

IRENA Initiative for a Clean Energy Corridor
Executive Strategy Workshop
June 2013



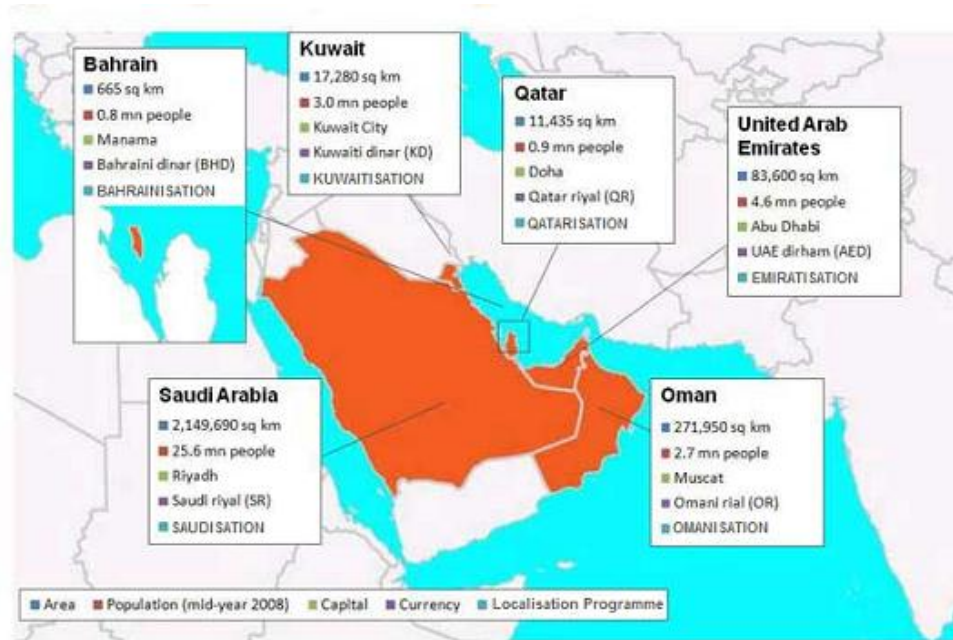
مكتب التنظيم و الرقابة
Regulation & Supervision Bureau

**400kV GCC Interconnector :
Overview and Comparison with Clean
Energy Corridor Enablers**

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Gulf Cooperation Council (GCC)



Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, Oman

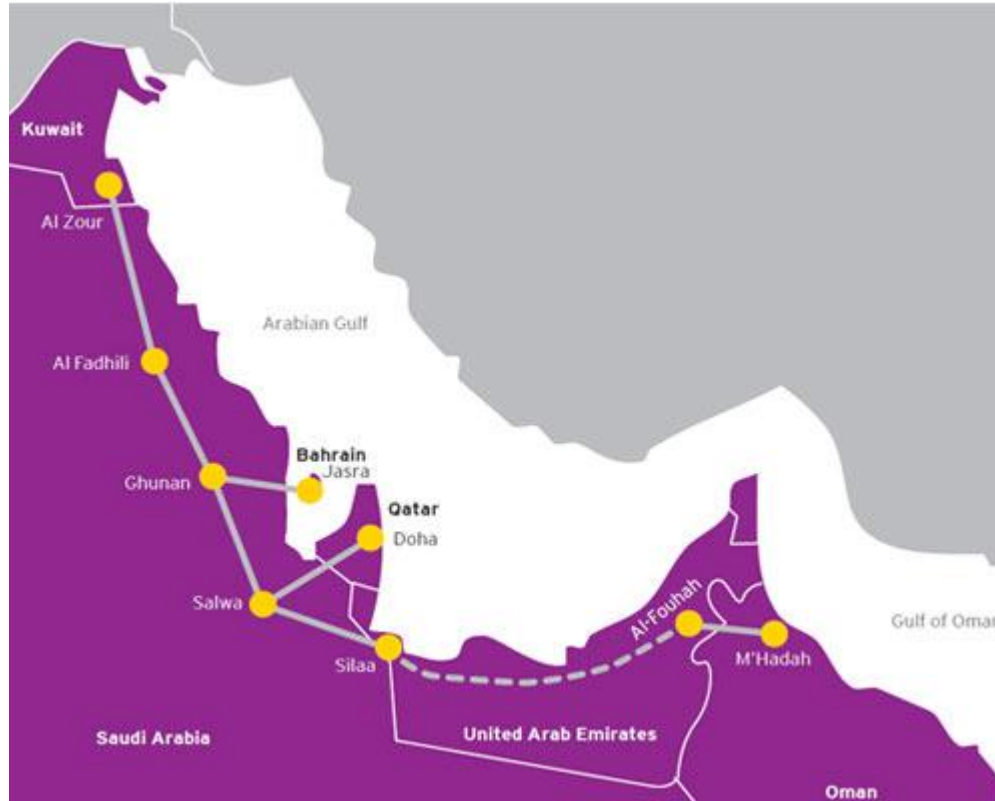
Together, these countries constitute the Gulf Cooperation Council (GCC).

Founded on 26 May 1981, the aim of this collective is to promote coordination between member states in all fields in order to achieve unity





The GCC Interconnector



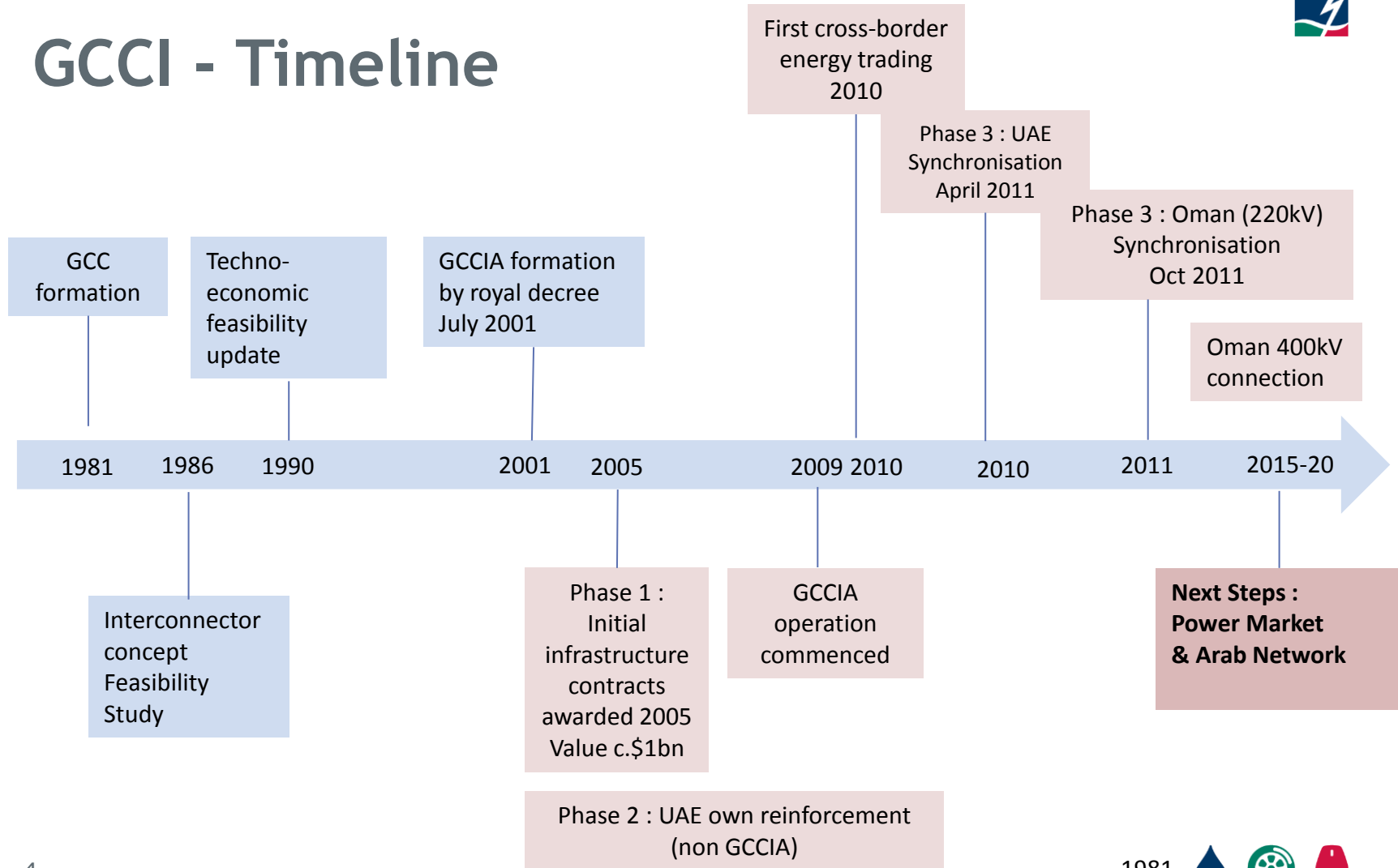
A 400kV 'backbone' electrical transmission link between all GCC Member States

Comprising all necessary infrastructure and operations control centre to facilitate a robust network operation



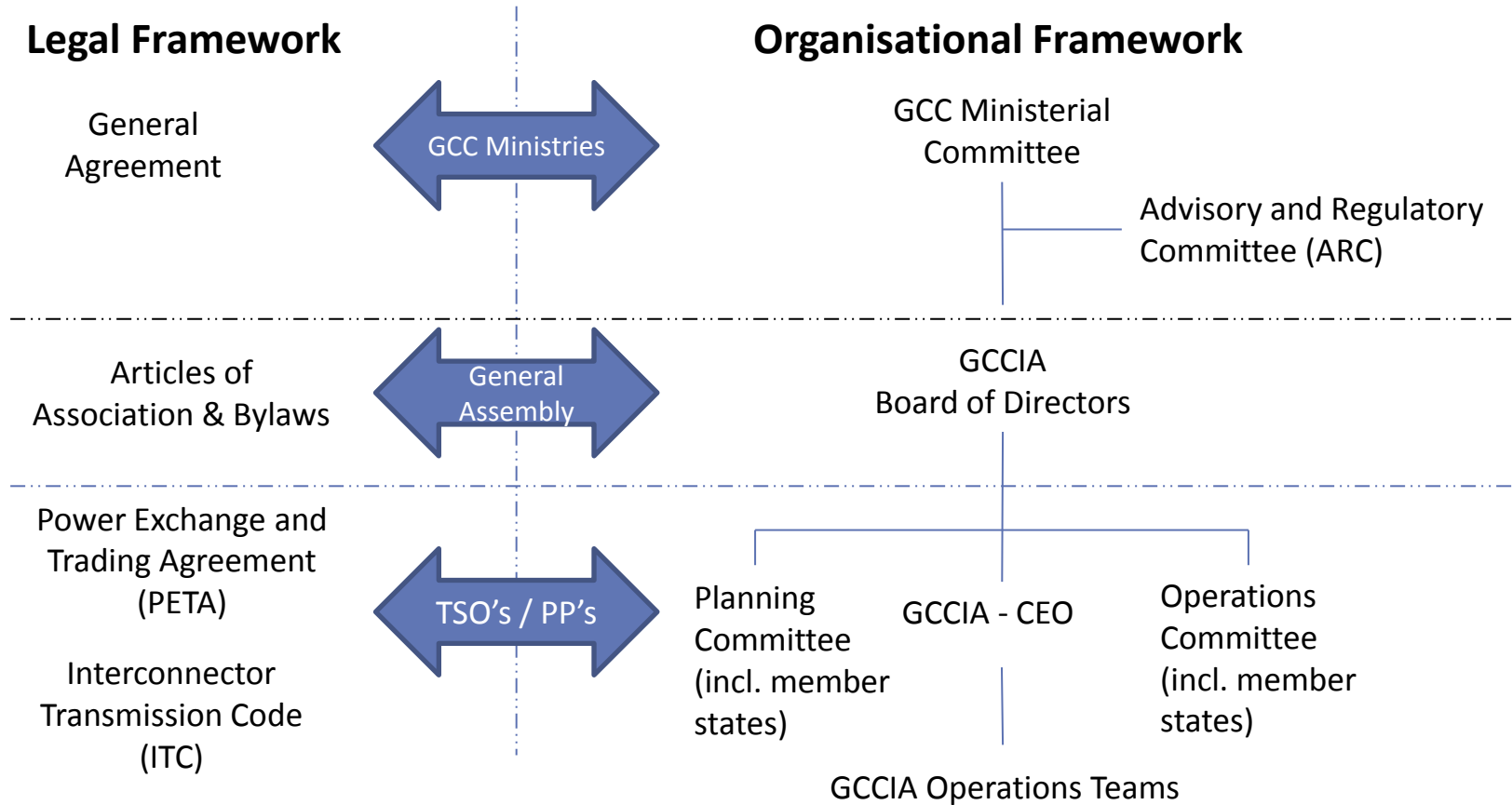


GCCI - Timeline





GCCIA - Structural Arrangements



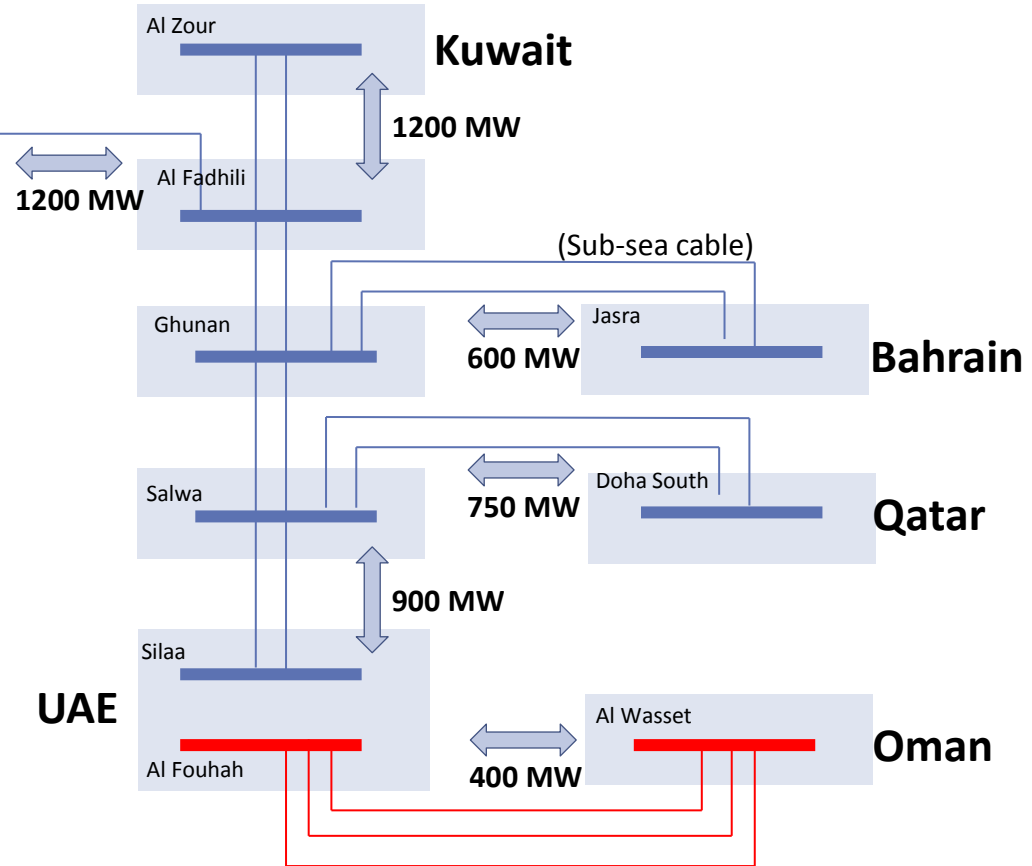
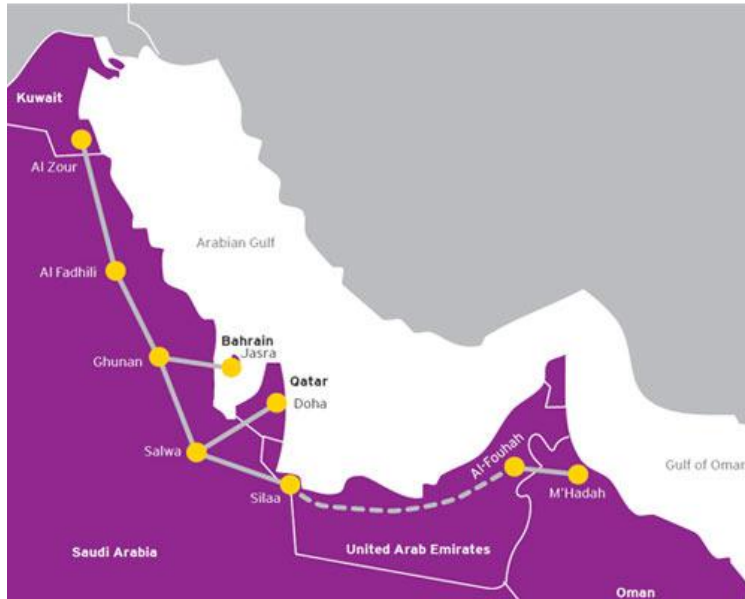


GCC Interconnector - Network Topology

400kV
220kV

Saudi Arabia

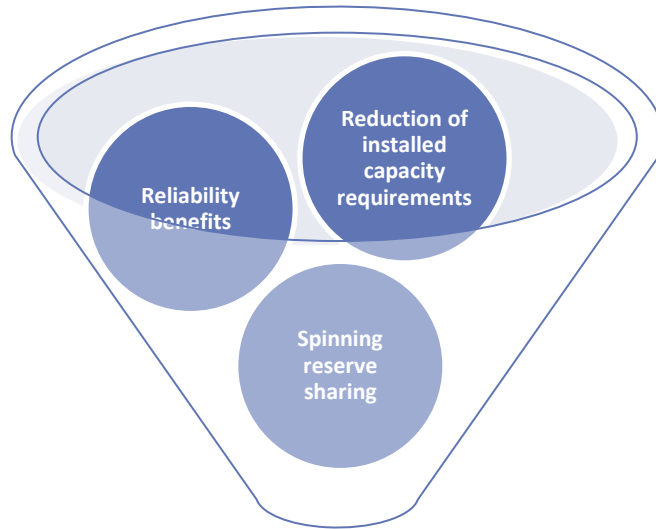
60Hz | 50Hz
HVDC 'back to back'





Key Benefits

Primary objectives :



c.US\$3 Billion

(estimated collective GCC capacity saving to 2020)

Platform for added benefit :





Legal Framework Mechanisms :

It is important to emphasize some basic assumptions:

- The primary rationale for the interconnector was to achieve cost savings through the sharing of reserves.
- Member States are contributing to the cost on the basis of expected benefits.
- All the Member States are therefore entitled to benefit from the use of the interconnector for provision of emergency support without further payment

Any Member State cannot expect to “free-ride” on another, so:

- Levels of installed capacity, operating reserve and commercial arrangements are specified for each entity.

Two key legal framework mechanisms exist in the form of :

- **Power Exchange and Trading Agreement (PETA) and**
- **Interconnector Transmission Code (TC)**





Power Exchange and Trading Agreement (PETA)

The key areas dealt with by the PETA are :

- Scheduled exchanges of energy
- Unscheduled exchanges of energy
- Cross-border operating reserve arrangements
- Installed capacity resource arrangements
- Allocation and pricing of the interconnector capacity





Who the PETA covers

The parties that are referred to in the PETA are:

- the GCCI Authority (GCCIA);
- the six Transmission System Operators (TSO's);
- the two procurement Parties, who are
 - Abu Dhabi Water and Electric Company
 - Oman Power and Water Procurement Company.

Each group has different rights and responsibilities.





Interconnector Transmission Code (TC)

- The operation of the interconnected system is founded on the principal that each TSO controls and is responsible for its own system.
- The Interconnector Transmission Code is the Members “Technical Code” for the 400 kV Gulf Interconnector
- The TC indicates how the Interconnector will be operated, including Operating Reserve allocation, and
- How Members of this ‘special club’ will conduct themselves





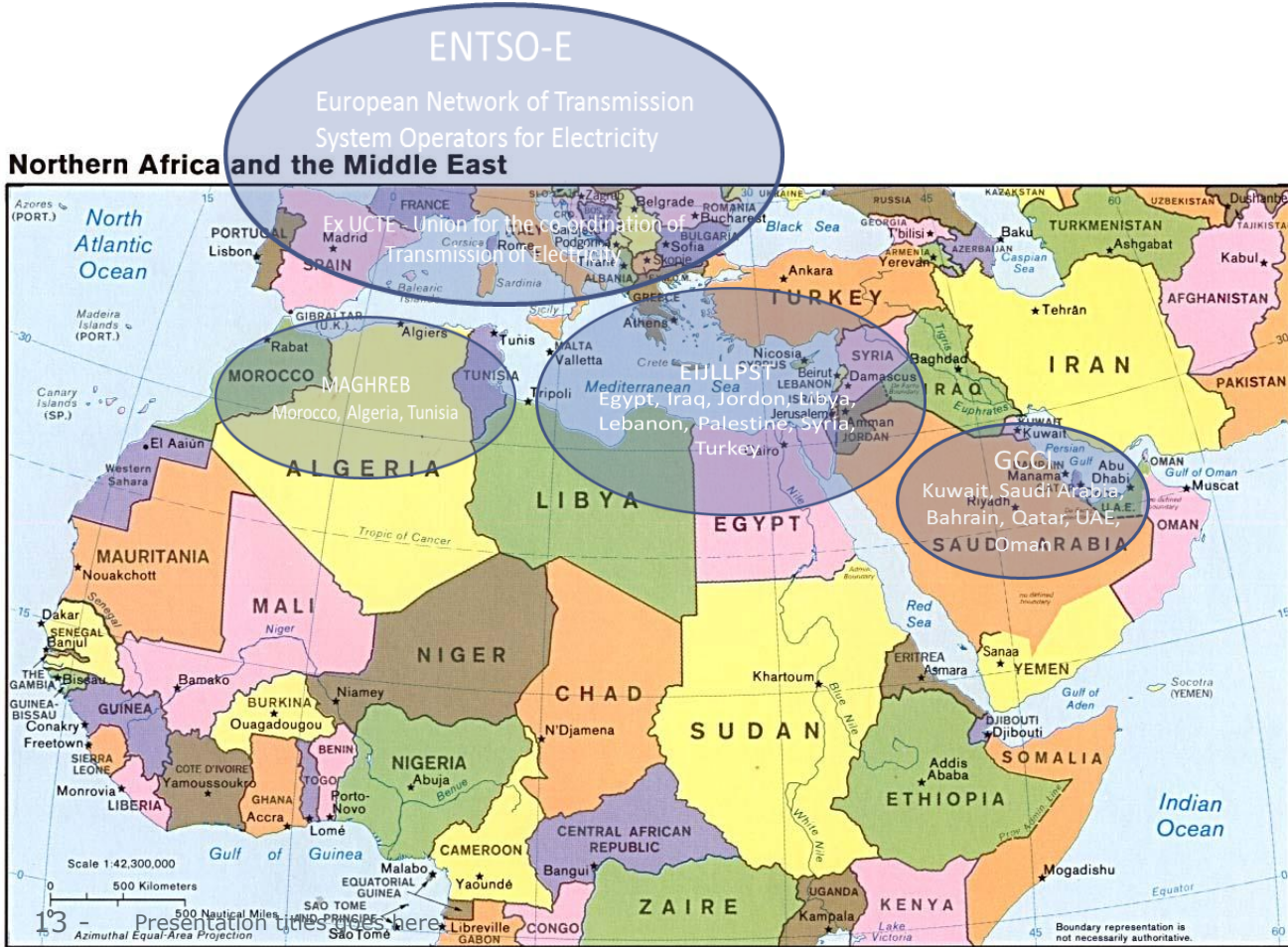
Facts & Figures - GCCI Infrastructure

- Capital Cost (*Ph1 & Ph3*) US\$ 1.4 Bn (2005)
- Construction Period c.4 years
- 400kV Route length (*double cct*) c.900km
- 400kV substations 9
(incl. back to back DC converter)
- System availability (2012) 97%
(incl. planned outage)





Future Network Integration





Interconnector - drivers / success

In different regions the drivers may be different :

Middle East (GCC)

- Cost Efficiencies
- Shared Reserves
- Reduced capacity investment
- Power market development

Developing Regions

- Sufficiency of power
- Access to remote resources
- Fully realising potential
- Enabling investment

Enablers and Foundations are common :

- A common vision and commitment among member states to co-operate for the greater good.
- A coherent, consistent and conducive policy and framework and associated governance are essential to successful implementation.
- An independent body mandated to co-ordinate, implement, operate and facilitate fair access and 'fair play'.





Infrastructure planning - Joined up thinking

Strong electrical infrastructure / interconnectors are a key enabler :

Access to remote resource

e.g. Hydro; geo-thermal; wind; solar

Provides the potential to fully develop and realise resource potential

- Economies of scale can 'make the case'

Where localised resources are identified, benefit of 'cluster' facilities :

- Technical shared facilities
 - Reduced unit costs
 - Higher integrity connection, security of supply
- Socio-economic development
 - Spin-off support services
 - Building and concentrating skills pool



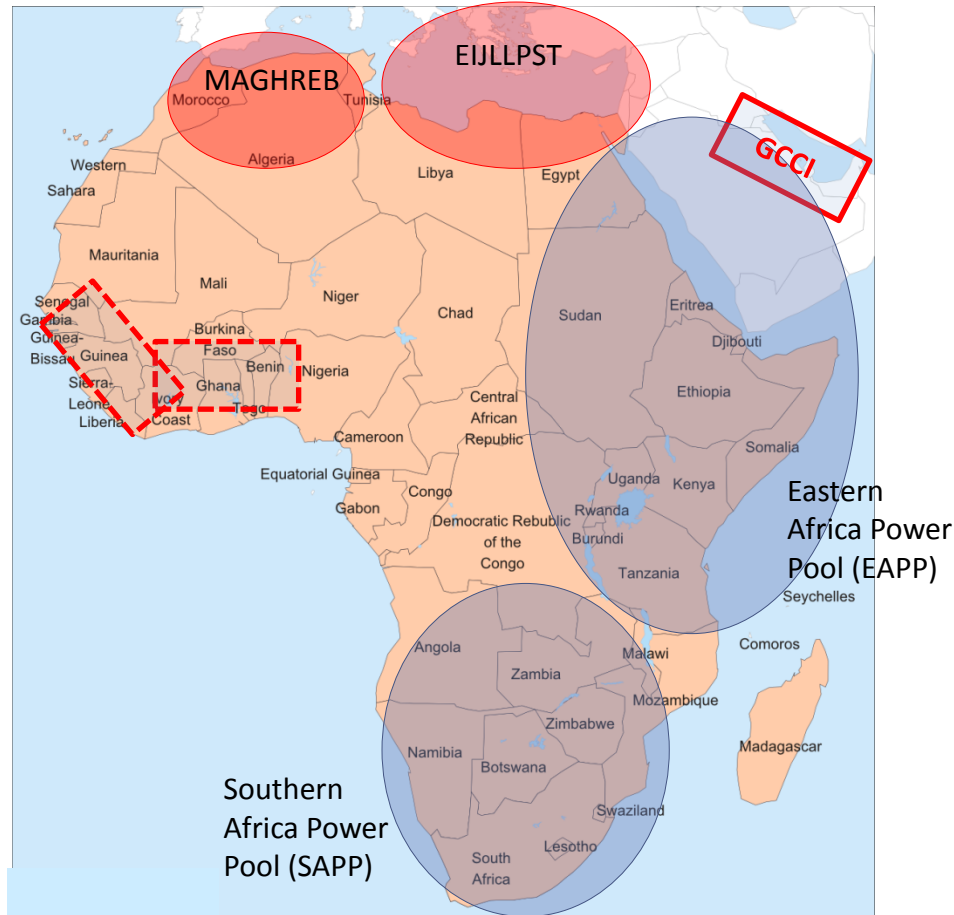


GCCI - Next Steps ?

- ***Address the obstacles by closer harmonization of energy sector policies***
- ***Build and Establish a GCC Power Market***
 - *The mindset, skills and competencies to confidently trade power on a regular basis.*
 - *Cost reflective pricing – cross border*
 - *Transparency of pricing – daily published rates*
- ***Vision and move towards a Pan-Arab Electricity Network and Market Integration***



Food for thought :



GCCI benchmark example

One may wish to consider in its simplest form (top down)

- Member state alignment
- Physical area
- Cost base

... Opportunity ?

....What's do-able ?



Thank you

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قطاع الماء ومياه الصرف الصحي والكهرباء في إمارة أبوظبي

