

General presentation of IEA SHC Task 53



Tim Selke – 20/04/2017 – Messina

Task 53

Energy challenges for sunny countries

Commitment of the countries to reach ambitious objectives and scale up Renewable Energy and Energy Efficiency measures

Very important share of the energy consumption due to air conditioning



One huge advantage in the sunny regions :

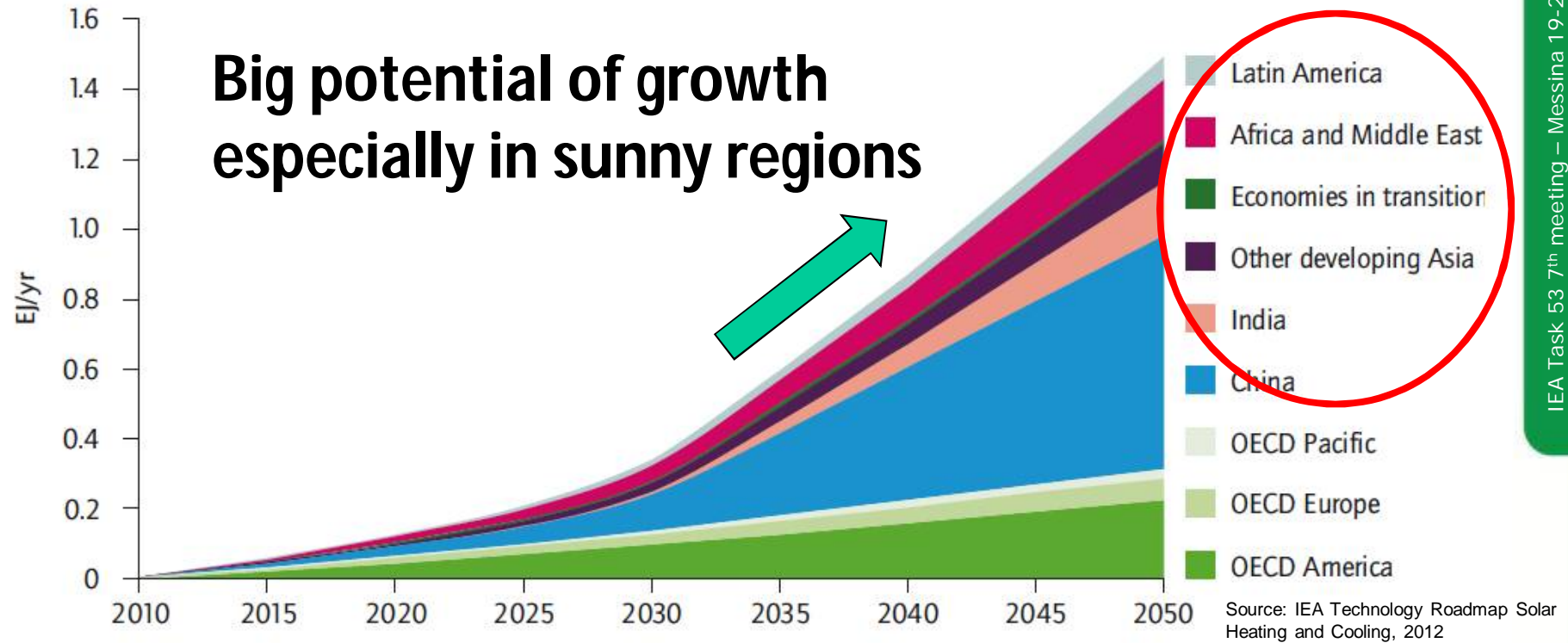
Infinite resource with the SUN !



How to go and spread cost competitive solar cooling ?

IEA Technology Roadmap SHC – *Market potential by 2050*

Figure 16: Roadmap vision for solar cooling (Exajoule/yr)



1.5×10^{18} J/a = 416.7 TWh/a Solar Cooling by 2050

Systems could enter the market between 2015 and 2020

2 main channels in 2017 for Solar Cooling



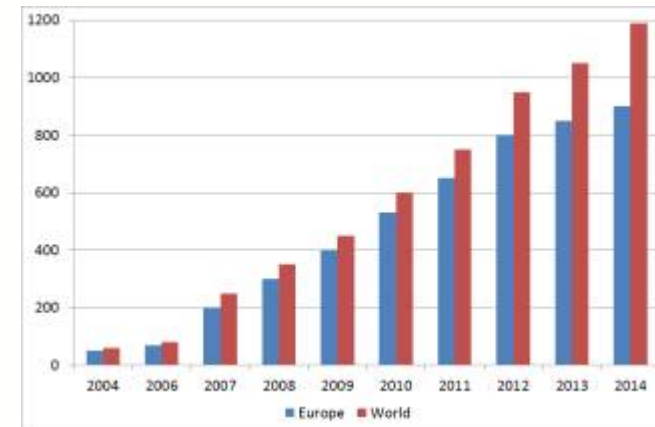
CHILLER / AIR CONDITIONER

Solar cooling market trends in the World

Still a niche market :
≈ **1,200 systems** installed worldwide (2015)

A High level of innovation still present :

- * Heat rejection
- * Electric consumption reduction
- * kWh cooling cost decrease



Source: Solem Consulting / TECSOL



TASK 53

New generation solar cooling & heating systems
(PV or solar thermally driven systems)



Title description and Work plan
November 2013
Report for the participants
David Miguez (TECSOL, France)
With the support of
The European Behavioural Change, Initiative

IEA SHC
Task 53

Already very accurate concepts for Arabic countries

- * low & medium temperature solar thermal absorption
- * small size PV air-conditioning



Task 53 

Need of a new Generation solar cooling systems

Solar thermal « traditionnal » cooling has **difficulty to emerge as a economically competitive solution**

Main reasons :

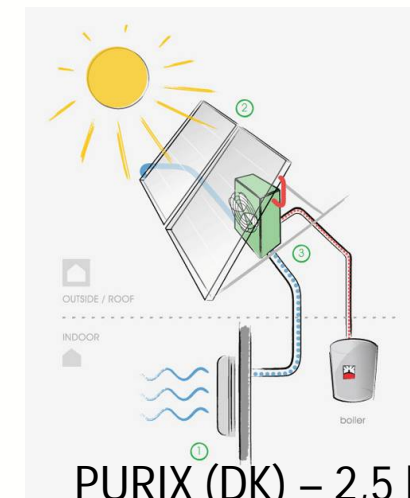
- **Technical** : Limit on adaptability due to hydraulics, complexity
- **Economical** : High upfront cost, especially for small systems

⇒ Still need **intensive R&D** for quality improvment and best solution selection (ongoing IEA SHC Task 53)

⇒ Very innovative concepts such...

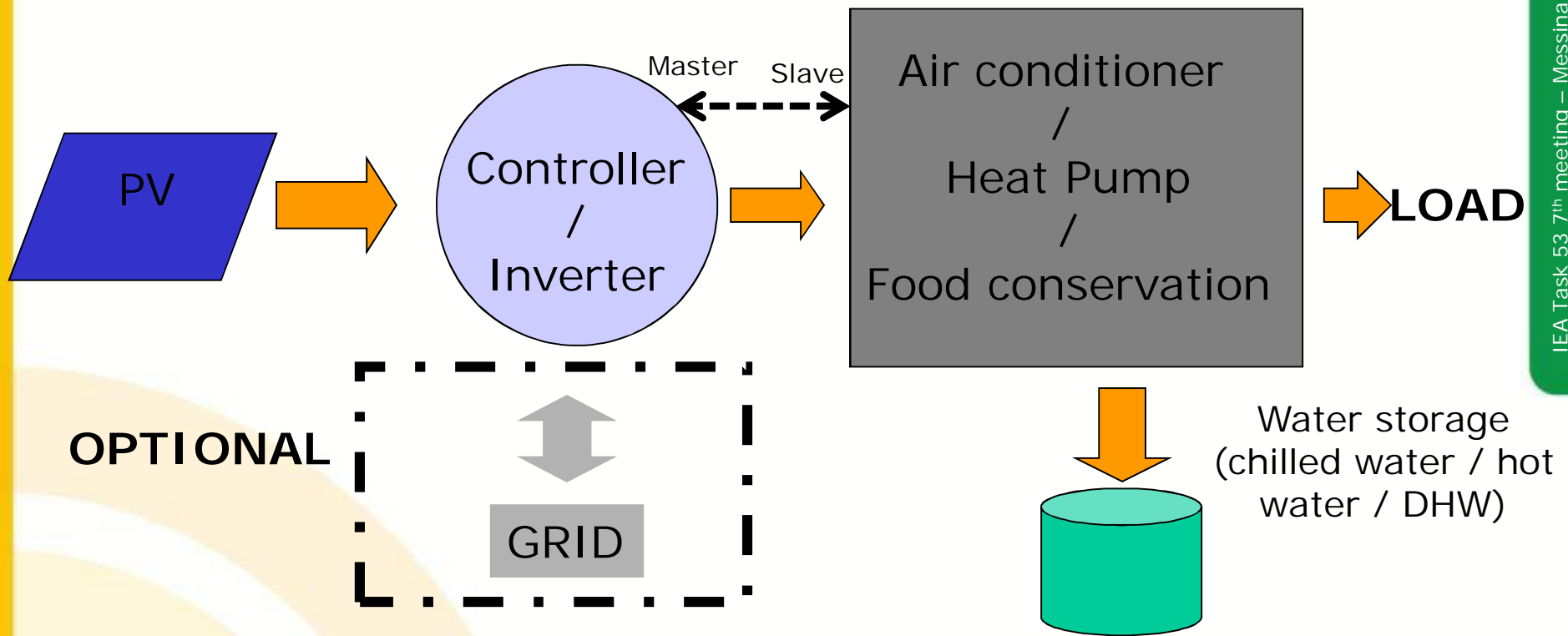


SOLABCOOL (NL)
4,5 kWc



PURIX (DK) – 2,5 kWc
5m² solar panels

Example of Basic concept for the PV approach



Main categories

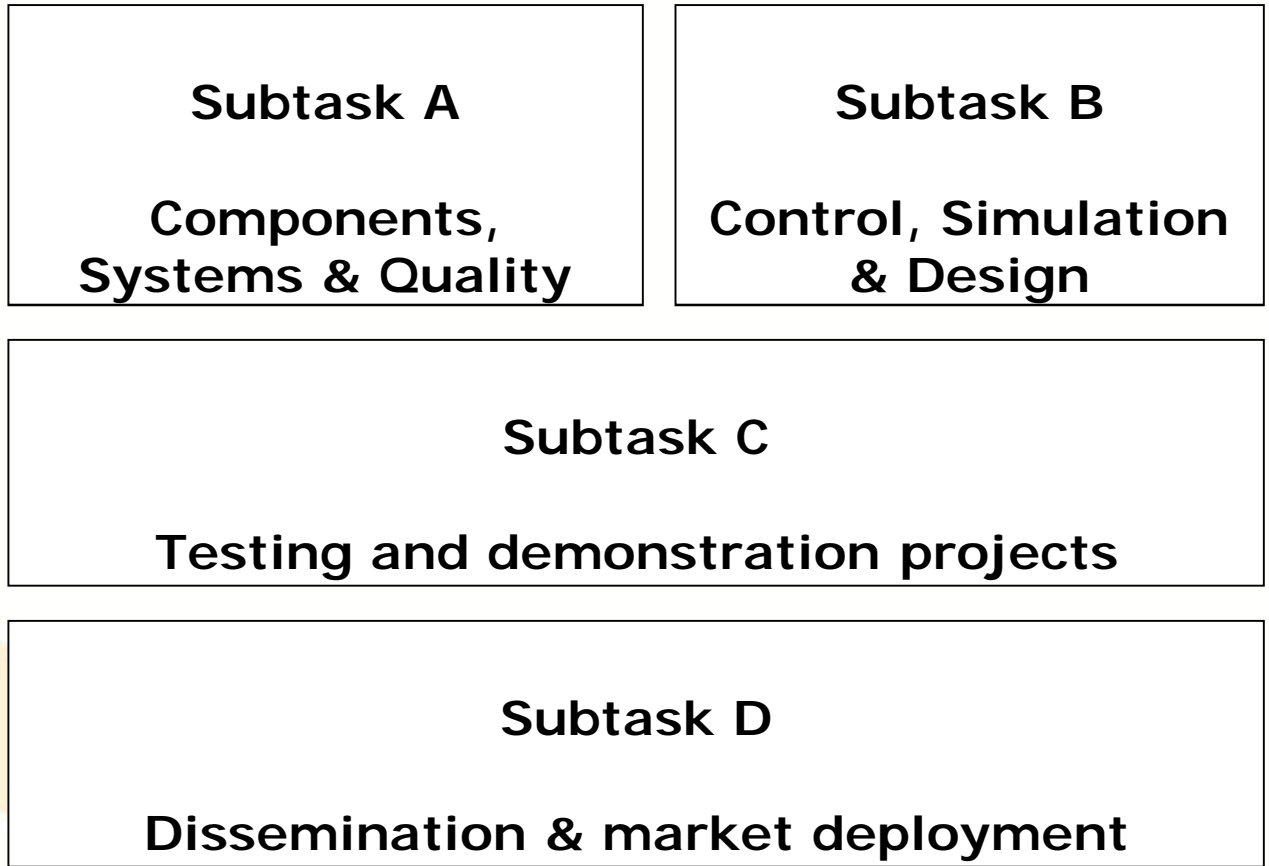


Solar air conditioners : Splits

PV+ HP coupling for Office/Commercial



Task 53 Structure



4 Subtasks & 19 activities











Time Schedule : 4,5 years

From March 2014 to June 2018



Task 53 new developments & progress

Subtask A: Components, Systems & Quality

Logo	Manufacturer, country	Market status	Service	Solar input type	Nominal cooling capacity (kW or m ³ /h)	Nominal heating capacity (kW)	Nominal solar input (Wp for PV and m ² for ST)	Cooling Storage	Target market area	Heat rejection	Back up	Other	Website
	ATISYS, France	R&D	Cooling/heating	PV	4 kW	5.1 kW	4.6 kW	Sensible tank	France, Northern Africa	Air	Grid	R290 chiller, short term elec. battery	www.atisys-concept.com
	CLIMATEWELL, Sweden	R&D	Cooling/heating/DHW	ST	40 kW	108 kW	180 m ²	Sensible tank	Europe, sunny countries	Air	Electric chiller (390 kW)	Adsorption (LiCl/H ₂ O)	www.climatewell.com
	FREECOLD, France	Commercial	Cooling	PV	2.5 kW	No heating	1.5 kW	-	Africa, developing countries	Air	Grid	solar input 24VDC, elec. battery possible	www.coldimov.com/en
	FREESCOO, Italy	R&D	Cooling/heating	ST/PV	500 m ³ /h	1.44 kW	2.4 kW	-	Italy	Air		Desiccant technology	www.freescOO.com/solarunit
	GREE, China	R&D	Cooling/heating	PV	33.5 kW	37.5 kW	12.2 kW	None	China	Air	Grid	VRF	www.greeac.com
	KAYSUN, Spain	Commercial	Cooling/heating	PV	3.5 kW	3.5 kW	0.7 kW	None	Spain, Europe	Air	Grid	Scroll, no battery	www.kaysun.es/en
	PURIX, Denmark	Commercial	Cooling/heating	ST	2.5 kW	3.6 kW	4.8 m ²	None	Europe, sunny countries	Air	Boiler	Absorption (LiBr/H ₂ O)	www.purix.com
	SENR, France	Commercial	Cooling/heating	PV	3.6 kW (split) 45 kW (VRF)	3.6 kW (split) 50 kW (VRF)	0.65 kW (split) 20 kW (VRF)	None	France, Europe, sunny countries	Air	Grid	Scroll, battery possible	www.senr.fr
	SOLABCOOL, Netherlands	R&D	Cooling/heating	ST	4.5 kW	8 kW	13.3 m ²	None	Europe, sunny countries	Air	District heating	Silicagel-water adsorption cooling machine	www.solabcool.com
	YAZAKI, Japan	R&D	Cooling/heating	ST	35 kW	60 kW	0.1 kW	Sensible tank	China	Air	Electric chiller (29.3 kW)	Absorption (LiBr/H ₂ O)	www.yazaki-group.com/global

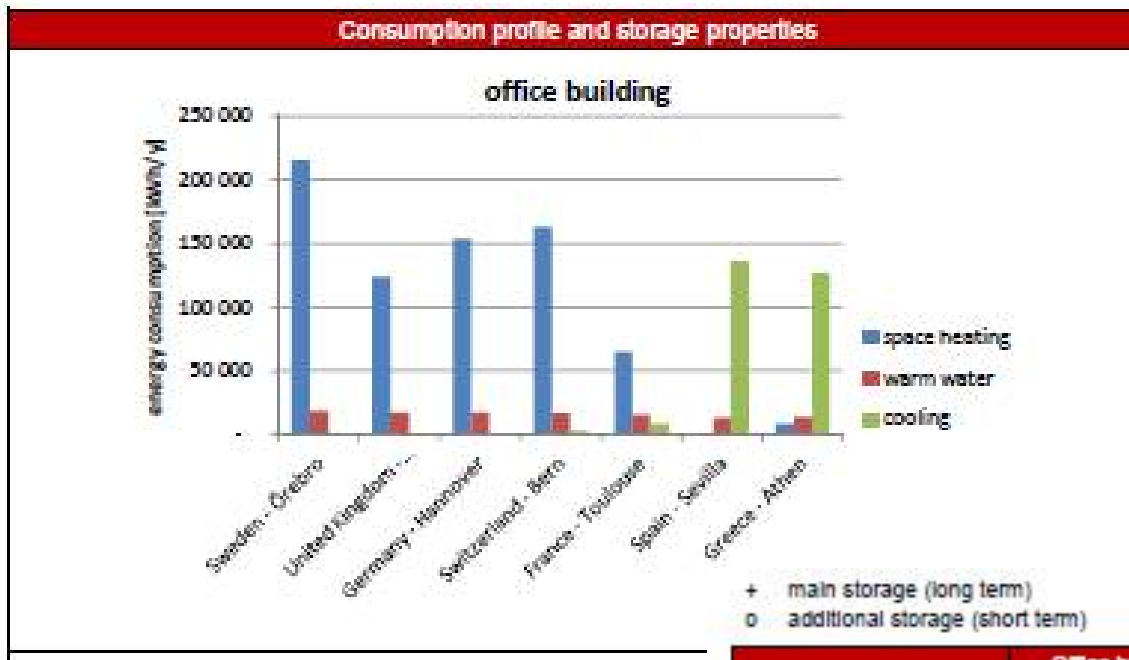
Overall presentation of the data collection on innovative solar cooling and heating systems among IEA SHC Task 53



State of the art of new generation commercially available



Subtask A: Components, Systems & Quality



Consumption profile and storage properties for office buildings in European cities

Estimation of the most economical storage technology for an office building depending on its location.

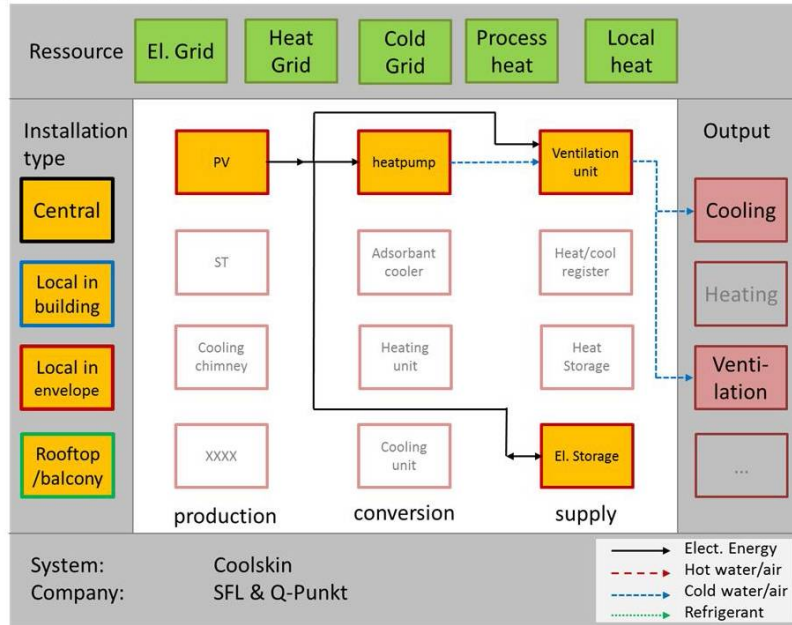
+ main storage (long term)
o additional storage (short term)

	Office building – northern climate zone	Office building – middle climate zone	Office building – southern climate zone
UTES	+	+	++
ATES	+	+	+
Pit storage	+	+	+
Solid media	o	o	o
PCM	o	o	o
Ice storage	o	++ / o	++ / o
Hot and cold water tank	++	+ / o	o

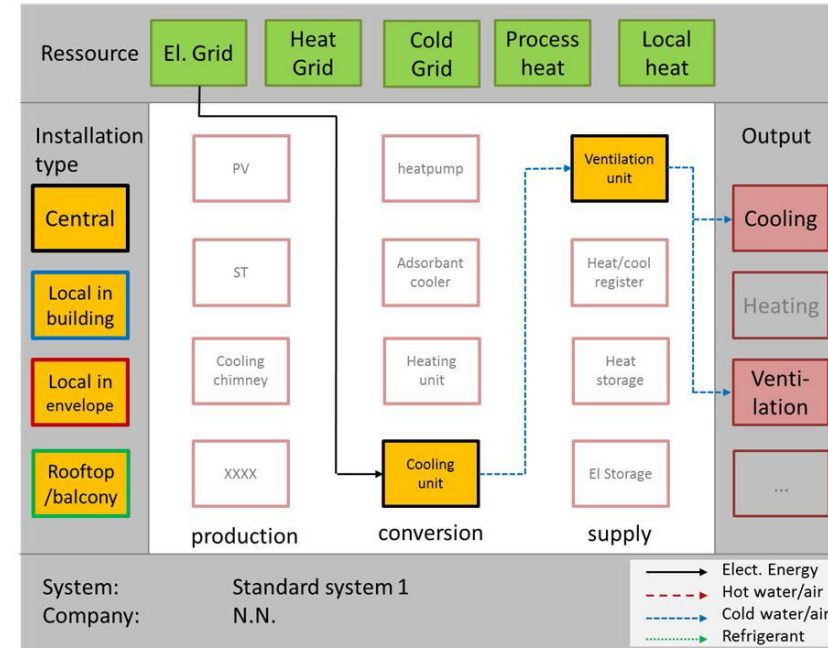
Technical report on best practices for energy storage including both efficiency and adaptability in solar cooling systems

Subtask A: Components, Systems & Quality

Schematic Draft 2: Example 1



Schematic Draft 2: Example 2

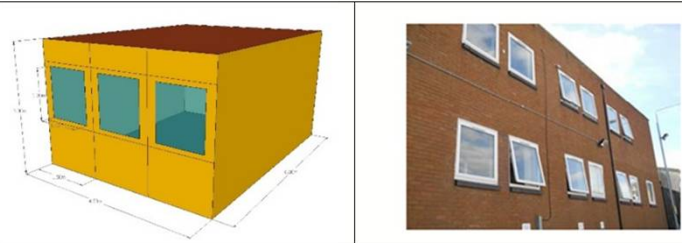
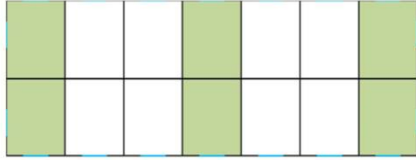


Report on a new and universal classification method “new generation solar cooling square view” for generic systems (A4 : System integration)

Subtask B: Control, Simulation and Design

Ongoing set up work of building TRNSYS models for simulating reference systems

Warning : so far, no climatic conditions out of Europe (research of new contributors)...

OFF	
Sketch and picture	
Zoning	
Zone height/width/depth	3.0 / 4.5 / 6.0 m Ceiling height 2.8 m
Zone floor area / volume	27 m ² / 81 m ³
Office area per floor	6 to 12 offices per floor
Number of floors	3 to 7
Roof type	Flat concrete roof
Glazing ratio	30 % to 60%

Definition for reference conditions
(B1 : Reference conditions)

Subtask C: Testing and demonstration projects



Task 53



Final draft report (including ST & PV)

Deliverable D-C1.2 – Adapted Monitoring Procedure for New Generation Solar Heating & Cooling Systems
Final Draft

Date: 17.05.2016

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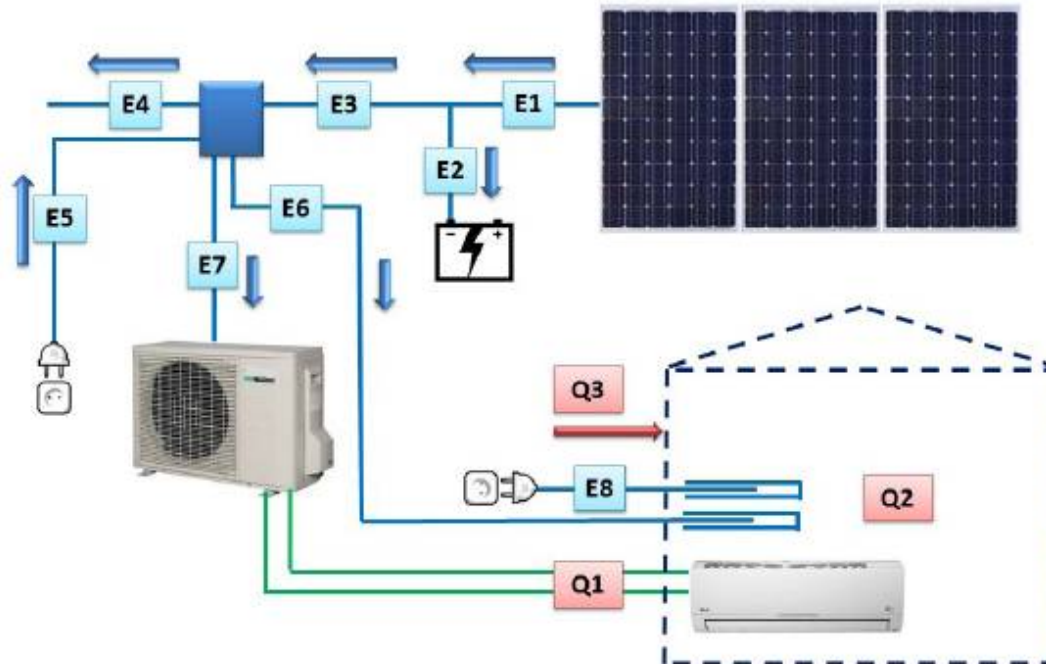


Figure 2 PV driven solar heating and cooling system of a HVAC installation.

Monitoring procedure
KPI's
Reference conditions
Example

Monitoring procedure for field test & demo systems (C1 : Monitoring procedure & monitoring system selection criteria)

Task 53



Task 53 communication

Workshops / conferences dealing with Task 53

Workshop/Conference /Seminar (include type: Task organized, keynote, presentation, poster, etc.)	Activity & Presenter (keynote, presentation, poster, etc.)	Date & Location	Number of Participants	If Hosted by Task # Industry, Government, Research, Countries
6 th OTTI SAC conference	keynote	Roma, 24/09/2015	80	OTTI 6 th SAC conference
SHC 2015 conference – Keynote on solar cooling	keynote	02/12/2015 - Istanbul	100	IEA SHC Programme
SHC Task53 / PVPS Task1 Join Workshop	presentations	Madrid 11/04/2016	35	IEA SHC /PVPS Programme
IEA SHC Task 53 Industry Workshop	presentations	Madrid 11/04/2016	50	IEA SHC Programme

≈ 260 persons «reached by Task 53 communication during 4 events



Task 53 is better known in Spain !



Task 53 Website

IEA SHC HOME TASK HOME MEMBER LOGIN SEARCH

SHC
SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

SHC Task 53
New Generation Solar Cooling & Heating

- About Project
- Participants
- Meetings / Events
- News
- Publications
- Related Sites
- Member Area
- Contact

New Generation Solar Cooling & Heating Systems (PV or solar thermally driven systems)

Overview

The main objective of this Task is to assist a strong and sustainable market development of solar PV or new innovative thermal cooling systems. It is focusing on solar driven systems for both cooling (ambient and food conservation) and heating (ambient and domestic hot water).

The scope of the Task are the technologies for production of cold/hot water or conditioned air by means of solar heat or solar electricity, i.e., the subject which is covered by the Task starts with the solar radiation reaching the collector or the PV modules and ends with the chilled/hot water and/or conditioned air transferred to the application. However, although the distribution system, the building and the interaction of both with the technical equipment are not the main topic of the Task this interaction will be considered where necessary.

Task Information

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What's New

NEWS MEETINGS

PUBLICATIONS

Check Back Soon



<http://task53.iea-shc.org/>





Thanks for your attention !

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