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**SMALL AND MEDIUM-SIZED ENTERPRISES:
OPPORTUNITIES IN ENERGY SERVICES**

United Nations

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Introduction

Unemployment is a major obstacle to sustainable development, particularly in the Arab region. The financial crisis has increased unemployment rates, especially among young people, necessitating greater effort at both national and regional levels to create new job opportunities and prevent migration and the associated negative socio-economic effects.

Given that small and medium-sized enterprises (SMEs) constitute an essential foundation for the economic structure of a country, both in terms of employment opportunities they offer young people and their contribution to the gross domestic product (GDP), it is clear that national and regional development programmes should focus efforts on developing and empowering such companies. At the same time, ensuring sustainability of the regional energy sector and dealing with the requirements of effective climate change management have led to the adoption of policies to improve energy efficiency and develop the use of renewable energy sources. The establishment of small and medium-sized enterprises to undertake the industrial and artisanal activities associated with such work would provide both direct and indirect employment opportunities in a variety of areas within the energy sector.

This document provides an overview of the opportunities available to SMEs in energy services. It explores business prospects in the field of energy efficiency and renewable energy, focuses on the barriers facing SMEs in the field of energy services and mechanisms for promoting the operation of SMEs in this sector.

A. OVERVIEW OF SMALL AND MEDIUM-SIZED ENTERPRISES

Classification of SMEs is generally by number of employees and economic turnover, which varies from country to country, as shown in table 1. International organizations identified different values for maximum investment in SMEs. For example, the World Bank determined the maximum investment to be US\$250,000, excluding the value of land (at 1976 prices), while the International Labour Organization identified the value as US\$100,000.¹ Small and medium-sized enterprises, constituting over 90 per cent of global business and representing 50 to 60 per cent of worldwide employment,² can play an important role in improving economic and industrial growth and are necessary for a competitive and efficient market. In addition, SMEs offer an essential source of employment in poor and rural regions, playing a significant role in poverty reduction which in turn improves livelihoods and upgrades living standards. Furthermore, SMEs are a major source of technological innovation and new products. Due to the economic situation in developing countries, SMEs face several obstacles such as weak infrastructure, weak coordination among concerned stakeholders and insufficient investment.

TABLE 1. SMALL AND MEDIUM-SIZED ENTERPRISE CLASSIFICATION IN VARIOUS COUNTRIES

	European Union		Canada		United States of America	Japan		Egypt
	Small	Medium	Small	Medium	Small	Small	Medium	Small
Maximum number of employees	50	250	50/100	500	250	30	300	50
Maximum turnover	€10 million	€50 million	N/A	US\$25 million	US\$250 million	N/A	US\$300 million	N/A

Sources: Arab Labour Organization, 2006, Human Resources (available in Arabic); European Commission: Enterprise and Industry, Small and medium-sized enterprises, 2003/361/EC; *Wikipédia, petites et moyennes entreprises*.

¹ Arab Labour Organization, 2006, Human Resources (available in Arabic).

² United States Agency for International Development, Energy and Small and Medium Enterprise. Available at: [www.energyandsecurity.com/images/3. Small and Medium Enterprise.pdf](http://www.energyandsecurity.com/images/3.Small%20and%20Medium%20Enterprise.pdf).

Significant business opportunities are available for SMEs in the energy services sector, particularly in the fields of energy efficiency and renewable energy. These opportunities include carrying out studies, surveys and consultancies, and design, manufacture, sales, marketing, installation and operation of related projects. Furthermore, SMEs can be involved in capacity-building and training in related fields. Energy services businesses can provide benefits for individuals and societies including job creation, energy savings, increasing profitability and emissions reduction.

B. CHARACTERISTICS OF ENERGY SERVICES BUSINESSES

An energy services business is characterized by its limited size, resources and management capabilities. The main features of an energy services business are:

(a) The product provided is energy savings resulting from improving energy efficiency. To promote this product, collaboration is required between all concerned stakeholders;

(b) The provider/seller is the energy services company (ESCO). These companies have limited administrative, technical and financial capabilities and should be supported by governments and public organizations;

(c) The buyer is the energy consumer, who needs incentives and motivation to implement energy-efficiency measures. Appropriate capacity-building and awareness programmes should be provided to the buyer;

(d) Many partners should be involved in energy services businesses particularly governments, public and private sectors, banks and non-governmental organizations. Coordination between all concerned partners is very essential and should be on a win-win basis;

(e) Energy services businesses face many difficulties, such as insufficient levels of information and awareness, the lack of credibility of ESCOs, insufficient internal funds and poor marketing.

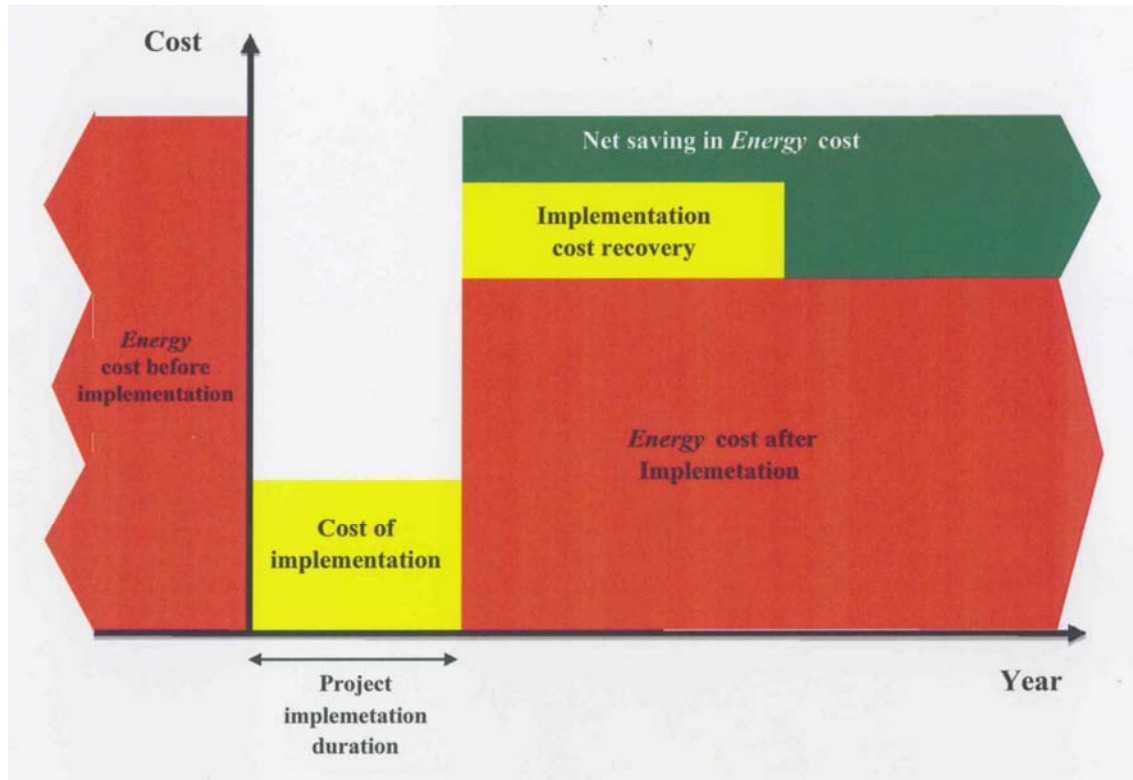
C. ENERGY SERVICES BUSINESSES: HISTORY, CONCEPT AND FINANCING

The idea of energy services started in Europe more than 100 years ago, appeared in the United States of America in the 1970s and then migrated to developing countries in the 1990s.³ Today, energy services businesses can provide a variety of services related to energy efficiency improvement, renewable energy and emission reduction all over the world. Energy services businesses can carry out activities pertaining to energy surveys and measurements, demand-side management, efficient lighting, combustion and steam systems efficiency improvement, waste heat recovery, cogeneration, electrical load management and efficient thermal insulation. They can also offer a set of services such as project development and design, financing and procurement, installation, maintenance and monitoring of related projects.

In energy services businesses, ESCOs bear financial and technical risks, as well as risks involved in predicting the expected amount of energy savings. Energy services projects can either be financed by ESCO, the consumer and/or banks or through international entities, such as the World Bank, which is the largest source of financial and technical assistance for such projects, the United Nations Environment Programme or the Global Environment Facility. For purposes of illustration, figure I shows the cost of energy before and after implementing energy efficiency measures, cost of implementation and net savings in energy cost. As shown, the cost of implementation is deducted from the energy savings during the first years of the project.

³ Üрге-Vorsatz, D. et al. 2007, An Assessment of Energy Service Companies (ESCOs) Worldwide, World Energy Council, Central European University, Budapest.

Figure I. Financing through saving energy



D. POTENTIAL OF ENERGY SERVICES BUSINESSES IN THE ARAB REGION

1. Potential of energy efficiency

The European target for energy savings by 2020 is 20 per cent of energy consumption. Applying the same 20 per cent to Arab countries creates an estimated target of 731 million barrels oil/year in annual savings, as indicated in table 2. Taking into consideration an average oil price of US\$84 per barrel, the value of savings is equivalent to US\$61.4 billion per year. According to energy audits carried out in certain Arab countries (Egypt, Jordan, Lebanon, the Sudan, the Syrian Arab Republic and Yemen), the potential of energy savings resulting from small to medium energy efficiency measures represents at least 10 per cent of total savings. Accordingly, the expected annual savings that can be realized by SMEs through energy efficiency measures in the Arab countries can reach US\$6.14 billion.

TABLE 2. ENERGY SAVING OPPORTUNITIES IN ARAB COUNTRIES

Country	Total energy consumption		Cost of energy consumption (assuming US\$84/barrel, millions of US\$/year ^{c/})	Annual savings ^{c/}			
	Barrels oil/day (thousands) ^{a/}	Barrels oil/year (thousands) ^{b/}		Barrels oil/year (thousands)		Millions of US\$/year (assuming US\$84/barrel)	
				Total (assuming 20 per cent of total consumption)	Saving resulting from SME activities (assuming 10 per cent of total)	Total	Saving resulting from measures implemented by SMEs
Bahrain	291.9	106 544	8 950	21 309	2 131	1 790	179.0
Egypt	1 278.5	466 653	39 199	93 331	9 333	7 840	784.0
Iraq	580.0	211 700	17 783	42 340	4 234	3 557	355.7
Jordan	156.0	56 940	4 783	11 388	1 139	957	95.7
Kuwait	612.0	223 380	18 764	44 676	4 468	3 753	375.3
Lebanon	144.6	52 779	4 433	10 556	1 056	887	88.7
Oman	165.0	60 225	5 059	12 045	1 205	1 012	101.2
Qatar	585.0	213 525	17 936	42 705	4 271	3 587	358.7
Saudi Arabia	2 765.0	1 009 225	84 775	201 845	20 185	16 955	
The Sudan	65.0	23 725	1 993	4 745	475	399	39.9
Syrian Arab Republic	477.1	174 142	14 628	34 828	3 483	2 926	292.6
United Arab Emirates	1 005.0	366 825	30 813	73 365	7 337	6 163	616.3
Yemen	138.0	50 370	4 231	10 074	1 007	846	84.6
Total, ESCWA member countries	8 263.1	3 016 033	253 347	603 207	60 324	50 672	5067.2
Algeria	846.3	308 900	25 948	61 780	6 178	5 190	519.0
The Comoros	NA	NA	NA	NA	NA	NA	NA
Djibouti	7.3	2 665	224	533	53	45	4.5
Libyan Arab Jamahiriya	510.0	186 150	15 637	37 230	3 723	3 127	312.7
Mauritania	10.9	3 979	334	796	80	67	6.7
Morocco	208.3	76 030	6 386	15 206	1 521	1 277	
Tunisia	163.2	59 568	5 004	11 914	1 191	1 001	100.1
Somalia	5.4	1 971	166	394	39	33	
Total, other Arab countries	10 014.5	3 655 293	307 045	731 059	73 106	61 409	6 140.9

a/ Annual Statistical Report of the Organization of Arab Petroleum Exporting Countries, 2009, p. 41.

b/ Barrels oil/year is equal to barrels oil/day multiplied by 365.

c/ Calculated values based on total energy consumption and oil price (US\$84/barrel).

2. Potential of renewable energy

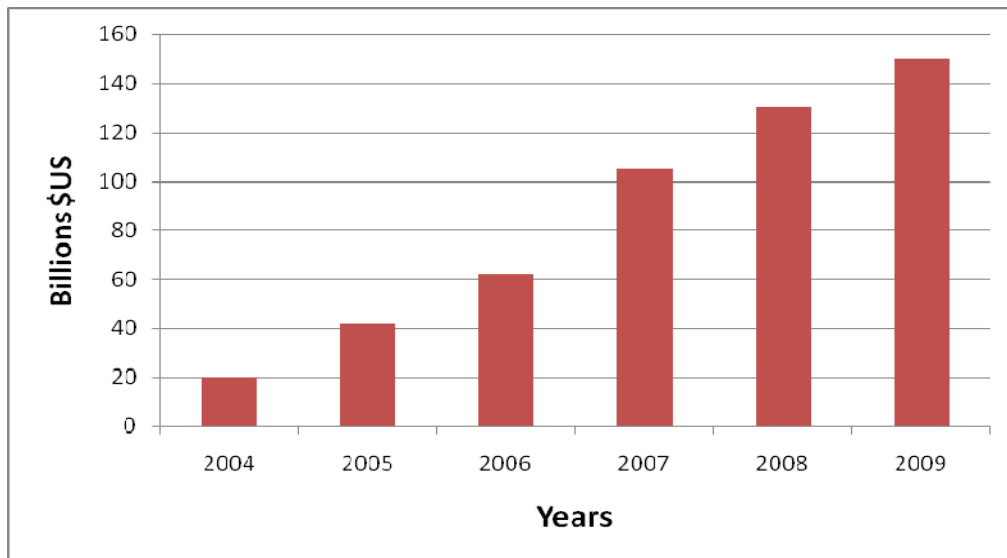
During the period 2005 to 2009, worldwide production of wind power, solar hot water and ethanol grew annually by an average of 27 per cent, 19 per cent and 20 per cent, respectively. Targets for renewables have increased, with countries calling for a share of 15 to 20 per cent of energy to be supplied

from renewable sources by 2020.⁴ In the Middle East and Africa, the wind installed capacity is expected to increase from 0.1 gigawatts (GW) in 2008 to 0.9 GW in 2013.⁵ The global solar photovoltaic production increased by 90 per cent in 2008 to reach 6.9 GW.⁶ Likewise, renewable energy industries recorded high growth during the last few years.

Global annual investment in renewable energy capacity (excluding large hydro projects) was US\$150 billion in 2009, compared to US\$20 billion in 2004, as depicted in figure II.⁷ World investment in cleaner energy reached US\$175 billion in 2010.⁸

In 2009, the number of jobs worldwide in renewable energy industries exceeded 3 million. Germany provided about 10 per cent of these jobs (300,000) and expects to have 400,000 jobs by 2020.⁹ China and Brazil have also created a large proportion of renewable energy jobs worldwide. As for the European Union, in order to reach its target of 20 per cent of energy consumption to be provided from renewable sources by 2020, full-time employment for 2,023,000 additional people will be available. Achieving this target will lead to a reduction of 728 million tons of CO₂ emissions per year (a 17.6 per cent decrease in total greenhouse gas emissions in Europe compared with 1990 levels) and a savings of €15.8 billion in fuel costs.¹⁰

**Figure II. Global annual investment in renewable energy capacity
2004-2009**



Source: REN 21, 2010, Global Status Report, p. 27.

⁴ Renewable Energy Policy Network for the 21st Century, REN 21, 2010, *Renewables 2010: Global Status Report*, Germany, p. 9. Available at: www.ren21.net/Portals/97/documents/GSR/REN21_GSR_2010_full_revised%20Sept2010.pdf.

⁵ Global Wind Energy Council, Global Wind 2008 Report, available at: www.google.com/search?q=gLOBAL+WIND+2008+REPORT&safe=vss&vss=1&sa.x=27&sa.y=7.

⁶ REN 21, *Renewables Global Status Report: 2009 Update*, p. 8.

⁷ REN 21, (2010) op. cit. p. 27.

⁸ Murray, T. 2010, Investments in renewable Energy Could Reach \$500 Billion by 2020, Investors Predict, Green Energy Reporter, available at: <http://greenenergyreporter.com/funding/investments-in-renewable-energy-could-reach-500>.

⁹ REN 21, (2010) op. cit. p. 34.

¹⁰ European Renewable Energy Council, *Renewable Energy Target for Europe 20% by 2020*, p. 3. Available at: www.erec.org/fileadmin/erec_docs/Documents/Publications/EREC_Targets_2020_def.pdf.

Renewable energy resources (mainly solar, wind and biomass) in many Arab countries are available on an utilizable scale, but have yet to be exploited in the region. Table 3 shows the potential of solar radiation, wind speed and biomass in the Arab countries. Several Arab countries have set strategies and targets for renewable energy use during the next years, as indicated in table 4. These strategies and targets represent an important step in policymaking, speeding up market development, technological advancement and consequently ensuring new jobs/employment in the field of renewable energy.

TABLE 3. SELECTED RENEWABLE ENERGY RESOURCES, ARAB COUNTRIES

Country	Solar radiation (kilowatt- hours/m ² /day)	Wind speed (metres/second)	Biomass (millions of tons of oil equivalent/year)
Algeria	7-5	4.1-2.8	1.66
Bahrain	8-5	6-5	0.14
The Comoros	N/A	N/A	N/A
Djibouti	6-4	5-4	N/A
Egypt	9-5	10-4	3.9
Iraq	6-5	N/A	6.3
Jordan	7-5	7.5-5.5	0.74
Kuwait	8-5	6.5-5	0.37
Lebanon	6-4	5-3	0.59
Libyan Arab Jamahiriya	7-5	6-3	0.127
Mauritania	6	7-6	0.107
Morocco	7-5	8-5	4.8
Oman	6-5	6-4	0.47
Palestine	6-4	5-3	0.015
Qatar	6-5	7-5	0.07
Saudi Arabia	8-6	6.5-4.5	3
Somalia	9-6	7-5	0.35
The Sudan	8-5	6.5-5	3.9
Syrian Arab Republic	6-5	11-4.5	1.24
Tunisia	7-5	6-5	0.18
United Arab Emirates	6-5	4.5-3.5	0.33
Yemen	6-4	6.6-4	3.5

Source: League of Arab States, Workshop on "Policies and Measures Leading to Promoting the Use of Renewable Energy in the Arab Region", Cairo, 29-30 April 2008 (in Arabic).

TABLE 4. ANNOUNCED TARGETS FOR RENEWABLE ENERGY SHARE IN
SELECTED ARAB COUNTRIES

Country	Year	Target
Algeria	2030	10 per cent from electrical energy
Egypt	2020	20 per cent from electrical energy
Jordan	2020	10 per cent from primary energy
Kuwait	2020	5 per cent from electrical energy
Lebanon	2020	12 per cent from electrical energy
Libyan Arab Jamahiriya	2020	10 per cent from electrical energy
	2030	25 per cent from electrical energy
Morocco	2020	42 per cent from electrical energy
The Sudan	2011	1 per cent from electrical energy
Syrian Arab Republic	2030	4.3 per cent from primary energy
Tunisia	2014	4 per cent from primary energy
United Arab Emirates	2030	7 per cent from electrical energy

Source: League of Arab States, 2010, Arab Strategy for Developing Renewable Energy Use: 2010-2030 (in Arabic).

The renewable energy business includes many activities including design, manufacturing, marketing, installation and maintenance. The possibilities for renewable energy businesses in the Arab region are shown in table 5.

TABLE 5. OPPORTUNITIES FOR RENEWABLE ENERGY BUSINESSES IN THE ARAB REGION

Applications	Manufacturing	Consulting, marketing, trading and procurement	Installation	Maintenance
Solar water heaters	√	√	√	√
Water heated by biomass and waste	√	√	√	√
Concentrated solar power Equipment	Partial	√	√	√
Photovoltaic cell panels	Assembling of photovoltaic cells	√	√	√
Wind energy equipment	Partial	√	√	√
Biofuels from agricultural waste technologies	√	√	√	√

Source: ESCWA, 2010, Expert Group Meeting on Promoting SME Sector Participation in Implementing Energy Efficiency and Renewable Energy Projects, Beirut, 28-29 April 2010 (in Arabic).

For example, wind energy activities related to installation include:

- (a) Civil works: roads, turbine foundations, transformer foundations and cable trenches;
- (b) Electrical works: cables, transformers, switch gears and cabins;
- (c) Mechanical works: towers and rotors;
- (d) Control works: panels and fibre optic cables.

The Arab region holds great potential for local manufacturing related to renewable energy and table 6 provides indicative capabilities of such activities in the Middle East and North Africa.

TABLE 6. POTENTIAL FOR LOCAL MANUFACTURING OF RENEWABLE ENERGY EQUIPMENT MIDDLE EAST AND NORTH AFRICA REGION

Application	Reactive policies	Proactive policies
Solar water heaters	70 per cent	95 per cent
Concentrated Solar Power equipment	30 per cent	50 per cent
Photovoltaic cell equipment	20 per cent	30 per cent
Wind energy equipment	40 per cent	60 per cent
Biomass equipment	50 per cent	95 per cent

Source: Mubarak, A., 2007, Road Map to Local Manufacturing of Renewable Energy Systems in Egypt, MENAREC4- Syria.

The table provides the percentage of components that can be manufactured in the Arab region under two types of policies: (a) reactive or conservative policies under which manufacturing capability in the Middle East and North Africa region varies from 30 per cent to 70 per cent; and (b) proactive or ambitious policies in which manufacturing capability varies from 30 per cent to 95 per cent. For example, in the case of solar water heaters; for conservative policies, the local manufacturing capability can produce 70 per cent of components and the remaining 30 per cent would be imported; while in proactive policies, 95 per cent can be manufactured locally and the remaining 5 per cent imported.

E. OPPORTUNITIES IN ENERGY SERVICES FOR SMALL AND MEDIUM-SIZED ENTERPRISES
IN THE ARAB REGION

The following sections list different opportunities for SMEs in energy efficiency and renewable energy fields.

1. *Opportunities in energy efficiency*

- (a) Opportunities for SMEs in the preparation of energy audits and balances include:
- (i) Preparing auditing plans;
 - (ii) Carrying out energy surveys;
 - (iii) Conducting field visits;
 - (iv) Collecting data and measurements;
 - (v) Estimating energy consumption and performing calculations and analysis;
 - (vi) Preparing audit reports and performing energy balances.
- (b) Opportunities for SMEs in undertaking consultancies, engineering studies and design related to energy efficiency projects include:
- (i) Cogeneration;
 - (ii) Waste heat recovery;
 - (iii) Fuel switching;
 - (iv) Industrial processes control;
 - (v) Steam systems efficiency improvement;
 - (vi) Thermal insulation improvement;
 - (vii) Efficient lighting;
 - (viii) Power factor improvement;
 - (ix) Cooling/heating systems efficiency improvement;
 - (x) Demand-side management;
 - (xi) Energy efficiency software applications;
 - (xii) Preparation of energy efficiency programmes and their action plans.
- (c) Opportunities for SMEs in installation, operation, maintenance and monitoring include:
- (i) Retrofitting lighting, boilers, furnaces, air conditioning, thermal insulation, industrial processes, steam and compressed air systems;
 - (ii) Installing capacitors for power factor improvement;
 - (iii) Maintaining and tuning energy systems/equipment, boilers, furnaces, electrical motors, air conditioners and water heaters;
 - (iv) Monitoring the operation of energy systems;
 - (v) Performing periodical field surveys and measurements;
 - (vi) Performing maintenance, inspection and tune up for vehicles.

2. *Opportunities in renewable energy*

- (a) Opportunities for SMEs in the field of wind energy include:
- (i) Preparation of a wind atlas;
 - (ii) Manufacture of metal structures;
 - (iii) Civil constructions such as tower foundations and installation/assembly of wind turbine parts;
 - (iv) Operation, maintenance and inspection of wind projects.

(b) Opportunities for SMEs in solar energy include:

- (i) Preparation of a solar atlas;
- (ii) Manufacture, installation and maintenance of solar water heaters;
- (iii) Activities related to solar drying of agricultural products;
- (iv) Small to medium-sized tasks related to large-scale solar projects.

(c) Opportunities for SMEs in biomass energy include:

- (i) Manufacture and installation of equipment for biogas projects including digesters and piping systems;
- (ii) Operation and maintenance of biomass projects.

3. *Opportunities in contracting, trading and procurement related to energy efficiency and renewable energy projects*

Opportunities for SMEs in this area include:

- (a) Preparation of contracts related to energy efficiency and renewable energy projects;
- (b) Provision of services in trading and procurement in the field of energy efficiency and renewable energy equipment and instruments.

4. *Opportunities in capacity-building and training related to energy efficiency and renewable energy*

Opportunities for SMEs in this area include:

- (a) Organization of training programmes, workshops, seminars and conferences related to energy efficiency and renewable energy;
- (b) Dissemination of related information and data and organization of campaigns on related areas;
- (c) Participation in education activities.

F. BARRIERS FACING SMALL AND MEDIUM-SIZED ENTERPRISES IN CARRYING OUT ENERGY SERVICES IN ARAB COUNTRIES

Generally SMEs face a number of barriers in carrying out energy services in Arab countries. These can be grouped into five main categories:

(a) *Knowledge barriers*. These include:

- (i) Lack of awareness of the potential and benefits of energy efficiency and renewable energy;
- (ii) Insufficient understanding of the related business sector;
- (iii) Lack of technical knowledge.

(b) *Market barriers*. The development of an active market for energy efficiency and renewable energy faces a number of obstacles resulting from a:

- (i) Lack of government support in promoting the market;
- (ii) Lack of coordination between stakeholders;
- (iii) Lack of motivation for businesses to move into the sector.

(c) *Institutional and regulatory barriers*. These include:

- (i) Weak coordination between the various stakeholders;

- (ii) Inflexibility of governmental institutions due to centralized decision-making, large numbers of contradictory regulations and low priority given to client interests;
 - (iii) Weakness of regulations/incentives that promote energy efficiency and renewable energy.
- (d) *Financial barriers.* SMEs face a wide variety of difficulties in obtaining finance for energy efficiency and renewable energy projects, including:
- (i) Lack of financial assessment and economic evaluation of such projects, which can lead to limited allocation of funds;
 - (ii) Currency risks associated with projects for which foreign exchange is required;
 - (iii) Small scale of energy efficiency projects that fails to attract the interest of financial institutions;
 - (iv) Weakness of legal and regulatory investment frameworks, particularly those related to the contracting process;
 - (v) Unfamiliarity of banks with energy efficiency and renewable energy projects and therefore their unwillingness to fund them;
 - (vi) Lack of experience in drafting loan applications;
 - (vii) Risks involved in the sector limiting guaranteed results to potential funders.
- (e) *Technical barriers.* These include:
- (i) Lack of skills and technical expertise;
 - (ii) Lack of commitment to the exchange of experience in energy efficiency and renewable energy;
 - (iii) Barriers related to the introduction of the new technologies necessary to develop a successful and sustainable market in energy efficiency and renewable energy.

G. PROMOTING SMALL AND MEDIUM-SIZED ENTERPRISES IN ENERGY SERVICES IN THE ARAB REGION

Promotion of the energy services sector requires the following:

- (a) Development encouragement of policies that encourage and support energy efficiency and renewable energy;
- (b) Development of institutions and regulatory frameworks for the sector;
- (c) Organization of campaigns to encourage the use of energy efficiency and renewable energy sources at all levels.

Once these are in place, opportunities for SMEs in the sector can be enhanced in a number of ways:

- (a) The energy efficiency and renewable energy market can be developed by:
 - (i) Capacity-building and organization of awareness programmes;
 - (ii) Exploitation of government initiatives for energy efficiency and renewable energy activities to implement pilot projects and build confidence among stakeholders;
 - (iii) Attempts to modify governmental procurement and other trading practices related to such projects;

- (iv) Adoption of a transparent approach to energy saving business;
 - (v) Adoption of sound economic management and energy-pricing policies;
 - (vi) Creation of regulatory measures with a view to promoting the energy efficiency and renewable energy market.
- (b) Sound financial mechanisms for the sector can be developed through:
- (i) Specialized financing windows in appropriate financial institutions;
 - (ii) Financial contracts and associated procedures;
 - (iii) Cost/benefit analysis projects.
- (c) Technical, financial and administrative support for SMEs should focus on:
- (i) Capability enhancement in the energy saving sector, with particular attention to technical, contracting, procurement, installation and administrative issues;
 - (ii) Capacity development in auditing, monitoring, verifying and reporting activities in the energy efficiency and renewable energy field;
 - (iii) Capacity improvement in developing energy efficiency and renewable energy databases and disseminating data and other information relating to the sector;
 - (iv) Development of negotiation skills.