TEMO – STPP

The TEMO Solar-Thermal Power Plant Project

Source: BOSCH Rexroth, Hyraulic Controls brochure

Above: Solar Thermal Power Plant in Mojave Desert, California

مشروع محطة طاقة عن طريق الطاقة الشمسية الحرارية

شارك في الاستثمار لتطور الامة

Investment for Future

بسم الله الرحمن الرحيم

„Our profile is the combination of a cooperation structure with applied research institutes, the experience and the know-how of our engineers and the intercultural competence of our young international team“.

Welcome

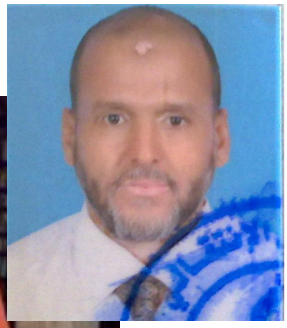
The worldwide growth of economies creates an increasing demand for energy and fuel.
On the other hand the demographic development both in Europe, where the working population is decreasing and in the North-African and Middle East region, where the amount of younger people who have a future working potential is increasing, it is necessary to find ways to offer future energy ressources for Europe and the North-African and Middle East region. And in an increasing amount there must be found working possibilities for the growing up youth in the North-African and Middle East region espesially now in background of the political changes in the region.
So it is very important to implement one of the key technologies – energy producing technology – in this region on the one side and on the other side implementing a future energy ressource for Europe when the conventional ressources will be over and especially nuclear energy is not any more a desiderable choice for Eruopean people after Fukushima accident.

So the TEMO-STPP project produces energy, which can be used by the producing country and also transported to Europe and on the other hand creates working possibilities for the young educated people in the North-African and Middle East region.
And with the help of God, the Almighty, this will be a big effort for a better and peaceful future for the two neighbour regions Europe and North-Africa/Middle East.

Samir Mourad, Electrical Engineer
AECENAR President & TEMO e.K. CEO

Our Team

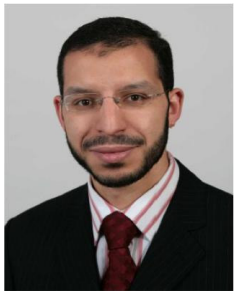
Samir Mourad,
Project Management &
Mechanical Engineering



Abdulfattah Ammar,
Component Integration &
Finance

Jamaluddin Mourad (right), Hussam Mourad (left),
Senior Partners and Advisors

Abdurrahman Mourad,
Abdullah Mourad,
Construction/Simulation



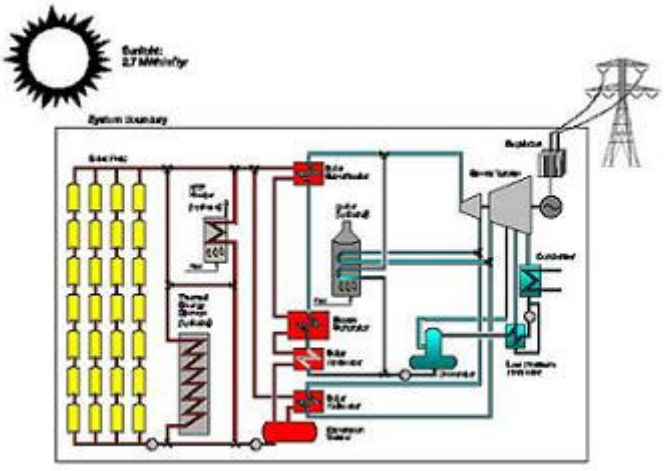
Said Elmsaadi,
Electrical Device Installation &
Process Control System

Nebil Messaoudi,
Technical Documentation Consultation

Hassan Derbani, Logistics

What is a “Solar Thermal Power Plant” (STPP)"?

A solar thermal power unit uses rays of the sun to heat thermal oil through mirrors. Thus water turns into water vapor. The water vapor is then conducted into a turbine that activates a current generator. This generator produces electric current, which is injected into the power supply system. For night operation storage salt is being used that was heated at daytime. The STPP operates without any photovoltaic, which use resource silica. Thus this technology is 100% sustainable and does not spend any of our most precious resources. Furthermore it is a very good alternative for regions rich of sun's rays instead of conventional power stations, such as coal-fired and nuclear power stations.

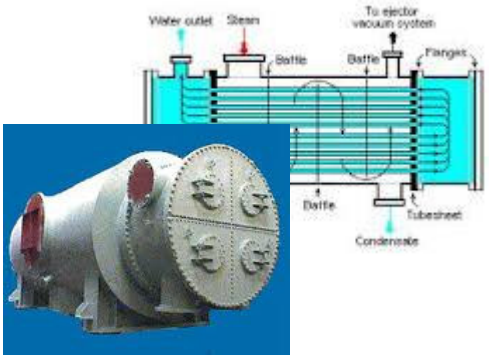


Block diagram of a solar thermal power plant

Solar collector array

Steam Turbine

Generator



Condenser

Conventional Main Power Plant Elements which are Reusable from Out of Service Conventional Power Plants

Efficiency and financial risks

According to a study of the AECENAR member institute VaEf (Institute for Alternative Energy Research) which is based, among other things, on studies of the world bank in 1999, the estimated costs of such a unit will be starting at 2010 about 3-4 Cent a KWh. Thus such a unit is competitive.

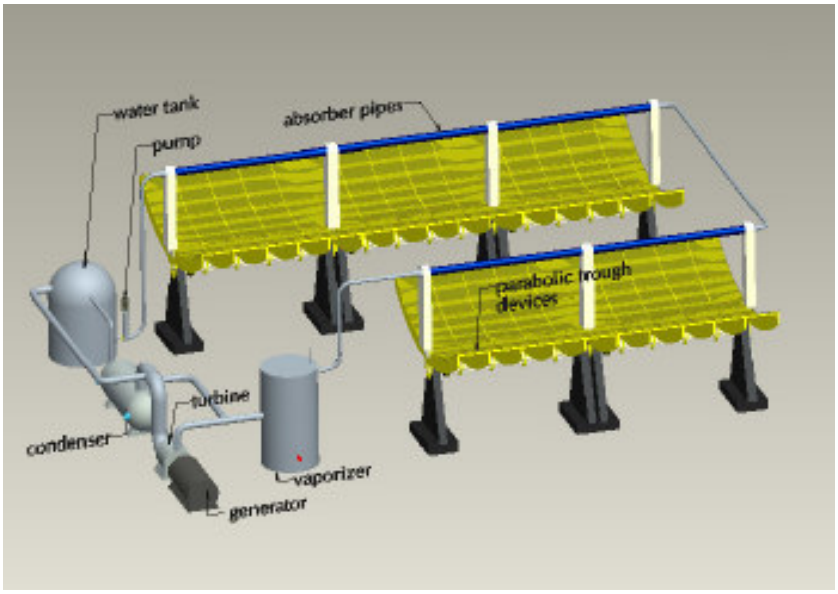
The TEMO-STPP project

It is planned to install a 7 MW power station.
The STPP is going to be completed by the end of 2013, so God will.
To gain major investors, in cooperation with scientific institutes (Assoc. for Alternative Energy Research (VaEf), Karlsruhe as well as the Institute for Nuclear Technology and Reactor Safety at the University of Karlsruhe) a model of the STPP as big as a table was installed.
For initial kernel team building a 40 kW test rig is developed actually.

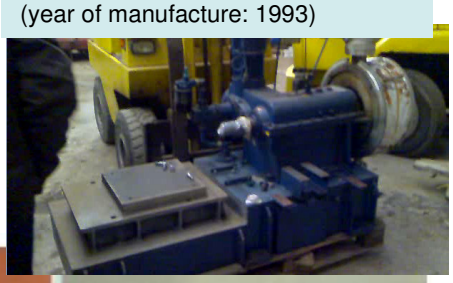
Time scale

	2004 - 2008	2008 – (planned) June 2012	(planned) July 2012 – December 2013
Activities	Studies and Pre-Development	Development of Test rig	Installing the 7 MW STPP in North Africa (Zawia/Lybia)
Partners	TEMO, VaEf (institute of AECENAR), KIT (Karlsruhe Institute of Technology (former name of KIT: University of Karlsruhe))	TEMO, AECENAR, KIT	TEMO, AECENAR, Lybian Solar Energy Company

Development of TEMO-STPP Test rig



Purchase of a used 40 kW turbine (year of manufacture: 1993)



Process control system
Development with Siemens S7 technology

Solar vacuum pipe

Construction of mechanical pieces with CAD program ProEngineer

Manufacturing of solar parabol panels

Connections between Europe and Middle East/North African Region

Actual Partners and Roles in the TEMO-STPP (Solar Thermal Power Plant) project

	Applied Research Institutes	Commercial Companies	Role
Germany	AECENAR Association for Economical and Technological Cooperation in the Euro-Asian and North-African Region www.aecenar.com	TEMO Consulting e.K. **www.temo-ek.de**	-**Project Management** - **Investment (390 TEUR)** - **Development of test rig in Lebanon.**
			Logistics
Lybia		LybianSolarPower	**Investment**
Lebanon	AECENAR Association for Economical and Technological Cooperation in the Euro-Asian and North-African Region www.aecenar.com جمعية الشرق الأوسط للتنمية والتعاون في الميدان التكنولوجي **AECENAR Middle East**		- **Logistics** - **Offering Development Facilities for Test rig**

Next Steps Overview

July 2011 – June 2012	July 2012 – December 2013
Test rig phase	**Installation in Zawia/Lybia**
Task: **Installation of 40 kW test rig** **Time span: 12 months** **Personnel: 4 engineers** **Costs: 361.000 EUR** **(79.500 EUR to be paid cash,** **281.500 EUR investment)**	**Task:** **Installation of a 7 MW power plant in the Lybian Desert** **Time span: 18 months** **Personnel: 4 engineers, 50 technicians** **Costs: 18 Mio. EUR**

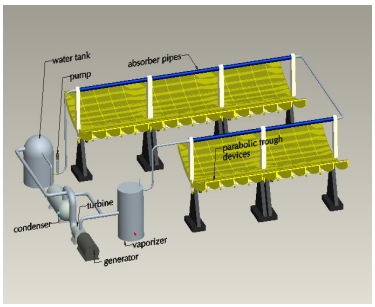
Amortization time: until 2028 insha Allah

Selling Price of 1 kWh: 7 EUR-Cent

TEMO-STPP (Solar Thermal Power Plant) project – **Test rig phase**
Planned working packages, costs, output

Task:
Installation of a 40 kW test rig

Time span: 12 months
Personnel: 4 engineers



Material Costs

Pump, pipes, …	**5.000 EUR**
Solar field	**10.000 EUR**
Steam production (by incineration)	**25.000 EUR**
40 kW Turbine	**13.000 EUR**
Missing oil pump (Dresser-Rand spare part)	**5.000 EUR**
Generator	**1.000 EUR**
Condensor	**15.000 EUR**
Sensors/Actuators	**5.000 EUR**
	69.000 EUR

(*40.000 EUR to be paid cash*, 29.000 EUR investment by suppliers)

Personnel Costs

- Project Management 12 MM
- Construction of Parabol Collector Device 3 MM
- S7 Control System 4 MM
- Installation of electrical components 6 MM
- Integration 5 MM

28 man months = **280.000 EUR**

(*37.500 EUR to be paid cash (each engineer 1500 EUR per months)*, 242.500 EUR investment by the engineers)

Using AECENAR Facility

12 x 1000 EUR = 12.000 EUR

Total costs: 361.000 EUR

(79.500 EUR to be paid cash,
281.500 EUR investment*)*

Small Solar thermal / conventional (Incineration) 40 kW combination Power Plant

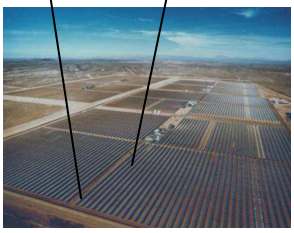
-Trained Middle East /North African personnel: experts which are able to lead the next stage (Lybian desert 7 MW STPP)

Activities | Costs | Output / Win

TEMO-STPP (Solar Thermal Power Plant) project – **Installation in Zawia/Lybia**

Time span:

18 months (Aug. 2012 – Dec. 2013)



Material

7 MW Turbine&Generator **1.000.000 EUR**
Heat exchanger, condensor, Pipes, pumps, … **200.000 EUR**
400m x 400m solar collector field (100x30x5.000 EUR) **15 Mio. EUR**

Personal

Project Management & Leadership
5 Engineers

About 50 technicians and workers

Personnel costs: **1.200.000 EUR**

Total installation cost:
about 18 Mio. EUR

7 MW Solar Thermal Power Plant

Operated and lead by experts from Lybia and neighbour countries

ivities:
allation of the
ver Plant

Costs

Output / Win

AECENAR e.V.
Haid-und-Neu-Strasse 7
76131 Karlsruhe, Germany

Email: info@aecenar.com
Website: www.aecenar.com

TEMO Consulting e.K.
Haid-und-Neu-Strasse 7
76131 Karlsruhe, Germany

Email: info@temo-ek.de
Website: www.temo-ek.de

AECENAR Middle East
جمعية الشرق الأوسط للتنمية والتعاون في الميدان التكنولوجي
Ras Nhache, Main Road, District: Batroun, Lebanon
Tel./Fax. 00961 (0)6 921318

Email: info@aecenar.com
Website: www.aecenar.com

For contact:
Samir Mourad
Phone (Office Lebanon) ++961(0)6 921318
(Mobile Lebanon) ++961 71 935 938
(Office Germany) ++49 (0)721 9658 567
(Mobile Germany) ++49 (0)176 4039 2038
Email: samir.mourad@temo-ek.de