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REPORT

MARKET STUDY: THERMAL ENERGY STORAGE AIR CONDITIONING SYSTEMS IN SAUDI ARABIA

FOR

BRITISH OFFSET

PREPARED BY ASA CONSULTING

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SYNOPSIS

Introduction

Thermal energy storage (TES) air conditioning systems currently used in Saudi Arabia are ice, chilled water and hollow core building mass thermal storage (BMTS).

TES systems to store energy are used in conjunction with conventional air conditioning installations to reduce power demand in major complexes / high-rise buildings by 35 to 50 per cent during peak periods of consumption.

Market for TES AC Systems

The Saudi Arabian market for supply and installation of TES AC systems in 2004 was 320,000 m2 (*1.1% new building floor space)* valued at over SR 171.00 million.

The demand for TES AC systems is due to regulatory restrictions imposed on the use of peak power. Some 40 buildings are now equipped with TES AC systems including the Abraj Atta'Awuneya Twin Towers, Al Faisaliyah Centre and Kingdom Centre.

Demand is split between ice storage systems (80%), chilled water storage systems (18%) and hollow core BMTS systems (2%). Most demand for TES AC systems (98%) is for very large complexes / high-rise buildings *(>50,000m2).*

The market is supplied by a small number of US specialist engineering and technology companies while hollow core BMTS technology originates in the UK and Sweden.

The drawback of ice and chilled water storage systems is that they are expensive to install and operate *(i.e. 85 per cent more to install than conventional AC and 130 per cent more than hollow core BMTS).* The hollow core BMTS system is used solely in conjunction with new hollow core floor slab (HCFS) concrete construction and, unlike the other TES systems, uses only 100 per cent Saudi manufactured products.

There is a high latent demand for low cost TES AC systems for small-scale domestic and commercial buildings. This is not adequately served at the present time due to a reticence by local consultants and contractors to embrace hollow core BMTS technology, the only TES technology that can currently service this market segment.

A key advantage of the hollow core BMTS system is that it not only reduces energy consumption but also eliminates peak load. It is also economical to install and operate and unlike ice and chilled water storage, can be used in small-scale applications.

TABLE S1: COST COMPARISON TES AC / CONVENTIONAL AC

AC System	Purchase and Installation Cost	Operating Cost
Conventional AC	100	100
Ice / Chilled Water Storage TES AC	185	106
Hollow Core BMTS TES AC	80	60

Source: ASA Consulting

Future Growth of TES AC Systems

Future growth in TES demand will come from greater use of low cost BMTS and ice storage systems for small-scale domestic and commercial buildings *(i.e.< 10,000 m2).*

The wider application of TES technology in Saudi Arabia will require government intervention (e.g. reduced tariffs for off-peak power consumption).

- *Without government intervention* the TES AC systems market will rise to 1.2 million m2 *(< 2.5% of new building floor space)* worth SR 460 million a year by 2020;

- *With strong government intervention* the market for TES AC systems could increase to 17 million m2 *(34 % of new building floor space)* worth SR 3.7 billion by 2020.

Key Conclusions

The increased utilisation of TES AC systems, particularly hollow core BMTS, could lead to major benefits for the Saudi government in terms of capital savings in power sector investments of over *SR 32 billion (US$ 8.6 billion)* from 2005 to 2020. (Also, the total estimated saving of CO2 emissions until 2020 would be 18.2 million tonnes).

Other cumulative savings to government (2005-2020) are up to SR 1.4 billion in construction and SR 6.0 billion in the operation of new government buildings by 2020.

The realisation of these savings will require strong government intervention such as the introduction of differential electricity rates for periods of peak and off-peak demand and a requirement for all new government buildings to install TES AC systems.