



Tunisian Solar Thermal Market “PROSOL Program”

Presented by : **Baccouche Abdelkader**, head of
Department, ANME

National Agency of Energy Conservation (ANME)

International Conference
on Solar Heating and Cooling
for Buildings and Industry



SHC 2013
CONFERENCE | SEPTEMBER 23-25
FREIBURG, GERMANY

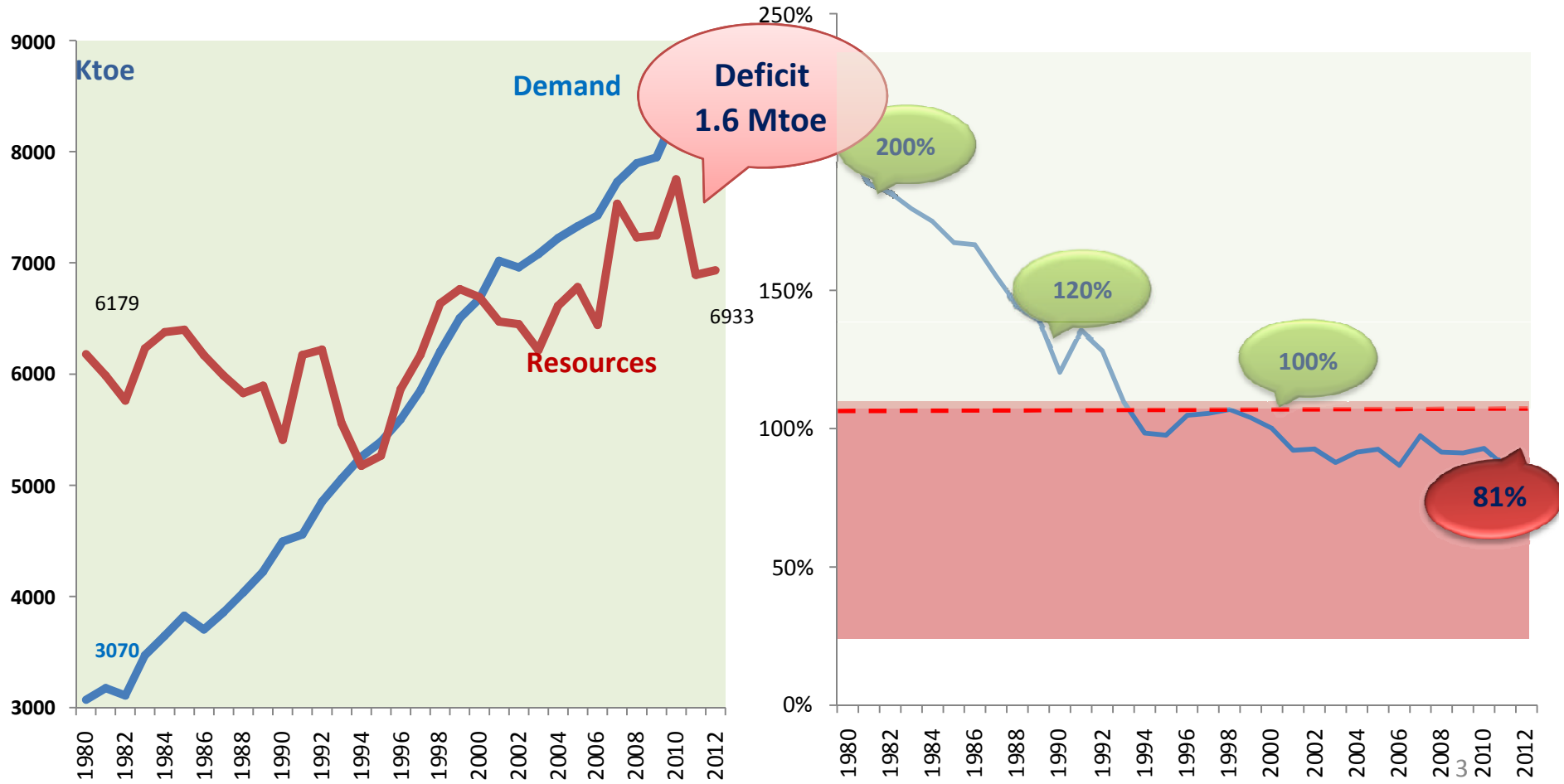
Presentationoutline

- ☞ Tunisian Energy balance
- ☞ Potential and Renewable Energy Strategy in the medium and long term
- ☞ **National program of the promotion of Solar thermal energy PROSOL:**
 - Residential PROSOL– TUNISIA, key of the success and achievement
 - Tertiary PROSOL – TUNISIA, hotels sector achievement and mechanism
 - PROSOL Industry– TUNISIA, Industrial sector, the aproch, the achievement
 - the new Solar process heat program

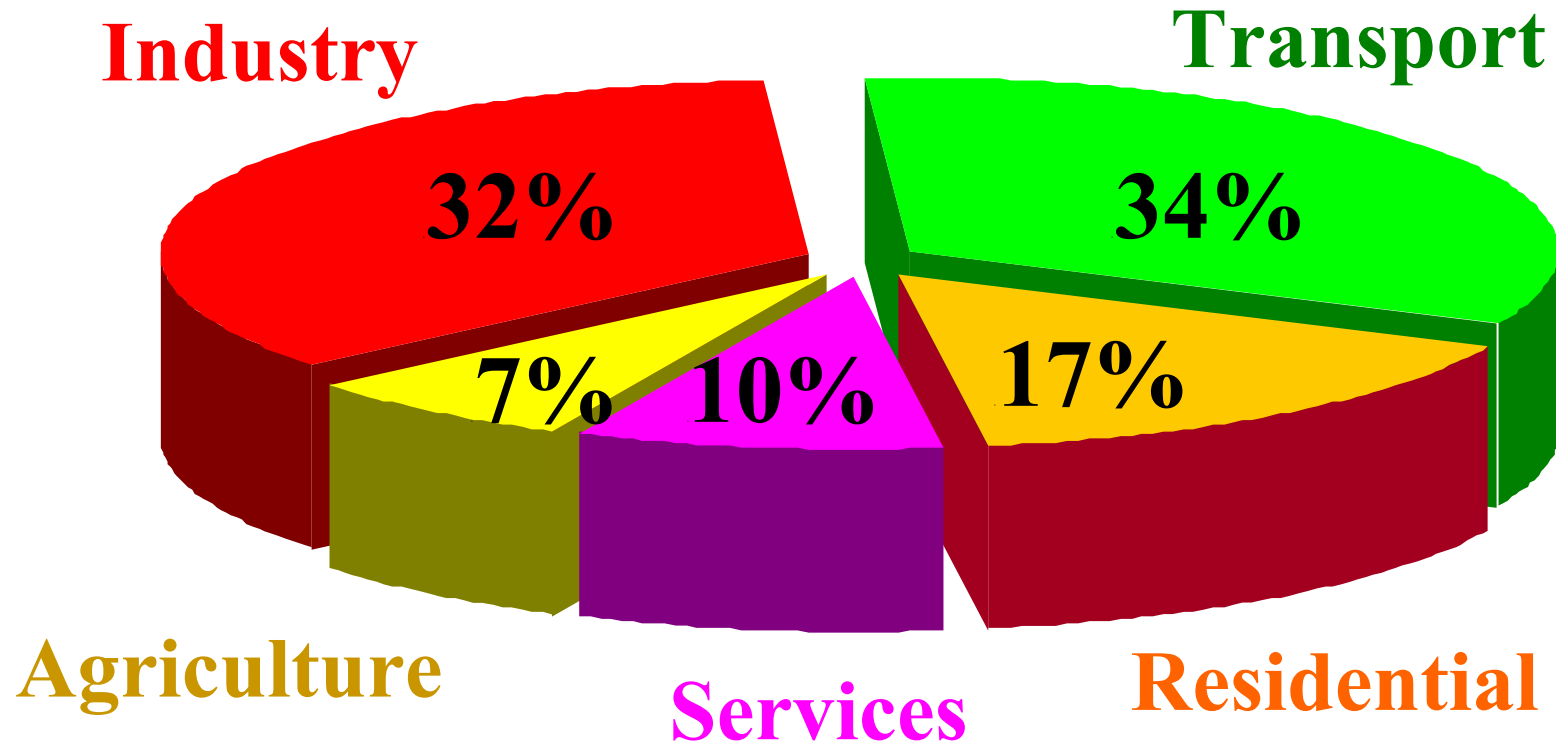
Tunisian Energy Balance

Resources & demand

independence ratio



Share of the final energy consumption in Tunisia

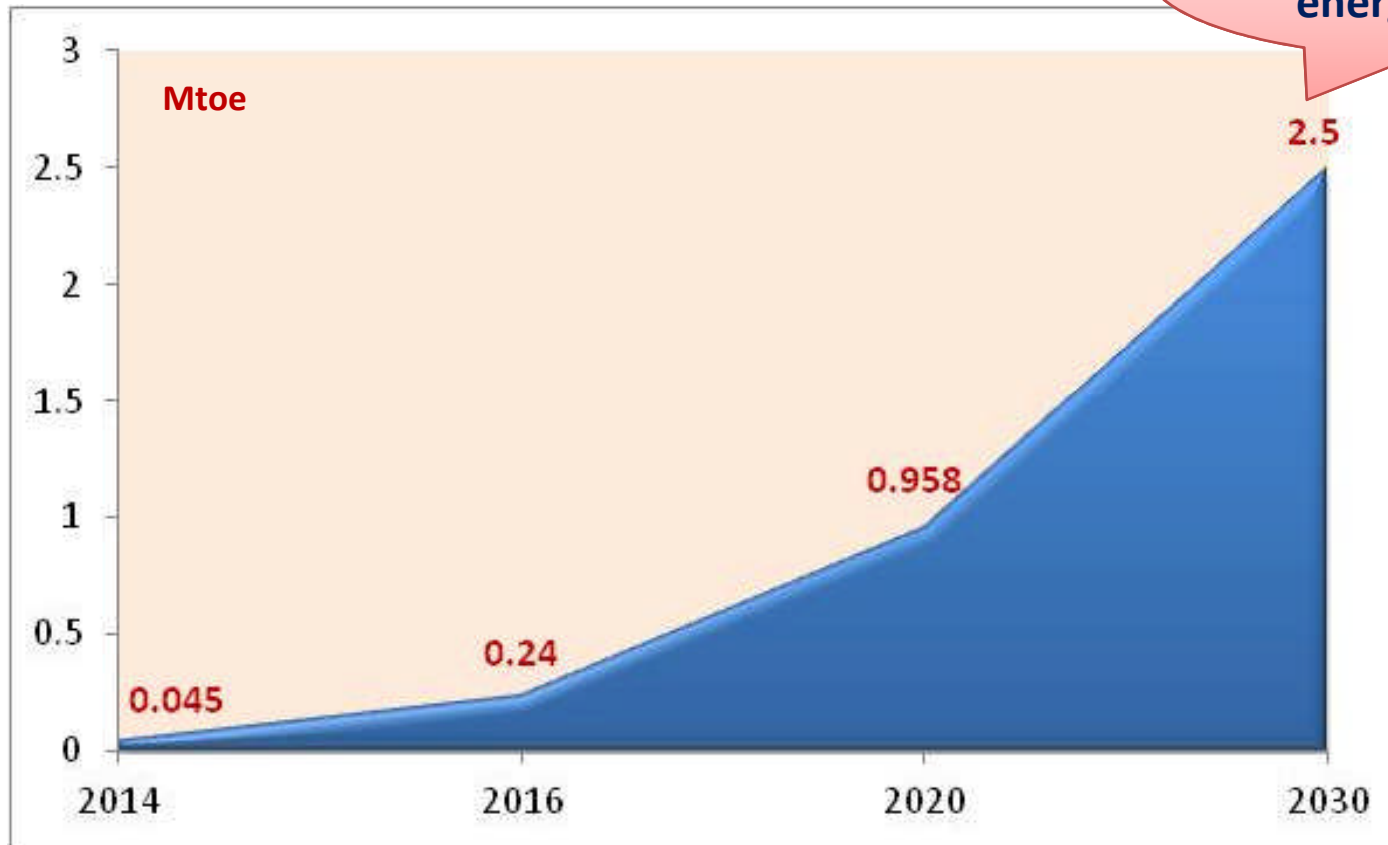


Total: 5,7 Mtoe in 2011

Potential and objectives of the Tunisian Renewable Energy strategy in medium and long term

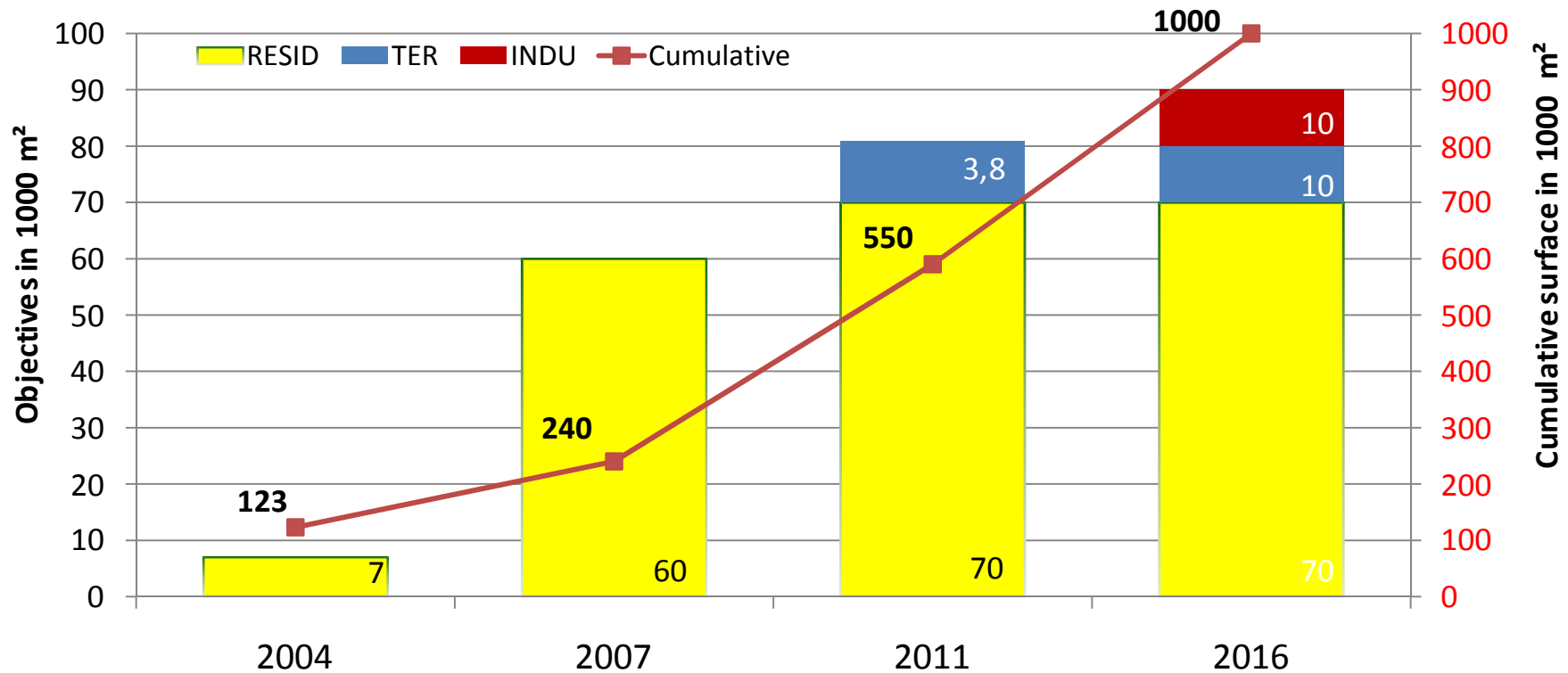
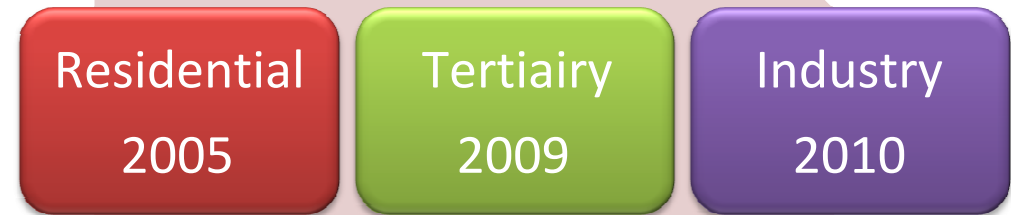
	Potentiel	Objectifs		
		2016	2020	2030
Filières				
Eolien	8000 MW	435 MW	835 MW	1755 MW
Solaire PV raccordé au réseau		140 MW	540 MW	1510 MW
Dont toits solaires (résidentiel, tertiaire et industriel)	5500 MW	60 MW	190 MW	590 MW
Solaire CSP			330 MW	460 MW
Pompage PV	24 MWh	0,55 MW	1,75 MW	8 MW
Bio-méthanisation	6 à 8 Mt de déchet par an	40 MW	140 MW	300 MW
Solaire thermique (résid. & ter.)	4,1 millions de m ²	0,98 Mm ²	1,44 Mm ²	2,85 Mm ²

Impact of the Tunisian Renewable Energy strategy in medium and long term



PROSOLprogram

- ❖ Aim: to create a long-term market for solar thermal
- ❖ Different components
 - ✓ Financial mechanism
 - ✓ VAT exemption
 - ✓ Capacity building
 - ✓ Awareness raising
 - ✓ Carbon finance



PROSOL: Residential sector

Incentives and credit Loan

A subsidy financed from the National Fund for Energy Management (FNME) :

- 100 € (200 TND) for the SWH collector area from 1 to 3 m²
- 200 € (400 TND) for the SWH collector area between 3 to 7 m²;

A refundable bank loan over 5 years by the STEG, through electricity bills

- Loan amount : 220 € (550 TND) , 380 €, 450 € and 570 € (1150 TND),
- Interest rate : TMM+1 (6,25 %) for 2007 and TMM+1,2 for the next year

Key of success

Involvement of STEG offers security

- Guarantee of the loan payments by the STEG through the electricity bills



Collaboration synergy between different actors (Public Partnership – Private)

The bases of the scale change



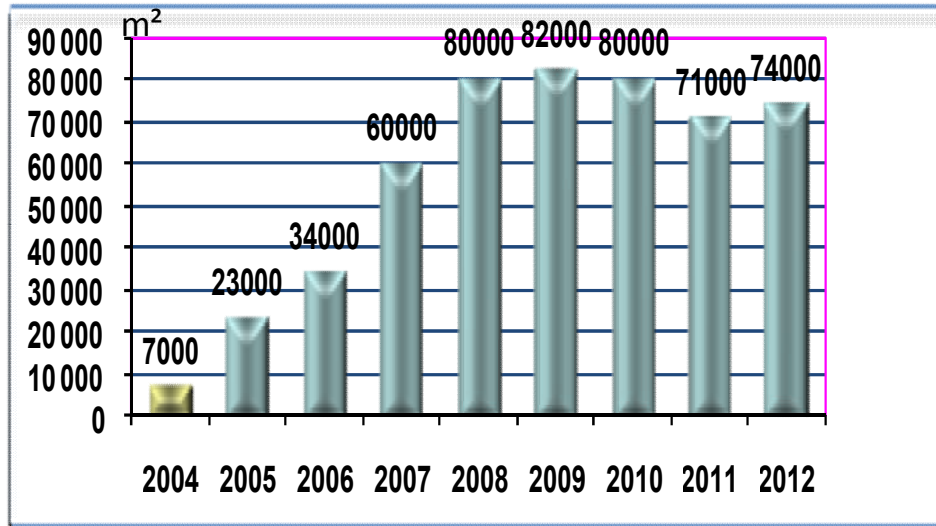
- A real support of the banking sector and a strong membership with the STEG
- Commitment of "Attijari Bank" for the granting of consumer loans with a financing of 64 M€ over the period 2007 – 2012 (This period was prolonged to the end of 2016 with a 60 M € until 2016)
- Interest rates down to 7%

- ❖ A comprehensive communication and awareness raising campaign



PROSOL: Residential sector

Achievements 2004 -2012



Evolution of the achievements from **7000 m²** the full year **2004** to a monthly rate of **7000 m²** in **2010**

Evolution of specific indicator to **62 m²/1000 inhabitants** in **2012**, against **25 m²/1000 inhabitants** in **2007**.

Evolution of the offer (end 2012)

- ❖ More than **50** eligible suppliers, (among **09** manufacturers)
- ❖ **1150** eligible Installers (Micro companies) and over than **400** installers are qualified "Qualisol system"
- ❖ More than **3000** direct jobs were created



The objective is to reach a specific indicator of about **100 m²/1000 inhabitants** in **2016**.

PROSOL: TertiarySector (Service and Hotels)

Targets: **Hotels**, Swimming pool, TraditionalBath (Hammam), Collectives residences ... with a potential of about **500 000 m²**

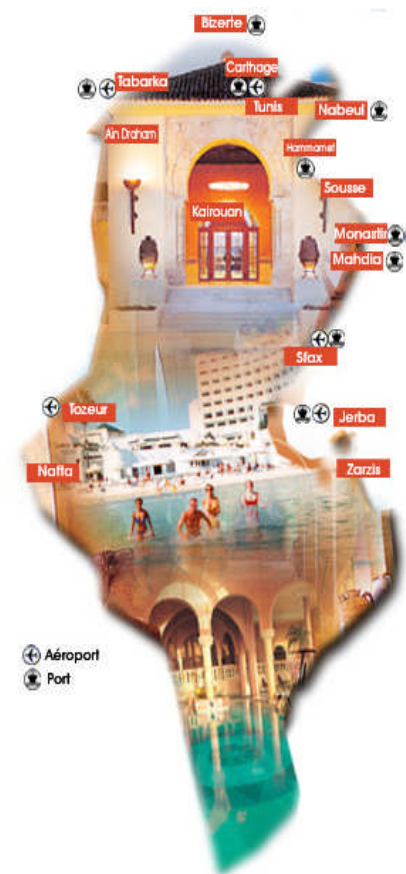


❖ Global potential of solar heating water in hotels

- ✓ Needs estimated of warm water : 6 000 000 m³
- ✓ Needs estimated of energy : 28 000 tep/an
- ✓ Potential of solar collector : 170 000 m²
- ✓ Energy saving estimated: 17 Ktoe / year
- ✓ Solar Cover rate: 60%

PRIME TARGET: 3 stars and over hotels

Hotels	450
Surface of solar collector	90000 m²
Average Surface	200 m²



PROSOL: TertiarySector (Service and Hotels)

Incentives

A subsidy of 30 % of the investment with a ceiling 75 € / m² financed by the FNME

70% of the cost of the study and control with a ceiling of 35000 €

Other subsidies from the funds IMELS-UNEP:

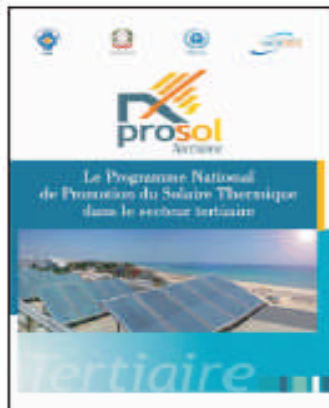
- A subsidy of 25% investment with ceiling 75 €/m²;
- 2% bonus on the interest rate of loans
- A subsidy of 3 €/m² in the maintenance costs over 4 years, the first year is considered as warranty;

Support measures

- ❖ Training leading to a qualification of
 - ✓ Engineering consulting firms (Designers and control offices)
 - ✓ Installers of solar stations
 - ✓ Maintenance responsible of hotels
- ❖ Elaboration of a membership process to the project
 - ✓ The specifications of eligibility of the operators and the products
 - ✓ Elaboration of typical documents
 - ✓ Role and responsibility of the operators
- ❖ Coaching for the first projects (study and implementation)
- ❖ Achievement of the different support of the communication plan

PROSOL: TertiarySector - The communication plan (Service and Hotels)

Affiches



Fiche programme



Photo choisie montée et retouchée pour le visuel



Dépliant



Autocollant



Brochure



- ❖ Offer evolutions (end 2012):
 - ✓ **16** Eligible Engineering consulting firms
 - ✓ **12** Eligible installation companies of solar station
 - ✓ **03** Eligible Offices of control
 - ✓ **50** Eligible models of collector

- ❖ Progress indications (end 2012):
 - ✓ **14 000 m²** was installed (hotels + others)
 - ✓ **60** hotels engaged in the program
 - ✓ **30** installations in hotels was realized that to say a surface of **3000 m²**

PROSOL: TertiarySector -ACHIEVEMENT(Hotels)

**Collector already installed:
3000 m²**

Success story : Djerba Beach Hotel

collector area
312 m²

Storage Volume
15 m³

Cost
205 000 TND

Subsidy
62 KDT

Energy conservation
46 Toe/year

Monetary gains
42,5 KDT/year

Payback time
4 years

Main asset :

**Satisfaction of the expected results
An interesting feedback**



PROSOL: TertiarySector -ACHIEVEMENT(Hotels)

**Collector already installed:
3000 m²**

Success story : Yadis Djerba Hotel

collector area
150 m²

Storage Volume
10 m³

Cost
105 000 TND

Subsidy
30 KDT

Energy conservation
22 Toe/year

Monetary gains
13 KDT/year

Payback time
5 years

Main asset :

**Satisfaction of the expected results
An interesting feedback**



IndustrialSector

Energy consumption share in Industry, 2010 (final toe)

Energy	2010	
	toe	%
Electricity	532 151	24,6%
Natural gas	838 170	38,8%
Other	789 899	36,6%
Fuel oil	348 259	16,1%
Pet Coke	344 100	15,9%
LPG	34 115	1,6%
Gas oil	62 958	2,9%
Pét lampant	467	0,0%
Total	2 160 220	100,0%

The thermal consumption of the sector is more than **75%**

IndustrialSector

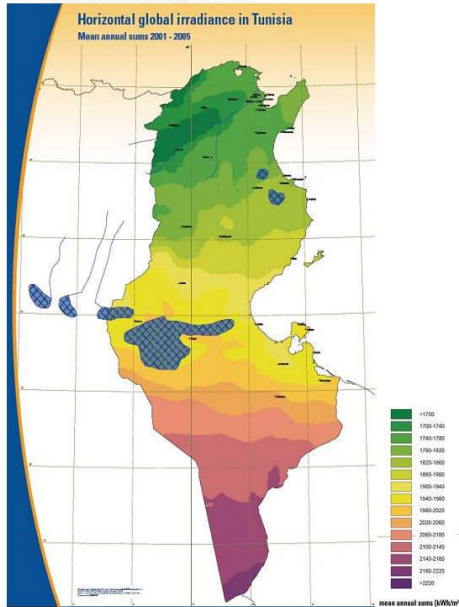
Final Thermal energy consumption in 2010 The potential of solar process heat integration (Final toe)

Thermal energy consumption by Branch	2010	
	tep	%
Textile	67 958	15%
Food	112 999	24%
Chemical	166 136	36%
ID	114 985	25%
Total	462 078	100%



PROSOLprogram :Industrial sector

11.2 Annex 2: Carte de rayonnement de Meteocontrol: Irradiation globale 2001 – 2005, basée sur Meteosat 7 et MSG



The average of the annual solar radiation in Tunisia is more than **2000 kWh/m²**



A huge potential : **3 million m²**

A real potential : **430 000 m²**

**300.000 m² (70%) de
90°C-250°C**



PROSOL Industry was launched with the support of the Italian Cooperation (IMELS, MEDREC) and UNEP in 2010.

Incentives

A subsidy of **30 %** of the investment with a ceiling **75 € / m²** financed by the **FNME**

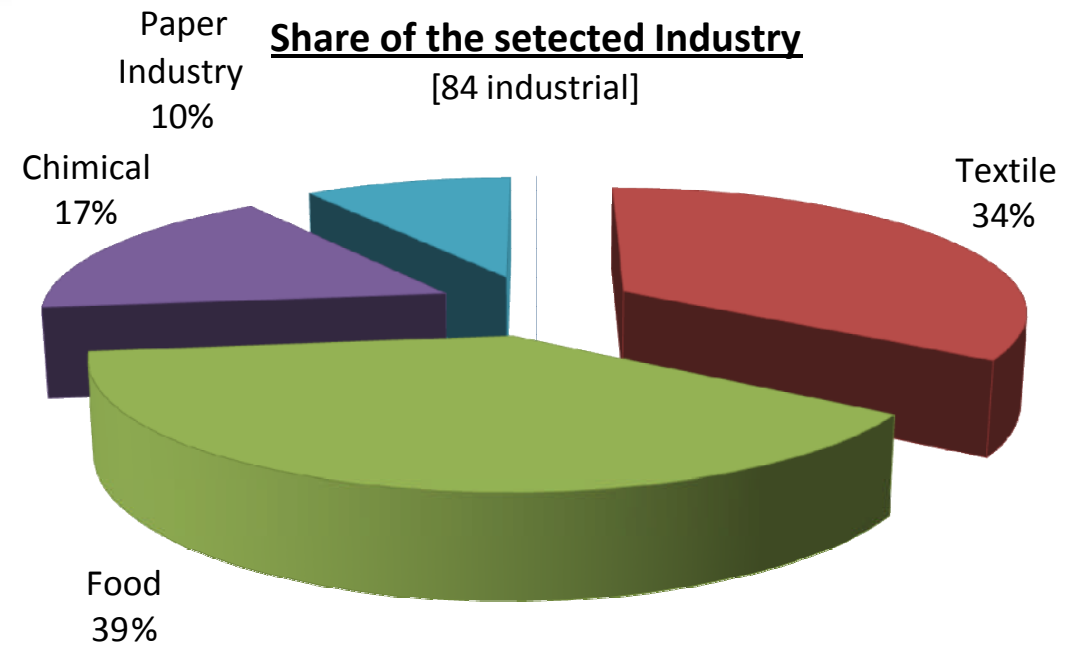
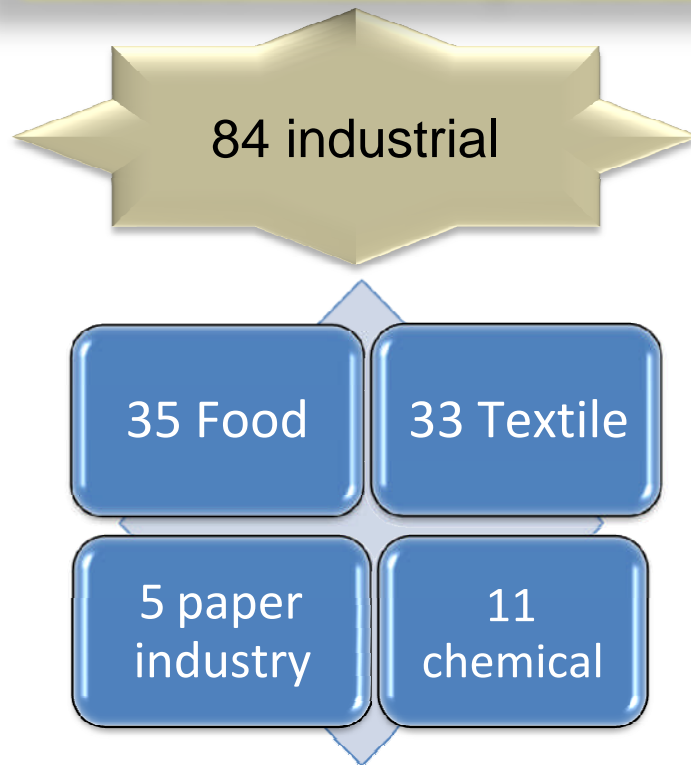


PROSOL Industry :The Approach Adopted

- ▶ The determination of the potential of using solar systems in 80 industrial institutions belonging to the branches of food, textile, chemical and paper industry,
- ▶ The realization of a survey to identify the degree of the commitment of the industrial for the SHIP,
- ▶ Identification of 40 industrial the most interested to the project
- ▶ The achievement of **40 prefeasibility** studies for the 40 industrial establishments the most interested and motivated to invest in the solar thermal technology,
- ▶ Information and awareness to identify the industrial interested to invest,
- ▶ The finalization of **10 detailed feasibility studies**
- ▶ Organization of a workshop to disseminate the results of the studies and identification of the industrial to realize pilot project,
- ▶ The implementation of a pilot project in the SHIP,
- ▶ The establishment of a financial **mechanism** for the industrial PROSOL program,



PROSOLIndustry :Selection and survey of industrial

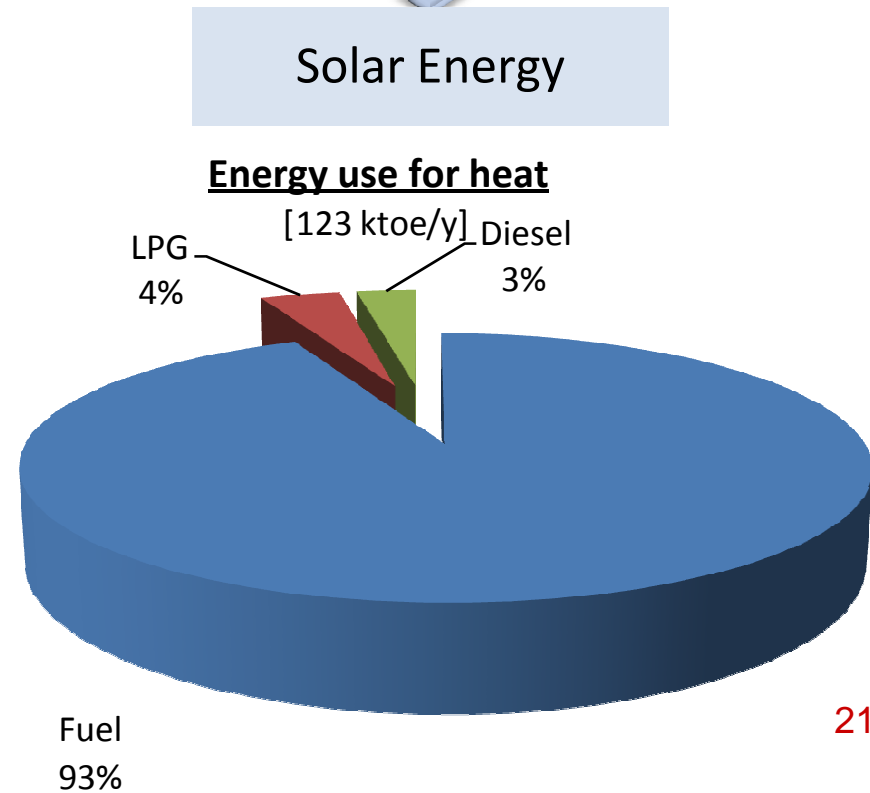
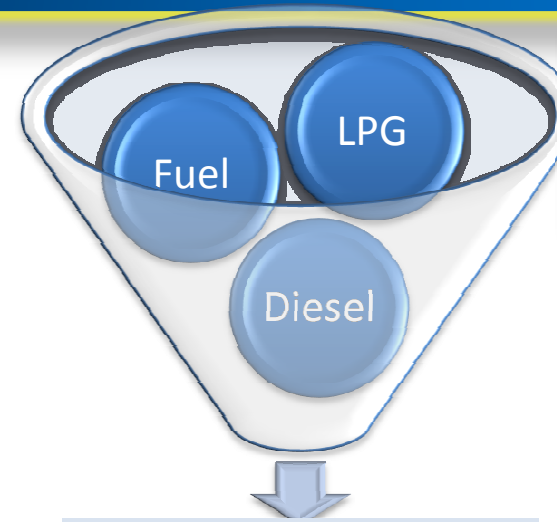
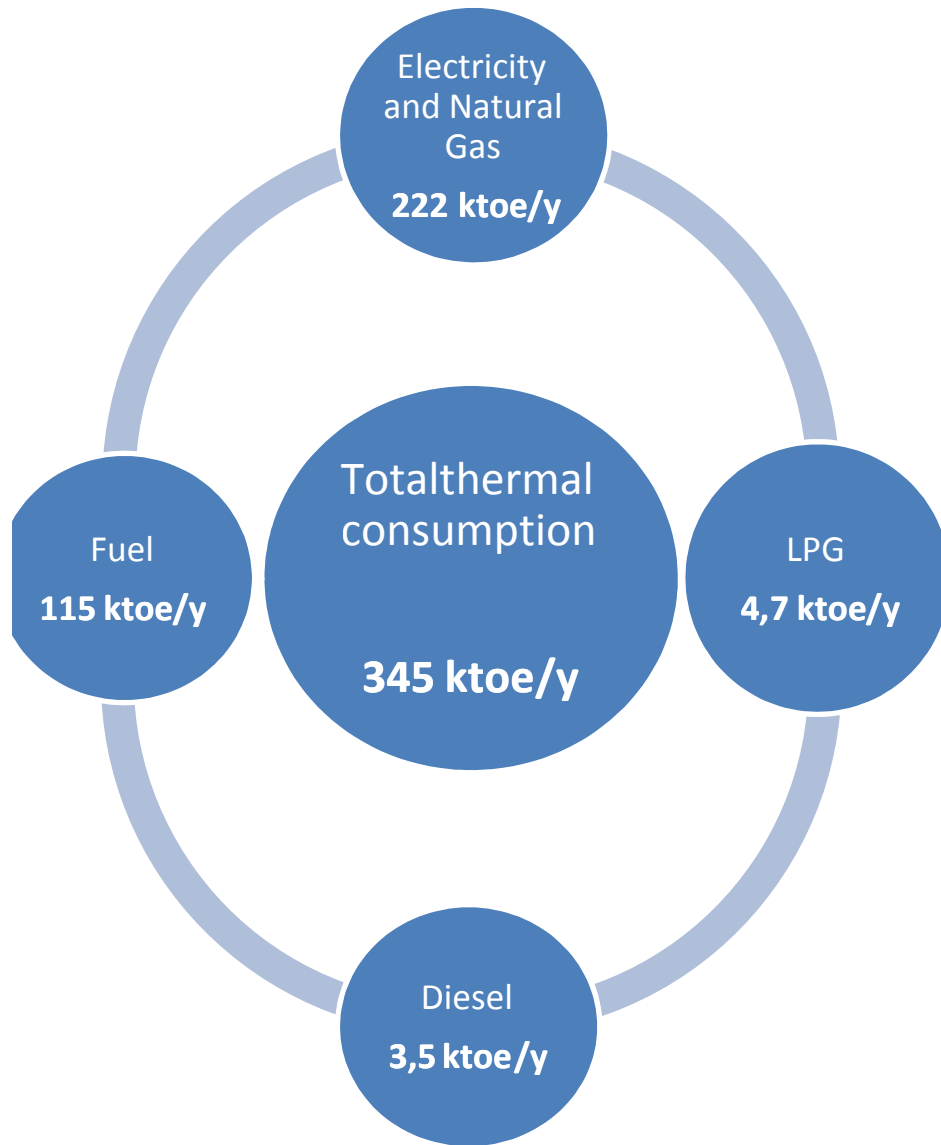


Degree of commitment

Degree of commitment	A	B	C	D	Total
Number of Industrial	38	8	13	25	84
Pourcentage (%)	45	10	15	30	100

A : Very interested
 B : Interested
 C : Indifferent
 D : Refusing

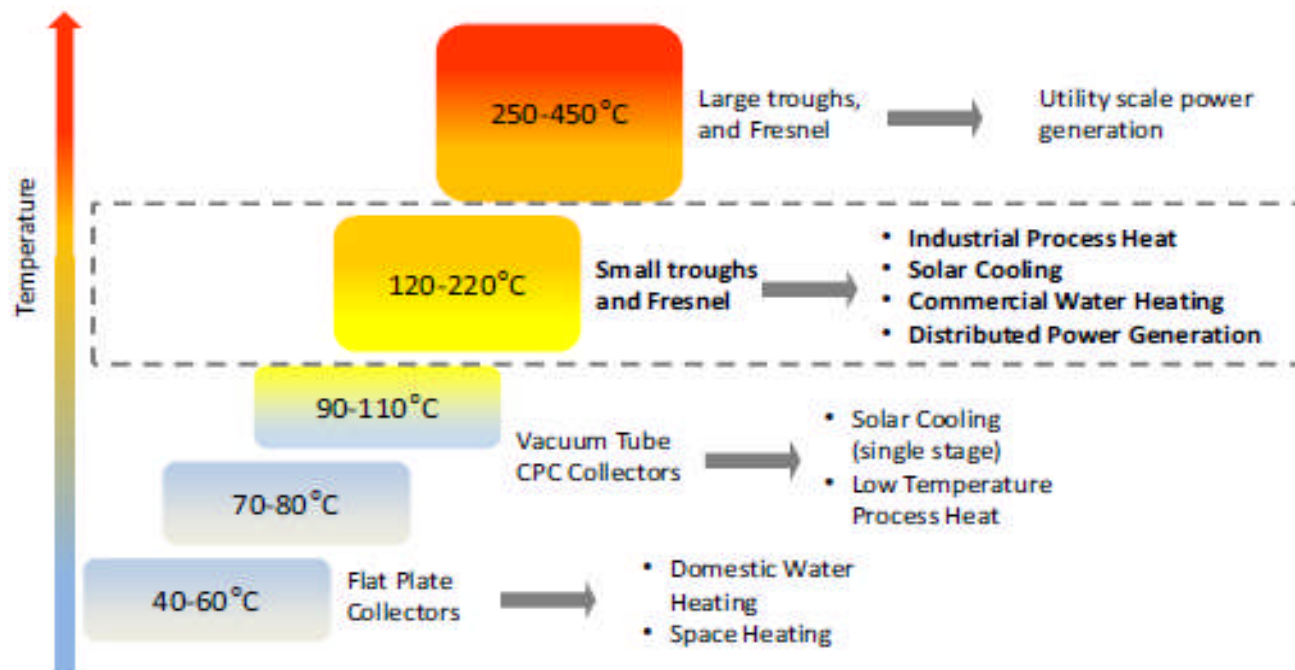
Typology of selected industrial



IndustrialSector :Feasibility studies

Recommendation for the first step

- Focus on Low temperature process heat to use matures technologies and to reduce the complexity,
- Focus on LPG and fuel oil (decrease the payback time witch was between 7 and 26 y),
- Establishment of a financial mechanism (increase the economic profitability) ;



Current action in the PROSOL INDUSTRY

- ❖ The achievement of a demonstrative solar plant in a low temperature industrial process (by the end of the 2013)
- ❖ Carry out a study for the setting up of a sustainable long-term regulatory framework for the promotion of the integration of solar thermal energy in the Industrial sector in Tunisia
- ❖ The analysis of the feedback from the pilot plant in low temperature
- ❖ Designing a financial mechanism appropriate to the Tunisian context for the development of the SHIP

**New program of the promotion
Of innovative solar thermal application in **Industry**
Financed by the **BMU**
ANME/GIZ
DASTII**

Project: Distribution of innovative solar thermal applications in the Tunisian industries (DASTII)

- **Basis: Project Bid signed between GIZ and BMU**
- **Runtime: 09/2012 – 03/2017**
- **Sponsor: German Ministry of Environment (BMU)**
- **Fund: Internationale Klimaschutzinitiative (IKI)**
- **Budget: 2.500.000 €**
- **Project Partners: ANME, Fraunhofer ISE**

DASTII

Aim to create a sustainable market of solar process heat in Tunisia

Specific Objectives (Output)	Indicators
1. Training of Tunisian experts and companies in the field of solar process heat	At least 80 Tunisian experts participate in trainings in the field of solar process heat
2. Execution of at least one solar process heat demonstration project in the Tunisian industry	A solar process heat system is installed in at least one industrial company in Tunisia
3. Set-up of a national program for solar process heat	The national program is operational
4. Sensibilisation of the public and dissemination of the project results	Project results are presented at one international conference in Tunisia

Conclusion

The PROSOL Program has a positive impact in all level with an approach “winner - winner” making possible to ensure a durability of development of this program

- ❖ For the State, the financial support which he gives solar thermal energy is not translated by an additional budgetary effort considering the public allocation is largely compensated by the amount of subsidy avoided on the consumption of the LPG for the heating of warm water;
- ❖ For the banking sector, the implementation of the program PROSOL creates a large wallet credit. This wallet is also of high quality, because of its security through the repayment of loans through the electricity bill;

Conclusion

- ❖ For the suppliers, it is clear that the program PROSOL is a unique business opportunity, taking into account the volume of the market which it generates
- ❖ For the consumer, the program allows him to improve his comfort enjoying a hot water service quality and payment terms are particularly advantageous. According to the investigation of satisfaction customer carried out by a specialized office, **87%** of the customers are completely satisfied with the use of SWH;
- ❖ Finally, the ANME plays an important role of regulation and control in order to preserve the interests of all the actors by a quality approach QUALISOL and standard Solar Key mark which the ANME is setting up in collaboration with the various actors

**Thank you
for your attention**



ANME

www.anme.nat.tn