The Economies of New Energy Technologies in Europe and the Gulf Region

GCC Regional Perspective

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GCC holds 29% of Global Crude Oil reserves and 21% of Global Natural Gas Reserves

Figure 1.1 Crude oil reserves by region in 2017 as a share of world total

Figure 1.2 Natural gas reserves by region in 2017 as a share of world total

Global total: 1,696 thousand billion barrels

- 3% Asia Pacific
- 19% South and Central America
- 18% Middle East excluding GCC
- 8% Africa
- 29% GCC
- 9% Europe and Eurasia
- 13% North America

Global total: 193.5 trillion cubic metres

- 32% Europe and Eurasia
- 19% North America
- 10% Asia Pacific
- 7% Africa
- 6% Middle East excluding GCC

GCC Growth in GDP amongst highest in the world

Population 2016 (millions)

- Saudi Arabia: 7%
- UAE: 8%
- Oman: 7%
- Kuwait: 7%
- Qatar: 12%
- Bahrain: 8%

Annualised growth in GDP (%), 1990 – 2016

Source: Based on World Bank, 2018; IEA, 2018b.

The GCC Interconnector – A Unique Structure
• A Regional Backbone Structure to support Energy Security
• Coordinated Operation - sets Operational Rules and targets
• Coordinated Planning – sets Generation and Interconnector expansion targets
Energy Security through Consolidated GCC Grid

Volume of Power Exchanged on the GCC Interconnection 2010 – 2017

Year 2010: 107389
Year 2011: 230754
Year 2012: 730977
Year 2013: 830847
Year 2014: 922479
Year 2015: 913385
Year 2016: 772968
Year 2017: 761982
Developing the Regional GCC Electricity Market

Volume of Power Trade on the GCC Interconnection
2010 – 2018
Rapid and far-reaching Global changes: the Energy Transition

- Renewable CO2-free energy
- Batteries and storage technologies
- Electric Vehicles
- Hydrogen Storage

CONSUMER to PROSUMER transition
**Large Scale Deployment of Renewables in the GCC**

**Saudi Arabia**
- 2020: 3.45GW
- 2023: 9.5GW (10%)
- 2030: 30% from REN and others (e.g. nuclear)

**Kuwait**
- 15% by 2030

**Bahrain**
- 10% by 2035

**Qatar**
- 500MW by 2020

**UAE**
- 44% by 2050

**Oman**
- 10% by 2025

**Issues: How to integrate?**
- Need for Storage
- Need for energy exchange
- Need for Interconnections
Price of Utility-Scale Electricity Technologies in the GCC


Sources: Derived from Mills, 2013; Channell et al., 2015; Manaar, 2014; Scribbler, 2015.

* Low = price for 300 MW Sakaka solar PV; and High = a conservative assumption based on project data and expert opinion

** Low = price for 700 MW MBRAMSP IVb in Dubai; and High = price for Morocco’s Noor II

*** Low = price for the Hassyan Clean Coal Power Plant; and High = estimate for coal with CCS

**** Estimated range for nuclear power based on (Mills, 2012) and (Scribbler, 2015)
GCC Excess Generation Capacity Available For Export During Winter Months

GW
GCC grid Expansion Opportunities: Exploring interconnections to Promising corridors

Corridors towards Europe / Turkey
- Complementary seasonal diversity between Europe / Turkey and GCC. Excess renewable (solar) energy in GCC
- Jordan being a hub for interconnecting to neighbouring system: Iraq, Syria, Egypt, Turkey
- Egypt: Interconnect with Europe thru Euro-Africa 2000 MW Interconnection
- Iraq: HVDC backbone towards Turkey

Corridors towards Africa: Ethiopia
- Complementary Solar Energy (Saudi Arabia) / Hydro (Ethiopia) with storage capabilities

Corridors towards Asia: India, Pakistan
- Complementary seasonal time diversity between south-east Asia and GCC. Excess renewable (solar) energy in GCC. Excess Wind energy potential in Pakistan & Afghanistan
GCC – Jordan – Egypt - Euro-Africa Interconnection

2000 MW HVDC link from GCCIA back-bone grid to Jordan then Egypt to link with Euro-Africa Interconnector will create an Electricity Highway (E-Highway) between GCC & Europe
THE GLOBAL GRID

- Interconnecting the unconnected grid to global grids.
- Integration of the Renewable Energy Sources
Prospects for GCC Euro Cooperation

- Interconnecting the GCC electricity markets with the EUROPEAN integrated system and steps to be taken to achieve it
- Create collaboration opportunities between GCC and European utilities to exchange experiences and lessons learned in renewable energy development and integration and the Energy Transition.
- Create collaboration opportunities between GCC and European academic and research centers to study energy transition issues and what needs to be changed in our systems.
- Exploring European policies and regulations that are appropriate to be considered for GCC to enable successful clean energy initiatives
- Exploring European initiatives regarding the use of green hydrogen in the energy transition, and what opportunities would it bring to the GCC
- Exploring the common elements in the energy transition in Europe and the GCC: differences and similarities and how we can benefit from joint action
Thank You

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