

IEA SHC Task 48 6<sup>th</sup> expert meeting

Quality assurance and support measures for Solar  
Cooling

PISTACHE – Presizing tool for solar cooling, heating  
and DHW systems



Daniel MUGNIER – Kingston, 12/05/2014

# General description of the tool



Presizing tool for solar cooling, heating and domestic hot water production systems

## Applications :

- solar cooling, heating and DHW installations
- solar combi+ and large scale systems, w/o back-up systems
- sorption chillers : aB / aDsorption
- collectors : FPC / ETC
- heat rejection : wet cooling tower / geothermal / drycooler

# General description of the tool



## Main characteristics and functions :

- 12 configuration schemes
- Input : hourly meteo + load file (tab text file)
- Automatic presizing of main components (Pn, Scoll, Vstorage) and default values for parameters
- Database of abso/adsorption chillers and collectors available on the market
- Use of for solar energy : cooling + heating and/or DHW production
- Integrated help, FR and ENGL version

# General description of the tool



## Output :

- Summary with main installation characteristics
- Monthly energy balance
- Annual performance indicators + their comparison to target values
- Online Graph
- Analysis of the results

# Input meteo/load file



tabulated text file saved with \*.mgp extension

1<sup>st</sup> line : name of the column

2<sup>nd</sup> line : units of the column

3<sup>rd</sup> line to 8763<sup>rd</sup> : hourly data beginning the 1<sup>st</sup> of January

# Input meteo/load file



Column name	Units	Nbr of decimal	Legitimate domain	Content
TIME	-	0	[1 ; 8760]	Number of the hour over the year
MOIS	-	0	[1 ; 12]	Number of the month
JOUR	-	0	[1 ; 31]	Number of the day
HEURE	-	0	[1 ; 24]	Number of the hour over the day
Text	°C	1	[-99.9 ; 99.9]	Ambient temperature
Ens_g_hz	W/m <sup>2</sup>	0	[ 0 ; 1200 ]	Total horizontal solar radiation
HR	%	0	[0 ; 100]	Ambient relative humidity
Tef	°C	1	[0.0 ; 100.0]	Fresh water temperature for DHW
Bchauff	kWh	1	[0.0 ; 999 999.9]	Building heating load
Bclim	kWh	1	[0.0 ; 999 999.9]	Building cooling load
Becs	kWh	1	[0.0 ; 999 999.9]	DHW net demand

## Conclusion : PISTACHE ....



- is **easy to use** due to **automatic pre-sizing** function
- is convenient for a **large number of applications**, to **evaluate the feasibility** of a project
- can also be used to **compare real performances** of an installation to predicted ones
- **is validated** thanks to comparison between calculations and existing installation monitoring data

Latest work : last debug, numerical validation (PIMENT Lab – University of La Réunion, FR)

...and experimental validation for other countries (IEA SHC Task 48 experts)



## To know more about PISTACHE....

Nowag J, Boudéhenn F & Al ; Calculation of performance indicators for solar cooling, heating and domestic hot water system ; Energy Procedia n° 30 ; 2012 ; p937-946.

→ definition of the **performance indicators**

Le denn A, Boudéhenn F & Al ; A simple predesign tool for solar cooling, heating and domestic hot water production systems ; Building simulation 2013, August 25-28, Chambéry, France

→ presentation of the tool and **validation on 4 SHC installations**

Semmari H, Marc O & Al ; Sensitivity analysis of the new sizing tool "PISTACHE" for solar heating, cooling and domestic hot water systems ; SHC 2013, September 23-25, Freiburg, Germany

→ presentation of **sensitivity analysis** and validation on 1 solar cooling installation (RAFSOL)

**OTTI Conference** : « System design : design tools, simulation, engineering Par 1 » Thursday, Sept 26th, 2013 (14h30)





## ACKNOWLEDGMENT

*This work has been supported by French Research National Agency (ANR) through Habitat intelligent et solaire photovoltaïque program (project MEGAPICS n° ANR-09-HABISOL-007)*



# Thank you for your attention



## PISTACHE

Pre-sizing Tool for Solar Cooling and Heating systems  
PRÉ-DIMENSIONNEMENT DES INSTALLATIONS DE  
CLIMATISATION/CHAUFFAGE SOLAIRES

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