Assessment of Potential for Energy Integration in the Mashreq and the Neighboring Countries

Concept Note

I. Introduction

The demand/supply balances of the countries[1] in the Mashreq region show that large investments will be required in new generation capacity to meet rapid growth in electricity demands as well as to further support higher level of electricity exports for countries with abundant available fuel resources. Jordan's electricity forecasts indicate that the country's peak demand will increase from 2030 MW in 2007 to 3466 MW in 2015 and 5812 MW in 2030 requiring large investments in new generation capacity of about 5000 MW by 2030. The annual electricity demand in Syria for the period 2002-2006 has also been growing with an average rate of 9%. The Ministry of Electricity in Syria estimates that more than 3000 MW of new generation capacity will be needed by 2010 constituting more than 50% of existing available generation capacity. Preliminary longer term demand forecasts show, however, that another 4000 MW of new generation capacity could also be required by 2020.

In Lebanon, the electricity sector will remain in the heart of a deep crisis where no new power generation capacity has been added since early 1990s resulting in frequent power outages and inability of the electric utility, EdL, to supply reliable electricity needs of all electricity consumers. Base case demand forecast estimates that about 1500 MW of new generation capacity must be developed in Lebanon to meet a total demand of 4000 MW by 2015. While, the electricity sector in West Bank and Gaza is small by regional standards, future plans for fuel utilization and supply and diversity of electricity supply would probably benefit from development of regional cross-border gas and transmission interconnections.

In Egypt, abundant with natural gas, a mid-term generation expansion plan (2008-2012) calls for the construction of about 8,500 MW of new power plants to meet projected electricity demand and possibly to support higher level of electricity export[2]. Finally, Iraq, rich with its primary energy resources but due to a combination of wars, sanctions and decades of lack of maintenance and underinvestment in energy

[1] Egypt, Jordan, Lebanon, Iraq, Syria, West Bank & Gaza

[2] Mainly to Libya and Jordan where the cost of electricity generation is much higher than that of Egypt

infrastructure, will remain in the short and medium terms in dire need for large investments in new generation capacity. Preliminary draft of ambitious electricity master plan for Iraq, estimates that a total of 16,000 MW of new generation capacity will be required to develop by 2015 to reliably meet projected electricity demand.

The above expansion plans indicate an investment requirement of at least $5 billion/year which of course points out to the difficulty of financing such investments. But even more challenging than the investment finance issue is the development of a comprehensive fuel supply strategy for Mashreq countries at a time that there is no clear picture of the magnitude and the sources of energy supply. Three countries – Syria, Jordan and Lebanon, are presently short of energy resources and would need to import energy (gas, oil or electricity) from other countries in or outside the Mashreq region. Two countries – Egypt and Iraq, have the potential to export energy to other countries in and outside the Mashreg region. Leaving the oil sector aside, Egypt and Iraq are rather well endowed with gas resources of 72 tcf, and 115 tcf, respectively. However, Egypt has gone a long way in developing its domestic and export markets. The internal use of gas has tripled in the last 10 years reaching 32 bcm in 2007, and accounting for 44% of the country's energy consumption. The government is now struggling to meet the rapidly growing demands of the power sector as well as the petrochemicals, and the residential/commercial consumers. Egypt's exports have reached 15 bcm/year including 3.3 bcm of piped gas to Jordan and Syria, and 12 bcm of LNG to North America, Europe and Asia. The government is under pressure to allocate more gas to meet the requirements of the Arab Gas Pipeline (AGP) [3] running through Jordan, Syria, Lebanon and eventually Turkey; the pipeline to Israel; and the expanding volumes of LNG at existing plants. Egypt's most recent initiative indicates its interest to interconnect its gas network to other North African countries (Algeria, Libya, Tunisia, and Morocco) and through them to the European gas network. This initiative may be somewhat unrealistic but it shows Egypt's interest to have the option of importing gas through this network in case it finds itself overstretched in meeting the domestic needs and prior export commitments.

Iraq gas endowments represent the biggest potential for changing/improving the fuel mix in the Mashreq region. Presently Iraq burns crude oil and heavy fuel oil in most of its thermal power stations.

[3] AGP has been under implementation since 2001 to bring gas from Egypt to Jordan, Syria, Lebanon and Turkey. The pipeline to Jordan became fully operational in 2005 and has since delivered 2.1 bcm/year of Egyptian gas to Jordan. The pipeline from Jordan to Syria was commissioned in July 2008 and is delivering 1 bcm/year of additional Egyptian gas to Syria. The segments from Syria to Lebanon and Turkey are expected to complete with one year.

Although the economic advantage of using gas in these stations, as well in the substantial planned capacity additions, is obvious, the security situation has not allowed the implementation of the gas supply systems. It is nevertheless, hoped that Iraq would built the essential infrastructure to use its associated (currently flaring) and non-associated gas resources to drastically change the fuel mix of the power sector. Iraq has also the potential and the interest to supply gas to Jordan, Syria and Turkey.

Syria is an oil and gas producing country but is experiencing a decline in the levels of oil and gas production. Although some of the decline could be avoided by upstream investments, the resource limitation will remain a constraining factor. There is therefore an increasing need for energy imports in particular to meet the demand-supply gap in the electricity sector. Since July 2008, Syria has started gas imports from Egypt (through Jordan). The present off-take is 1.1bcm/year but expected to expand to 2 bcm/year as soon as Egypt can allocate more gas to the AGP.

II. Context and Objective of the Study

The development of least cost generation expansion plans and electricity supply strategies for Mashreq countries will benefit from the ability of these countries to access fuel resources and electricity generation available in other countries in the region. Integration of the electricity and gas systems of the Mashreq countries, however, has been limited to very few existing, but not fully utilized, cross border interconnections.

Several Mashreq countries have lately expressed interests in exploring potential and benefits of expanding regional cross border interconnections to improve prospects of regional energy trades between themselves and to allow for gas and electricity exports to neighboring regions. However, a systematic assessment of existing energy situations of Mashreq countries including their energy resources and consumptions as well as opportunities for regional gas and electricity trades is lacking. Such an assessment will also be necessary to provide a quantitative basis for a follow up detailed assessment of necessary investments in regional energy projects and cross border interconnections as well as for development of a framework for future Mashreq regional energy trades

The objective of this study co-financed by ESMAP and funds provided by the World Bank Arab World Initiative is to carry out a country-by-country assessment of the power and gas sectors in order to assess

opportunities for regional energy integration in the Mashreq and neighboring countries.

III. Scope / Methodology

The proposed study constitutes the Phase 1 of a two-phase activity. In this phase we concentrate on the assessment of energy demand and resources, and identification of potentials for energy integration in Mashreq countries. Phases 2 will subsequently carry out technical and economic analysis of identified energy trade and interconnection projects.

The potential of energy integration in the Mashreq will be determined by the energy resources available to each country and country's ability to have access to fuel resources or electricity supply of other countries in the Mashreq and neighboring regions. Therefore, we will first collect, synthesis, analysis and document most recent information available on electricity demands, energy resources and generation expansion plans for Mashreq countries and relevant neighboring countries as well as their cross-border interconnections. We will then use this information to provide an assessment of prospects for gas and electricity trades in the Mashreq region. The study will include 11 sub-tasks as follows:

(1) Provide a country by-country projection of power and gas consumption;
(2) compile information on peak/off-peak composition of power and gas demand;
(3) present the future mix of the power generating capacity;
(4) calculate the fuel requirements of the power sector;
(5) Compile information on gas resource availability and production profile; and
(6) Review the existing electricity transmission and gas pipe line systems including cross border interconnections.
(7) summarize the electricity and gas pricing policy of each country;
(8) make an assessment of potential for export and imports of gas and electricity from each country;
(9) Identify potential regional investment projects;
(10) Identify main obstacles for expanding energy integration in the Mashreq; and
(11) Recommend the scope of the Phase 2 study for the development of a framework for Mashreq regional energy trade markets and investment needs.

IV. Ownership, Partnership and Dissemination

Although all governments of Mashreq countries have expressed interest in energy trade, there is no common understanding of the emerging trends because of inconsistent perceptions of the potentials and comparative advantages of various options for energy trade. The proposed study is expected to provide a clear picture of potentials and realistic opportunities that may be present for energy trade and integration in the Mashreq countries. It would therefore develop an objective basis for dialogue among these countries. The findings of the study should also help the private sector in separating the real potentials from "pipe dreams" and in pursuing more productive cooperation with the corresponding governments. Although this phase will be a primarily desk study, it will heavily draw upon the Bank's operational work in each country. The results of the study will be published in the form of a joint World Bank-ESMAP report and disseminated to the relevant public sector entities such as the ministries of energy and finance, and the private sector outfits such as energy companies involved in the gas and power sector. As importantly, the results of the study will feed back to the Bank's energy assistance to each country. The specific identified interconnection projects will be reviewed and may be considered for operational support by the Bank.

V. Resources

The study team consists of the TTLs who are managing the Bank activities in various countries of the Mashreq region. It will also use short term consultants to complement the technical expertise required to carry out the underlying analytical work.

Team Composition		
Name	**Title**	**Unit**
Anna Bjerde	Lead Energy Specialist	MNSSD
Hossien Razavi	Consultant, co-task leader	MNSSD
Husam Beides	Senior Energy Specialist, co-task leader	MNSSD
Vladislav Vucetic	Lead Energy Specialist	MNSSD
Short term technical consultants		

Peer Reviewers		
Name	**Title**	**Unit**
Franz Gerner	Senior Energy Economist	ECSSD
Sameer Shukla	Senior Energy Specialist	ECSSD

Estimated Cost		
ESMAP	**Arab World Initiative**	**Total**
US$ 100,000	US$100,000	US$200,000

Timetable:

Milestones	Date
Activity implementation start/concept note review	September 2008
Hiring of short term consultant	September 2008
Completion of data analysis and country-by-country profiles	February 2009
Completion of analysis of trade potentials	August 2009
Delivery of Final Report	October 2009