**Report Launch Event**

May 2025

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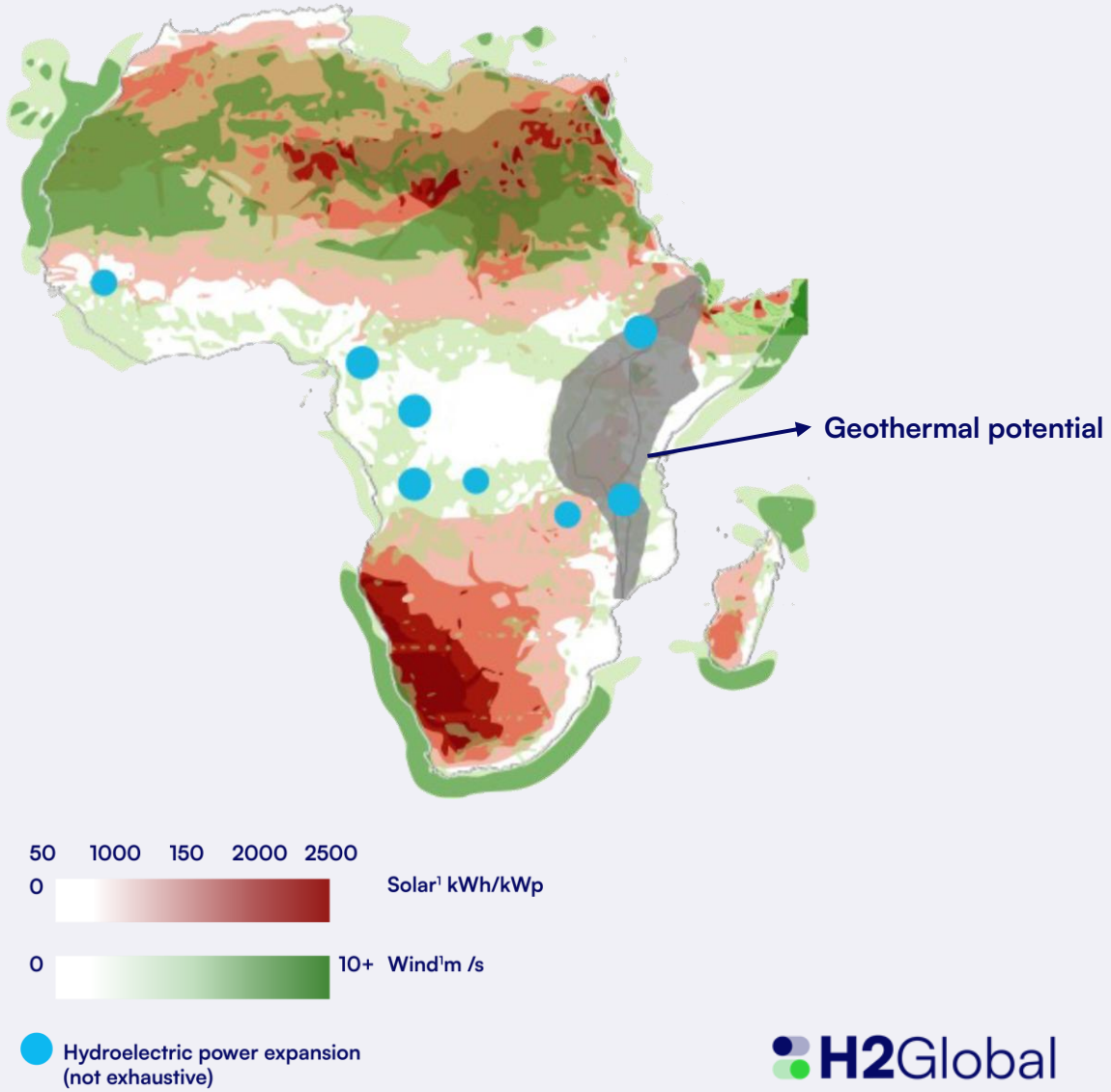
# Hydrogen opportunity

# Africa’s vast hydrogen production potential

- Africa has an enormous potential for low-cost renewable hydrogen production.
- However, the total number and capacity of announced renewable hydrogen projects by 2030 is low compared to other regions of the world.
- Initial conditions for developing a new hydrogen economy differ considerably across African countries



# Which African countries have potential for establishing a new hydrogen economy?

## Existing analyses focus on:

- Planned renewable hydrogen projects
- Wind & PV potential
- Hydrogen production costs
- Export potential to Europe

## But successful renewable hydrogen market creation also depends on:

- Water availability
- Political support & international collaboration
- High levels of national & international investment
- Existing domestic offtakers/markets
- Country stability for long-term project realization
- Strengthening of legal, regulatory, & institutional frameworks



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# Our research

# Innovative country clustering

| | | | | |
|---|---|---|---|---|
| **H2O & RE potential** | Water stress | GIS analysis of wind & PV | Sea access for desalination | Geothermal & hydropower |
| **National hydrogen commitment** | National hydrogen strategy | Planned renewable hydrogen projects | | |
| **Domestic anchor demand** | Fertilizer production | Mining | Crude steel production | |
| **Country risk** | Country-risk rating | | | |
| **Export infrastructure** | Terminals for NH3, MeOH, & LNG | | | |



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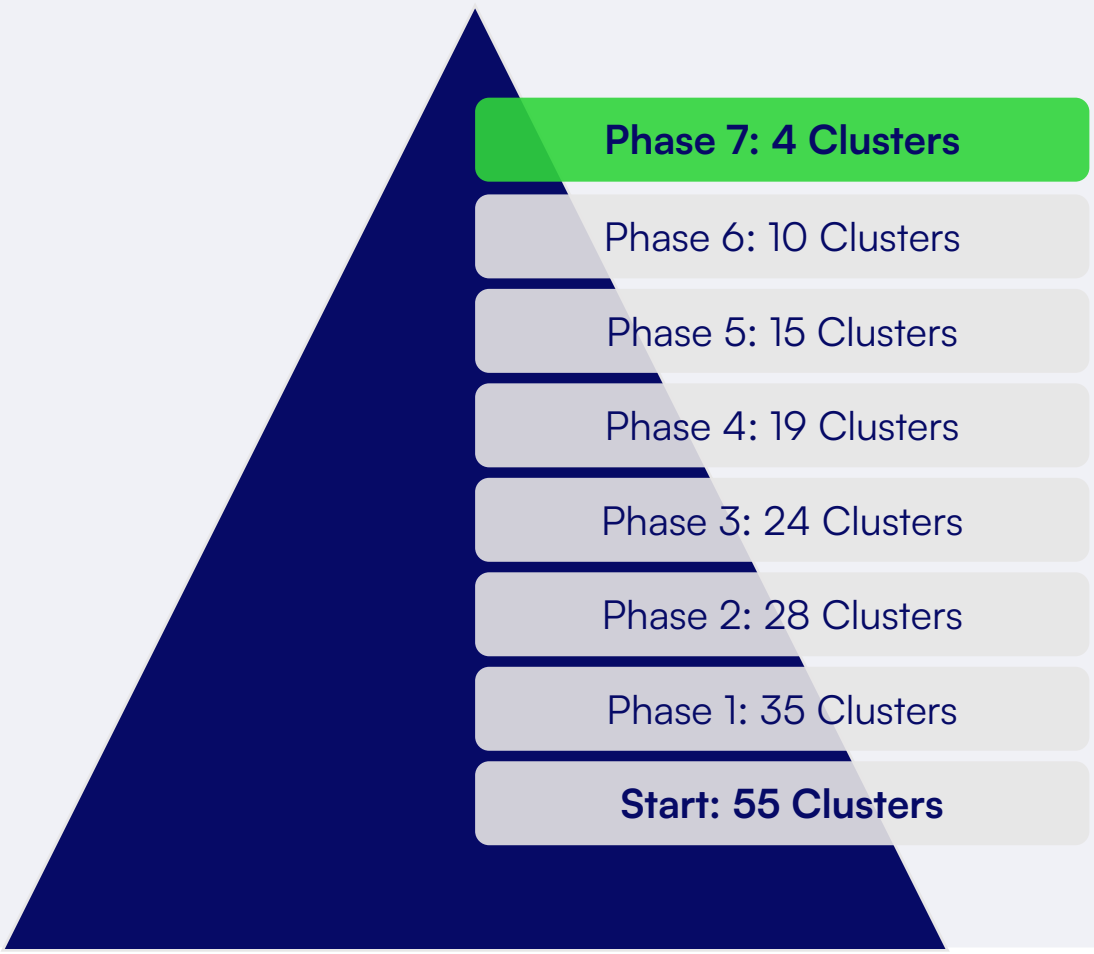
# Country clustering methodology




**Step-by-step manual clustering of countries based on similarities across 5 dimensions:**

- RE and water potential
- National hydrogen commitment
- Domestic anchor demand
- Country risk
- Export infrastructure



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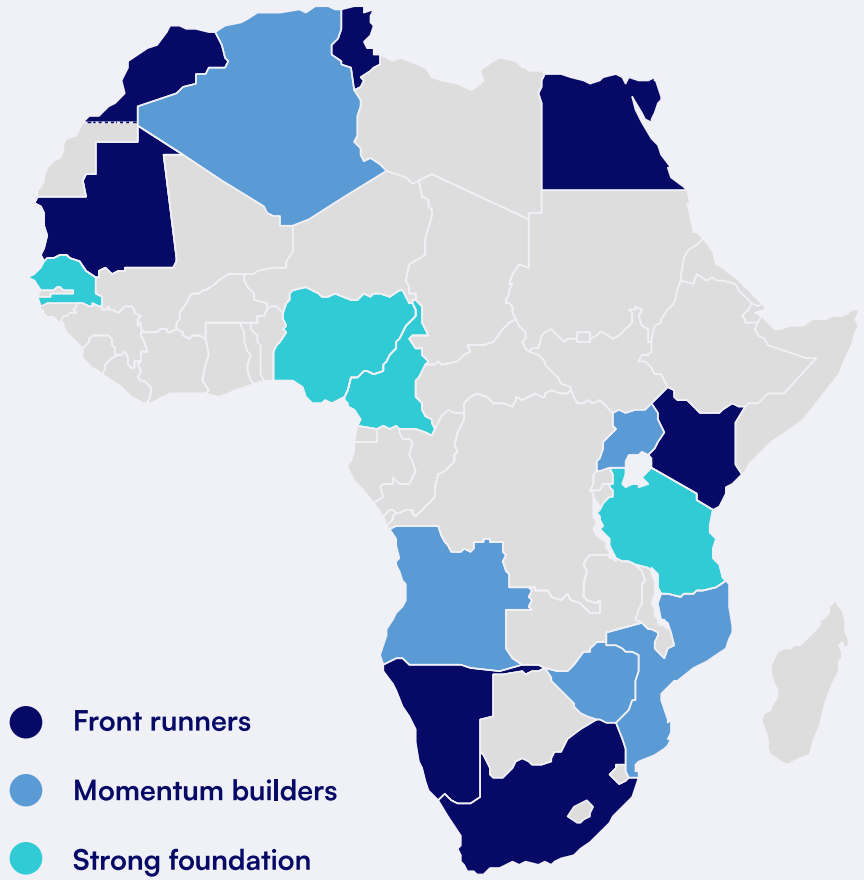
# Results

# Country clustering results




High rating
Medium rating
Low rating

| | $H_2O$ & RE potential | Green hydrogen commitment | Domestic anchor demand | Country risk | Export infrastructure |
|---|---|---|---|---|---|
| Front runners | ★ ✓ | ★ | ★ | ★ ✓ ✗ | ★ ✗ |
| Momentum builders | ★ ✓ | ✓ | ★ | ★ ✓ ✗ | ★ ✗ |
| Strong foundation | ✓ | ✗ | ★ | ★ ✓ | ★ ✗ |



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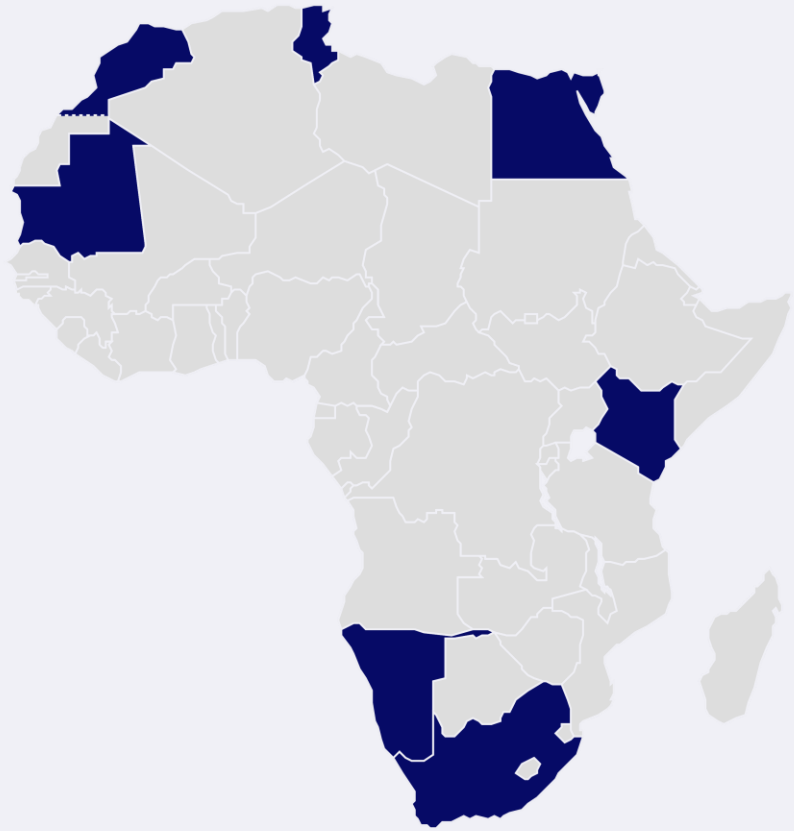
# Front runners

## Egypt, Kenya, Mauritania, Morocco, Namibia, South Africa and Tunisia

- Great renewable potential and access to water incl. via desalination
- Existing hydrogen strategy
- At least one planned hydrogen project
- Domestic anchor demand
- Sea access, even if not all countries have terminals for export
- Mixed country risk profiles



- High rating
- Medium rating
- Low rating

| | |
|---|---|
| | H2O & RE potential |
| | National hydrogen commitment |
| | Domestic anchor demand |
| | Country risk |
| | Export infrastructure |

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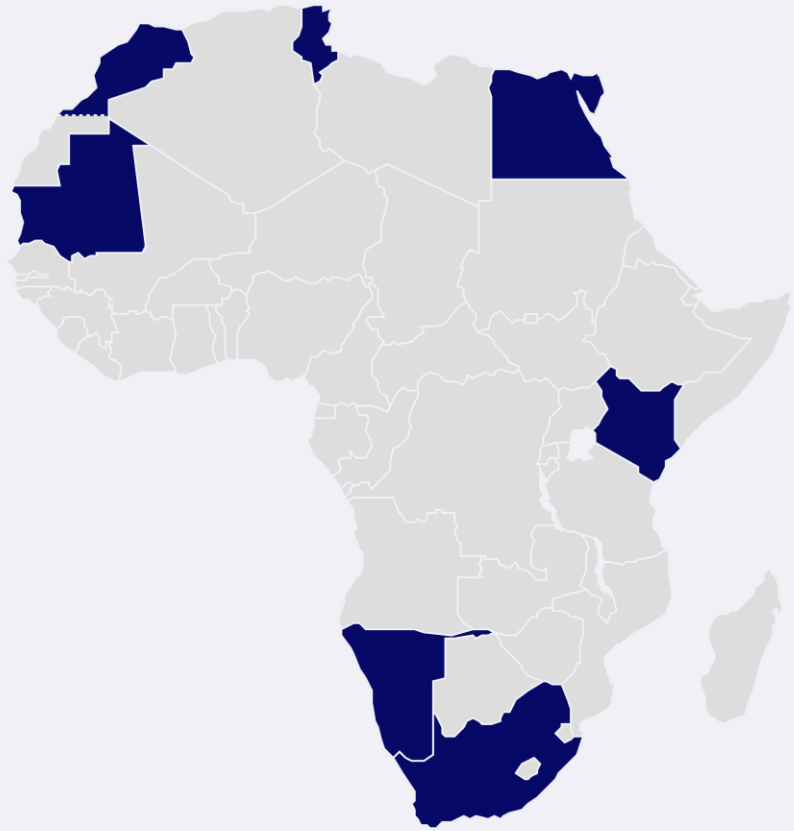
# Recommendations for the front runners

## Egypt, Kenya, Mauritania, Morocco, Namibia, South Africa and Tunisia

- Strengthen the legal, regulatory & institutional frameworks and implement 'one-stop shops'
- Support local offtake by targeting 'low hanging fruit' such as fertilizers
- Target key risks through de-risking mechanisms:
  - Offtake risk (e.g., quotas, mandates, contracts-for-difference)
  - High country risk (e.g., political risk insurance, foreign investment insurance, partial credit guarantees)
- Unlock investment in infrastructure by promoting PPPs, supporting hydrogen hubs, faster permitting, etc.
- Invest in skills development and capacity building



| | |
|---|---|
| High rating | |
| Medium rating | |
| Low rating | |

| | |
|---|---|
| | H2O & RE potential |
| | National hydrogen commitment |
| | Domestic anchor demand |
| | Country risk |
| | Export infrastructure |

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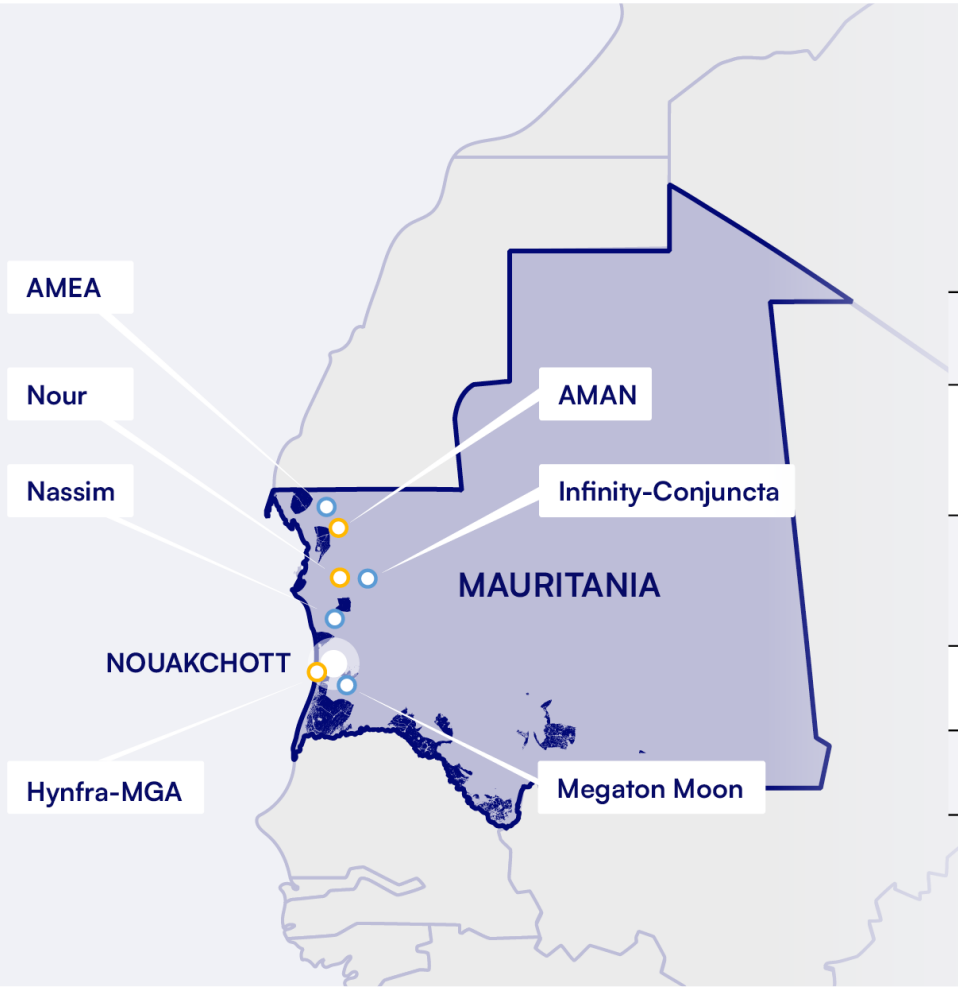
# Case study: Mauritania

**Project status:**

- Feasibility study
- Concept
- RE potential with access to water, roads and cities




| | | |
|---|---|---|
| **H2O & RE potential** | PV: 23,015 km² | Wind: 20,028 km² |
| | Hydropower: 0 GW | Geothermal: 0 GW |
| **National hydrogen commitment** | Published hydrogen strategy<br>3 projects in feasibility study phase<br>4 projects in concept phase | |
| **Domestic anchor demand** | No nitrogen fertilizer production<br>No crude steel production<br>Mineral production: 8,290,552 t/a | |
| **Country risk** | High risk classification: 7/7 | |
| **Export infrastructure** | No LNG, ammonia, or methanol terminals | |

High rating · Medium rating · Low rating



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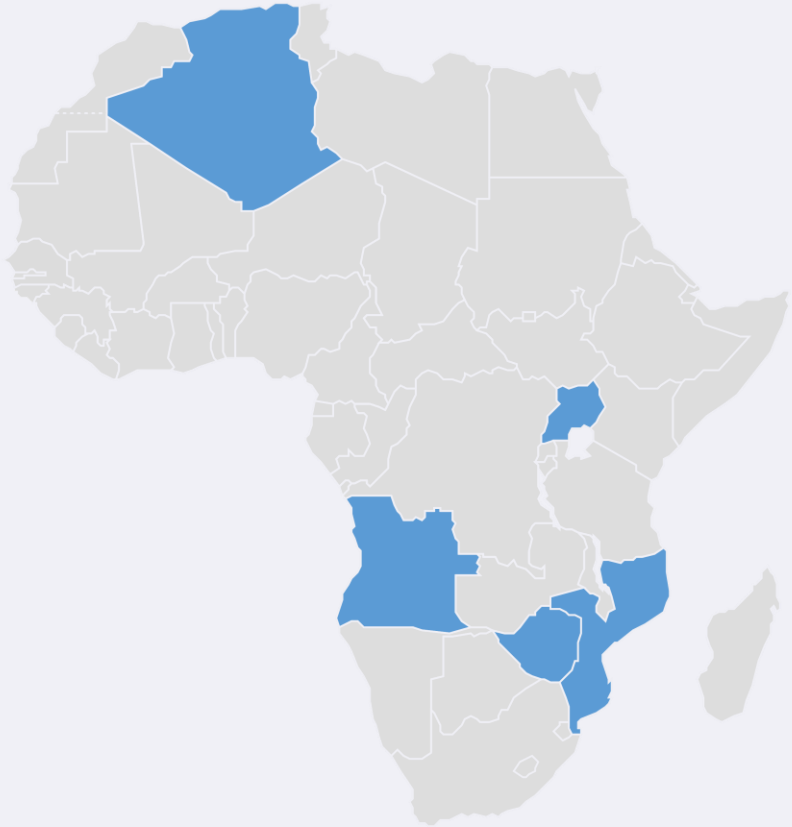
# Momentum builders

## Algeria, Angola, Mozambique, Uganda and Zimbabwe

- Good renewable potential and access to water incl. via desalination
- Either an existing hydrogen strategy *or* one planned hydrogen project
- Domestic anchor demand
- Mixed country risk profiles



| | |
|---|---|
| High rating | H2O & RE potential |
| Medium rating | National hydrogen commitment |
| Low rating | Domestic anchor demand |
| | Country risk |
| | Export infrastructure |

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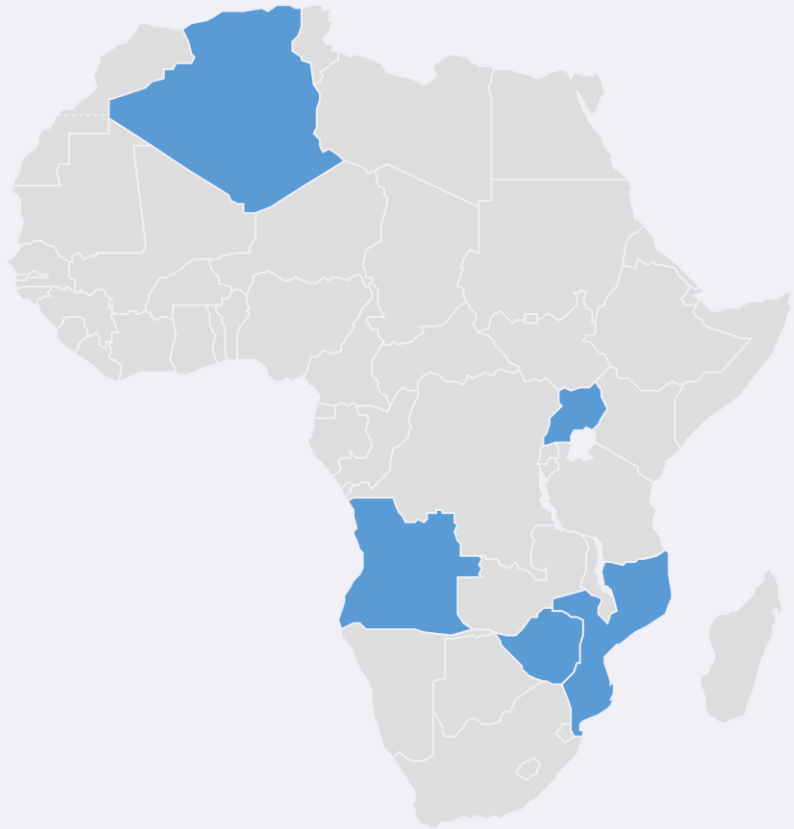
# Recommendations for the momentum builders

## Algeria, Angola, Mozambique, Uganda and Zimbabwe

- Develop and publish a hydrogen strategy
- Promote private sector investment by creating visibility regarding the country's strong potential and initial hydrogen experience
- Strengthen the legal, regulatory & institutional frameworks and implement 'one-stop-shops'
- Support local offtake by targeting 'low hanging fruit' such as fertilizers
- Target key risks through de-risking mechanisms:
  - Offtake risk (e.g., quotas, mandates, contracts-for-difference)
  - High country risk (e.g., political risk insurance, foreign investment insurance, partial credit guarantees)
- Identify key gaps in infrastructure and promote investment through PPPs, hydrogen hubs, faster permitting, etc.
- Invest in skills development and capacity building



| | |
|---|---|
| High rating | |
| Medium rating | |
| Low rating | |

| | |
|---|---|
| | H2O & RE potential |
| | National hydrogen commitment |
| | Domestic anchor demand |
| | Country risk |
| | Export infrastructure |

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# Case study: Angola

**Project status:**

- Feasibility study
- RE potential with access to water, roads and cities


| | | | |
|---|---|---|---|
| **H2O & RE potential** | PV: 16,301 km² | Wind: 0 km² |
| | Hydropower: 110 GW | Geothermal: 0 GW |
| **National hydrogen commitment** | No hydrogen strategy<br>2 projects in feasibility study phase | | |
| **Domestic anchor demand** | No nitrogen fertilizer production<br>Crude steel production: 500,000 t/a<br>Mineral production: 270,212 t/a | | |
| **Country risk** | Medium risk classification: 6/7 | | |
| **Export infrastructure** | 1 LNG terminal<br>No ammonia or methanol terminals | | |

High rating · Medium rating · Low rating



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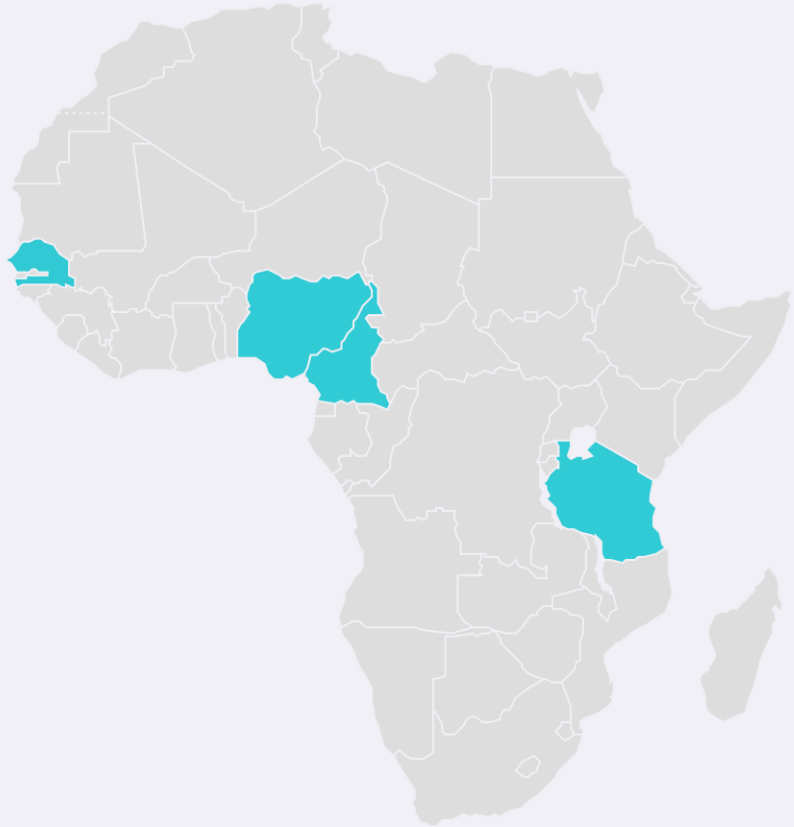
# Strong foundation

## Cameroon, Nigeria, Senegal and Tanzania

- Good renewable potential and access to water incl. via desalination
- Domestic anchor demand
- Low-to-medium country risk profiles
- No hydrogen strategy
- No planned hydrogen project
- Sea access, even if not all countries have terminals for export



- High rating
- Medium rating
- Low rating

| | |
|---|---|
| ✓ | H2O & RE potential |
| ✗ | National hydrogen commitment |
| ☆ | Domestic anchor demand |
| ☆ ✓ | Country risk |
| ☆ ✗ | Export infrastructure |

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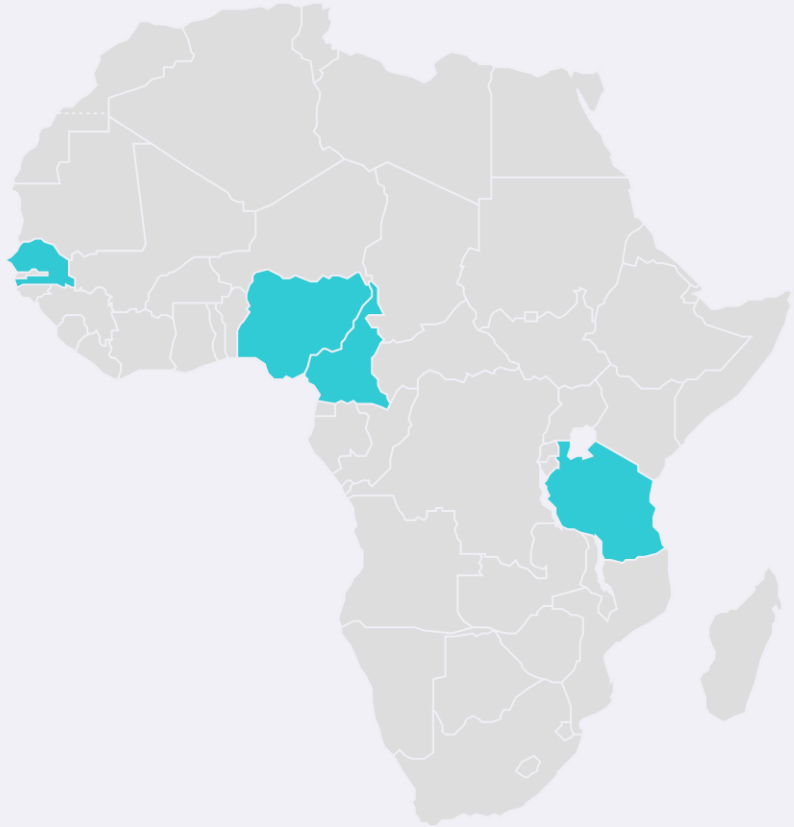
# Recommendations for strong foundation countries

## Cameroon, Nigeria, Senegal and Tanzania

- Develop and publish a hydrogen strategy
- Support the planning of first hydrogen projects and link them to local and international offtake opportunities
- Promote private sector investment by creating visibility regarding the country's strong potential and low-to-medium country risk
- Evaluate alternative de-risking mechanisms that best fit local circumstances to improve the investment environment
- Identify key gaps in infrastructure
- Identify skills and capacity needed



High rating
Medium rating
Low rating

| | |
|---|---|
| ✓ | H2O & RE potential |
| ✗ | National hydrogen commitment |
| ★ | Domestic anchor demand |
| ★ ✓ | Country risk |
| ★ ✗ | Export infrastructure |

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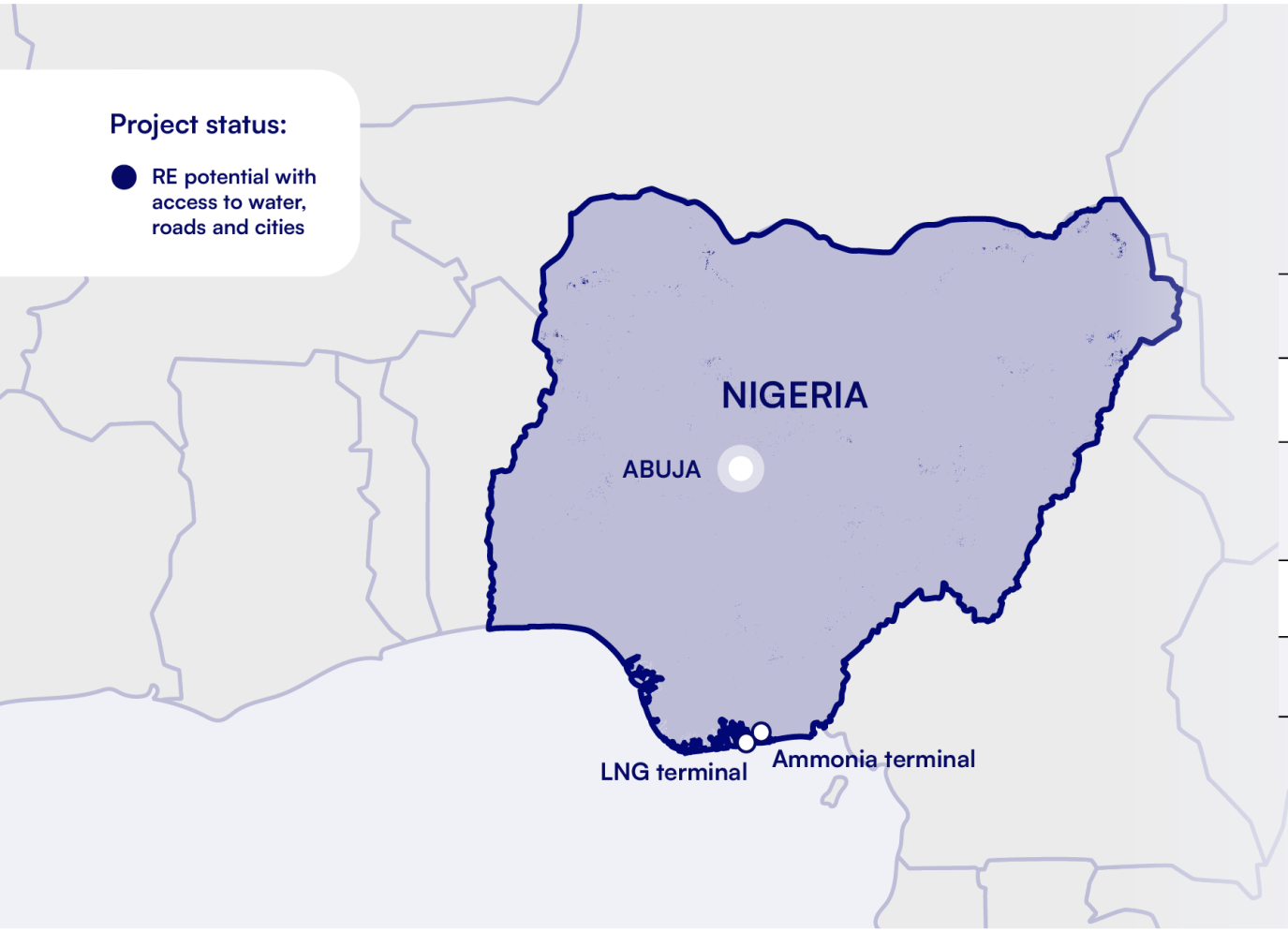
# Case study: Nigeria




| | | |
|---|---|---|
| ✓ | **H2O & RE potential** | PV: 1,018 km² Wind: 309 km²<br>Hydropower: 73 GW Geothermal: 0 GW |
| ✗ | **National hydrogen commitment** | No hydrogen strategy<br>No projects announced |
| ★ | **Domestic anchor demand** | Fertilizer production: 6,400,000 t/a<br>Crude steel production: 3,400,000 t/a<br>Mineral production: 264,393 t/a |
| ✓ | **Country risk** | Medium risk classification: 6/7 |
| ★ | **Export infrastructure** | 1 LNG terminal, 1 ammonia terminal, and no methanol terminal |

★ **High rating** ✓ **Medium rating** ✗ **Low rating**



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# Pathways forward

# Pathways towards clean hydrogen economies across Africa

| | Front runners | Momentum builders | Strong foundation |
|---|---|---|---|
| Develop & publish a H2 strategy | Completed | Ongoing | Pending |
| Support the planning of first H2 projects | Completed | Ongoing | Pending |
| Create hydrogen potential visibility | Ongoing | Ongoing | Pending |
| Strengthen legal, regulatory & institutional frameworks; implement one-stop-shops | Ongoing | Pending | Pending |
| Support H2 projects by linking them to local offtake | Ongoing | Pending | Pending |
| Implement (financial) de-risking mechanisms | Ongoing | Pending | Pending |
| Invest in supporting infrastructure | Ongoing | Pending | Pending |
| Skills development and capacity building | Ongoing | Pending | Pending |



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