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Future Potential for Energy Services in Saudi Arabia.

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FUTURE POTENTIAL FOR ENERGY SERVICES IN SAUDI ARABIA

مستقبل وضع خدمات الطاقة فى المملكة العربية السعودية

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خلاصة

نتج عن الطفرة التي أعقبت التغيير في أسعار النفط في أواخر السبعينات الميلادي توسع في معظم القطاعات في المملكة العربية السعودية. و قد كان من الطبيعي أن يستجيب قطاع الطاقة الكهربائية لهذه التغيرات. و لقد انعكس هذا على التوسع في شبكات نقل الطاقة و الحاجة للمزيد من قدرة التوليد. على أن الضوابط التي وضعتها الدولة على أي تغيير في أسعار الطاقة الكهربائية قد زادت من معاناة النظام الكهربائي مع ازدياد الأحمال و نموها. إلا أن التوجه نحو خصخصة قطاع الكهرباء بالكامل - بعد أن كان مشترك - قد نتج عنه إعادة هيكلة للقطاع. لكن التغييرات المتلاحقة في أسعار الطاقة الكهربائية بعد الهيكلة عكست مدى صعوبة اتخاذ القرارات المتعلقة بتحديد تكلفة الاستهلاك. و بالجانب الأخر فقد أوضحت أهمية مشاريع ترشيد استهلاك الطاقة. يناقش هذا البحث الوضع الراهن لنظام الطاقة الكهربائية. كما يحدد فرص برامج الترشيد في استهلاك الطاقة و يناقش المعوقات الرئيسية للتوسع فيها.

Abstract
Economic boom in 1970s has yielded expansion in most sectors in Saudi Arabia. The electric energy system had had to respond to these changes. The pressure on the network and the need for extra generating plants reflects the difficulty of the situation in the kingdom. However, governmental regulations have limited changes in the pricing of the service leading to more pressure due to increasing demand. Full privatization of the sector during last year resulted in restructuring of the electric energy sector. The consequent changes of the tariff system, accordingly, reflected the complexity of economic decision regarding electricity pricing. However, it highlighted the importance of energy conservation. This paper lays out the existing conditions of the electrical energy system. Identifying major causes and opportunities for energy conservation and energy saving programs. On the other hand, it analysis the main obstacles that delay saving programs implementation

I. Introduction

Energy Consumption has increased sharply during the last three decades. In addition to the economical expansion, the increasing population growth rates in Saudi Arabia, and the expansion in the residential, commercial and industrial sectors have played major rules in increasing the electrical

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demand. The electrical companies, in order to fulfill the needs of the consumers and to meet the government requirements, have had added up generation and network systems leading to higher growth rates for the system. Consequently, the peak load has increased.

Figure 1 shows the peak load growth in SCECO – Central system (Saudi consolidated electric company at central province in S.A- Riyadh city and areas connected to it) between 1990 and 2000 with an average annual growth rate of 6.85% [1]. In total, electrical energy consumption in Saudi Arabia has increased from 3.7 million MWh in 1975 to 80 million MWh in 1997 [2]. Annual electricity peak load is expected to increase to 59000 MW in 2020 [3]. The required increase needs a huge investment for increasing installed generating capacity or upgrading the electrical network. The utilities face real problems during the summer at peak loads.

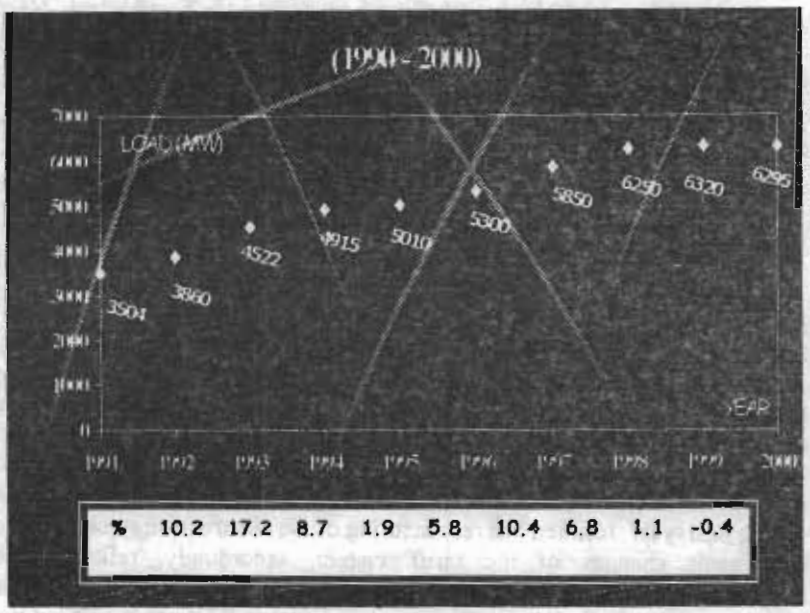

Figure (1) SCECO – Central Peak load growth 1990 - 2000

II. Distribution of the Load

Due to 1970's crises and increase in oil prices, construction of new houses, complexes and high-rise buildings has had become promising economical activities. Therefore, consumption in the residential sector became the highest among the different load sectors. Table 1 shows that for most Kingdom provinces, the residential load represents over 60% of the demand [4]. In 1999, the residential, commercial and governmental load grasp over

90% of the central province load – around the capital of Saudi Arabia, Riyadh - as shown in Table 2 [4].

The type of building materials, the design and the purpose of the buildings reflect the lack of awareness for energy conservation, hence, increases the electricity bills and loads. During the last decades, there has been escalating efforts to include materials that can enhance the energy conservation in buildings. Thermal insulation, different building bricks types, and thermal storage A/C systems are examples of the materials and systems that have been adopted to enhance building thermal conservativeness. However, this can be considered the main target and result of energy conservation awareness.

Table (1) electric energy consumption percentage for various sectors 1995

Sector	SCECO east	SCECO central	SCECO west	SCECO south	Total consumption
Residential	22 %	57.8	65.1	71	47
Commercial	5.1	6.5	19.7	8	9.6
Government	10.2	24.6	8.7	18.7	14.2
Industrial	62.7	11.1	6.4	2.2	29.2
Total	100%	100	100	100	100 %

Table (2) load distribution for SCECO – central 1999

sector	Percentage of the consumption	Percentage of the load
Residential	57 %	65 %
Governmental	19	22
Commercial	9	2
Industrial	7	4.5
Agricultural	5	2
Hospitals	2	2
Mosques	1	2.5
Total	100 %	100 %

- Industrial sector tariff will be applied to private hospitals and clinics.
- Industrial sector tariff will be applied to private schools, institutes and training centers.
- Agriculture sector tariff will be applied to mosques and charitable organizations.
- Independent apartment tariff will be applied to furnished apartments.

III. Changes in National Electrical Systems

Electrical energy sector in Saudi Arabia has encountered fundamental changes during the recent years. Tariff system has climbed many times. On the other hand, restructuring of the electrical system during the last year played a very important role towards laying the future patterns for the system.

Utility companies have been initially formed as a semi-public sector. As it owned 50% of the share of these companies, the government usually decides on the tariff level and consequently, subsidizes the companies to meet there deficit. Few years ago, studies have shown that privatization should be implemented to this sector. Benefit of privatization of those areas sponsored by government-such as the electrical sector- was the subject of a number of workshops and studies. Quality improvement, load market competence, monitorial release for the government budget and supporting involvement of the private sectors were some of the benefits aimed. Hence, a major restructure was decided on the beginning of April 2000, where the utility companies were set to be fully owned by the private sector through a transitional period.

Utilities used to be subsidized by the government to assist having low tariff. However, the tariff had passed by a number of changes before reaching the situation prior to April 2000 as shown in Table 3. With the tendency towards fully privatization of the electrical system, the tariff system shown in Tables 4 -5 has been applied in April 2000. The tariff jump has resulted in an approximately doubling the bills for most of the private commercial sectors. This increase affected private hospitals, commercial centers, hotels, apartment buildings, Automobile agencies and most of the activities in the private sector. An increasing pressure from this sector has yielded a modification of the tariff by October 2000 as shown in Table 6. This modification is considered temporarily and resulted in a 30% increase at most in the consumption cost as compared to the rates prior to April 2000.

Many units have sensed the effect of the tariff change. The commercial sector including high-rise towers, residential and commercial, suffered the most. It can be said that this increase has triggered more attention to energy efficiency and energy saving programs including energy auditing.

IV. The market of Energy services

Towards forming an energy efficiency program, integrated organizations and sectors initiated number of actions and programs. A relatively early consideration was given for regulations to implement and use thermal

insulation. Utilities, research centers and government organizations have conducted many symposiums and workshops and set regulations to enhance the use of thermal insulation.

On the other hand, utilities have organized campaigns to promote energy conservation concept and implementation. At this level media and publicity were utilized to promote the message to the end user. The utilities also set regulation to assist consumers to use efficient energy equipments. While enforcing the installation of such equipment mainly for A/C, utilities laid conditions for different reliability level services including partial load shedding at peak load on emergency.

Except for few scattered projects, energy audit programs have not yet been recognized and formalized in the Saudi market. A number of activities have started, such as a couple of workshops during the last three years conducted by UNDP to establish energy audit training forum at KACST. However, consumers are still not aware of the benefits and can only see the immediate financial burden of such programs.

V. Obstacles for promotion of energy services

Chief executives and chief financial officers at organizations do not appreciate that improved performance of building systems can result in financial saving as they are not well informed about their facility energy. They face myriad options when they purchase energy services. This can include retrofit options for lighting, HVAC and energy management systems, audit services, replacement of inefficient appliances and equipments and metering and energy procurement options.

In general, there is a need to increase the awareness of CEO's, financial executives and even the individual employees -or consumers- on broader aspects related to energy services. They tend to equate energy savings with turning down the thermostat and making it too cold, or turning down the lights and making it too dim to see. [5].

Because energy service programs and energy efficiency improvements may require significant investment, it is essential to have potential to an adequate return on the investment. The need for a finance for implementing the requirements of energy audit studies delay or may prevent the progress of the project. Financing houses and bodies are normally looking for guarantees of return and investment and therefore success of the projects. Energy service is considered a new market full of uncertainty and risk.

In many countries, many service programs have been delayed or waived – withdrawn- mainly because of lack of finance [6] [7] [8]. Energy performance contractors in north America rely on finance housing or banks

to participate through loans which are paid back in installments over reasonably long periods (20 – 25 years). The return on the investment for the contractors is paid back – with other costs – from cutting a percentage of the savings for predetermined periods. The rest of the savings – which is initially a small percentage and increases with time, is left for the customers to ensure the benefit of such programs.

Another barrier is that too many firms still regard energy costs as an overhead that they cannot control and must simply accept. Energy bills are automatically routed to the accounting department, where they are paid, and then filled and forgotten. On occasion, they may be briefly brought back for inclusion in an annual report. But in most of the firms, the people who actually work with energy, and energy consuming machinery or equipments, rarely see the energy bills. [9].

The lack of vendors awareness of the market need for energy service systems or energy efficiency equipments delays possibilities for successful implementation of such programs. On one hand, only few providers deal with energy efficiency materials and energy management systems. On the other, the instability in system and equipment prices in the local market and the lack of post-sale services increase the reluctance in pursuing such programs.

VI. Recommendations

The economical and technical potential for energy services is promising. Actions are needed to elevate the problems facing the market which can be summarized as fellow:

- promoting electric energy saving and conservation awareness,
- support tariff schemes that enhance energy conservation acts and programs,
- establishing an independent body in the electric energy industry – both observatory and regulatory –,
- provision of needed support and aid to establishing energy audit firms and energy service companies,
- increasing activities for promotion and marketing of energy services and energy efficiency programs.

VII. References

VII. References

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Table (3) Tariff system before 6/4/2000

Tariff system (Saudi Riyals s.r/kwh)								
1995		1992		1986		1985		
T	Kwh	T	kwh	T	kwh	T	kwh	
0.05 0.10 0.13 0.20	1 – 2000 2001 – 4000 4001 – 6000 above 6001	0.05 0.08 0.15	1 – 4000 4001 – 6000 above 6001	0.07 0.10 0.15	1 – 3000 3001 – 4000 above 4001	0.07 0.10 0.15	1 – 1000 1001 – 2000 above 2001	

Table (4) Tariff system from 6/4/200 to 27/10/2000

Monthly consumption tariff (s.r/kwh)									
Above 10,000	9001-10,000	8001 - 9000	7001 - 8000	6001 - 7000	5001 - 6000	4001 - 5000	2001 - 4000	1 - 2000	kwh
0.38	0.36	0.32	0.28	0.23	0.18	0.13	0.10	0.05	tariff

Table (5) Tariff system from 6/4/2000 to 27/10/2000 for industrial, agriculture and charitable sectors.

Tariff s.r/kwh	Monthly consumption kwh
0.012	industrial
0.10	Agriculture and charitable upto 4000
0.12	Agriculture and charitable above 4001

Table (6) Tariff system from 27/10/2000

Monthly Consumption kwh	Sector Tariff				
	Residential	commercial	government	industrial	agriculture
1 – 1000	0.05	0.05	0.05	0.12	0.05
1001 – 2000	0.05	0.05	0.05	0.12	0.05
2001 – 3000	0.10	0.10	0.10	0.12	0.10
3001 – 4000	0.10	0.10	0.10	0.12	0.10
4001 – 5000	0.12	0.12	0.12	0.12	0.12
5001 – 6000	0.12	0.12	0.12	0.12	0.12
6001 – 7000	0.15	0.15	0.15	0.12	0.12
7001 – 8000	0.20	0.20	0.20	0.12	0.12
8001 – 9000	0.22	0.22	0.22	0.12	0.12
9001 – 10,000	0.24	0.24	0.24	0.12	0.12
Above 10,000	0.26	0.26	0.12	0.12	0.12