

**EXPANSION OF SOLAR POWER TECHNOLOGY IN
YEMEN**

PROJECT CONCEPT PAPER

MINISTRY OF INDUSTRY AND TRADE

REPUBLIC OF YEMEN

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I. INTRODUCTION

A major concern in the world today is achieving the Millennium Development Goals (MDGs) to contribute to the wellbeing of societies around the globe. One key approach to achieving those goals and reducing poverty is rural electrification and supply of sufficient energy sources.

Access to sufficient, reliable and cost-effective energy supply is vital for improving livelihoods and development in general. It is a major tool for poverty reduction, income generation, improved education, better health services and other development areas. More than 1.6 billion people, roughly a third of the world's population, live without access to electricity, with majority living in rural areas. The World Bank estimates 67 percent of rural population in developing countries live without electricity.

In Yemen, 70 percent of the population live in rural areas and only about 20 percent of the rural population have access to electricity. Yemen is the poorest country in the Middle East with the lowest electricity connection. Reports show that only 45 percent of the country's population has access to electricity compared to the regional average of 90 percent. Yemen has the lowest per capita income in the region and it belongs in the group of high oil subsidizers.

The country is endowed with significant wind, solar and geothermal energy sources which can be used in large-scale commercial power development and small-scale decentralized power systems; yet, it highly depends on oil and gas to produce electricity to meet commercial and residential demand. These fossil fuel reserves are ultimately finite natural resources and Yemen needs to utilize renewable energy sources which should make a great contribution to future energy-supply if the energy costs, which are often projected to rise, are to remain at affordable prices.

Studies show that Yemen's economy had been growing at an average of 6 percent annually for over a decade prior to the 2011 political conflicts. This growth coupled with the population growth led to an increasing demand of electricity and an increase in total primary energy supply from 3.7 million tons of oil equivalents (mtoe) in 1997 to 7.2 mtoe in 2007, an average annual growth rate of about 7 percent. Electricity generation increased from 3.4 Twh in 2000 to 7.1 Twh in 2010 which is an average annual growth rate of about 8 percent. Yet, per capita electricity consumption was only 256 kWh in 2010 compared to the world average of about 2,800 kWh.

The latest Power Development Plan (2009-2020) forecasts a total capacity demand of 3,102 MW at an annual growth rate of 10 percent over the next decade. New capacity of 3,538 MW by 2020 will need to be added to the grid to replace the retiring units and to accommodate the growing demand with sufficient capacity. Demand projections are based on GDP growth rate of 6.5 percent up to 2020, the minimum required for Yemen to maintain current employment. For this, new investment in the power sector will be needed to satisfy the continued rapid growth and the consequent energy demand.

Today, Yemeni population having access to grid connected electricity suffer from long hours of electricity cuts due to occasional sabotage attacks on power supply lines and power stations. They depend mainly on diesel and petrol fueled generators to generate electricity. Those in rural areas resort to alternative energy sources such as charcoal, firewood, disposable batteries and kerosene to meet their energy needs. These alternative energy sources contradict another cross-cutting concern about global environment and climate change. Hence, there is a compelling need to invest in renewable, efficient and clean energy technologies.

Yemen needs an instrument for the promotion of renewable forms of energy, specifically solar energy, which will lead to its initiation and implementation in local and national projects. Solar energy is a growing investment opportunity worldwide and its use is expected to continue growing throughout the coming years. Using solar power will help to alleviate Yemen's power woes which, according to the ministry of electricity, 18,000 megawatts of solar power could eventually be produced in the country.

II. CONCEPT

The project aims at developing policy and implementation strategy for the government of Yemen to undertake the expansion of the use of solar power all over the country especially in government offices, agencies, schools, hospitals and in the agricultural sector. This project will be the key catalyst for private investment, job creation, poverty alleviation and an improved economy. It has a significant potential of widespread acceptance by consumers with extensive social, economic and financial impacts.

The idea is to create awareness and finance, hence, market demand for solar power. With this, the project should see a large section of the country's energy needs derived from solar sources, thus, cutting down its grid-based electricity needs dramatically. Awareness will be created through pilot projects done in different regions in the country to explain the long-term benefits of using solar power, especially to individual farmers.

The Ministry of Industry and Trade (MoIT) will be the facilitator and the presiding ministry for the project under the chair of HE Dr. Saadaldeen Talib, Minister of Industry and Trade. Funds obtained will be put in an account under the SME fund which comes

under the MoIT. These funds are meant to be “revolving funds” to provide accessible financing source for the beneficiaries of this long-term project. An estimated initial fund of USD 50 million is expected to kick-start the project by the end of 2014.

III. PROJECT OBJECTIVES

The primary objective of the project is to create market demand for solar power through awareness campaigns and providing affordable financing (possibly partial grants); hence, expanding the use of solar power and greatly decreasing fossil fuel subsidies. It also aims to:

- Enhance the quality of life for a large number of people, particularly in rural areas.
- Create job opportunities through the development of new enterprises
- Diversify the country’s energy mix to decrease the dependence on fossil fuels
- Eliminate energy shortages faced by the electricity sector
- Create investment opportunities to foreign and private sectors
- Support the local economy by stabilizing energy prices

IV. EXPECTED IMPACT

○ Financial impact

Currently, fuel subsidies contribute a formidable burden in state budget. Petroleum subsidies in Yemen make up more than 20 percent of government budget, and this expanded cost of subsidies comes at the expense of other development sectors like education, health, infrastructure and social affairs.

One of project goals is to decrease the high dependence on fossil fuels for electricity production, especially in the agricultural sector, which is a main target of the project. Statistics from the Ministry of Agriculture shows that 40% of total diesel consumption goes to the agricultural sector for irrigation and water pumping which makes up a total of around 650 million litres of diesel per year.

Initial calculations show that capital investment in solar power will have direct returns on investment of around 70%. The overall impact of the investment is much wider in the social, economic and environmental arenas. Beneficiaries will achieve a direct impact in job creation and improved living standards, hence, reduced poverty. It is estimated that the overall economic returns of investment is 40 to 50 percent.

○ **Economic, social and environmental impacts**

- Contribute to a clean environment by reducing pollution especially the pollution caused by generators used over long hours of power cuts
- Contribute to development of the welfare of the society by alleviating poverty through job creation and providing independence of affordable energy sources
- Provide independent energy sources
- Provide better educational environment to students
- Reduce health risks associated with using alternative energy sources like kerosene and candles
- Provide long-term benefits to users mainly farmers
- Meet energy demands for people in remote rural areas and provide them with safe and affordable energy sources

V. PROJECT MECHANISM

- Formation of a steering committee comprising of members from related ministries, local funds and agencies
- Formation of a focal point at MoIT for contact and project coordination
- Opening a solar revolving funds account at the SME fund in MoIT
- Creation of partnerships with interested parties
- Obtaining needed funds from donors to expand the benefits of the project
- Operation of pilot projects in at least five regions in the country
- Awareness campaigns on cost-benefit analysis of solar power use
- Cabinet support will be sought for the project

VI. PROJECT SUSTAINABILITY

One barrier that hinders people in the country from using solar power is the lack of secure funds to invest in solar power. With the revolving funds, this project will provide affordable means of financing to beneficiaries to implement solar projects.

The project aims to alleviate as much as possible financial burden of the investment. This can be done through alleviation of interest and, possibly providing partial grants. Government and donor funds are required for such alleviation. Beneficiary repayments of the loans will be reused for financing further beneficiaries.

VII. ADMINISTRATIVE STRUCTURE

The project will be directed by the **steering committee** which will be responsible for approving the project mechanism, overseeing the smooth flow of the project stages, policy making and evaluation of the project outcomes.

The steering committee is chaired by H.E Dr. Saadaldeen Talib, Minister of Industry and Trade and is composed of representatives of:

- Ministry of Industry and Trade
- Ministry of Finance
- Ministry of Planning and Development
- Ministry of Electricity and Energy
- Ministry of Technical and Vocational Training
- Ministry of Water and Environment
- Ministry of Agriculture
- Social Development Fund
- Small and Medium Enterprises Fund
- Economic Opportunity Fund
- Agriculture and Fisheries Production Promotion Fund
- Sana'a University (Faculty of Engineering)

Executive Committee: Will be responsible for administering the project and will also be responsible for decision making and job delegation to other team members.

Technical team: Will be responsible for providing data, statistics, studies on the project mechanism and implementation. It will also be responsible for preparing project reports, coordinating with partners, providing necessary documents to the steering committee on held meetings, decisions of the meetings and follow up designated tasks.

Executive secretariat: Responsible for secretarial and communication duties.

Communication point: Responsible for correspondence and communication with local and international donor agencies.

VIII. COMMUNICATION PLAN

Involved parties and team members will communicate through the project's executive secretariat. Communication mediums are emails, formal reports and scheduled meetings. Quarterly and required meetings will be held by the steering committee to oversee the project and to undertake decisions. Other teams will meet regularly for the smooth implementation of the project

IX. LOCAL INITIATIVES

Some of the local solar-power projects that have been implemented in the country include:

1. Lightings for Balqis Basketball Club in Sana'a.

Donor: USAID (PYCE) Cost: \$28,000

2. Nassim Club Basketball Court in Marib.

Donor: USAID (PYCE) Cost: \$30,000

3. Mena Club in Aden (Lighting, fans, computers, water pumps)

Donor: USAID (PYCE) Cost: \$ 109,000

4. Intelak Club football stadium in Lahj

Donor: USAID (PYCE) Cost: \$38,000

5. Water pumps for irrigation in Bada'an

Donor: USAID (CLP) Cost: \$15,000-\$20,000

6. Water pumps for irrigation and lighting in Soqotra

Donor: UNDP Cost: Different for each project