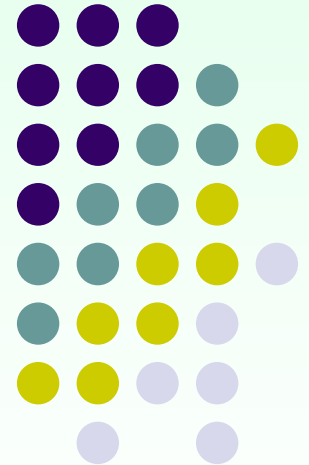


Lebanese Sustainable Solar Thermal Strategy – Opportunities & Challenges

Anwar Ali, Project Manager
Lebanese Center for Energy Conservation Project

“Greek – Arab Technical Cooperation on
Engineering Projects & Investments Plans”

Athens, Greece
27th – 29th March 2008

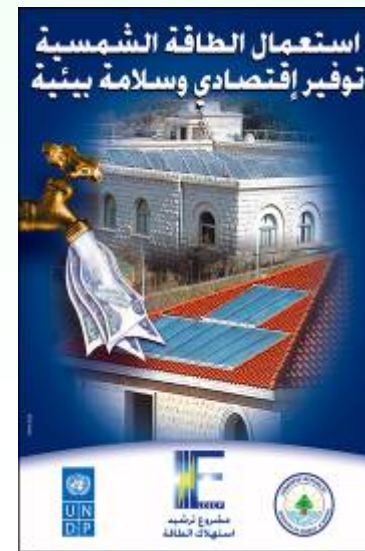


Lebanese Sustainable Solar Thermal Strategy – Opportunities & Challenges

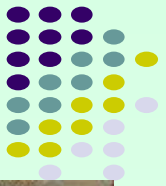


Presentation outline

- Country & Energy Sector Background
- Why sustainable solar thermal strategy for Lebanon?
- Defining the sustainable solar thermal strategy
- Strategy implementation schedule (Market Survey, stds, testing facilities, pilot projects, donations, etc...)
- Ideal market transformation trend



Country Background

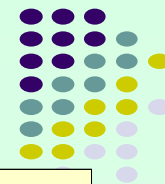


* Capital	:	Beirut
* Area	:	10,452 km²
* Population	:	~ 3.8 million
* Population Density	:	~ 382 hab/km²
* GDP	:	~ 26 Billion USD
(Services 67%, Industry 21% & Agriculture 12%)		
* Public Debt	:	~ 40 Billion USD
* Energy Bill	:	~ 3.1 Billion USD

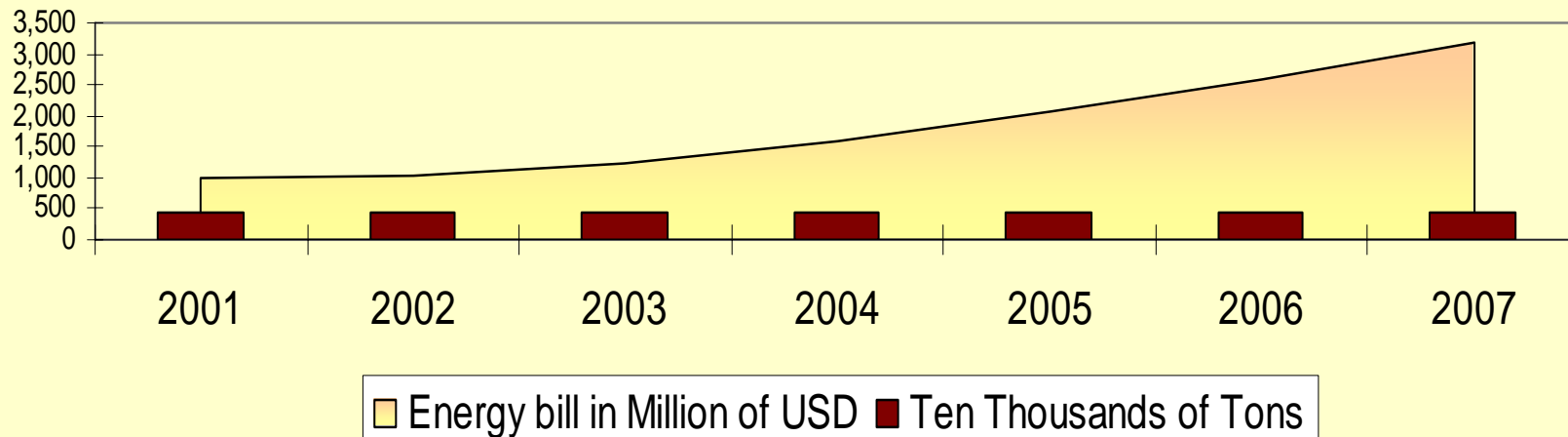


- ✓ Lebanon has made potential progress toward rebuilding its energy sector.
- ✓ Ministry of Energy & Water (MEW) is responsible for the energy sector.
- ✓ Electricite du Liban (EDL) covers the majority of the electricity sector.
- ✓ In 2002, Government of Lebanon has developed an Electricity Decree # 462 which for the first time identifies the role of the private sector as well as clean energy issues.
- ✓ No explicit national policy currently exists to promote EE & RE, but under development.

Energy Sector Background

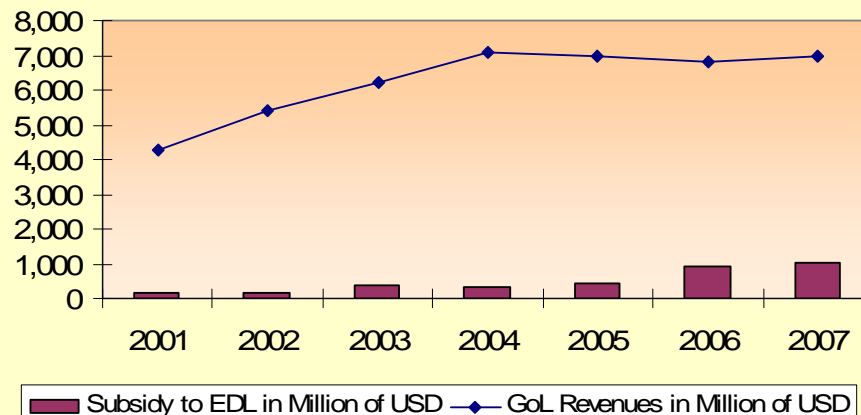


The Lebanese Energy Bill 2001-2007

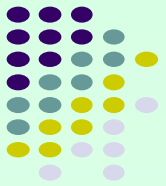


	2001	2002	2003	2004	2005	2006	2007
%	4	3	6	5	6	13	15

GoL Revenues and subsidy to EDL 2001-2007



Why sustainable solar thermal strategy for Lebanon?



- High national energy bill & in-efficient electricity infra-structure
 - Extremely high governmental financial subsidy to EDL
- Direct correlation between energy consumption & GHG emissions/climate change

Importance of GoL intervention through MEW with close collaboration with int'l organizations & Countries friends of Lebanon to act immediately

Sustainable EE & RE strategies

- Cost-effective solutions to the high energy cost
- Feasible measures to reduce national energy consumption
- Decrease investment for future power generation
- Create new job opportunities
- Environmentally sound practices

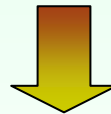
- Establishment of Lebanese Center for Energy Conservation
- Adoption national sustain energy efficiency strategies



Defining the sustainable solar thermal strategy

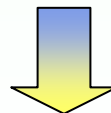
Entry Points

- Technical Issues
 - Lebanese solar thermal market status definition (current & future)
 - **Lebanese solar thermal standards adoption**
 - **Certifications & labeling** through testing facilities
 - Capacity building (manufacturing & installation)
 - National awareness campaign
 - Pilot solar projects & donations raising



Sustainable Issues

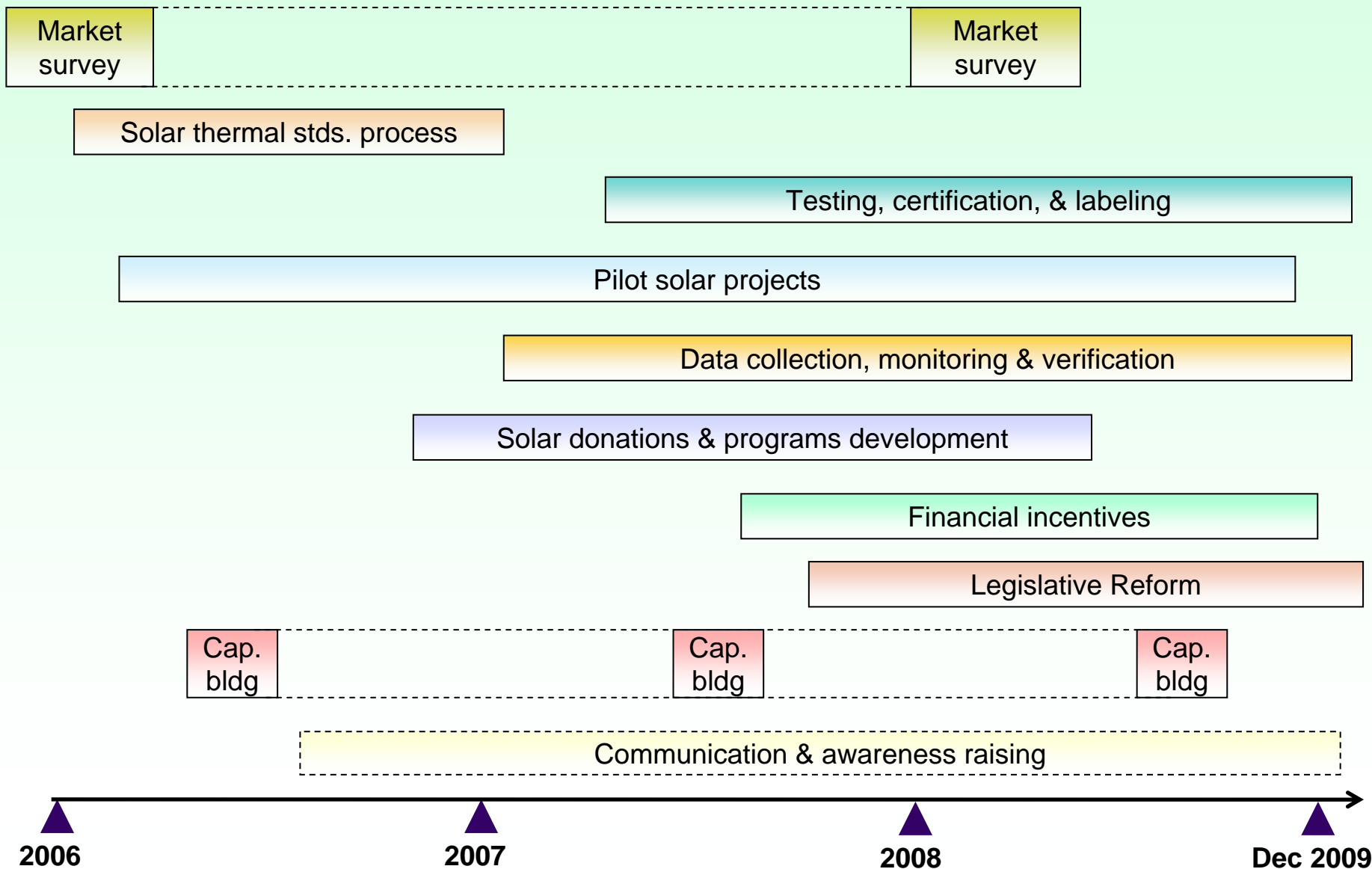
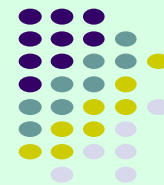
- Legal issues
- Financial issues



Objective

National sustainable solar thermal strategy

Strategy implementation schedule

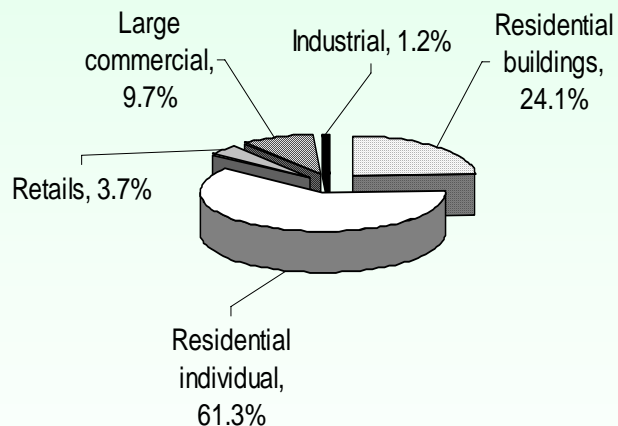


Local Market Survey

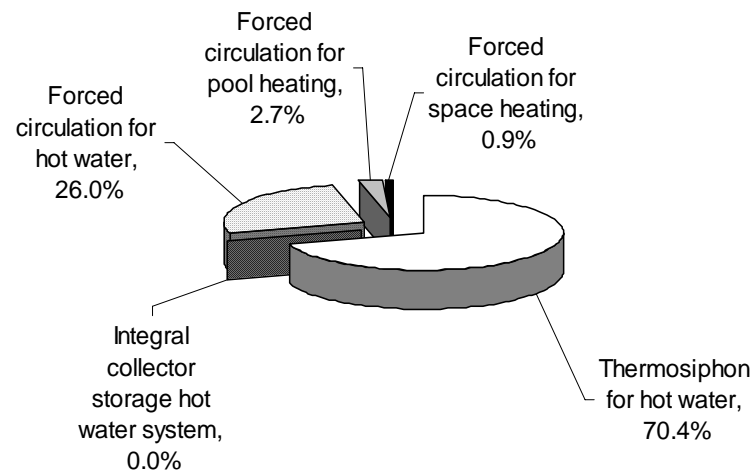


Market survey conducted in year 2006 to study the current situation of the Lebanese solar water heaters market. The survey revealed essential figures:

Manufacturers & Suppliers provide equipment mainly to



Manufacturers & Suppliers Application Type



□ Efforts should be concentrated to increase the installed solar panels for collective systems especially for existing buildings to efficiently utilize the roof area.

Local Market Survey

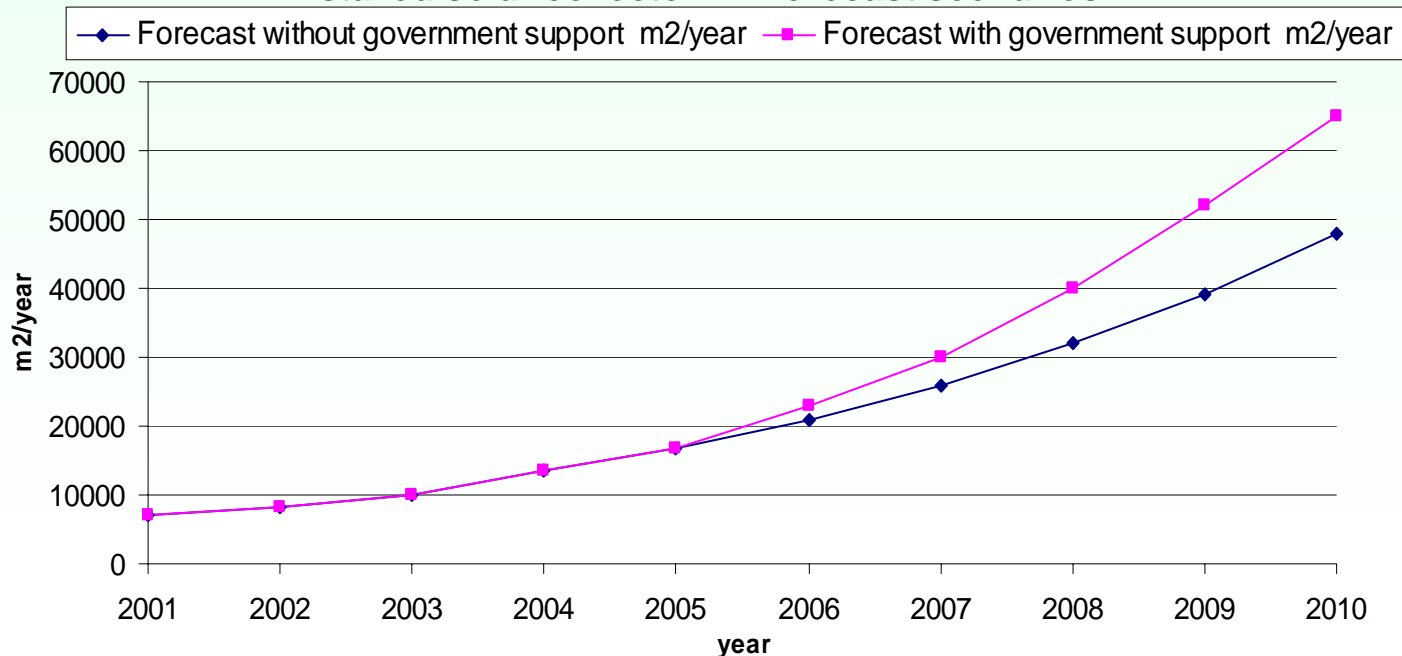


m ² per 1000 person	Country
26	Lebanon
615	Cyprus
305	Greece

Year 2006 Market Survey Results



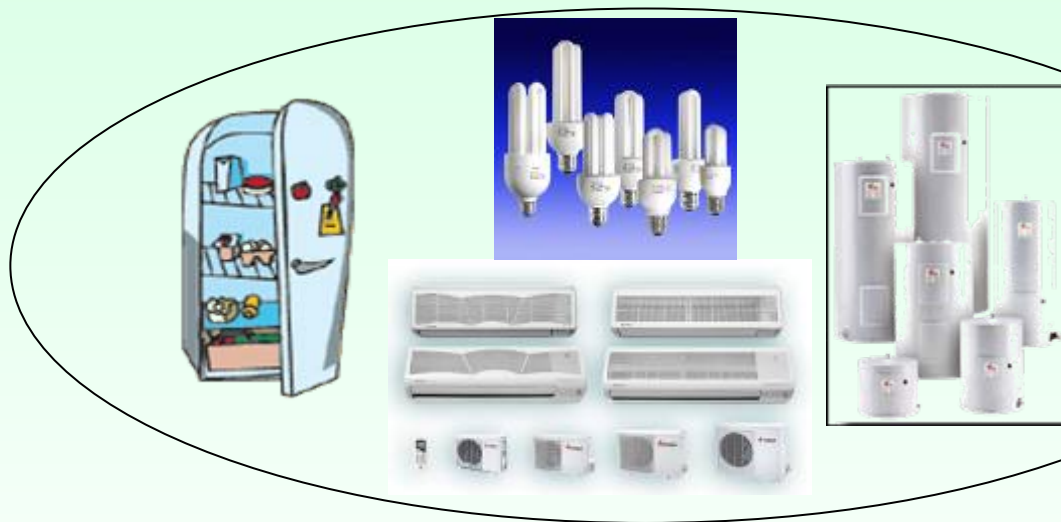
Installed solar collector m2 forecast scenarios



Solar Thermal Standard Process

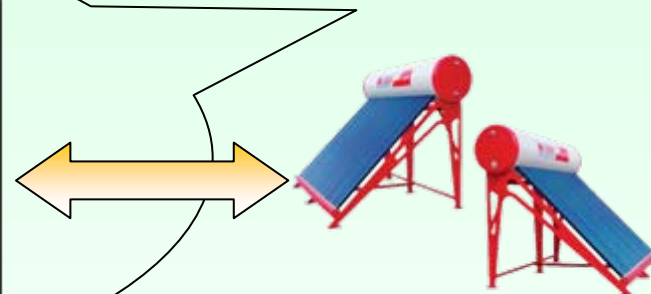


Most energy consuming household appliances

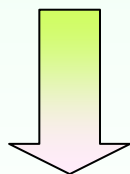


Typical Lebanese Household Electricity Bill

>80%



Water Heating is 30% of Electricity Bill



LCECP has initiated the process for **EE standards adoption & GoL adopted European EE standards on voluntary basis**

Testing, certification, & labelling



Solar thermal equipment **Quality control** is the most critical factor in promoting solar water heaters within the Lebanese market

LCECP managed to secure a Greek fund to procure solar testing facilities (**expected to be operational in 2008**)

**LCECP's
intervention**

LCECP is coordinating with the Greek Center for Renewable Energy (**CRES**) to establish the basis for testing, certification & labelling

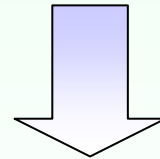
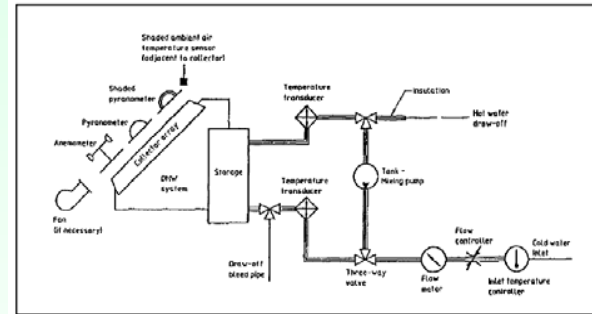
Lebanese solar thermal stds become **mandatory**

Greek Testing Facilities Donation – Scope of Supply



Foreseen Test Installations:

- Collector Thermal Performance
- Internal Pressure
- High Temperature Resistance
- Exposure Resistance
- External & Internal thermal Shock
- High Temperature Resistance
- Rain Penetration
- Impact Resistance
- System Thermal Performance

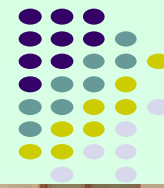


- Transfer of Greek solar know how & experience to the Lebanese market

- Increase capacity building of Lebanese engineers on the solar collectors
- Enhance the quality of the local manufactured solar thermal water heaters
- Regulate the local solar market



Solar Pilot Project (Chinese Donation)

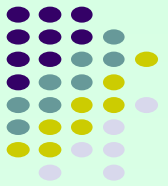


- Project Name : Chinese Solar Thermal Applications
- Fund Amount : In-Kind Contribution of 500 solar units
- Estimated donation value : 625,000 USD
- Administrator : MEW / UNDP
- Technical Agency : LCECP
- Project Areas : South – Liberated areas
- Starting Date : Nov. 2005
- Duration : 1 year
- Beneficiaries : Selected families in the south
- Type of Project : Individual solar systems (Evacuated Tube)
- Project Capacity : 500 solar units (200 l) (*)
- Project Status : Completed early 2007
- Annual savings : 1.2 Gwhr, 1,000 tn CO2, 120 KUSD (Estimated)

(*) Almost 220 solar units were damaged during July 2006 war.



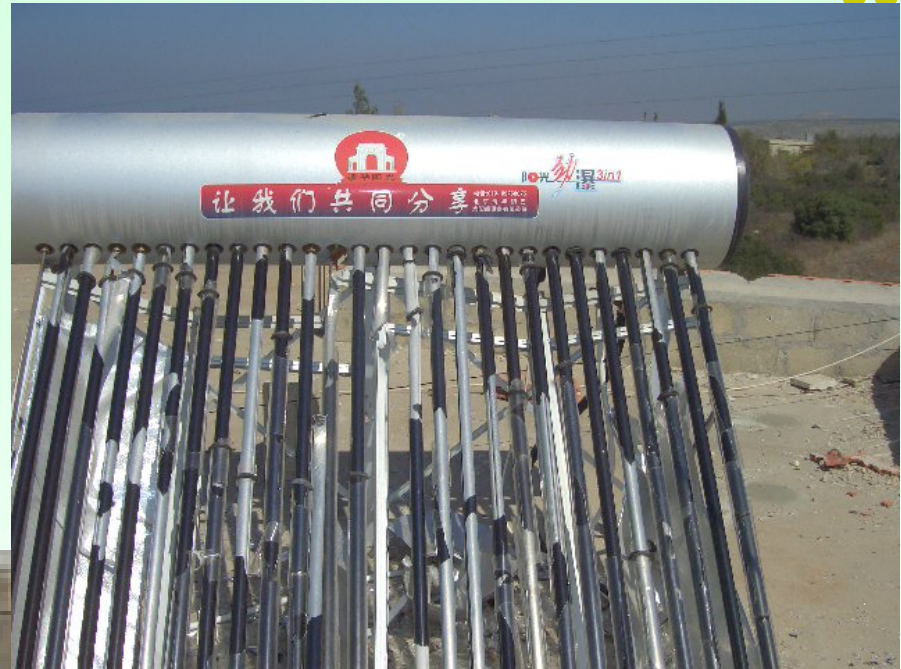
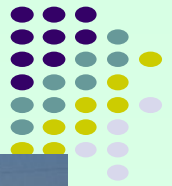
Solar Pilot Project (Chinese Donation) Damaged Units



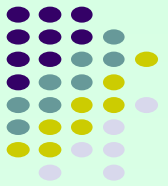
Solar Pilot Project (Chinese Donation) Damaged Units



Solar Pilot Project (Chinese Donation) Damaged Units



Solar Pilot Project (Chinese Donation) Damaged Units

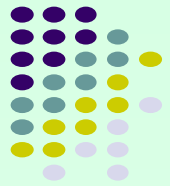


Solar Pilot Project (Swedish Donation)



- Project Name : Swedish Solar Thermal Applications
- Fund Amount : 500,000 USD
- Administrator : UNDP / LCECP
- Project Areas : Beirut, Bekaa & South
- Starting Date : March 2007
- Duration : 1 year
- Beneficiaries : Public Buildings (public hospitals, orphanages, red cross centers, health centers, civil defense centers)
- Type of Project : Individual & collective solar systems
- Project Capacity : - 93 individual units (100 – 200 l)
- 12 collective systems (35,000 l hot water)
- Project Status : Estimated Overall Progress is 85%
- Annual savings : 1.1 Gwhr, 965 tn CO2, 115 KUSD (Estimated)





EE & RE Projects / Donations for Lebanon

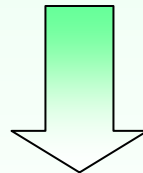
- UNDP / MEW / LCECP are coordinating with international organizations & countries friends of Lebanon to develop EE & RE projects & programmes

- UNDP / MEW / LCECP are preparing the necessary technical proposals and presenting them to:

a- UNDP/LRF

b- GEF

c- Countries friends of Lebanon (China, Greece, Spain, Sweden, etc...)



with the objective

- to secure sufficient funds for strategy execution
- to develop demonstrative projects
- to ensure sustainable infra-structure framework
- to transfer the know-how & expertise to the local market
- to increase the public awareness level



EE & RE Projects / Donations for Lebanon



- **Project Name** Greek Program "Towards Energy Eff. Reconstruction"
- **Funding Agency** Hellenic Aid - Greece
- **Fund Amount** 941,500 USD
- **Administrator** UNDP
- **Technical Agency** LCECP
- **Project Areas** South & Beirut
- **Starting Date** June 2008
- **Duration** 1.5 years
- **Beneficiaries** families in the south & LCECP
- **Type of Project** Individual solar units & solar testing facilities
- **Project Capacity**
 - 350 individual units (150 – 200 l)
 - complete solar testing facilities
 - 90,000 EE lamps
- **Project Status** to be initiated

(*) The programme falls under Sustainable Energy Strategy programme with MoF.



EE & RE Projects / Donations for Lebanon



- **Project Name** CEDRO (Phase 1 + 2)
- **Funding Agency** AECI - Spain
- **Fund Amount** 6.2 million USD
- **Administrator** UNDP
- **Technical Agency** MEW/LCECP
- **Project Areas** Bekaa, South & Akkar (Phase1) & all over Lebanon (Phase 2)
- **Starting Date** Sept. 2007
- **Duration** 2.5 years
- **Beneficiaries** Public Buildings (public hospitals, municipalities, ministries, etc...)
- **Type of Project** Energy Efficiency & Renewable Energy
- **Project Capacity** to be assessed (*)
- **Project Status** initiation & assessment stage

(*) The programme considers also EE lamps, PV street lighting, energy audit implementation, roof insulation, etc...

(**) The programme falls under Sustainable Energy Strategy programme with MoF.



EE & RE Projects / Donations for Lebanon



- **Project Name** Chinese Solar Thermal Applications (Phase 2)
- **Funding Agency** ETC – China
- **Fund Amount** 600,000 USD (Estimated)
- **Administrator** MEW/UNDP
- **Technical Agency** LCECP
- **Project Areas** South
- **Starting Date** To be determined (Expected Summer 2008)
- **Duration** 1 year
- **Beneficiaries** families in the south
- **Type of Project** Individual solar systems (Evacuated Tube)
- **Project Capacity**
 - 200 solar units for the damaged houses
 - 400 solar units (extension of pilot project)
- **Project Status** Under development





EE & RE Projects / Donations for Lebanon

- Project Name	Sustainable Energy Strategy (SES)
- Funding Agency	Ministry of Finance
- Fund Amount	500,000 USD (*)
- Administrator	UNDP
- Technical Agency	LCEC
- Direct Partners	MEW & MoE
- Project Areas	National
- Starting Date	December 2007
- Duration	2.5 years
- Beneficiaries	Public Buildings
- Type of Project	Energy Conservation Measures (ECMs) & Solar Thermal Applications (STAs)
- Project Capacity	- Implementation of ECMs & STAs - Development of Legal Reforms - Development of Financial / Fiscal Incentives - Capacity Building & Communications
- Project Status	Under Approval

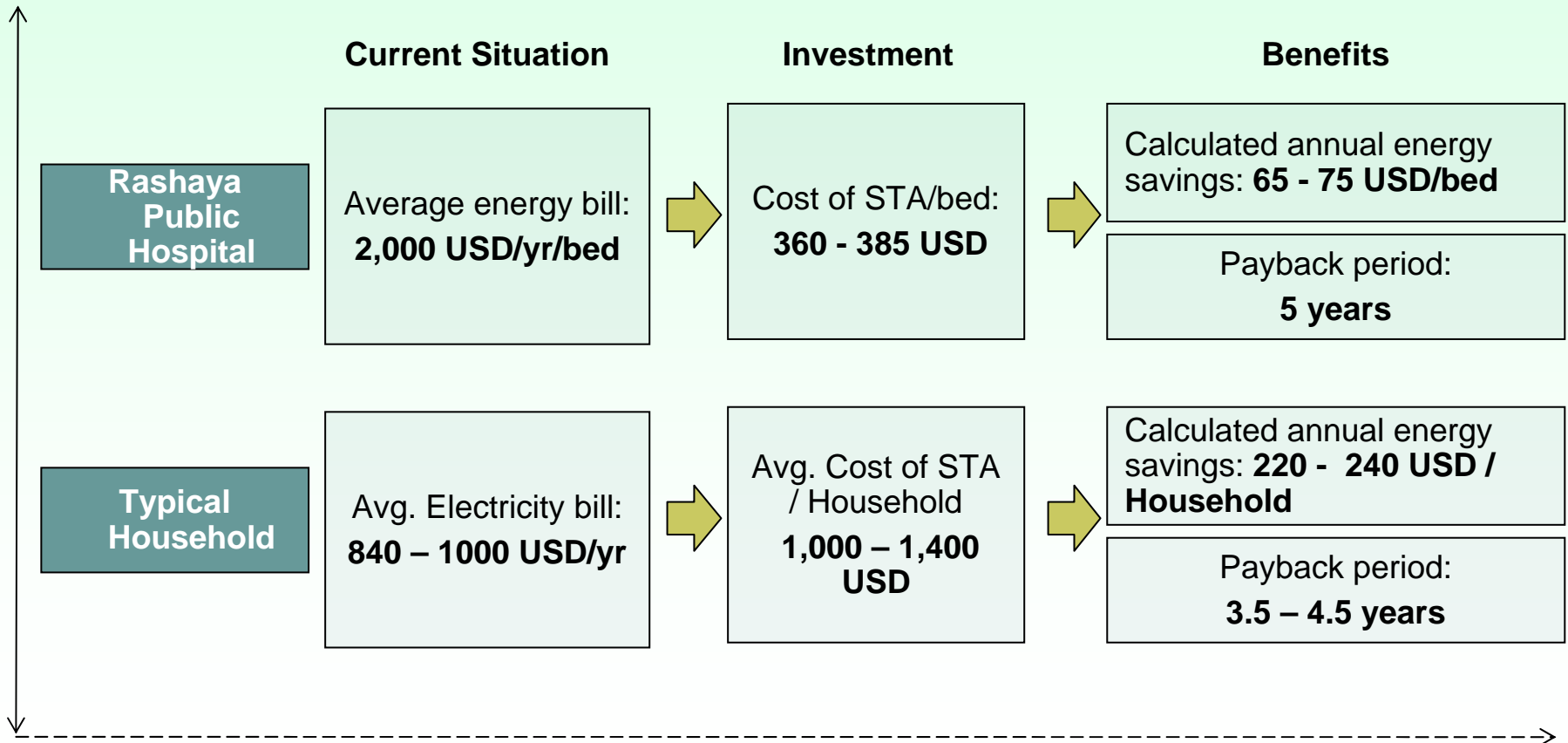
(*) The allocated fund would be increased depending on the assessment of the ECMs & STAs at the public bldgs along with the on-going/planned projects.





Financial incentives

- Favourable environmental conditions: more than **300 solar days** in Lebanon
- Energy for heating uses **around 30%** of household energy bill





Financial incentives

- There are **no financial incentives** for the solar thermal applications in Lebanon
- Only two private banks are providing solar loans, but with **high interest rates**

LCECP financials prospects

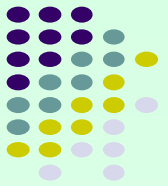
Government financial support

Based on Cost-Benefit Analysis

Solar Thermal Applications (STA)

- Tax/custom reduction
- Property tax reduction upon installation of STA
- Private banks / interest subsidies
- STA fund

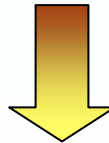
Creating a competitive local solar market



LCECP shall gain from the regional & int'l solar experiences

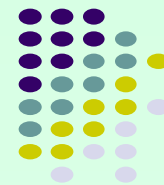
Solar Thermal Applications (STA)

- STA reflected in recent building code
- Property tax
- Municipality tax
- Legal modifications undertaken to create the STA fund
- Favorable solar degrees especially those related to existing buildings

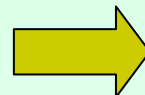


Sustainable Solar Thermal Applications

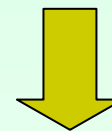
Capacity Building



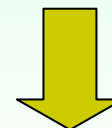
Improper solar designs & installations will result in **negative impact** on the local solar market & many countries experienced such implication



Capacity building on STA assist in **develop the necessary national know-how and expertise**



LCECP paid attention to this important technical factor and considering capacity building in all its pilot solar projects/programs.



The Spanish & Greek solar donations consider intensive capacity building programme & workshop

Chinese Solar Donations (in-house & field training by Chinese experts)

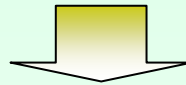




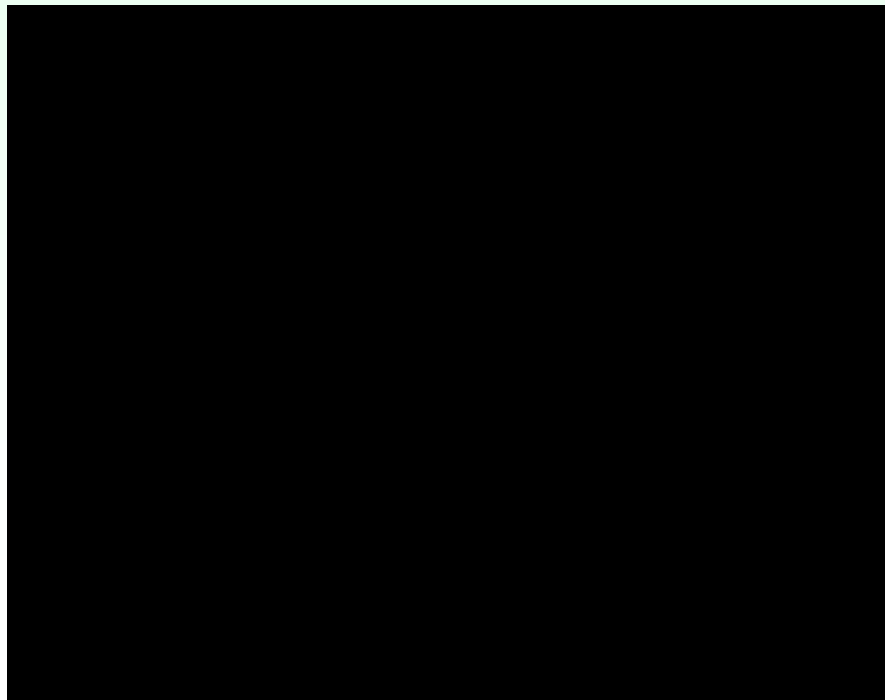
National Solar Awareness Campaign

LCECP launched a comprehensive national solar thermal awareness campaign.

- a- Free of charge media mileage (TV, radios, billboards, prints)
- b- **A free partnership** with a creative advertising agency
- c- LCECP funded \$40,000 to launch the campaign v.s. \$1.4 million cost of air time



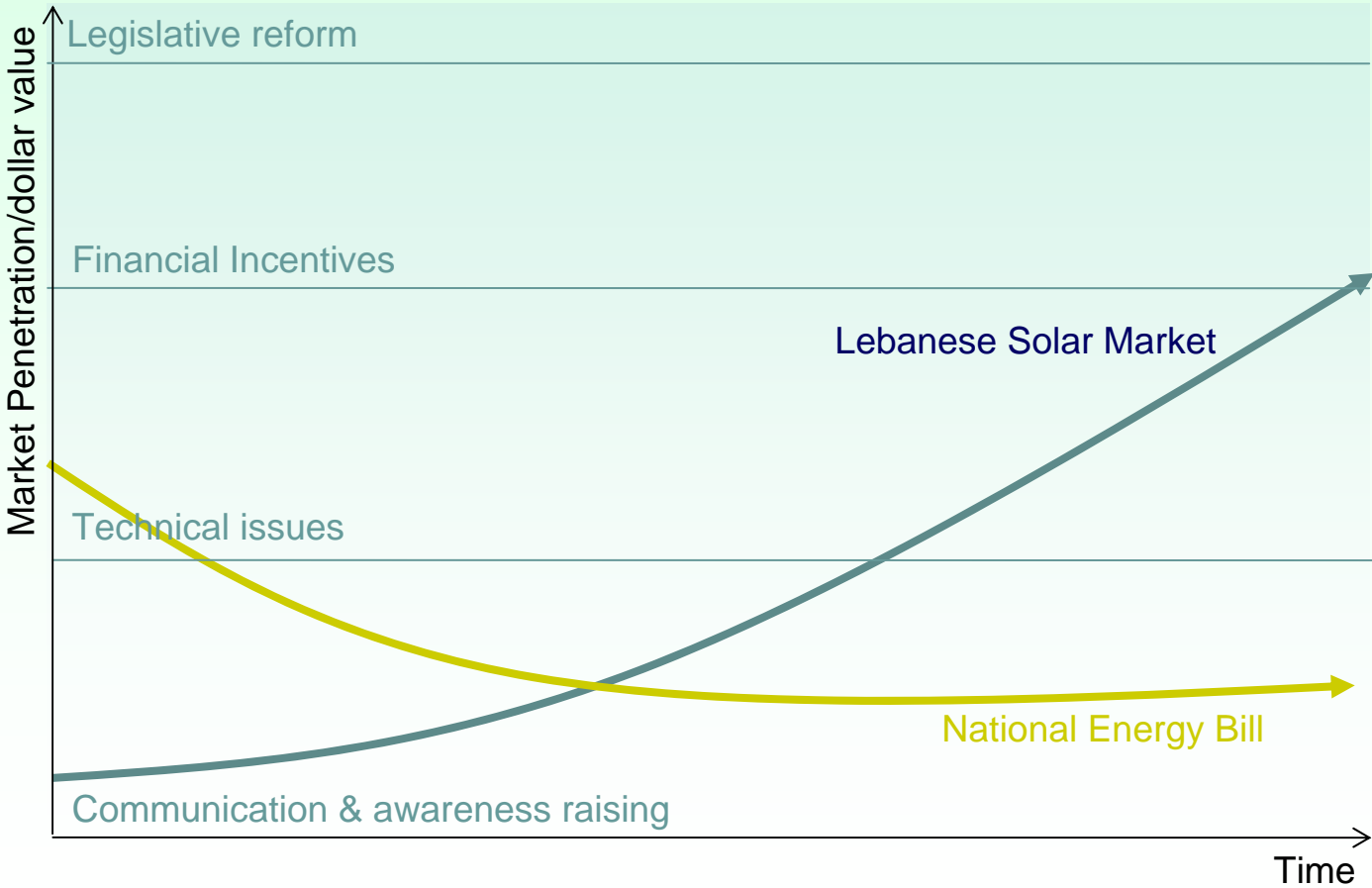
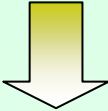
Lesson Learnt : National EE campaigns should be **integrated within Governments policies & should be on continuous basis.**



Ideal market transformation trend



Sustainable Solar Thermal Strategy for Lebanon



Lebanese Sustainable Solar Thermal Strategy – Opportunities & Challenges



Special Thanks to the Greek Government represented by:

- Foreign Ministry
- Technical Chamber of Greece
- Arab Greek Chamber of Commerce & Development
- Greek Embassy in Lebanon
- Center for Renewable Energy Sources (CRES)
- Demokritos (Greek Solar Testing Lab.)

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Ministry of Energy & Water**

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