GCC Lab
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Gulf Renewable Energy Lab

Transmission as Key Enablers of Energy Transition in KSA

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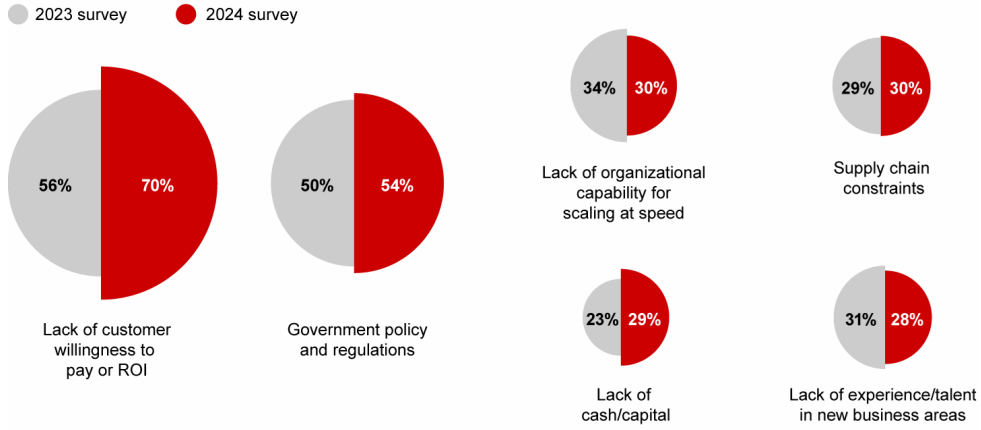
Agenda

1. General Background
2. Energy Dilemma in GCC & ME
3. Energy Transitions Programs
4. Challenges & Solutions
5. Expected Impact

General Background

Bain's Survey During COP28 (2023 United Nations Climate Change Conference)

- About **62%** of executives expect the world to reach net-zero emissions by 2060 or later, up from 54% in last year's Bain survey.
- The energy transition looks slower as it becomes even more difficult to ensure adequate investment returns.



Note: Not all categories are shown
Sources: Bain ENR Transition Survey 2023 (n=608); Bain ENR Transition Survey 2024 (n=638)

International Potential

- In 42 economies, world bank has pledged **45% of its annual financing** will be directed to climate-related projects for the fiscal year 2025. (country climate and development reports “CCDR”)
- The International Finance Corporation (IFC) estimates that by 2030, supporting low carbon investments will:
  - Generate **$10.2 trillion** investment opportunities
  - Create **213 million** jobs
  - Reduce greenhouse gas emissions by **4 billion tons.**

Energy Dilemma in KSA & GCC

Hydrocarbon Export Contribution to GCC Economy

Exported Hydrocarbons in 2021

KSA	UAE	Kuwait	Qatar	Oman	Bahrain
60%	80-84%	80-84%	80-84%	74%	63%

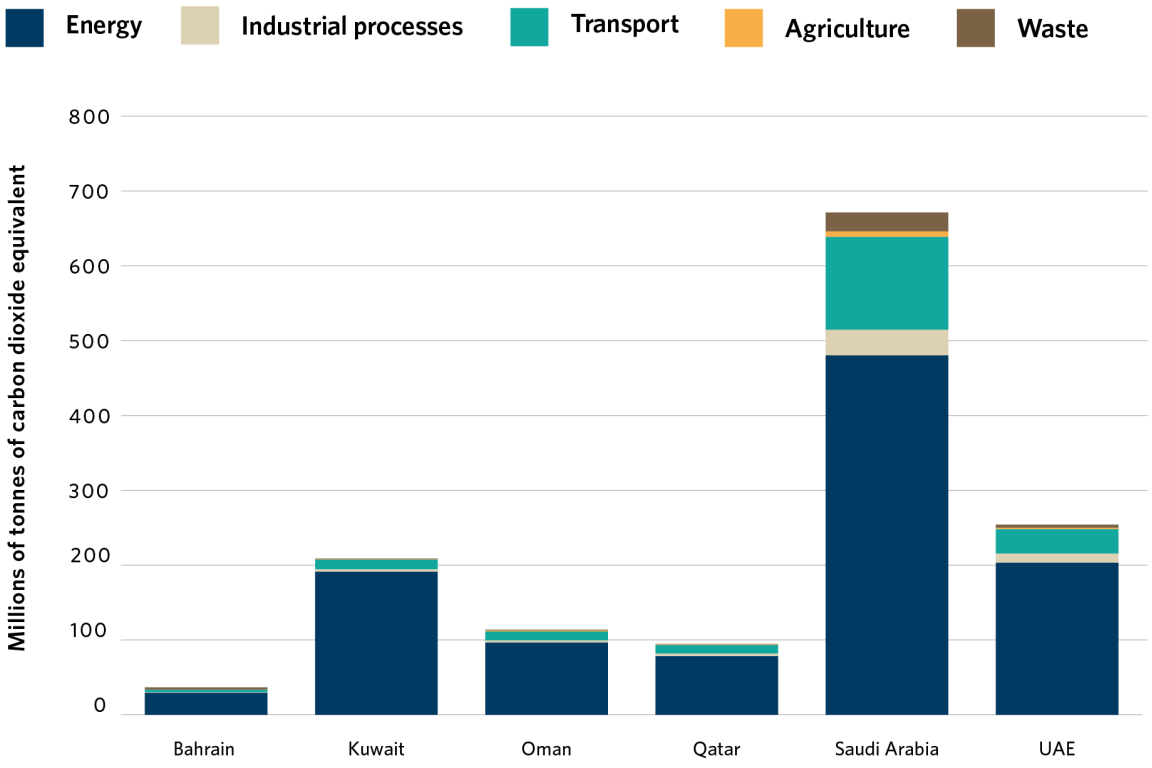
Non-Hydrocarbons Export Growth

- KSA, the non-oil sector growth has accelerated reaching 4.8% in 2022.
- UAE, non-hydrocarbon GDP was expected to grow by 5.8% in 2022.

Energy Transition Challenges in KSA Energy Sector

- Oil prices and demand decreasing globally resulting in financial challenges.
- Significant increase in the internal energy demands due to modernization projects
- Sustainable energy in the region provides non-economic justifications
- Fossil fuels have been the largest contributor to greenhouse gas (GHG) emissions

GHG Emissions at GCC



GHG Emissions at GCC States - 2018

Global rank	Country	CO2 emissions per capita 2021 (ton)
1	Qatar	35.59
2	Bahrain	26.66
3	Kuwait	24.97
4	Trinidad and Tobago	23.68
5	Brunei	23.53
6	United Arab Emirates	21.79
7	New Caledonia	19.1
8	Saudi Arabia	18.7
9	Oman	17.92
10	Australia	15.09

Source: Global Carbon Project.

Energy Transition Programs

1. Carbon Circular Economy

Saudi Arabia, Qatar, and the UAE have accelerated investments in CCS facilities, currently they capture approximately 12% of global CO2 captured annually.

Saudi Arabia's Green Initiative and Middle East Green Initiative to plant 10 billion trees in Saudi Arabia and another 40 billion trees in the Middle East

Saudi Arabia is investing around 1.2$ billion in green buildings, and it is retrofitting around 90 thousand mosques

The CCE is based on four pillars

2. GCC Energy Transition Programs

Net Zero Target for GCC Countries	
Saudi Arabia	2060
United Arab Emirates	2050
Oman	2050
Bahrain	2060
Kuwait	2060
Qatar	--

The program includes the support of low carbon technologies such as **GREEN HYDROGEN**, **CIRCULAR CARBON ECONOMY**, increased engagement with carbon markets, and domestic energy efficiency initiatives, among others.

3. Renewable Energy Penetration

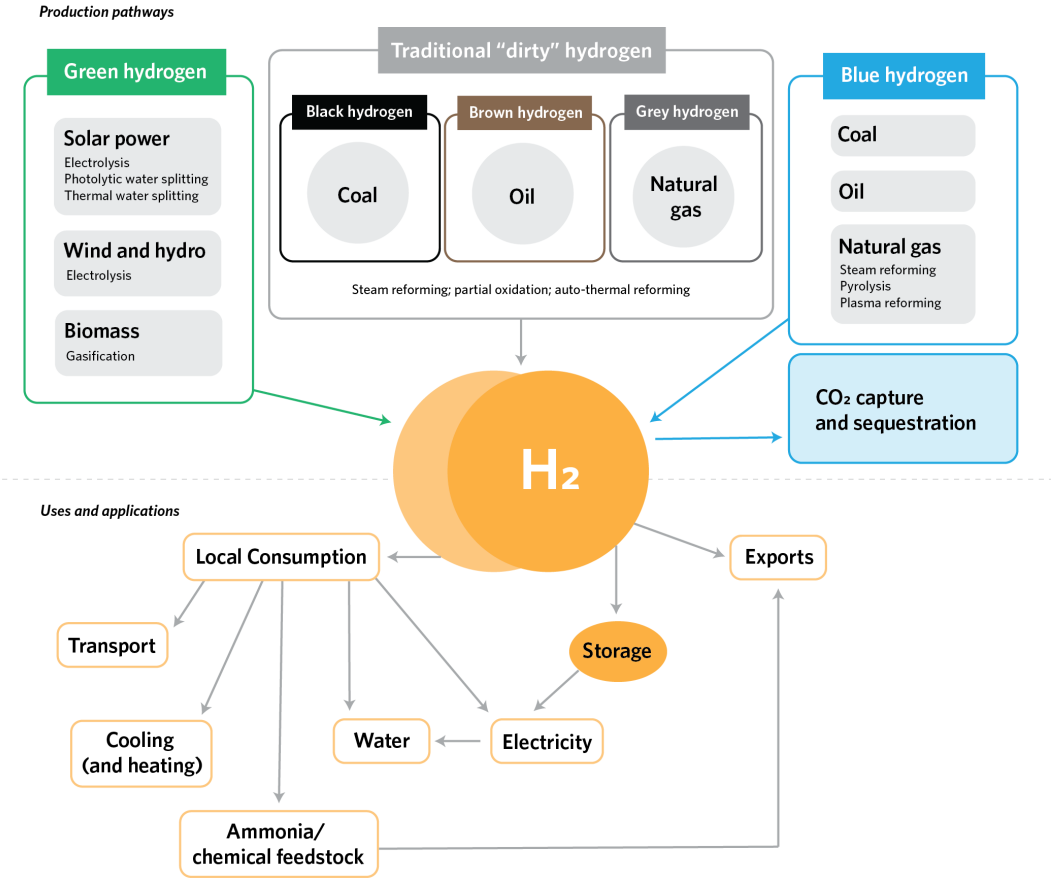
Targeted Energy Mix		
Saudi Arabia	50%	2030
United Arab Emirates	44%	2050
Oman	30%	2030
Bahrain	20%	2035
Kuwait	15%	2030
Qatar	20%	2030

In 2021 Renewable Energy forms 1% of Energy mix of GCC states

4. Green Hydrogen

Advantages

- Not emitting GHG when burned
- Can be produced from green source
- Can be produced from water



Green Hydrogen Production Ongoing Projects

Country	**Project**	Value	Start up
Saudi Arabia	Facility – NEOM and ACWA Power	US$8.4bn	2026
Saudi Arabia	Jubail Industrial City Carbon Capture & Storage Hub	US$4.5bn	2027
Saudi Arabia	Green Hydrogen – PIF, Samsung C&T & POSCO	US$6.5bn	2029
Oman	**Green Energy Oman**	**US $10 bn**	**2028**
Oman	Duqm Green Ammonia & Hydrogen Project	US $3.5 bn	2025
Oman	SalalaH2 Green Hydrogen & Ammonia Project	US $1 bn	2028
UAE	Habshan 5 Gas Plant Carbon Capture Project	US$500m	2026
UAE	Brooge RE Green Hydrogen & Green Ammonia Plant	US$300m	2026
UAE	ADNOC Blue Ammonia Production Facility – Ruwais	US$200m	2025

KSA: US $19.4bn **Oman: US $14.5bn** **UAE: US $10bn**

Challenges & Solutions

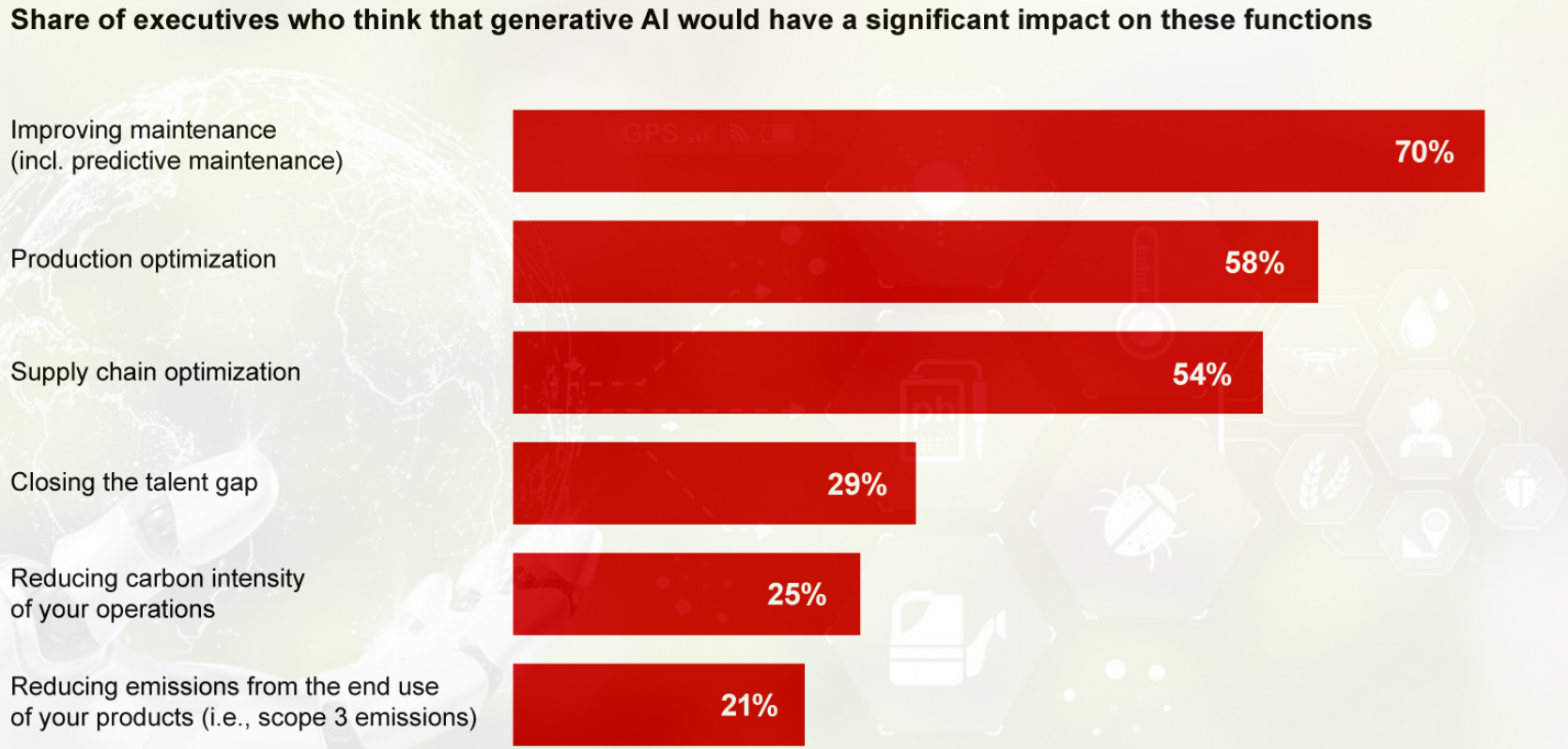
Challenge: High Upfront Cost

- Meeting net-zero commitments will require increased funding
- ROI challenges are increasing.

- Collaborate with investors and DFIs to encourage the creation of innovative financial products.
- Increase grant funding or enable debt financing without requiring government guarantees.

Industry leaders believe generative AI has the potential to improve maintenance, production, and supply chains, among other areas

Where Can AI Reduce Cost in Energy Projects



Challenge: Stakeholders Engagement

We need participation from all stakeholders—public and private, Regulators, Institutes to:

- Promote social dialogue,
- Partner across sectors to scale new ventures, and
- Create sustainable employment and development opportunities

Developed Solution must be

Challenge: Driving Equitable Employment

- The energy transition will create 30 million clean-energy-related jobs by 2030,
- That need new skill sets and specializations,
- Measures and policies will be needed to minimize the impact to workers' livelihoods.

- Develop sustainability academic and certification programs
- Incentive programs to employ affected communities' worker
- Motivate global expertise movement to the territory

Challenge: Supply Chain

according to PwC experts. Many of the world's global supply chains saw extreme disruption through the pandemic, furthering the case for nationalism and bolstering calls to develop more regional and local capabilities.

The war in Ukraine has disrupted the supply of oil and gas and has driven many European countries to make decisions that will have a long-term impact on where and how they source their energy supply.

Challenge: Supply Chain

Potential Risks Associated with Supply Chain

1. Volume Shortage
2. Price Volatility
3. Sourcing Dependency
4. Long Lead Time
5. Quality

“One of the solutions might be manufacturing or having your suppliers closer to the point of use”

Brett Cayot, partner, strategy & operations, PwC US

Localization Advantages

- Positive Impact on the national GDP
- Approximately 65% of global customers would prefer products made in their country,
- Geographical proximity, time zone alignment, shorter lead times, and better service delivery.
- Job Creation for the Local Community. It sends a positive message about your brand.
- Easier to Travel to Suppliers for Meetings
- Lower Costs for Logistics are an expensive part of operations, often outweighing labor costs

Impact Expected

Expected Impact

- GCC states GDP to jump up to $13 trillion by 2050
- Accelerate the economics diversification
- Reduce domestic demands on fossil fuels
- Boost localization initiatives for proper security
- Cut GHG emissions by 278 MM tones by 2030
- Pioneering clean energy, climatic technology & innovation

Reference: The World Bank

Thank you

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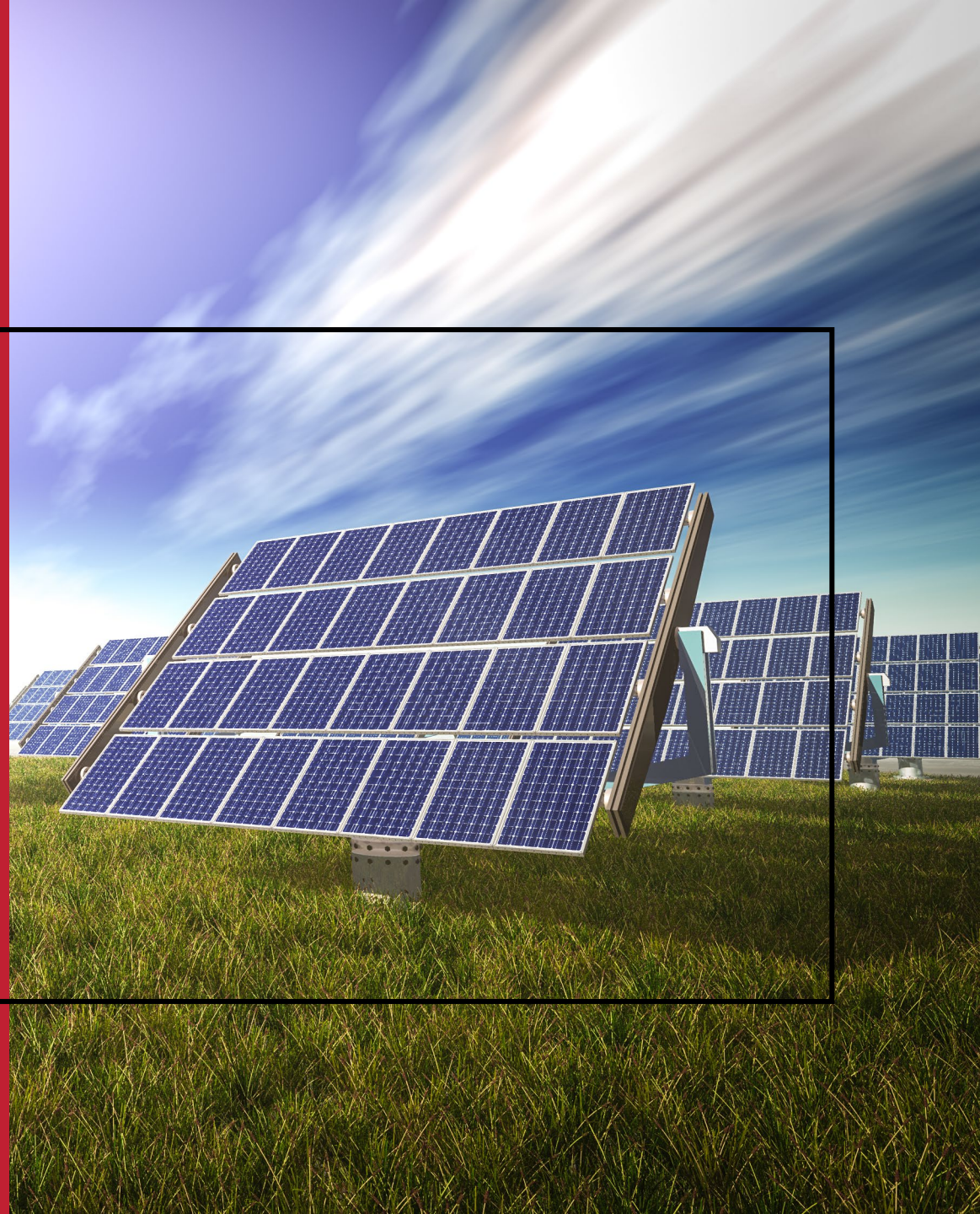

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