Form of Proposal

Joint Laboratory Program

Instruction:

1. This form of proposal should be filled out by applicant country's government authorities in typewritten English

2. An official letter with a signature of the official with a position of Director-General and above from the Science and Technology Authority of the host country should be attached and sent to the Ministry of Science and Technology of China together with this form of proposal.

I. Basic Information

Basic Information about the proposed joint laboratory			
Host country	Egypt		
Name of the proposed joint laboratory	Renewable Energy Laboratory in Sohag for the Sustainable Development of the Renewable Energy Industry in Egypt		
Information about Science and Technology Authority of the host country			
Name	Ministry of Scientific Research		
Address	101 Kasr Al-Ainy Street, Cairo, Egypt		
Name and Position of the contact person	Prof. Dr. Hazem Mansour Assistant Minister of Scientific Research, Supervisor of International Relations	Tel	+ 202 27926693 +202 27925079
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Information about the host institute of the joint laboratory			
Name	Academy of Scientific Research and Technology (ASRT)		
Address	101 Kasr Al-Ainy Street, Cairo, Egypt		
Name and title of the contact person	Amr AMIN - Professor	Tel	+20 1001069706
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Profile of the host institute	ASRT is a nonprofit organization, providing public service by ensuring independent, unbiased assessment of scientific activities, and by representing the scientific community both within Egypt and internationally. ASRT is the main coordinating body for scientific research in Egypt. As a national authority responsible for Science and Technology in Egypt, it includes high caliber experts from different areas of science, engineering, social sciences & humanities, IT, ..etc. The gathering of these outstanding scientists represents a synergy of the different types of expertise that can be found in Universities, Research institutions, Private sectors, NGOs, and among Policymakers. ASRT is continuously addressing national-scale problems by proposing well-planned activities to treat these problems scientifically, and to come up with the proper solution that will positively impact the society. On this track, ASRT is the executive arm of the Egyptian Ministry of Scientific Research, responsible for the design and implementation of Research programs. ASRT hosts the Egyptian Sectorial Councils, which conducts strategic analysis, planning and foresight, as well as the Intelligent Synergistic Information System (ISIS). The ASRT's "Sectorial Councils" consist of groups of eminent professors in various fields. The roles and responsibilities of these Councils include defining Egyptian scientific research priorities that will have a wide positive impact on the society. In this context, ASRT's program "Science in Society" contributes strongly to determining the national priorities and challenges, and to the implementation strategies of research outcomes. In addition, ASRT is much concerned with the national scientific activities within its national plan for Science and Technology. The structure of ASRT also includes the National Patent Office and the National Innovation/Invention Development Agency. ASRT coordinates the national network of Technology Transfer and Innovation, a funded ASRT network of 35 institutions including industrial establishments, universities and different ministries. ASRT has a wide geographical coverage in Egypt with more than 5 regional centers located in different governorates. These regional centers provide R&D services and technological solutions to the region in addition to extending routine functions of ASRT to the surrounding community. ASRT hosts and coordinates the UNESCO Regional Center for Bioethics and Ethics in Science & Technology. Moreover, ASRT is the main provider of S&T informatics services, and provides the linkages of the Egyptian research community with GEANT and the USA-based GLORIAD (Global Ring for Advanced Applications Development).

	Example of previous projects: 2011-2015. National coordinator of mega scale EU Funded Renewable Project (MATS): This project is a Multipurpose Application by Thermodynamic Solar. Please pay a visit to: http://www.mats.enea.it. ASRT role is to coordinate the Egyptian partners (various Universities, national authorities, Ministries) and will continuously managing the experimental operation of MATS facilities. 2007-2012: Leader at FP7 project (MIRA) www.miraproject.eu: Euro-Mediterranean Innovation Research Area. ASRT is responsible for drawing common policies and strategies for research & Innovation at the Euro_MED region. 2013-2015: Partner in the EU Funded project "STS-Med" Small scale thermal solar district units for Mediterranean communities. http://www.stsmed.eu/. STS-Med focuses on the development, implementation and diffusion of technologies to improve energy efficiency in public buildings. The project will deploy 4 demonstrative plants based on Concentrating Solar (CS) power serving the energy demand of 20.000 end users coming from 20 Mediterranean local and will raise the capacities of 1.000 energy professionals.

II. Reasons for proposing the joint laboratory

（Please state the reasons for proposing such a joint laboratory. How will this joint laboratory meet the needs of the host country? What kind of problems will the joint laboratory provide solutions to?）

Egypt experienced a rapid economic growth in the last decade. The average annual growth rate was above 5 percent between 2000 and 2010. However, the recent political events have slowed down economic growth considerably. GDP growth contracted by about 3% in the first six months of 2011, reducing growth for the entire fiscal year 2010/11 to only about 1.4%.

The government of Egypt has recognized that the availability of sustainable power supplies is essential for economic and social prosperity and human development as well as for attracting private sector investments in the country. The government has, therefore, a clear policy of securing a reliable supply of power to all sectors of the economy. However, the power sector is facing a number of outstanding issues that hamper efficient development and operation of the sector.

Rapid Increase in Electricity Demand: The high economic growth rates of the last decade triggered a rapid increase in electricity demand. Peak load growth rate averaged 7.5% p.a. in 2005-2010 reaching 22,500 MW. In response to the rapid growth in demand, the supply capacity has been expanded through an ambitious power sector investment program that has resulted in an installed capacity of about 25000 MW at the end 2010, see Figure 1.

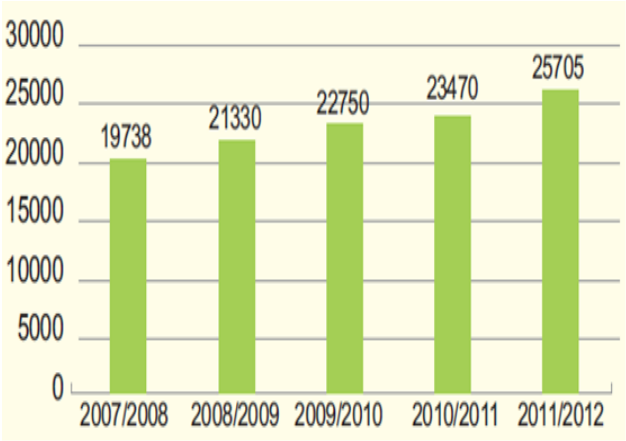


Figure 1: Yearly peak load development (MW)

This installed capacity is viewed as rather insufficient to meet the prevailing peak demand because the reserve margin has declined to unacceptably low levels since 2009, and wide-spread electricity shortages were experienced, particularly in the summer of 2010.
The complexity of the electricity and gas supply situation became publicly evident in August 2010 when the government had to review at the highest level the prevailing power shortages. The review brought out the fact that the availability of natural gas for power generation has turned into a real constraint and that the power sector is forced to use increasing amounts of oil for power generation, as shown in Figure 2.

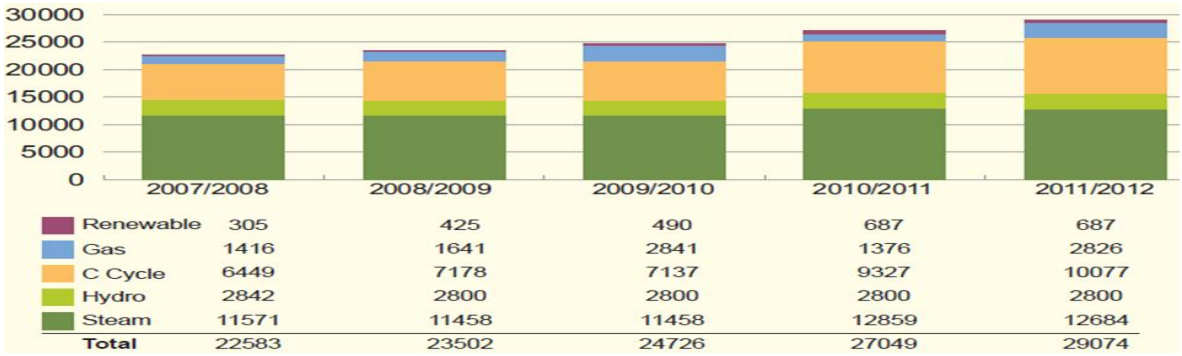


Figure 2: Installed capacity development by type of generation (MW)

The issue is exasperated by the projection that there is a need to expand the power supply capacity by a rather large magnitude in the next 10 years. Such an expansion raises certain concerns about: (a) the volume and the cost of natural gas that would be available to the power sector; (b) the realistic potentials, costs, and time-line of other (hydro, solar, wind, nuclear) energy options; and (c) the manner in which the corresponding huge investments would be financed.

A. Solar Energy

Egypt is located in the world's solar belt countries and has excellent solar resource availability. According to Solar Atlas of Egypt issued by NREA (New and Renewable Energy Authority) in 1991. Egypt has a high intensity of direct solar radiation ranging between 5.5-9 kWh/m²/day from Northern to South-Western part of the country. That means the annual global radiation varies between 1,900-2,600 kWh/m²/y. The total sunshine hours range between 3,200 and 3,600 hr/year, see Figure 3.

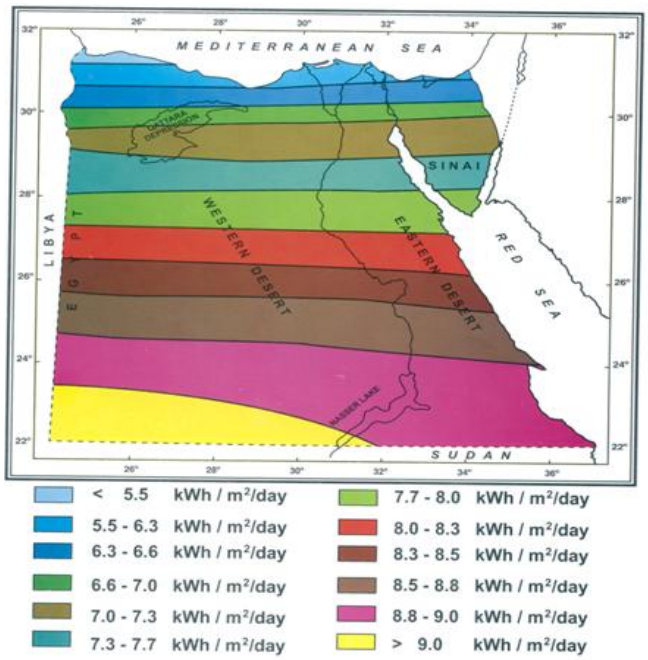


Figure 3: Egypt average annual direct solar radiation.

A solar obligation was introduced in 1987, which called for new residential buildings to consider the use of solar water heaters and include the design for their use. The authorizing agencies have to verify the use of solar hot water heaters (decree N. 401/1987 by the Minister of New Communities, Housing and Utilities). However, the solar obligation is not generally applied or enforced.

During the 1980s, the Ministry of Electricity and Energy imported 1000 solar flat plate water heaters with different capacities. They were installed in different places in order to initiate a market for solar water heaters and to increase the national awareness of the benefits and advantages of solar heaters utilization.

In Egypt, about 400,000 solar water heating units with a total collector surface of 800,000 m^2 (560 MWth), are estimated to be in place. Solar collectors are mostly used in new residential developments (36% in 2009). Several solar initiatives have been proposed over the years, mostly under the framework of international co-operation programs. The first grid connected type photovoltaic power plant was built in November 2011 by the Arab Organization for Industrialization (AOI).

In July 2012 an Egyptian Solar Plan was approved by the Cabinet, which aimed at installing about 3500 MW by 2027 (2800 MW CSP + 700 MW PV), with a private investment share of 67%, including enhancement of relevant local industries. The five-year plan (2012-2017) includes the establishment of a 100 MW CSP grid, to be connected at Kom Ombo site. It is under construaction and will be finalized to provide a comprehensive plan for renewable energy development in Egypt. It expected that the project will go into operation in 2016. More reliable technology will be used in the project, as thermal storage banks will be involved, as shown in Figure 4. Also, 2 grid connected PV projects, 20 MW each, in Hurghada & Kom Omb are under preparation.

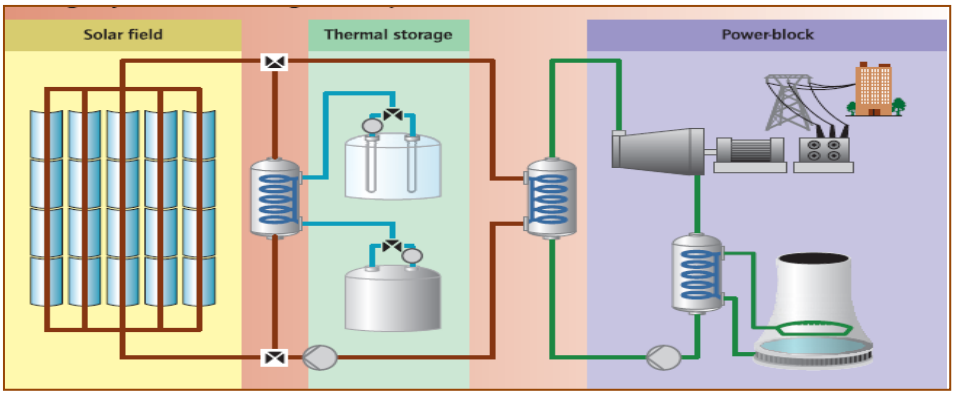


Figure 4: Proposed Kom Ombo CSP plant

B. Wind Energy

The Egypt Wind Atlas was issued in December 2005 in co-operation with RISO laboratories of Denmark, and the Egyptian Meteorological Authority (EMA). It indicates the areas with high wind speed which are qualified for wind energy projects.

The Atlas concluded that there are many promising areas with high wind speeds in the Gulf of Suez; some areas are located on both sides of the Nile River, and some areas in Sinai. These areas are qualified for hosting the establishment of large-scale wind energy projects.

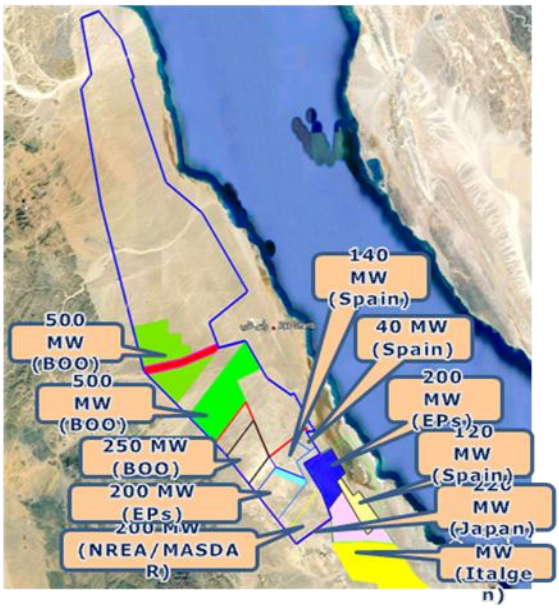


Figure 5: future wind farm projects.

Since 2001, series of large scale wind farms were established with a capacity of 550 MW in cooperation with Germany (KFW), Denmark (DANIDA), Spain and Japan (JICA) through soft loans. The future of wind energy includes governmental projects (1340 MW) and private sector projects (1470MW), as shown in Figure 5.

Local manufacturing

The private sector in Egypt has shown a lot of interest in the energy related manufacturing industries and services. The government has also been supportive of such developments. The wind industry has had a good start but solar manufacturing has not developed. The government has been supportive of the development of local manufacturing capacity in the renewable energy industry. However, the support has been of an ad hoc nature. Going forward, the local industry would need a clearly announced support mechanism from the government. The mechanism should enable local manufacturers to assess the size of the market and to understand the decision making process and the available incentives.

Egypt has been pursuing wind technology since 1970s when it founded its first wind test station with the assistance from DANIDA. However, much of the progress has been achieved in recent years. NREA has substantial in-house expertise from developing some 500 MW of wind power in Egypt in areas ranging from initial resource assessment to wind farm operation and maintenance. The government has also encouraged local production of wind turbine components. Electrical components (cables, transformers) and wind turbine towers have been mostly produced by local companies. Egypt has the capability to manufacture towers and the majority of the "balance of system" items. Together, these account for around 75 per cent of the investment costs of wind turbines. This program will help build local capacity and generate new jobs. It will require a staff of several hundred persons for regular maintenance and additional workforce for repairs and major overhauls. Increased local production and employment will directly contribute to local economic development.

Egypt is well positioned to embark on developing local manufacturing of wind and solar equipment and services. It has a good basis for acquiring the required technical and managerial skills. It has the support of the international community and it can count on export potentials to other countries in Africa and the Middle East. However, it needs to develop a vision as well as a clear design for the institutional arrangements, the R&D facility, human resource development and international cooperation

International Collaboration

Egypt has a good track record in international cooperation in the energy sector in general and in the wind energy development in particular. However, international cooperation in local manufacturing has been limited to Sewedy for Wind Energy Generation SWEG's efforts to develop various segments of the wind manufacturing industry. There is a lot that

the government can do to help in strategizing and optimizing cooperation with the international community particularly in regard to technology development. A well coordinated public-private partnership on the Egyptian side would enable the country to take advantage of both private and government facilities in other countries. Cooperation should be implemented at the level of research organizations as well as industry partners.

Reasons of RE lab

Support Human Resource Development, The key to development of wind and solar manufacturing industries is the ability to acquire technically qualified manpower of international standard. Some capacity already exists in Egypt in manufacturing of wind turbine components. However, there is substantial further skill requirement in both wind and solar manufacturing and services, especially in the south of Egypt (Upper Egypt) where the climatic conditions are ideal for the construction of solar power units, and where the need exists for the development of human resources, and the support of industries for the local production of components of solar energy units. Coherent laboratories are needed to develop human resources while drawing upon the country's educational and vocational facilities, as well as utilizing the abundant international assistance.

Research and Development, R&D in the area of renewable energy in Egypt should follow a clear strategy to combine technology transfer with local adaptation in order to provide advice to local manufacturers.

Calibration and Validation, renewable energy market has an enormous number of technology alternatives, imported and locally manufactured. Grid connected renewable sources must follow the Egyptian grid code, which raises an urgent need for calibration and validation centers.

Public awareness raising, Renewable energy can be considered as the corner stone for the future of investment and industry in Egypt. The people of Egypt should be sentient by essentials of different renewable energy technologies, particularly, off grid and small scale ones.

III. Objectives, expected activities and expected outcomes of the joint laboratory

(Please state the objectives, expected activities and expected outcomes of the joint laboratory.）

1- The objectives of the laboratory include:

(i) designing and offering courses (by engineering colleges) in solar and wind technologies with financial assistance from the government;

(ii) technical training courses for technicians aimed at providing skilled manpower for field installations and after sales service network;

(iii) introducing a government fellowship program to train selected engineers and scientists in wind and solar energy in world class institutions abroad; this could be supported under programs of bilateral cooperation, or institution-to-institution arrangements.

2- The laboratory will provide advice to local manufactures on:

(i) technology validation and demonstration projects aimed at field evaluation of different configurations in order to obtain feedback on the performance, operability and costs, and

(ii) support for incubation and start-ups.

3- The laboratory will support new research on:

(i) innovative and new materials: processes and applications,

(ii) new and potential improvement to the existing processes, materials and the technology for enhanced performance, durability and cost competitiveness of the systems/devices,

4- The proposed laboratory should contain educational equipment, and will offer courses that describe and simplify the requirements and benefits of different residential renewable energy systems for public.

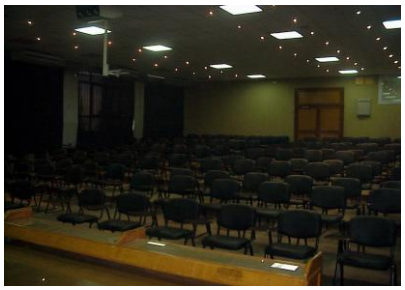
IV. Existed foundation

(Please state the existed foundation that the host institute has already had on the laboratory. What kind of foundation does the host institute have regarding the proposed joint laboratory, including facilities, personnel and research? What kind of support could the domestic science authority provide to the establishment of the joint laboratory?）

Development and Research Center in the Southern Upper Egypt,

Upper Egypt region has maximum solar radiation in Egypt. It has also cheap labor and a wide variety of raw materials that can be used in manufacturing of solar cells, collectors, thermal storage units ..etc. This maximizes the research benefits specifically in the solar energy field.

On the other hands, the Upper Egypt region has suffered, for a long time, from a severe shortage in services like pure drinkable water, electricity,…etc. Development of this wide region is related to a national security need especially after the Egyptian revolution.



The proposed lab will help the development of the renewable energy industry in Upper Egypt. It will also promote the culture of energy saving and energy efficiency in Southern Egypt. This will give the opportunity for the researchers in that region to have future valuable cooperation with other researchers from China, and will create sustainable networking with them and other worldwide relevant networks.

The city of Sohag is ideally located in the heart of Upper Egypt. This will facilitate a wide spectrum of research activities and spread the experience over the entire Upper Egypt area.

The proposed center:

The total area of the proposed center is about 5 acres on the Karman Island in Sohag.

The center includes:

1- A Conference Hall which can accommodate up to 300 persons with video conference facilities,
2- A well-equipped Training Hall which can accommodate up to 100 persons,

3- A Library which can accommodate up to 48 persons,
4- A Laboratory, that includes different meters for:
1-Dust suspended in the inhaled air
2-Combustion products,
3- Radiation intensity,
4-Spectrophotometer,
5-Wind speed,
6-Physical indicators (pH, salinity, temperature, ..etc)
7- Water distillation unit and
8- Fine balances of chemicals.

5- Meeting Hall

6- Information center

7- Restaurant.

Current Human Resources: the center has 27 permanent members of staff, plus the continuous cooperation with Upper Egypt researchers.
Projects: It support research in different fields, particularly agriculture and engineering.

Its infrastructure: Egypt, through the Academy of Scientific Research & Technology, has become the first African country to join a high-speed internet network, aimed at research institutions, that will foster high technology joint applications and boost the speed of data transfer with thousands of universities and science facilities across the world. That has been done through the Global Ring Network for Advanced Applications Development (GLORIAD) which offers research institutions speeds of up to 10 gigabits per second. It was started in 1998, initially linking the United States with Russia.

The Academy of Scientific Research & Technology is supporting the Egyptian Universities' network that is now connected to GLORIAD. ASRT is a member of the Internet network for research and education for the Mediterranean and member of EUMED Connect network, which has Algeria, Morocco, Egypt and Tunisia as its members, is the one with the largest amount of bandwidth at the moment due to its undersea fiber link to GEANT. Through a 622-Mbps connection between Alexandria and Amsterdam, the ASRT, connects to GÉANT, providing connectivity for end users at Egypt's research institutions. In term of connectivity, ASRT consists of 11 sectorial nodes, located in Cairo, which service 7major sectors of the scientific and technical community, plus another 6 regional nodes, which are located all over the country. The network is designed to form a star, with an organizing body called the Focal Point (FP), which manages the network. ASRT is connected to the UUCP network through EUNet for e-mails. It is also connected to EUN (Egyptian Universities Network) through a leased fiber line. ASRT is a also member of Arab States Research and Education Network (ASREN)

V. What is expected from the Chinese Side

（Please state your expectation on how the Chinese side could help in the light of the above-mentioned objectives and existed foundation.）

1- ***Research facilities improvement***, to purchase calibration, testing and educational equipments for different solar and wind energy source technologies, such as:

   A- Turbine technologies Wind Lab™ electrical generation system,
   B- Wind turbine 500 W,
   C- Complete set of Meto. station (solar meter, global & diffuse) , wind speed & direction, ambient temp., barometer, sand contamination sensor,
   D- Calibrated unit for solar meter (pyrometer),
   E- Temperature sensor calibration unit (water bath),
   F- Flow meter calibration unit,
   G- IV tester for the PV module,
   H- Mobile Solar Photovoltaic Training Cart
   I- Solar simulators for collectors, PV modules and solar cells,
   J- Trackers for collector tests,
   K- Laminator (solar panel manufacturer)
   L- Spectral response (Solar cells characterization)
   M- Ageing test machine (weathering machine)
   N- Weather Station

2- ***Joint research,*** for joint research between Egyptian and Chinese universities in development and manufacturing wind and solar sources.
3- ***Exchange of researchers,*** to define the benefits of dual investments and cooperation opportunities between the two countries in the field of renewable energy.
4- ***Personal training*** Four persons should be trained on the operation and maintenance of the required equipment.
5- ***Technology transfer,*** to get benefits from advanced experience and development in wind and solar energy field.
6- ***Connecting to other renewable energy technology in China,*** particularly domestic small scale renewable energy schemes.