

## Arab Gas Pipeline Projects: City Gate Al Aqaba & Rashadeyya

The Arab gas pipeline is a pipeline that exports Egyptian natural gas to the Middle East and, once it has been extended, even to Europe. The first pipeline section runs from Al Arish in Egypt to Aqaba in Jordan. This section was completed in July 2003, costing \$220 million. The annual capacity of this section is 1.1 bcm. The second section extended the pipeline from Aqaba to El Rehab in Jordan (24 km from the Syrian border). This pipeline, which cost \$250 million, is 393 km long with a diameter of 36 inches. The second section was commissioned in 2005.

The Egyptian consortium that developed this section included the Egyptian Natural Gas Holding Company (EGAS) and its Egyptian partners Petrojet, the Egyptian Natural Gas Company (GASCO) and Engineering for the Petroleum and Process Industries (ENPPI). It registered the Al-Fajr project company with the Ministry of Industry and Trade on 18 September 2003. Al-Fajr is responsible for designing, building, financing and operating the pipeline from Aqaba to the north of the country. Furthermore, it was granted a 30-year licence to buy gas from Egypt's Al-Sharq Gas Company and to resell it to the National Electricity Power Company (NEPCO) for use in power stations in the north.



Arab gas pipelines



Pipeline installation

As a part of the Arab gas pipeline, Elster-Instromet has already engineered 5 complete systems, comprising the skids, ultrasonic meters and shelters, including all equipment to be used for gas metering. In 2005, three shelters were delivered to Aqaba, Samra and Rehab. In 2006, two new gas measurement systems were delivered to the Al Aqaba city gate and Rashadeyya. The big difference between the projects in 2005 and 2006 is the addition of a redundant pressure reduction system and redundant water bath heaters.

### Al Aqaba city gate

At the Al Aqaba city gate station, the quantity of gas is measured and the pressure reduced before the natural gas enters the city of Aqaba. The nominal size of both 4-path Q.Sonic ultrasonic flow meters is 6 inches. Since the gas is to be used by the inhabitants of Aqaba, this project also included an odorisation unit.

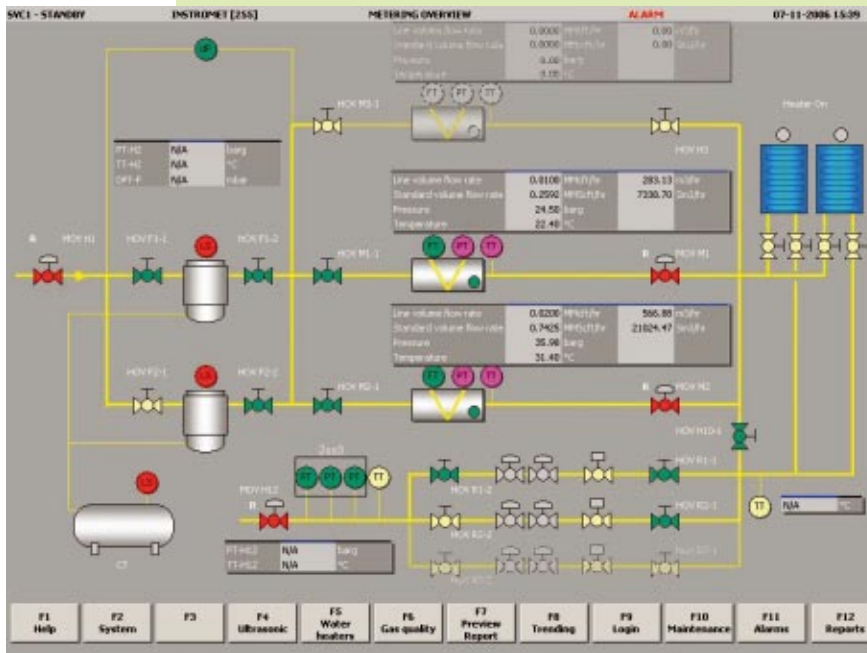
### Rashadeyya

The pipeline is intended to supply gas to most of the large industrial customers. The Jordan Cement Factories Company Ltd. plant in Rashadeyya, the Arab Potash Company, the Jordan Phosphate Mines Company and some industrial cities have already agreed to convert their machines to natural gas operation, expecting more private sector companies to follow suit. For this reason, the Arab gas pipeline has been designed to supply industrial customers with gas as well. The nominal size of both 4-path Q.Sonic ultrasonic flow meters is 8 inches.



Control shelter

Both computers are mounted in a desk in the control shelter, with the related I/O equipment such as TFT display, keyboard and mouse placed on the tabletop. The supervisory computers generate reports, which are stored on disk in Excel format. The reports can be manually and/or automatically printed on the DeskJet report printer. A dot matrix printer is connected to the supervisory computers for printing of alarms. These alarms are also logged and stored on disk in text file format. An analogue telephone line modem is provided for easy remote servicing from the Elster-Instromet premises.



ISS screenshot system overview

### Measurement system

The metering stations include two 3-stream Instromet Model 2000 ultrasonic flow computers. Each flow computer is connected to both 4-path Q.Sonic ultrasonic flow meters via an RS485 serial link. Pressure and temperature transmitters are doubled and multi-dropped to communicate with the Model 2000 flow computer using the digital HART protocol. The flow computer is equipped with a dual Ethernet link for connection to both supervisory computers. A warm-standby PLC, including warm-standby I/O modules, is used to control and to obtain position and status information from the valves and the water bath heaters in the metering station. The ISS supervisory computer system consists of two dual redundant industrial computers for collecting data from all equipment in the metering system.



Control shelter (inside)

### Arab gas pipeline extensions

The third section has a total length of 324 km from Jordan to the Deir Ali power station in Syria and will then be extended to the town of Rayan, Syria. In March 2006, Egypt, Syria, Jordan, Turkey, Lebanon and Romania reached an agreement to continue the pipeline's extension through Syria to the Turkish border. From there, the pipeline will be connected to the planned Nabucco pipeline for the delivery of gas to Europe. Turkey expects to buy 2 to 4 bcm of gas annually to be transported by the Arab gas pipeline.

In September 2004, Egypt, Jordan, Syria and Lebanon agreed to connect the Arab gas pipeline to the Iraqi gas grid to allow Iraqi gas export to Europe. This project is to be completed by 2010.

It has been planned to extend the Arab gas pipeline from Syria to Tripoli in Lebanon and probably further from Baniyas in Syria to Cyprus.

The East Mediterranean Gas Company, a joint venture of Egyptian General Petroleum Corp. (EGPC – 68.4%), the Israeli company Merhav (25%) and Ampal-American Israel Corp. (6.6%), is building a submarine pipeline connecting Ashkelon in Israel to the Arab gas pipeline at Al-Arish. The pipeline will supply 1.7 bcm of gas annually and is expected to become operational in 2007.

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