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PROMOTING AWARENESS ON ENERGY CONSERVATION AND EFFICIENT ENERGY SYSTEMS IN THE ESCWA MEMBER COUNTRIES^(*)

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ABSTRACT

Achieving sustainable development requires the integration of energy issues within the overall development plans with due consideration for reducing the environmental impacts of the energy sector. Energy conservation and efficiency improvement (ECEI) are in the core of the measures for achieving energy sector sustainability, however the level of awareness on its available options, opportunities and impacts is limited among most of the concerned energy parties. It is due to such fact that, the need has grown for extensive awareness programs aiming at disseminating information and knowledge between concerned energy parties on means and measures of (ECEI) during the various processes of energy production, transportation, distribution and consumption.

This paper will briefly overview the main energy consumption indicators in the ESCWA member countries and the need to conserve such consumption. It will examine the possibilities to achieve (ECEI) in the whole energy chain from exploration to end-use. The paper will also determine the various parties concerned with the process of (ECEI) at all levels from policy makers to end users and recommend means and measures for increasing their awareness on the subject through:

- Raising the understanding of energy conservation in the family and Integrating it in their behavior;
- Promoting awareness of concerned energy parties through training workshops corresponding to the needs of decision makers, managers, professionals and technicians;
- Development of detailed, organized and repeatable media programs and campaigns on relevant issues, means and technologies of (ECEI);
- Initiating and supporting regional cooperation and coordination between ESCWA MCs to exchange information on successful experiences in the fields of energy conservation and efficiency.

^(*)ESCWA Member Countries are: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, and Yemen.

1 - INTRODUCTION

Achieving sustainable development in ESCWA region requires the integration of energy issues within the overall national development plans with due consideration for reducing the impacts of the energy sector on the environment. Energy is consumed in ESCWA Member Countries (MCs) as primary energy and final energy in the end-use economic sectors. The indicators of energy use are per capita consumption of primary and electrical energy and the intensity of primary and electrical energy. These indicators point out how effectively a country uses its energy for productive activities. Promoting energy conservation and efficiency improvement (ECEI) is one of the most cost-effective measures, which offers significant opportunities to improve these indicators, reduces the need for new power plants, increases production competitiveness in the market and, at the same time, reduces local air pollution by decreasing greenhouse gas emissions. Many opportunities exist to improve energy efficiency using low-cost, commercial technologies with short payback period. But the lack of awareness and knowledge of different energy partners on applying the measures and using the technologies of (ECEI) in energy production and consumption sectors hinders the achievement of (ECEI) in ESCWA MCs.

2 - ENERGY INDICATORS IN ESCWA MEMBER COUNTRIES

Primary energy consumption in ESCWA MCs is mainly dependent on crude oil and natural gas. It has been increased from 176.24 million tons of oil equivalent (mtoe) in 1990, to 247.6 (mtoe) in 1999 and to 283.7(mtoe) in 2001 with average growth rate of about 4.8 per cent. Table (1) shows per capita consumption of primary and electrical energy, intensities of primary and electrical energy in 1999 and in 2001. It indicates that, although the average of per capita consumption of primary and electrical energy, (1558 & 1704 kgoe/capita and 2106 & 2302 Kwh/capita 1n 1999 & in 2001 respectively), were close to the world average (1451 & 1521 kgoe/capita and 2482 & 2600 Kwh/capita respectively), they varied from country to another, for example they were less than 15 per cent and 5 per cent of the world average in Yemen and more than 10 times and 6.5 times the world average in Qatar.

Both primary and electrical energy intensities express the amount of primary and electrical energy consumed for every dollar of the gross national product. The less the value of the intensity, the more efficient is the utilization of primary and electrical energy. The average primary energy intensity consumption in ESCWA MCs in 1999 & 2001 reached 0,522 & 524 kgoe/US\$ respectively, accounting for 1.6 times the world average and that varied from 1.5 times the world average in Egypt to 4 times the world average in Bahrain. The average electrical energy intensity reached 0.647 & 707 Kwh/US\$ respectively, accounting for 1.18 times the world average and that arrived to 1.7 times the world average in Kuwait and to 2 times the world average in the Syrian Arab Republic.

Table (1) Per capita consumption of primary/electrical energy and primary/electrical intensities in ESCWEA MCs in 1999 & 2001

| Country | Per Capita Consumption | | | | Energy Intensity | | | |
|----------------------|------------------------|-------|---------------------|-------|--------------------------------|------|------------------------------|------|
| | Primary Energy (kgoe) | | Elect. Energy (kWh) | | Primary Energy (kgoe/1000 USD) | | Elect. Energy (kWh/1000 USD) | |
| | 1999 | 2001 | 1999 | 2001 | 1999 | 2001 | 1999 | 2001 |
| Bahrain | 13286 | 16755 | 8722 | 9322 | 1305 | 1514 | 823 | 843 |
| Egypt | 660 | 717 | 1064 | 1160 | 534 | 511 | 717 | 825 |
| Iraq | 1197 | 1136 | 1314 | 1318 | 324 | 381 | 385 | 442 |
| Jordan | 970 | 1024 | 1445 | 1844 | 627 | 602 | 765 | 1082 |
| Kuwait | 6474 | 6655 | 13959 | 13861 | 496 | 462 | 913 | 962 |
| Lebanon | 1633 | 1555 | 3045 | 2602 | 349 | 354 | 656 | 591 |
| Oman | 1865 | 2899 | 3400 | 3939 | 295 | 348 | 416 | 474 |
| Palestine | - | - | 733 | - | - | - | - | - |
| Qatar | 14804 | ????? | 15188 | 17808 | 722 | 1223 | 734 | 633 |
| Saudi Arabia | 4290 | 3939 | 5926 | 6039 | 624 | 503 | 759 | 770 |
| Syrian A. R. | 887 | 870 | 1416 | 1569 | 810 | 761 | 1100 | 1371 |
| United A. E. | 9059 | 10927 | 10030 | 9651 | 508 | 530 | 485 | 468 |
| Yemen | 210 | 192 | 124 | 127 | 550 | 398 | 108 | 264 |
| Total ESCWA | 1558 | 1704 | 2106 | 2302 | 522 | 524 | 647 | 707 |
| Total Arab C. | 1120 | 1218 | 1432 | 1556 | 514 | 505 | 577 | 646 |
| Total World | 1451 | 1521 | 2482 | 2600 | 320 | | 550 | |

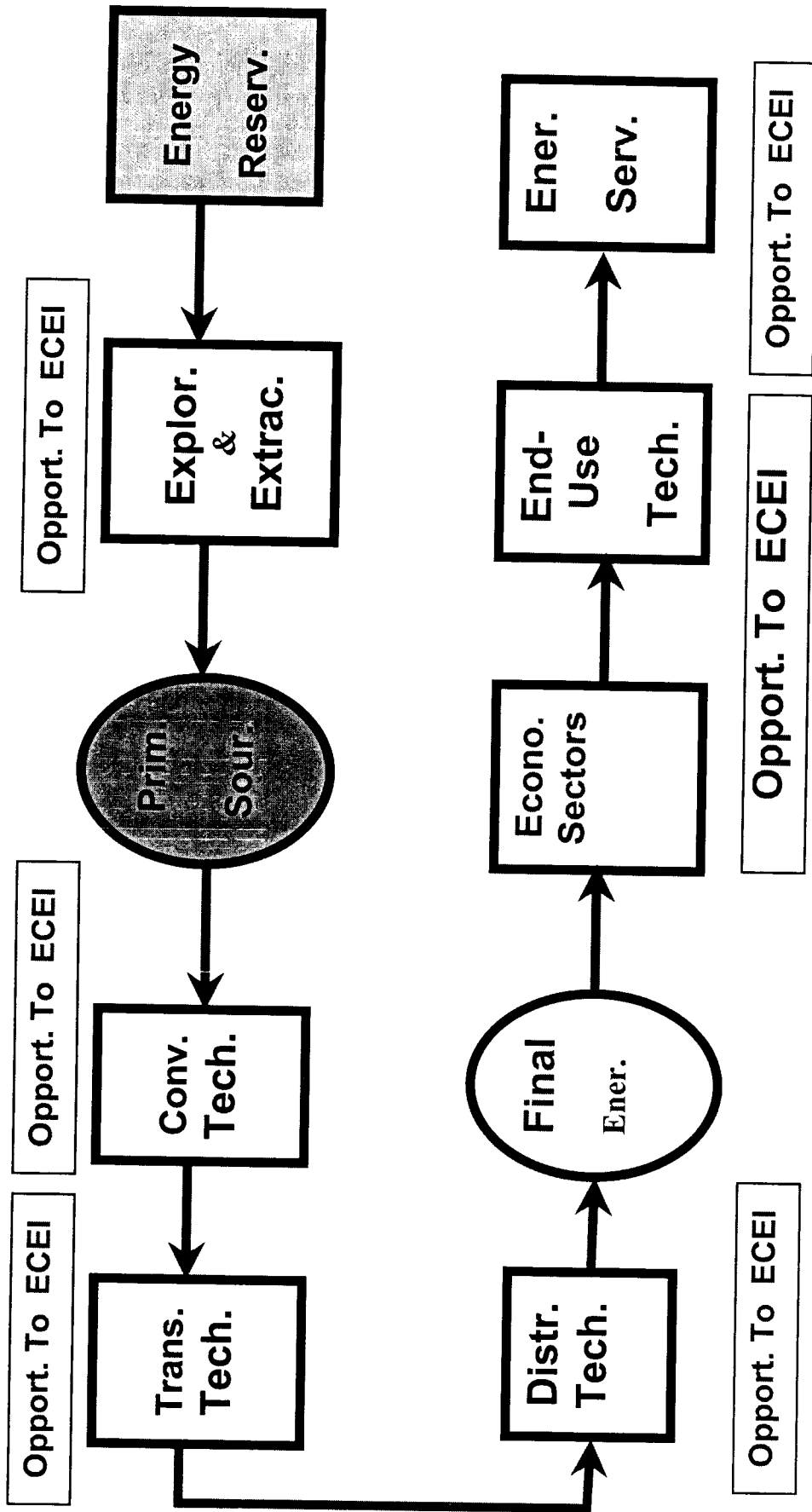
Source: Efficient Use of Energy in the building sector: an analysis of Options for Selected ESCWA Member Countries, E/ESCWA/ENR/2001/16, & OAPEC Statistic Annual Report 2002

The growth rate of energy consumption in ESCWA Member Countries is high, and it is expected to continue to increase. This enhances efforts for extensive awareness campaigns and training programs aiming at disseminating information and knowledge between concerned energy partners on applying measures and technologies of ECEI leading to energy saving in production and consumption sectors.

3 - OPPORTUNITIES OF ECEI IN ESCWA MEMBER COUNTRIES

The objective of the energy system is to provide energy services necessary for all sectors of the economy. The energy chain for these services begins with the exploration, collection or extraction of primary energy supplies from nature. Primary energy sources are converted in one or more steps into final energy sources that are used in different economic sectors by end-use equipment and technologies to provide desired energy services. The various processes of energy chain are shown in figure (1). Large potential and opportunities exist for energy savings in each process of the energy chain, from exploration and production to distribution and consumption processes. Applying the ECEI measures, where opportunities exist, could change current unsustainable consumption patterns into more sustainable ones.

Fig (1) Energy Chain



Opport.= Opportunities; Reserv.= Reserves; Explor. & Extrac.= Exploration & Extraction; Prim. Sour.=Primary Sources; Conv.= Conversion; Trans= Transmission; Distr.= Distribution; Tech.= Technologies; Ener.= Energy; Econo.= economical; Serv.= Services

4- ISSUES TO BE TACKLED AND CONCERNED PARTNERS TO BE ADDRESSED IN AWARENESS AND TRAINING PROGRAMMES FOR ECEI

The following table shows the issues to be discussed and the partners to whom the awareness programmes should be addressed with brief justification on them:

| Issues to be tackled | Justifications | concerned partners to be addressed |
|--|--|---|
| <p>The importance of ECEI</p> | <p>Although ECEI are cheap energy sources, they have many economic and environmental benefits and an important role to play in energy demand reduction and in environmentally-sound energy source provision. They do not receive the appropriate attention they deserve, either from decision makers or energy consumers; No attention is paid by energy producers and distributors to rationalize energy demand because all of their incentives are linked to increasing energy supply; Consumers often have no knowledge of ECEI and, even if they do, they cannot afford the increases in equipment costs, and the problem of this knowledge gap concerns not only end-user but also all concerned partners of the energy market; therefore, there is a need for detailed information and training programmes and awareness campaigns to upgrade the knowledge of policy makers, professionals as well as consumers regarding the ECEI importance.</p> | <p>-Decision makers,</p> <p>-Professionals, engineers, and technicians;</p> <p>- Consumers</p> |
| <p>Energy prices adjustment</p> | <p>Energy prices in ESCWA countries do not reflect the full cost of energy production, transmission and distribution because most of ESCWA governments are subsidizing energy supply; moreover, these prices do not include environmental costs. Although most ESCWA Countries have different electrical energy prices for different levels of monthly consumption, with high subsidies to low levels, but these low levels vary from 1-350 Kwh/month in the northern ESCWA Countries to 1-2000 Kwh/month in Bahrain,</p> | <p>- Decision makers</p> <p>- Consumers</p> |

| | | |
|---|--|--|
| | 1-3000 Kwh/month in Oman, 1-4000 Kwh/month in Saudi Arabia, almost free in Kuwait and free of charge for citizens of Qatar and UAE; therefore there is a need to initiate a dialogue with energy decision makers in ESCWA MCs on the adjustment of energy prices to reflect the real cost and at the same time to maintain subsidies through other forms (i.e. cash or tax reduction) | |
| capacity building for technical persons | Lack of skilled trained technical personnel for installing new energy-efficient equipments, especially for households and small- and medium- enterprises (SME); many producers have little knowledge of how to make their products energy efficient, and even less access to the technology for producing the improved products; end-use energy equipment providers are often unacquainted with efficient technologies; therefore there is a need to develop and apply training programmes on the subject tailored to meet the demands of each category | Technical persons - End-use equipment producers - End-use equipment providers |
| Unwillingness to invest in ECEI, or lack of appropriate financing mechanisms | Financial institutions are hesitant to take risks in promoting new technologies; governments are less (or barely) involved in providing incentives necessary for consumers to make intelligent choices on energy efficiency; therefore there is a need to establish innovative financial mechanisms to encourage the applications of ECEI technologies. | - Financial Institutions - Concerned officials in the government |

5 - APPLYING AWARENESS CAMPAIGNS AND TRAINING PROGRAMMES FOR ECEI

Capacity-building and awareness programmes including education, information transfer on the national and regional levels, training in all aspects of energy efficiency (ranging from energy planning to engineering) and technical training, are essential. These programme structures should be tailored to meet the demands of all the energy partners. An analysis of needs for execution of these programmes should be determined. A follow up on executed efforts should be regularly evaluated in order to maintain the effectiveness of applying these programmes and to be able to redirect them according to the needs. At the same time the quality and availability of information on ECEI provided through energy

agencies, vendors, trade and consumer associations, or other appropriate bodies needs to be verified and improved regularly.

5-1 Information programmes and awareness campaigns concerning consumers

These programmes should be designed to assist energy consumers in applying technologies and understanding practices to use energy more efficiently. They aim to increase consumers' awareness, acceptance, and utilization of particular technologies or utilities energy conservation programmes. Therefore, successful programmes should be tailored to meet consumer needs since people are more likely to pay close attention about information they will use. Moreover, incentive programmes will get the attention of consumers, when combined with the provision of clear and high-quality information:

- **Raising the understanding of energy conservation in the family**, especially children and house maids, and integrating it in their behavior such as: (1) performing duties that consume a large amount of electrical energy (laundry, cooking and electric water heating) off peak hours;(2) benefiting from clear and sunny days around the year to dry laundry instead of using electric dryers;(3)Turning off electrical appliances (television, radio, stereo, computer...) as soon as usage ends;(4) lowering shutters during summer days to prevent solar radiation from entering the house and causing it to overheat and vice versa during winter days;
- **Development of detailed, organized and repeatable media programmes** and campaigns on relevant issues, means and technologies of ECEI. They could include(1) confirming the importance of ECEI at homes, schools, and clubs ... and using all means of information for explaining the performance required to realize them. such means would be brochures, hotlines, videos, home energy rating systems, design- assistance programmes, energy audits using feedback programmes; (2) encouraging students in universities and schools to prepare projects and undertake field research related to the subject; *take over informative, periodical and organized campaign for ECEI, in written and audiovisual mass media with short flash television publicities on all means, methods and technologies to be diffused in local television channels a number of times per day and during relevant periods*;(3) providing understandable information on labels for appliances and other energy efficiency information derived from test procedures.

5-2 Information and training programmes concerning professionals and technicians

- **Specializing training workshops corresponding to the needs of concerned energy partners** such as decision makers, national officials, energy managers, professionals, technicians, NGOs, entrepreneurs, financial institutions, and other key energy partners, these specialized training workshops would (1) increase the capacity of these energy partners and; (2) offer a great potential for achieving long-term energy efficiency savings;

- **Upgrading awareness through energy audit programmes**
This will make energy audits more targeted type of information transaction than simple advertising. It has been noted that Commercial and industrial customers that received audits reduced their electricity consumption by an average of 2 to 8 per cent⁽⁵⁾; and higher savings rates were achieved when utilities followed up the audits initial recommendations with strong marketing, repeated follow-up visits, and some financial incentives to implement the recommended measures. Information alone has not been very effective in getting consumers to actually commit to purchase energy efficient products, however, information programmes combined with various other approaches can be very effective; in particular, applying combined information programmes with incentives for energy efficiency may achieve favorable results;
- **Awareness and information programmes on appliance standards and labeling:** They could be oriented towards:
 1. **Professionals, engineers and technicians** through: (a) building the in-country capacity to develop, adopt, update, and implement energy efficiency standards for appliances and lighting products; (b) introducing best practices in the design and compliance of efficiency standards from both developed countries and developing countries; (c) promoting the adoption and implementation of efficiency labeling for appliances;
 2. **Consumers** through: (a) conducting awareness programs on energy efficiency labeling to increase consumer knowledge about the economic life-cycle benefits of highly-efficient products; (b) upgrading the awareness ability of large energy consumers (i.e. government agencies, apartment building owners and developers, military housing providers, hotels, and other large real estate owners and managers), to invest in energy-efficient products. These consumers include government agencies, apartment building owners and developers, military housing providers, hotels, and other large real estate owners and managers.

5-3 Upgrading the awareness abilities of financial institutions for ECEI investments.

One of the major market barriers to apply energy efficiency measures and technologies the economic sectors is the lack of appropriate financing mechanisms. Energy efficiency projects are generally small-scale with high transaction costs when conducted individually. Conventional banks consider these projects to be of high risk and many project proponents are unable to offer adequate collateral or security for loans. Furthermore, conventional financial institutions generally lack the experience to make technical and financial evaluations of energy efficiency investments. There is an urgent need to establish innovative financial intermediation mechanisms to address this key barrier. These mechanisms could include:

- Providing training to financial institutions and creating specialized energy efficiency units within them;

- Establishing intermediary institutions specializing in bundling small-scale projects together and arranging financing;
- Creating a guarantee fund, and/or providing technical and financial assistance to identify and prepare projects;
- Country partners could identify appropriate financing mechanisms that suit the context of the country. These partners are government officials, national financial institutions, industries, energy service companies (ESCOs), equipment vendors, and electric utilities.

6- INFORMATION AND TRAINING PROGRAMMES THROUGH REGIONAL COOPERATION BETWEEN ESCWA MEMBER COUNTRIES

ESCWA can play a vital role in upgrading awareness abilities, building capacities of concerned officials in ESCWA member countries and improving the exchange of information activities on ECEI. This could be done by Initiating and supporting regional cooperation and coordination between member countries to exchange information on successful experiences in the fields of ECEI and through the ESCWA's **Regional Mechanism on Sustainable Energy Systems (RMSES)**. It could be done through:

- Establishing a programme of training workshops and seminars in cooperation of member countries on priority options of ECEI;
- Harmonizing analysis and testing methodologies that enable concerned officials to improve their abilities on applying ECEI policies and technologies;
- Advising concerned officials and decision makers to redirect national, regional and international capital spending in the field of energy to be in line with energy conservation and efficiency.

7- CONCLUSION

It is concluded that:

- The growth rate of energy consumption in ESCWA member countries is high, and is expected to increase. Energy consumption indicators show that energy is consumed inefficiently. Extensive awareness campaigns and training programmes on ECEI are necessary and essential for achieving energy saving in the economic production and consumption sectors;
- Large potentials and opportunities exist for energy saving in each process of the energy chain, from exploration to conversion, transmission, distribution and consumption processes;
- The main issues to be tackled in awareness campaigns and training programs of ECEI are:

- The importance of ECEI;
 - The adjustment of energy prices;
 - Building capacity of professional and technical persons;
 - The appropriate financing mechanisms;
- The concerned partners to be addressed in awareness and training programmes of ECEI are:
 - Consumers;
 - Professionals, engineers and technicians;
 - End-use equipment producers and providers;
 - Financial institutions;
 - Decision makers and energy concerned officials;
- The structure of awareness and training programmes should be tailored to meet the demands of all the energy partners:
 - 1- Those concerning consumers should be designed for raising the understanding of energy conservation in the family, especially children and house maids, and integrated it in their behavior;
 - 2- They should consist of detailed, organized and repeatable media programmes and campaigns on relevant issues, means and technologies of ECEI;
 - 3- Upgrading consumers' awareness and knowledge could be realized through energy audit programmes and detailed information on appliance standards and labeling;
- Programmes concerning decision makers, professionals and technicians and other partners should be oriented toward specialized training workshops corresponding to the needs of each energy partner for increasing their capacity, hoping that will offer a great potential for achieving long-term energy efficiency savings by developing policies and applying energy efficiency measures and systems;

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