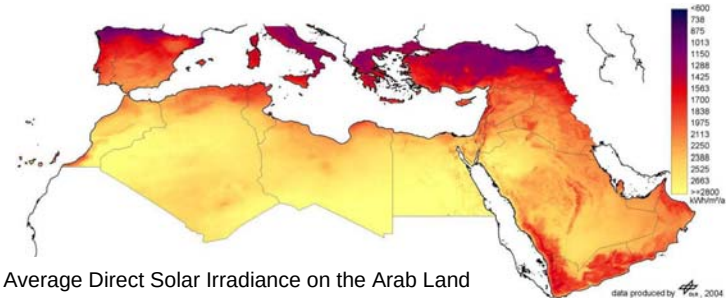
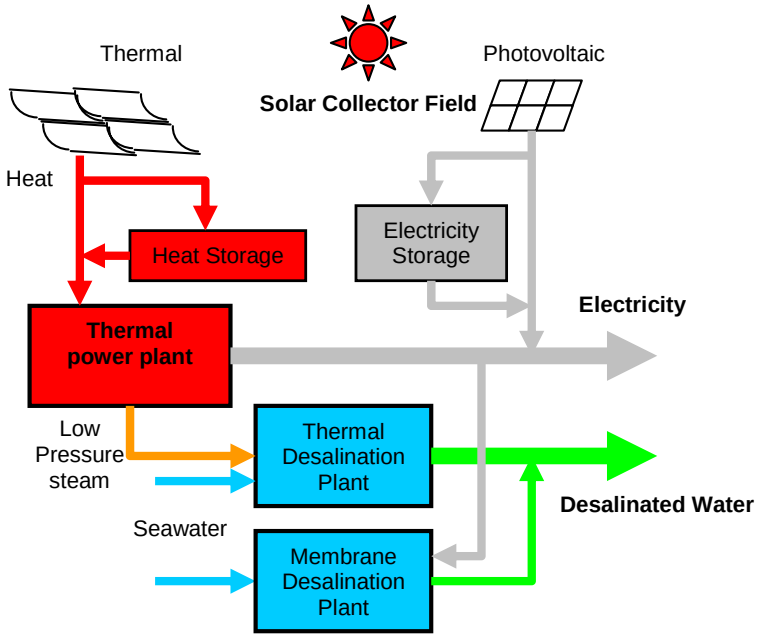
INTERNATIONAL CONFERENCE ON

RENEWABLE AND ALTERNATIVE SOURCES OF ENERGY (ARSE)

Organized by Arab Academy of Sciences (AAS) (www.arabacs.org) and Arab Forum for Sustainability Science (AFFSS) (www.terracuranda.net/Altaka_Almia)
25-26 November 2010, Beirut, Lebanon
(Dedicated to the memory of Professor Richard E. Smalley, 1996 Nobel Laureate in Chemistry, Author of "*Future Global Energy Prosperity: the Terawatt Challenge*, MRS Bulletin • Vol. 30 • JUNE 2005)

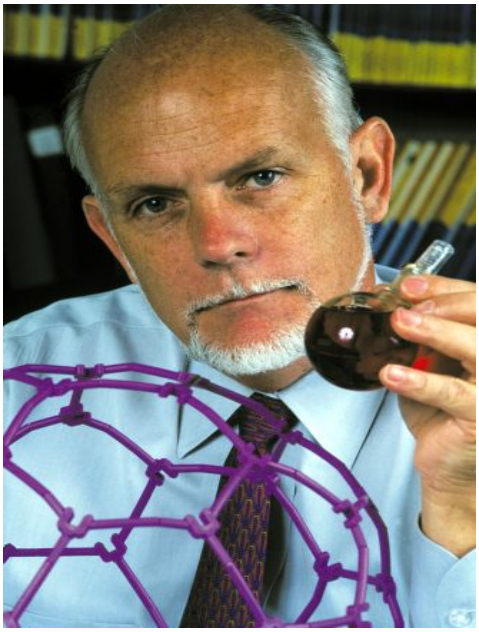


Average Direct Solar Irradiance on the Arab Land



Sponsored by
Islamic Educational Scientific and Cultural Organisation (ISESCO)
Economic and Social commission for Western Asia (ESCWA)
International Centre for Water and Energy Systems (ICWES)

Inspiration



"*The history of oil is basically the history of modern civilization as we have known it for the past 100 years. -------- What will we do when there is no longer enough oil and gas?.*" **Richard E. Smalley (1943–2005)**

Motivation

This conference is motivated by the widely growing concern due to rapidly depleting irreplaceable fossil energy sources and consequent need to move to alternative sustainable energy systems.

Towards Pan Arab Strategy for the Development of Renewable Energy

General Objective

The Pan Arab Strategy aims at formulating a common Arab Vision in the field of renewable energy which will represent a significant contribution to the energy mix. The strategy is also designed to provide guidance for energy planners in each Arab country, in order to join their efforts towards improving Arab technology in the field of renewable energy

Solar Energy Activities of the Arab Ministerial Council (League of Arab States) for Electricity (May 2010)

1. Establishment of a permanent committee for renewable energy and energy efficiency.
2. Formulating a comprehensive Arab vision towards the deployment of solar energy plants and related initiatives (MSP, DESERTEC).
3. Nominating a working group dedicated for Arab solar plans.
4. Arranging a scientific visit to solar power plants in Spain.

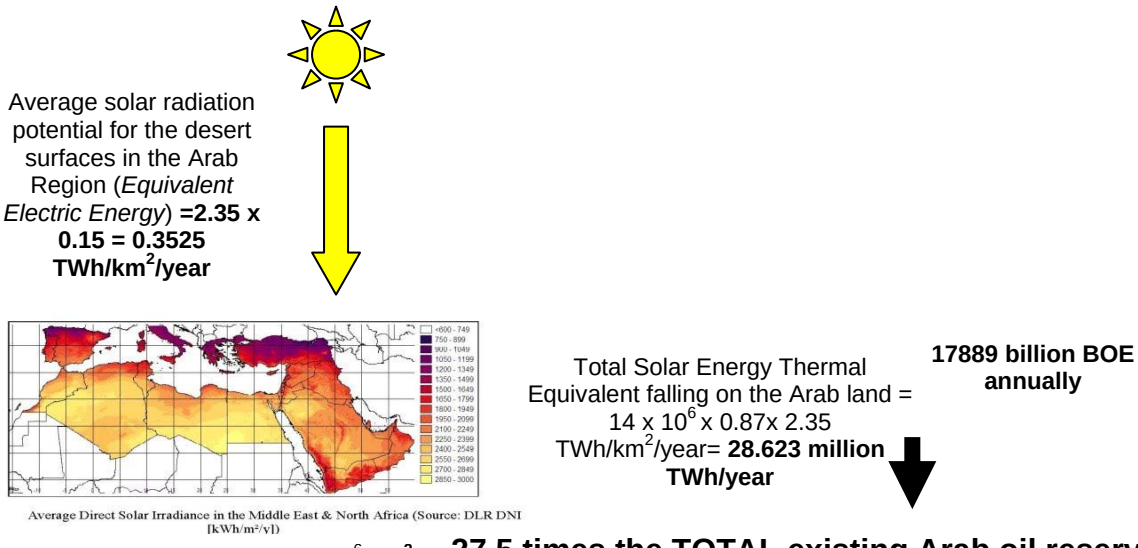
5. Agreement with different concerned parties on technical training

The Comprehensive Arab solar Vision (Means of Implementation)

1. Choosing the convenient technologies required (stages of technology transfer / capacity building in accordance with national priorities).
2. Modernization and development of infrastructure.
3. Setting a timeline for the implementation.
4. Estimating the required cost.
5. Selecting financing schemes and alternatives.
6. Specifying the scope and limits of private equity participation.
7. Identifying the industries related to renewable energy which can achieve a comparative advantage over the short run and others on the medium and long run.

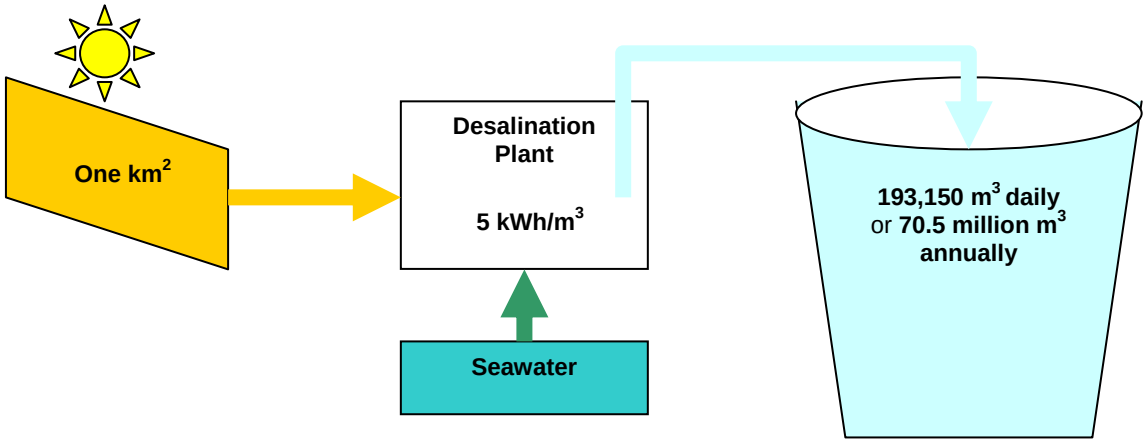
Alternatives must be considered on the basis of the availability and viability of renewable energy resources. The choice of Solar Energy as the most appropriate alternative for the Arab Region is obvious from the following facts. A great part of the Arab Region is arid. The stress due to scarcity of water is presently relieved by desalination of seawater which is an energy intensive process. If there is no energy, the arid regions will also have no potable water and life in such areas will be unimaginable. The Arab Land is blessed with an abundance of solar energy. The interruptions to the coming solar radiation are the least for a major part of the year.

The Arab region has a total area of about 14 million square kilometers, of which more than 87 per cent is desert, with extreme aridity and poor vegetation cover (Arab Countries Regional Report, WWF5, 2009.) Average solar radiation potential for the desert surfaces in the Arab Region (*Equivalent Electric Energy*) **=2.35 x 0.15 = 0.3525 TWh/km^2/year.** Total Solar Thermal Energy falling on the Arab land = 14 x 10^6 x 0.87x 2.35 TWh/km^2/year= **28.623 million TWh/year** or **17889 billion barrels of oil equivalent annually**. This ANNUAL amount (RENEWABLE) is about **27.5 times the TOTAL existing Arab oil reserves** WHICH ARE NON RENEWABLE!



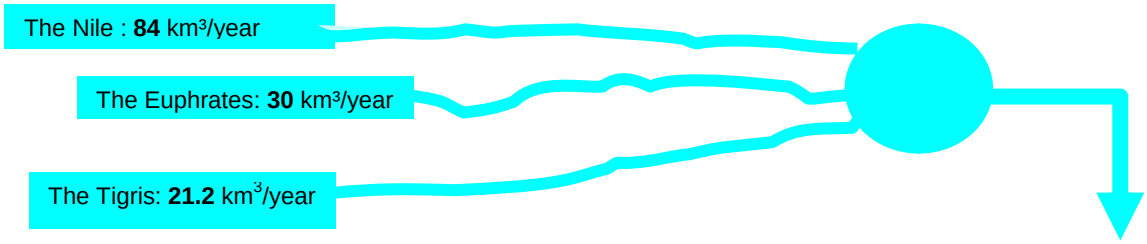
Oil equivalent of Solar Energy Wealth over the Arab Land

One km^2 of solar collector area can also produce desalinated water of about **193,150 m^3 daily** or **70.5 million m^3 annually**, assuming average electric energy consumption for desalinated water of about **5** kWh/m^3. Here seawater is abundant, but the energy used to desalinate it is not; it is very precious being nonrenewable We should take advantage of the great solar energy potential of the region now, especially when we have the support of present resources.



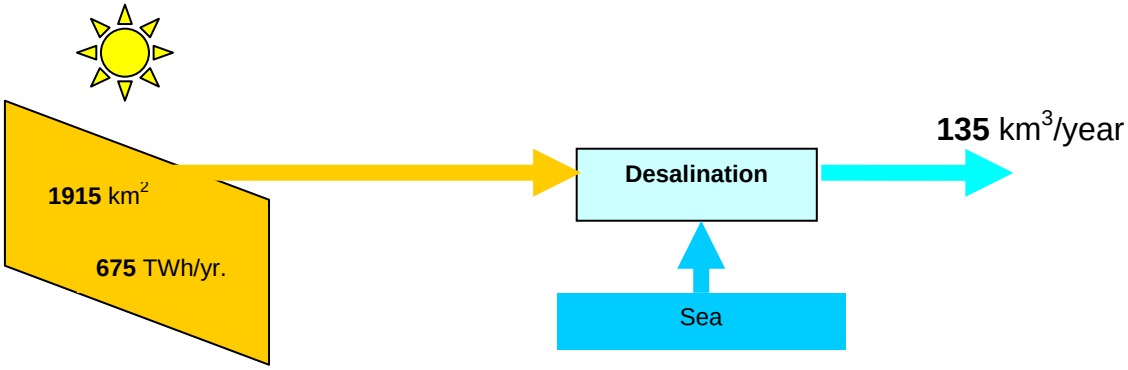
Relationship between solar collector area and the amount of desalinated water it can produce

There are three major rivers in the Arab Region, Nile in Egypt, Euphrates and Tigris in Syria and Iraq. These rivers are all originating outside Arab territories. The total flow of these rivers = **84** km³/year (Nile) + **30** km³/year (Euphrates) + **21.2** km^3/year (Tigris) = **135** km^3/year



Total annual water flow in the three major regions of the Arab world 135 km^3/year

The electrical energy required to produce desalinated water equivalent to the total water flowing in all these rivers **= 135** x **10^9** m^3/year x **5** kWh/m^3 = **675** TWh/yr. The total solar PV/Thermal collector surface area required to generate this amount of energy is about **1915** km^2.



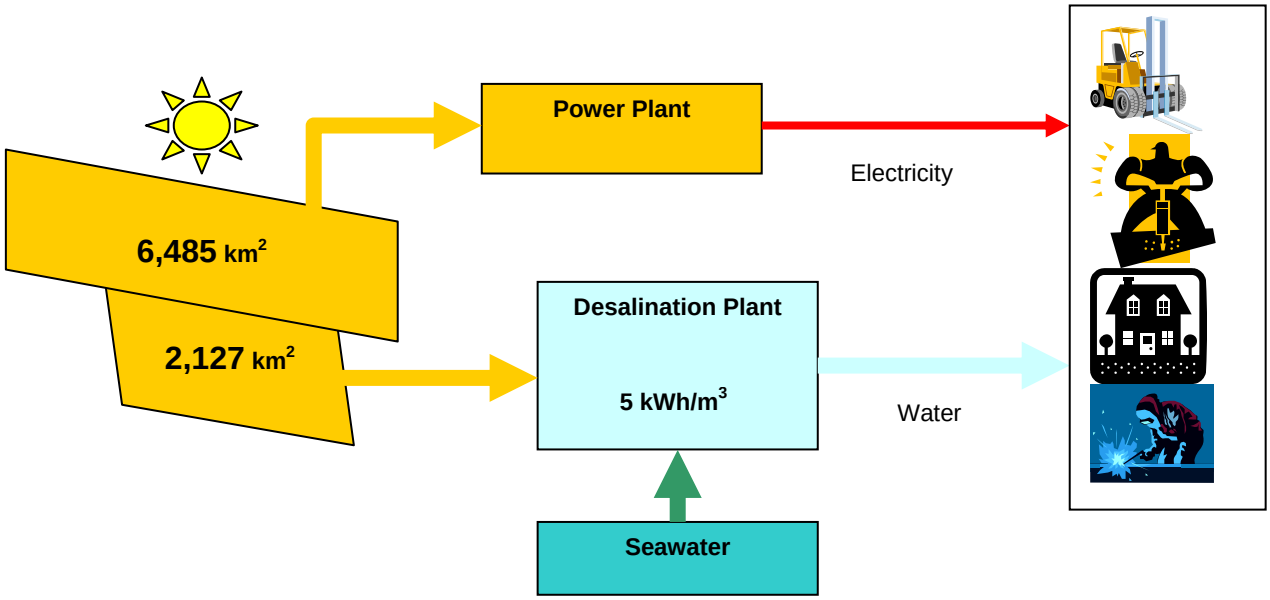
Solar collector of 1915 km^2 can produce three more rivers

According to a study conducted by the Institute of Technical Thermodynamics, Germany in 2007, the water deficit in the Arab Region will be about **150** km^3 in 2050. According to the analysis, this deficit will tend to increase from **50** billion m^3 per year at present, which is almost the annual flow of the Nile River allocated to Egypt, to **150** billion m^3 in the year 2050. Almost all Arab countries, Egypt, Saudi Arabia, United Arab Emirates, Kuwait, Bahrain, Qatar, Yemen, and Syria, etc are the countries that will experience serious water deficits. If we assume roughly the water deficit is likely to be equivalent to 150 km^3 and solar powered desalination will be used to produce this quantity, then the energy will be about =**150** x $\mathbf{10^9}$ m^3 x **5** kWh/m^3 = **750** TWh/year.

Let us consider the total annual energy demand of 623.148 TWh in the Arab Countries (OAPEC 2006)

The total electric energy demand for the Arab Region is expected to be about **2286** TWh/year in 2050 assuming a reasonable growth of about 3% annually.

The total energy (**2286**+**750**) TWh/year) for meeting power and water demand will require an area of about of about **8613** km^2 which is **0.06** % of the Arab Region surface area.



Solar energy can meet the demands of both water and electricity of the Arab Region

Consider CO_2 emissions/ MWh_e in tons
1. Solar Thermal Power Plants: **0. 01–0. 015**
2. Gas Fired Combined Cycle Power Plants: **0.5**
3. Steam /Coal Fired Power Plants: **0.9**

In view of the above, for example, a solar thermal plant of **50MW** capacity (with $1km^2$ collector) at **80%** of average capacity over one year of operation will cause only about **3500- 5260** tons of CO2 emissions while, a typical gas fired combined cycle plant will

cause **175000** tons of CO2 emissions. Solar alternative implies a huge reduction of greenhouse gas emissions.

These simple estimates of the solar energy potential and relative greenhouse gas emissions make it obvious for sustainable energy systems development strategy with **emphasis on solar energy**. All short term economic considerations must be abandoned to ensure a concerted effort to establish solar energy systems. **The reorganization of educational systems is very much needed to create awareness.**

At this point one may be tempted to think of nuclear energy as an alternative. But it is important to remember that nuclear power plants have been excluded from clean development mechanism (CDM) for many obvious reasons and that many European countries have decided to phase out their nuclear installations.

The conclusion is simple and straightforward. The only viable alternative energy for the Arab World is solar energy and other renewable energy systems(wind energy, hydropower, ocean Energy, geothermal energy, hydrogen energy & fuel cell, biomass energy) as a with large scale solar collector farms and large scale solar power plants.

Are world's vast hot deserts not welcoming humanity to harness the vast solar energy falling on them and live in harmony with the Earth's Life Support Systems? Let us accept their invitation and conserve the Earth's nonrenewable stocks of resources for future generations.

When the world could spare 1600 Billion dollars (and the Arab countries 105 Billion dollars) in 2010 for military expenditure, building large sale solar energy installations should not be a financial challenge. After all, this investment is into Energy and Water Security to ensure sustainable life in the Region that is far more than just territorial security.

"Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone.
It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children.[.....] Under the cloud of threatening war, it is humanity hanging from a cross of iron."
Dwight D. Eisenhower, US President, 1953

The mission

The conference aims at bringing together expertise in the fields of Sustainability Science and Renewable and Alternative Energy Systems to address the issue of sustainable energy systems for the world in general and for the Arab Region in particular. In view of the fast depleting fossil fuel resources and the growing need for energy with increasing population, the conference calls for a concerted effort to move

as fast as possible to an renewable and alternative energy base simultaneously phasing out the conventional energy base for a sustainable future.

The conference features lectures from selected specialists from the Arab Region and Abroad to come up with a strategy for a sustainable energy systems appropriate for regional conditions.

Languages

Arabic and English

CONFERENCE PROGRAM

25 NOVEMBER 2010

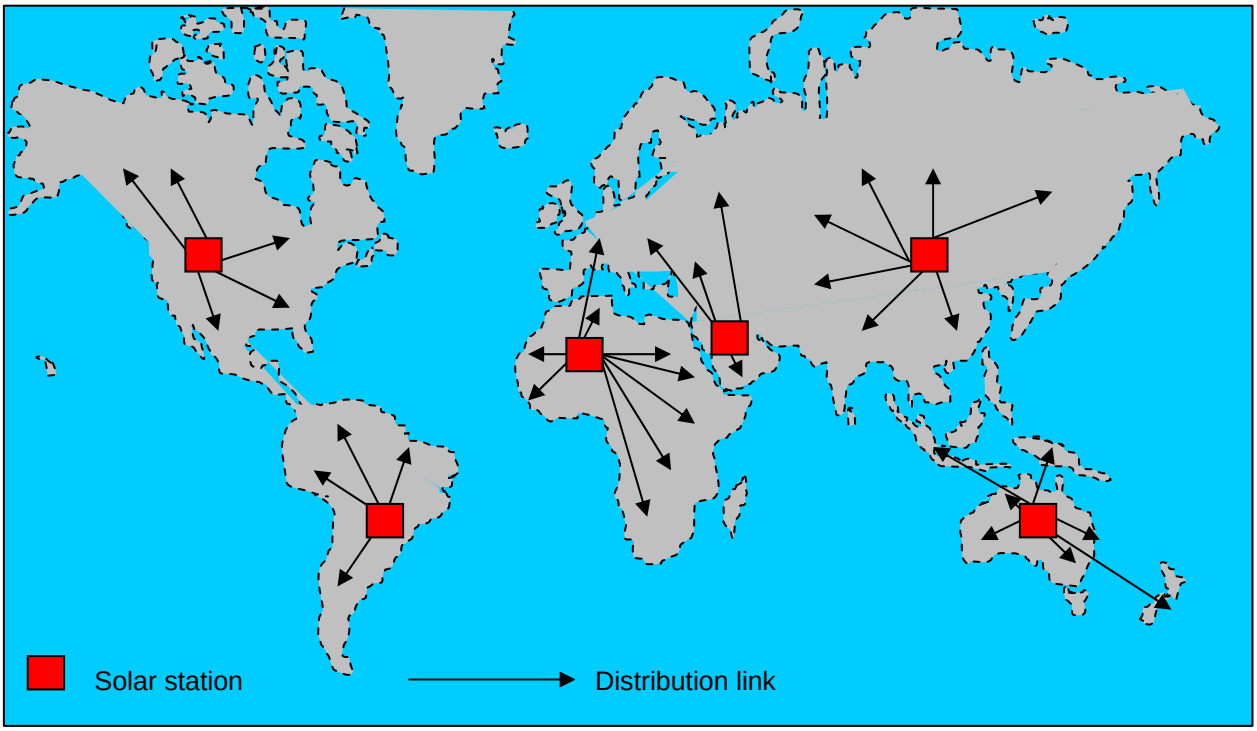
0900-0915 Registration (Bristol Hotel)	
0915-0930 OPENING CEREMONY	
***To be confirmed**	**Adnan Badran,** President, Petra University, Amman, Jordan, President Arab Academy of Sciences
	***El Tayeb Mustafa,** President, Future University, Sudan and Chairman of Arab Forum for Sustainability Science (AFFSS)
0930 -1030	
KEYNOTE ADDRESS ***Solar Energy for Electricity, Water and Food Supply in Regional and Global Context***	**Nasir El Bassam,** International Research Centre for Renewable Energy (IFEED), Kirchweg 4A, D-31275 Lehrte-Sievershausen, Germany
The Role of Advanced Nuclear Technologies, Fission and Fusion, in Solving the World Energy and Environmental Problems.	**Mohamed Abdou,** Distinguished Professor and Director of the Center for Energy Science and Technology, University of California, Los Angeles, CA, USA
1030AM-1100 AM Coffee Break	
1100 -1330 SESSION-I: BIOFUELS **Chairman: ----------**	
KEYNOTE ADDRESS ***Affordable Energy Solutions for the Oil Haves and Have-Nots***	**Reyad Sawafta**, President & CEO, QuarTek Corporation, Greensboro, NC USA
Converting Waste to Energy Products	**Yousef Haik** Department of Mechanical Engineering, United Arab Emirates University, UAE
Production of Biofuel, its engine performance and emission test from waste oil, algae and date fruit biomass	**A.B.M. Sharif. Hossain,** Division of Biotechnology, Institute of Biological Sciences, Faculty of Science University of Malaya, 50603 Kuala Lumpur, Malaysia
Combustion and Emissions Characteristics of Diesel and Biodiesel Fuel Blends in Single Cylinder Diesel Engine	**Isam Janajreh,** Masdar Institute of Science and Technology**,** Abu Dhabi**,** United Arab Emirates
1330-1500 Lunch	
1500 -1700 SESSION-II: SOLAR ENERGY **Chairman: ----------**	
Renewable Energy versus Nuclear Energy	**Darwish M K Al Gobaisi, Omran Sultan M. Al Hallami, Bushara M., Ali M El-Nashar, Woldai A.** International Centre for Water and Energy Systems (ICWES), PO Box 2623, Abu Dhabi, UAE
Application of Solar Heat in Industrial Process (SHIP)	**Prof. Yehia ElMahgary**, University Adviser, E-JUST, Project Manager, RIPECAP, International Senior Adviser on Energy & Environment, Managing Director, Tapiola Engineering
How Smart-Grid Capabilities Can Improve Photovoltaic Systems Return on Investment	**Shihab Kuran,** President & CEO, Petra Solar, South Plainfield, New Jersey USA 07080
Dye sensitized solar cells incorporating a new class of cyclometalated ruthenium complexes	**Tarek Ghaddar,** Department of Chemistry**,** American University of Beirut, Beirut, Lebanon
Dinner hosted by ICWES: 0800 PM-1000 PM	

26 NOVEMBER 2010

0900-1100 SESSION III: NANOTECHNOLOGY APPLICATIONS IN ENERGY Chairman: ----------	
KEYNOTE ADDRESS ***Nanotechnology Applications in Alternative and Renewable Energy***	**Khaled Elshuraydeh,** President, The National Nanotechnology Centre of Jordan (NANCEJ), Amman, Jordan
Nanomaterials as energy storage medium	**Arshad Saleem Bhatti,** COMSATS Institute of Technology, Islamabad, Pakistan
1100 -1130 Coffee Break	
1130-1330 SESSION IV: SUSTAINABILITY AND MANAGEMENT Chairman: ----------	
Sustainability Framework for Energy Systems	**Ganti Prasada Rao,** Inventive Pathways- Management Consultancy, PO Box 2623, Abu Dhabi, UAE
Phase Change Materials: The Future in Energy Management	**Reyad Sawafta,** President & CEO, QuarTek Corporation, Greensboro, NC
Sustainability considerations for renewable energy technologies	**Mahieddine Emziane,** Masdar Institute of Science and Technology, Masdar City, Abu Dhabi, UAE.
1330-1500 Lunch	
1500-1600 SESSION V: TRANSLATING THEORY INTO REALITY Chairman: ----------	
Green Technology Investment and Culture in the MENA Region	**Ennis Rimawi,** Managing Partner, Catalyst Private Equity, Amman, Jordan
Survey and quality assessment of waste frying oil produced in Abu Dhabi city with the aim to make a local biodiesel production	**Isam Janajreh,** Masdar Institute of Science and Technology**,** Abu Dhabi**,** United Arab Emirates
	Local Speaker
	Local Speaker
1600-1700 SESSION VI: FINAL DISCUSSION AND RECOMMENDATIONS Chairman: ----------	
****To be confirmed***	**Adnan Badran,** President, Petra University, Amman, Jordan, President Arab Academy of Sciences
	***El Tayeb Mustafa,** President, Future University, Sudan

*The items in red have to be confirmed by invitation/reminder.

A conceptual model of a solar power global grid with solar stations at places of rich solar potential and serving the surrounding regions as indicated.



Let the world's responsible investors invest as much as they can afford in the long future without seeking rapid short term gains.

Let the world's governments strive for attaining energy security in their regions, not merely to ensure victory in the next elections.

Let citizens and institutions all over the world be educated for enlightenment and trained for empowerment in pursuit of sustainability.