IEA SHC Task 53

Solar cooling: worldwide overview and challenges

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The Future of Cooling - Implications and opportunities

energy efficiency (IEA)

Reference scenario

- On current trends, energy needs for space cooling – almost entirely in the form of electricity – will more than triple between 2016 and 2050, driven mainly by the residential sector (2 000 TWh => 6 000 TWh)

- Most of the projected growth in energy use for cooling is set to come from India, China and other emerging economies.

- Space cooling is set to overtake appliances and plug loads to become the single largest user of electricity in buildings (2015:10% ; 2050 : 30%) and the second largest electrical end use after industrial motors.

- The share of cooling in electricity demand increases everywhere bar China and most notably in India and Brazil, where the potential for increased use of air conditioners is greatest.
The Future of Cooling Implications and opportunities energy efficiency

Efficient cooling scenario

• Energy needs for air conditioning almost double over 2016-2050 in the Efficient Cooling Scenario but the increase is less than half that of the Reference Scenario.

How to deal with this MAJOR challenge!
Vision for solar cooling – ROADMAP until 2050

Cost of solar cooling technology is expected to reduce

Electricity cost is expected to continuously increase
A High level of innovation still present:

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

Already very accurate concepts for Arabic countries

* low & medium temperature solar thermal absorption
* small size PV air-conditioning
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 improvement and best solution selection (ongoing IEA SHC Task 53)

⇒ Very innovative concepts such...

SOLABCOOL (NL)
4,5 kWc
Main categories of PV cooling systems

Solar air conditioners: Splits

PV+ HP coupling for Office/Commercial

PV COOLING CONCEPT

PV + INVERTER + R290 « clean » chiller

Ready for the market via demos..
Conclusions

Solar cooling highly needs innovations: cost reduction, 30 years reliability and performance..

High stimulation from PV to solar thermal for small to medium cooling power range

High priority targets in term of markets:
- MENA region
- China
- Sun Belt

Very promising segments for solar thermal cooling with large system concepts
Main driving future for solar cooling...

Linked with Mission Innovation Challenge #7

**Affordable Heating & Cooling for Building Innovation**

**Statement**: Cooling is one of the major energy need increase worldwide and except solar, no renewables are really competing

The future market is essentially in the Sunbelt: **MENA**, India, Asia, Africa, America, Oceania

IEA SHC Countries own a real knowhow on solar cooling but the “mistake” was to imagine to develop solutions for IEA SHC countries

A “technology-transfer” collaborative Work/Task is more than ever needed
Thanks for your attention!

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