



GCC Interconnection Authority

An update on the GCC and Pan-Arab Interconnection Grids

Part I - The GCC Region
Part II - Arab Countries

Saleh H. Alawaji, Ph.D.
Chairman of the Board of GCCIA

2005 JEDDAH WATER and POWER FORUM, 12 – 14 November 2005

Jeddah, Saudi Arabia



Contents

Part I - GCC REGION: -

- **About the Authority**
- **Power Systems in GCC Countries – Year 2004**
- **GCC Interconnection Phases and Scheme**
- **Single-Line Block Diagram**
- **Interconnection Share Capital**
- **Contract Value**
- **Project Timeframe**
- **Future Developments**

Part II – ARAB COUNTRIES:



About the Authority

- Established in July 2001 by Royal Decree No. M/21.
- Owned by the six GCC Countries the authorized share capital is (\$US 1,100,000,000) divided into (1,100,000) shares of (\$US 1,000) each share.
- The Authority is managed by a (twelve member) Board of Directors; each member country is represented by two members. The Chairmanship is rotated among the member states every three years.
- The official domicile of the Authority is Dammam, with the Control Center to be located in Ghunan, Saudi Arabia.
- The primary objective of the Authority is to:
 - link up the power grids of the six GCC countries
 - operate and maintain the interconnection
 - become a leading player in the regional electricity market



Power Systems in the GCC – Year 2004

GCC State	Total Generation Capacity (MW)	Peak Load (MW)	Energy (GWh)	Growth Rate (%)
State of Kuwait	9,326	8,635	43,308	6.0
Kingdom of Saudi Arabia	30,500 *	27,847 *	146,569 *	6.2 *
East Region of Kingdom of Saudi Arabia	11,873	11,235	69,756	8.2
Kingdom of Bahrain	2,097	1,738	8,918	6.0
State of Qatar	3,025	2,710	13,580	9.5
United Arab Emirates	11,184	10,564	59,721	6.9
Sultanate of Oman	2,485	2,406	10,582	3.9
TOTAL	58,617	53,899	282678	

* Not included in the total, (East Region of Saudi Arabia is considered)

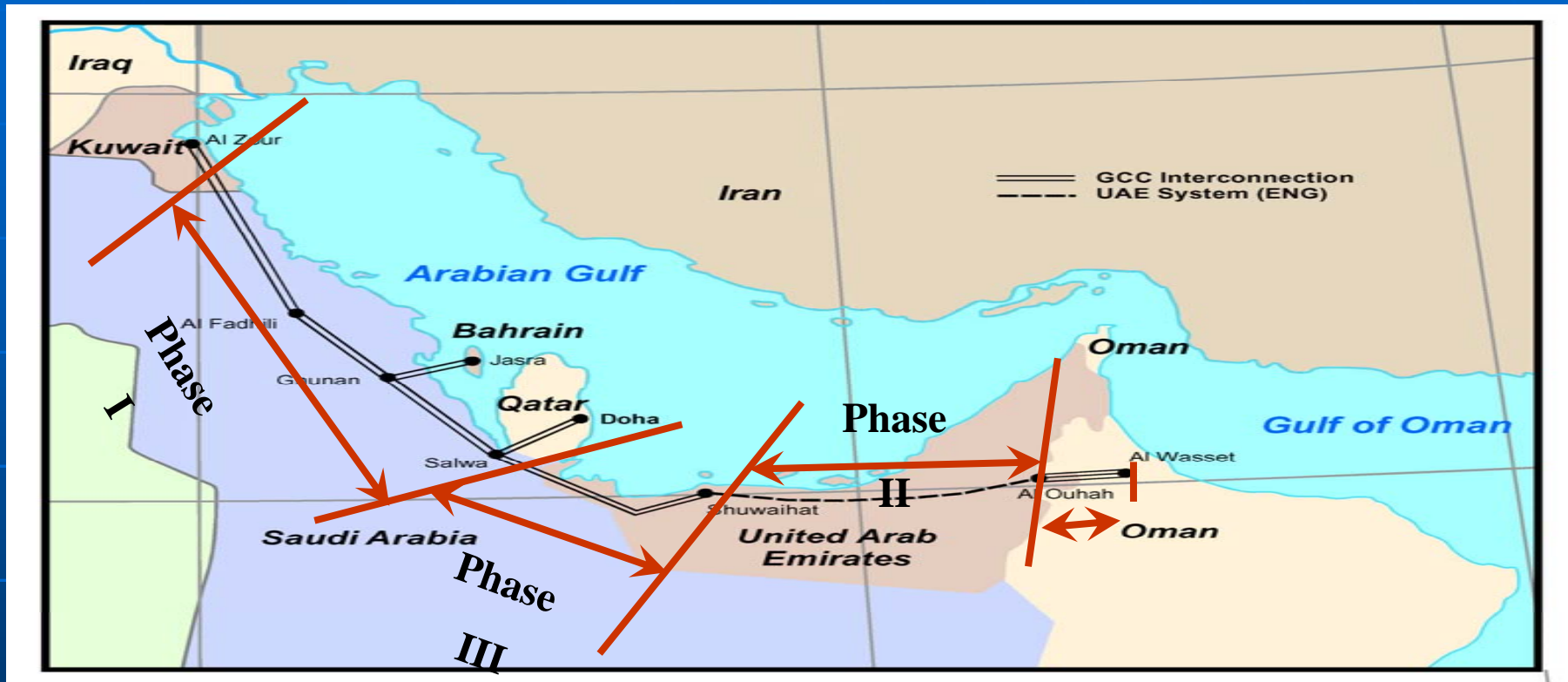


Benefits of the Interconnection

- **Reduce generation reserves;**
- **Provide power exchange and strengthens supply reliability;**
- **Improve the economic efficiency of the electricity power systems;**
- **Strengthens operational efficiency;**
- **Promoting utilities to construct larger generation units to share extra generated power;**
- **Provide opportunities for industrial customers and utilities to shop around for more attractive supply of power;**
- **Adopt technological development and use the best modern technologies;**
- **Providing long-term environmental advantages by reducing waste emissions from increasing generation plants.**



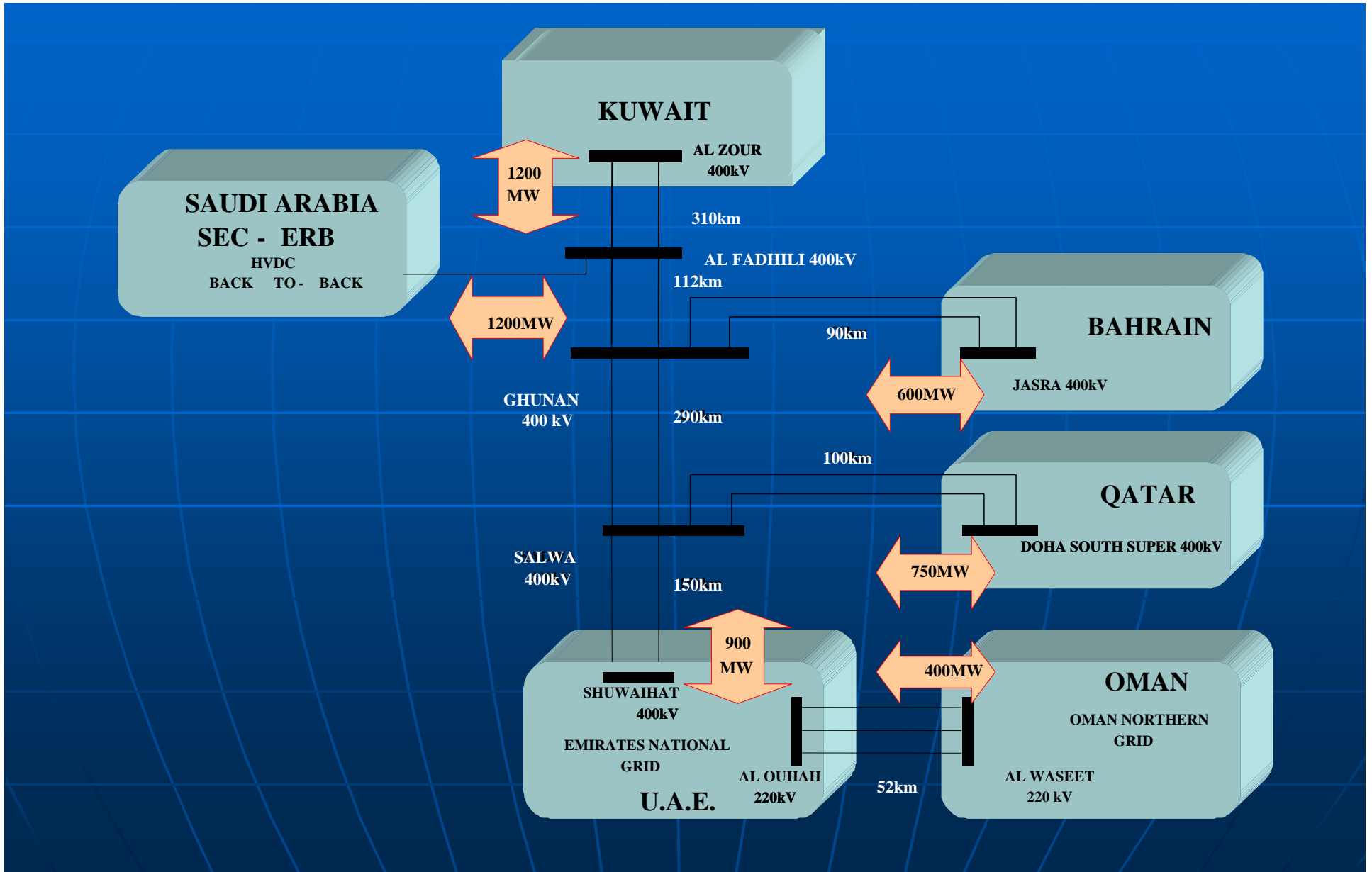
Interconnection Phases & Scheme



- Phase I: Al-Zour Substation (Kuwait), Al-Fadhili, Ghunan & Salwa Substations (Saudi Arabia); Al-Jasra Substation (Bahrain); and Doha South (Qatar), and a double circuit 400 kV line interconnecting all substations and HVDC back-to-back converter station and Control Center.
- Phase II: double circuit 400 kV line interconnecting Shuwaihat to Al-Ouhah and associated substations.
- Phase III: Interconnecting Salwa and Shuwaihat with a double circuit 400 kV, and a double circuit 220 kV line between Al-Ouhah (UAE) and Al-Waset (Oman).



Single-Line Block Diagram





Capacity of Interconnection to GCC

- The interconnection allows the reduction of the capacity reserve up to 50% that of the isolated grid.
- The interconnection size was dimensioned in such a manner that each system can import up to 50% the capacity of its largest plant.
- The interconnection size is summarized as follows:

Country		Capacity (MW)
Kuwait	➔	1200
Saudi Arabia	➔	1200
Bahrain	➔	600
Qatar	➔	750
UAE	➔	900
Oman	➔	400



Interconnection Share Capital

Founders	No. of Shares	Nominal Value	Percent
United Arab Emirates	169,400	\$169,400,000	15.40%
Kingdom of Bahrain	99,000	99,000,000	9.00%
Kingdom of Saudi Arabia	347,600	347,600,000	31.60%
Sultanate of Oman	61,600	61,600,000	5.60%
State of Qatar	128,700	128,700,000	11.70%
State of Kuwait	293,700	293,700,000	26.70%
Total	1,100,000	\$1,100,000,000	100.00%

Based on the 1990 Project Study it was determined that the share of the cost of the interconnection will be the present worth of the capacity savings.



Contract Value

The value of the final evaluated technical and commercial tenders for the thirteen (13) lots are as follows:

Lots	Contract Value
Substations	\$221,983,888
HVDC	\$205,896,785
OHL	\$280,400,717
Cable	\$343,122,125
Control	\$27,637,220
Total	\$1,079,040,735



Project Timeframe

The Project timeframe for the Phase I Interconnection Project is as follows:

Event	Date
Engagement of Consultant	September 2004
Availability of Bidding Documents	February 2005
Invitation to Pre-Qualified Bidders	February 2005
Pre-Tender Meetings	March 2005
Tendering Period	April 2005
Bid Evaluation	May-August 2005
Pre-Award Meetings	September 2005
Contract Award Ceremonies	November 2005
Project Construction Commencement	December 2005
Project Commissioning	Year 2008



Other Developments

Consultancy & Supervision Services

The Authority is currently evaluating tenders to provide Consultancy & Supervision services for the construction of the Phase-I project.

Consulting & Engineering Firm

Review & Approval of Design Documents

Construction Supervision of

Contractors

Sub-Contractors & Manufacturers

Training & Transfer of Technology to

GCCIA Personnel



Other Developments

Management Consultancy Services

- Realizing the importance of operating a vital facility such as the interconnection the Authority has embarked on hiring a reputable management consulting firm to develop GCCIA into an organization to meet future growth and change.
- The vision of the Authority preceding the construction of the Phase-I project is to be able to fully Operate and Maintain the Interconnection.
- To develop the Authority to become a major player in regional and global energy trading.





Conclusion of Part I

- The technical and economical feasibility for the GCC Interconnection has been proven, (cost \$1.7 Billion, Benefits \$3.2 Billion)
- The GCC Interconnection will enhance the Power Systems of the GCC Countries.
- The Power Grid is a fundamental step leading to the liberalization of regional power market.
- The GCC grid will be a significant part of the Pan-Arab Grid.
- The GCC Interconnection will be the main gateway towards a Regional and Pan-Arab Power Pools.



End of Part I

For further information you may
access the website of the Authority at:

www.qccia.com.sa



Part II: Arab Interconnection Grid

Contents:

- Brief overview
- Regional Groups
- Benefits of Interconnections
- Mediterranean Ring
- Conclusion & Recommendations



Brief overview

Installed Capacity, Peak Load and Generated Energy in 2004

Country	Installed Capacity (MW)	Peak Load (MW)	Generated Energy (GWH)
Jordan	1,790	1,555	8,967
UAE	15,228	10,334	58,481
Bahrain	1,849	1,632	8,448
Tunisa	3,569	2008	11,508
Algeria	6,753	5,541	30,885
KSA	30,526	27,847	159,875
Sudan	1,201	611	3,749
Syria	7,079	5,620	32,077
Iraq	*	*	*
Oman	3,166	2,626	11,485
Palestine	0	240	
Qatar	1,829	2,520	13,232
Kuwait	9,709	7,750	41,256
Lebanon	2,312	1,850	10,275
Libya	4,708	3,612	20,202
Egypt	18,324	14,735	95,183
Morocco	5,006	3,191	16,383
Mauritania	99	58**	174
Yemen	1,105	642	4,338
Total	114,253	92,372	526,518

* No available data.

** Data of year 2003.

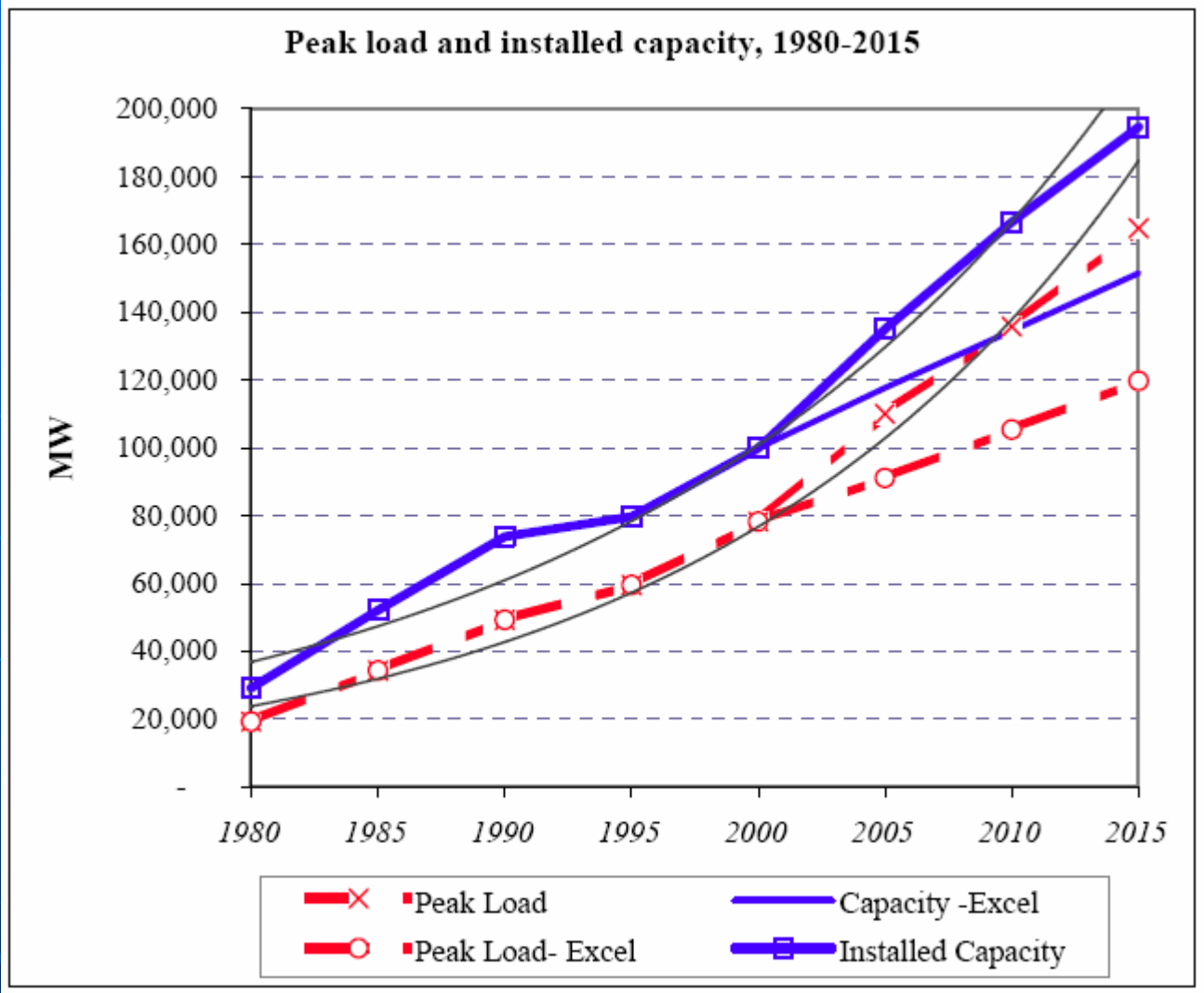
Source: AUPTDE; Statistical Bulletin 2004



Brief overview

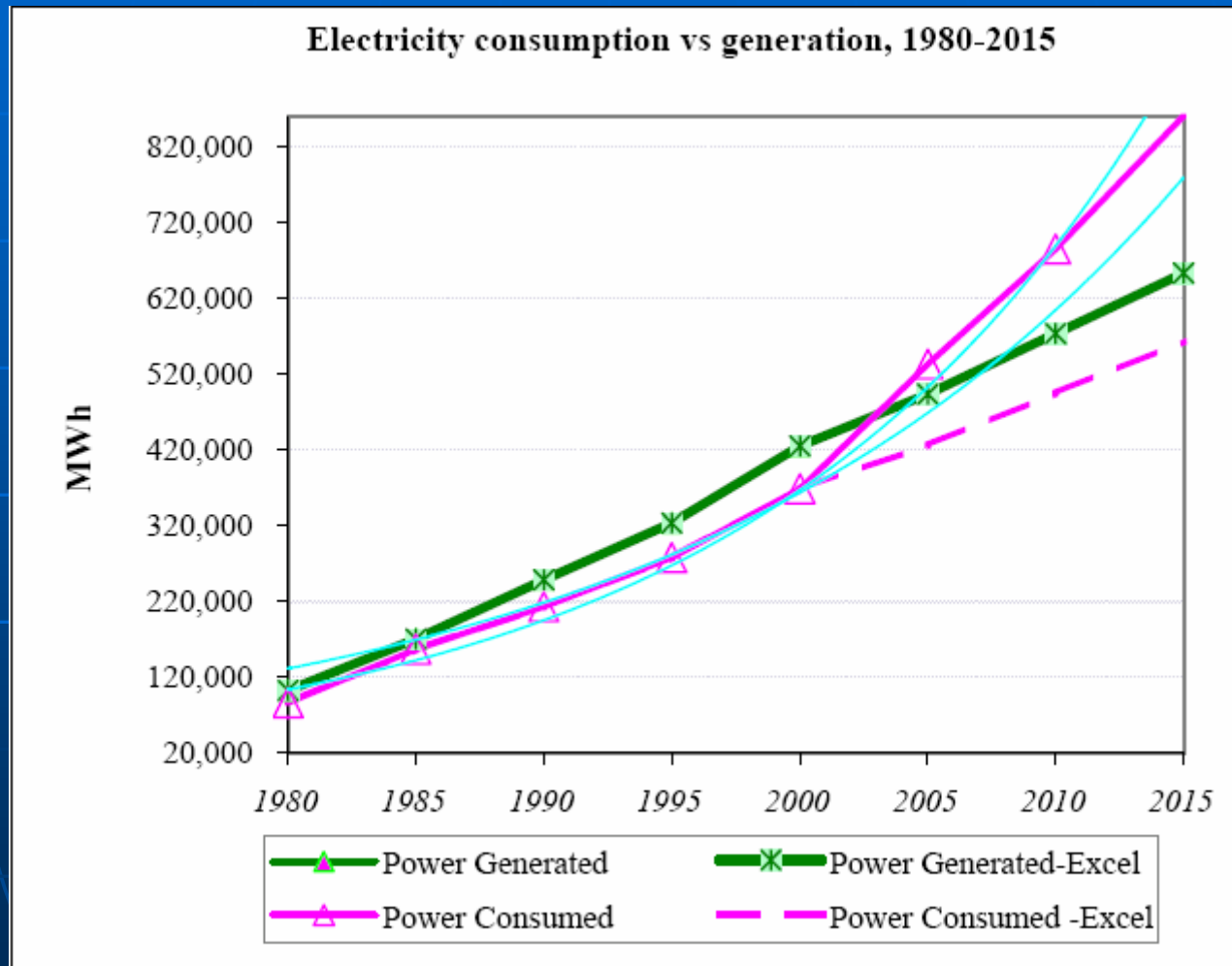
- High Annual Growth Rate 4-6%
- Investment needs \$130 billion (2000-2020)
- Cost of Interconnections \$8.5 billion
- Total Net Benefits \$10 billion
- Weak private financing
- Good opportunities for investors

Extrapolation for electricity in Arab countries 2000-2015



Source: Oxford Institute for Energy Studies; R. Alami

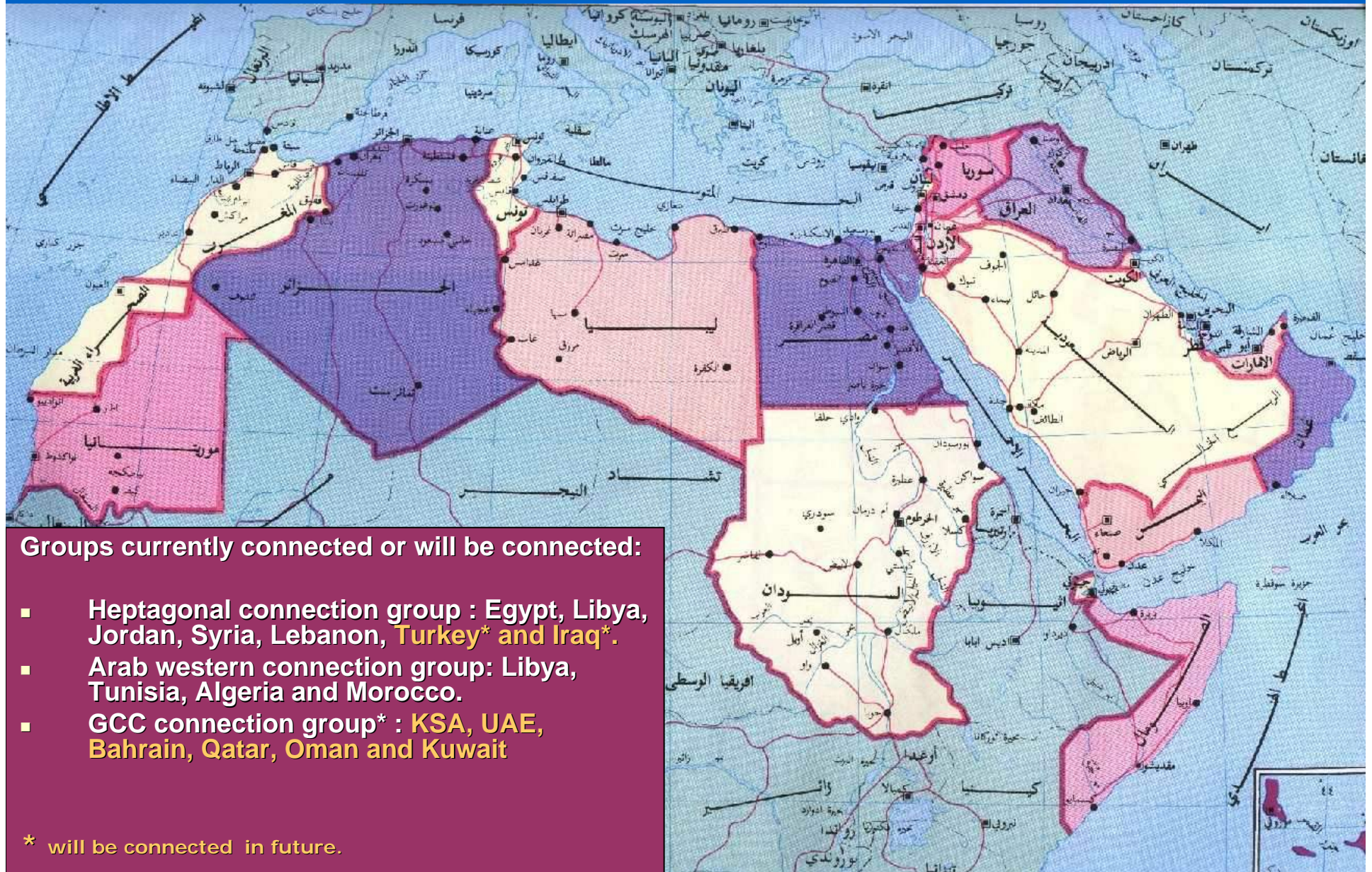
Extrapolation for electricity in Arab countries 2000-2015



Source: Oxford Institute for Energy Studies; R. Alami

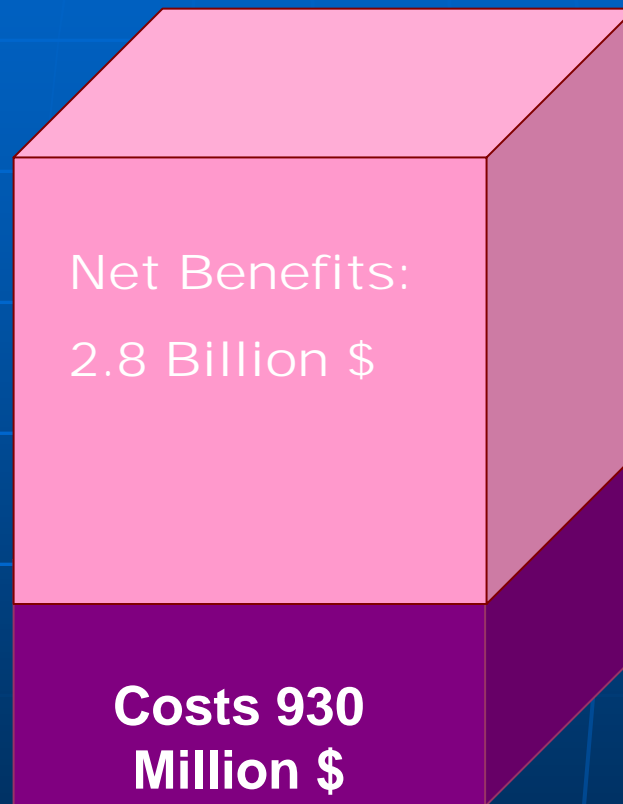
Regional Groups

Electrical Connections Between Arab countries




Estimated Net Benefits of Pan-Arab Interconnections


(Projects Funded by AFESD)




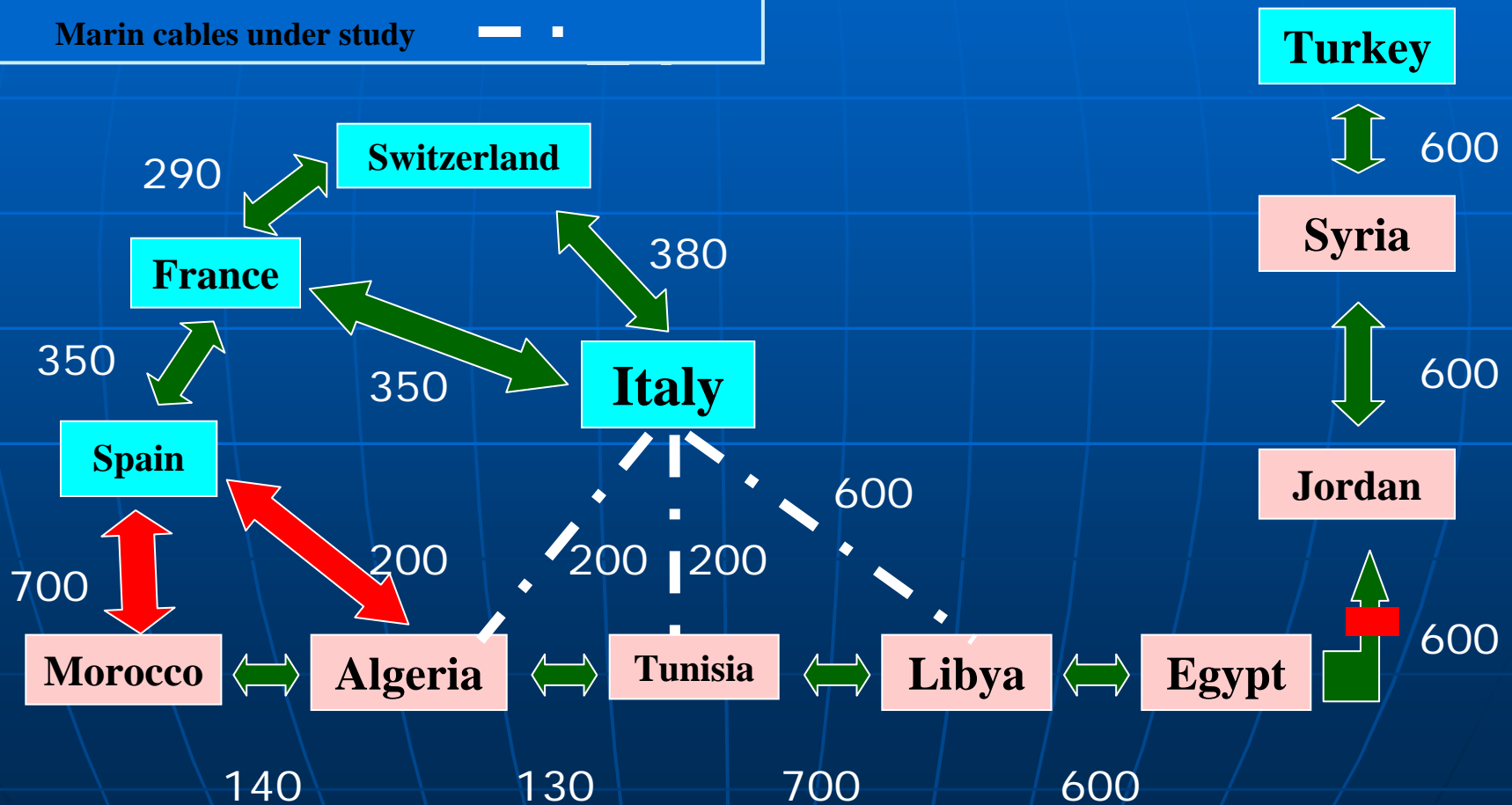
Source: Report of AFESD on Arab Interconnection Projects; Achievements and Challenges.

Transmission line capacities in the grid of the Mediterranean Ring in 2010 in MW

Overhead lines 

Marin cables 

Marin cables under study 



Conclusions & Recommendations

- **The Pan-Arab, and the GCC Grids are fundamental step leading to the liberalization of the power markets, and promoting regional social, economic development and assuring environmental protection.**
- **The great expansion of Arab electrical interconnection requires every state to focus on completing and enhancing its internal grid, so as to enhance the capability of the Pan-Arab interconnection.**
- **The private sector must be encouraged to participate in Electrical Projects in Arab Countries, such as power production and transmission projects, where there are good opportunities for investors.**
- **Power projects in Arab countries suffer from lack and shortage of financing, therefore, it is the role of the governments to take the necessary measures so that the financial institutions could provide the required fund.**

THANK YOU