



Banyuls vineyard solar cooling installation, France

Trends in solar heating and cooling applications from PV

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Technology Collaboration Programme
by **iea**

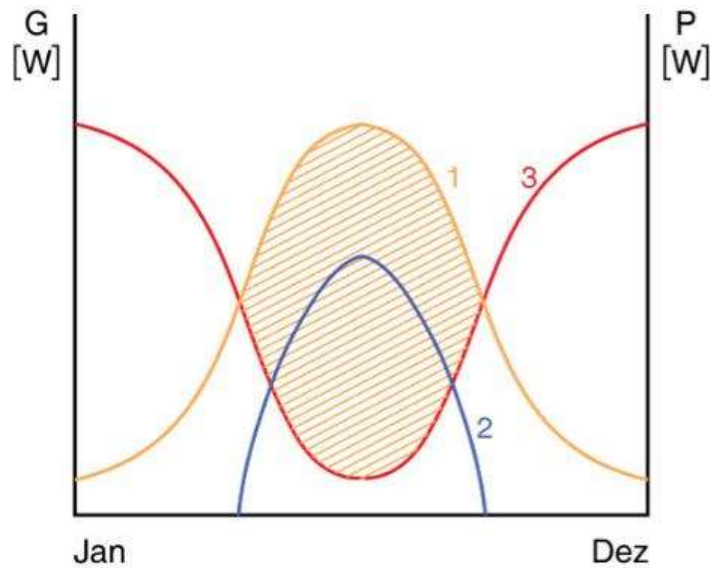
Tecsol, 40 years of experience in solar engineering



- Leading independent engineering office in thermal and PV solar energy
- 40 engineers distributed in France
- Tele-monitoring products and services
- Running multiple projects on solar cooling
- One of the major French innovative company on PV self consumption : individual, collective and e-mobility
- Creation of Sunchain in 2016, spin-off in blockchain and energy labeled GreenTech Verte



Solar cooling – Solar resource vs. Cooling demand



1 G Global radiation

2 K Cooling demand

3 H Heat demand

s Excess solar heat in summer

Source: SolarNext

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Resource and demand are in phase

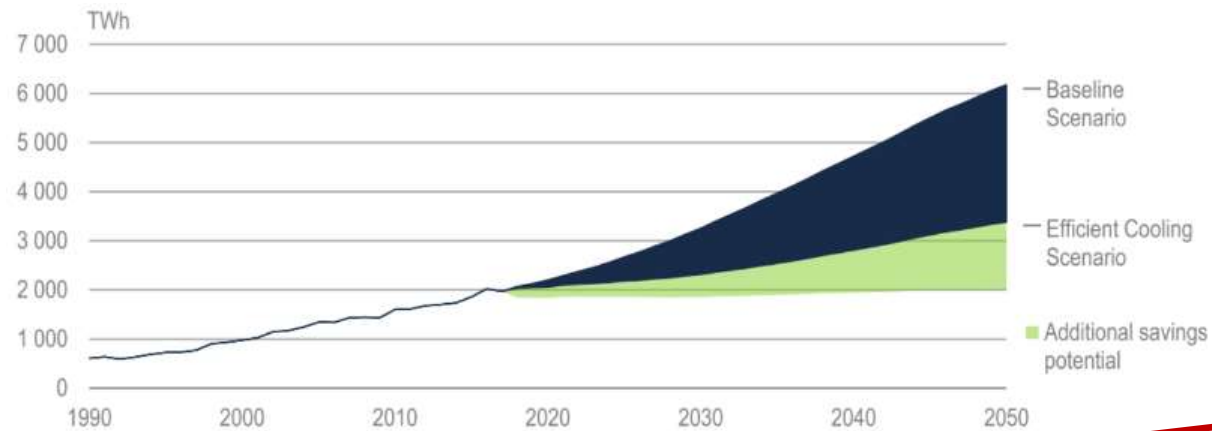
Future cooling demand



<https://www.iea.org/cooling/>

OECD/IEA efficiency scenario

- Measures on building level are possible but limited...



Source: OECD/IEA (2018) The Future of Cooling

→ Contribution of solar cooling!?

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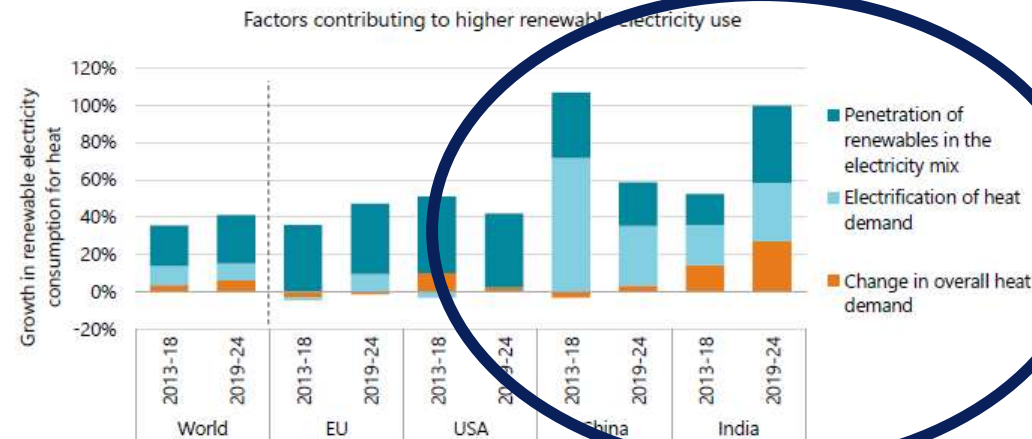
Importance of PV solar heating and cooling



IEA Renewable Energy Market Report 2019

Renewable electricity uptake benefits the heat sector

Renewables 2019
Analysis and forecast to 2024



Electrification of heat and adoption of heat pumps play a significant role in China and India.
Penetration of renewables in the electricity mix is the key reason for growth in the EU and the USA.

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2 channels for solar cooling in 2020..



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IEA SHC Task 65 : Objective & Scope



Objective

- Focus on innovations for affordable, safe and reliable solar cooling systems for the sunbelt regions worldwide
- Implementation/adaptation of components and systems for the different boundary conditions is forced by cooperation with industry and with support of target countries like UAE through Mission Innovation IC7
- The innovation driver and the keyword is adaptation of existing concepts/technologies to the sunbelt regions using solar energy either solar thermal (ST) or solar PV

Scope

- Build on previous tasks 25, 38, 48 and 53
- Target size segment on cooling and air conditioning between 2 kW and 5,000 kW (PV and ST)
- Task duration: July 2020 – June 2024

<https://task65.iea-shc.org>

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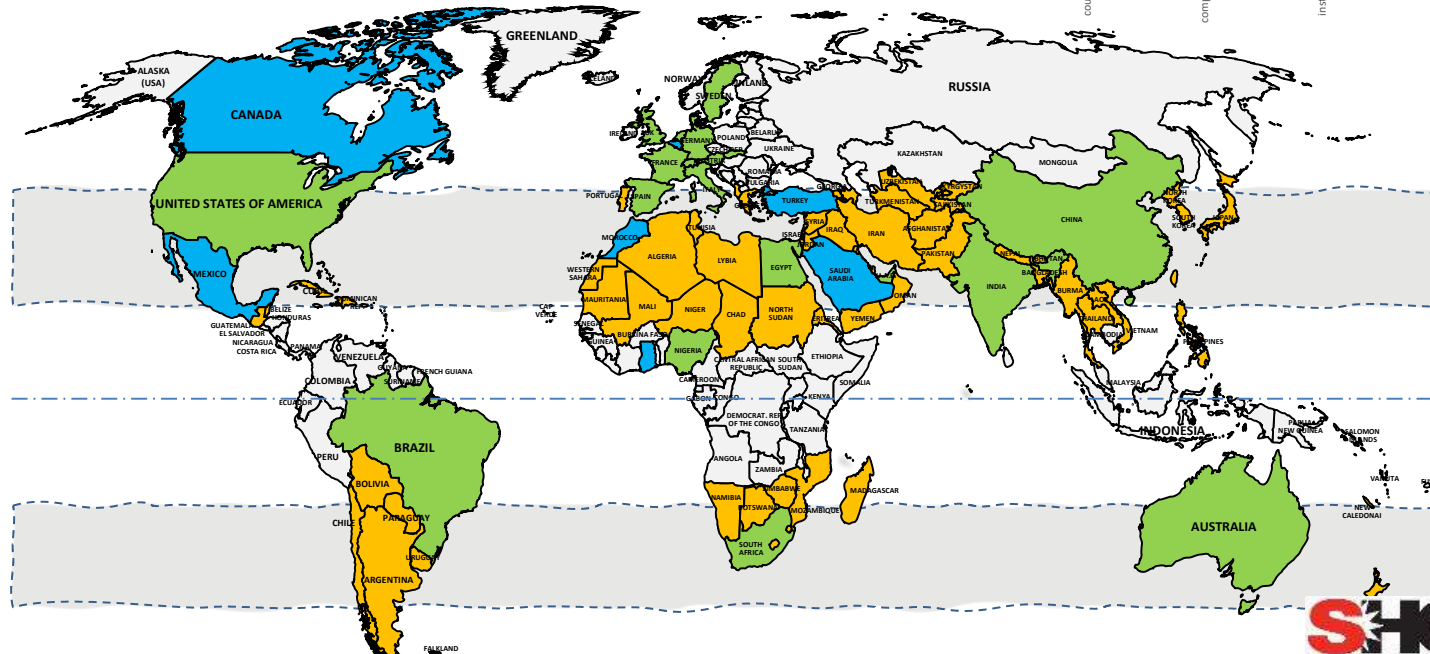
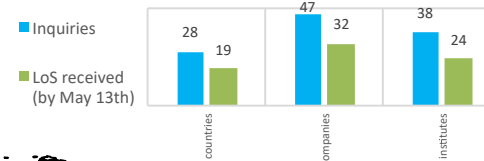


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IEA SHC Task 65 : Countries interested (LoS)



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Main categories of PV heating and cooling



Solar air conditioners : Splits



PV+ HP coupling for tertiary and commercial



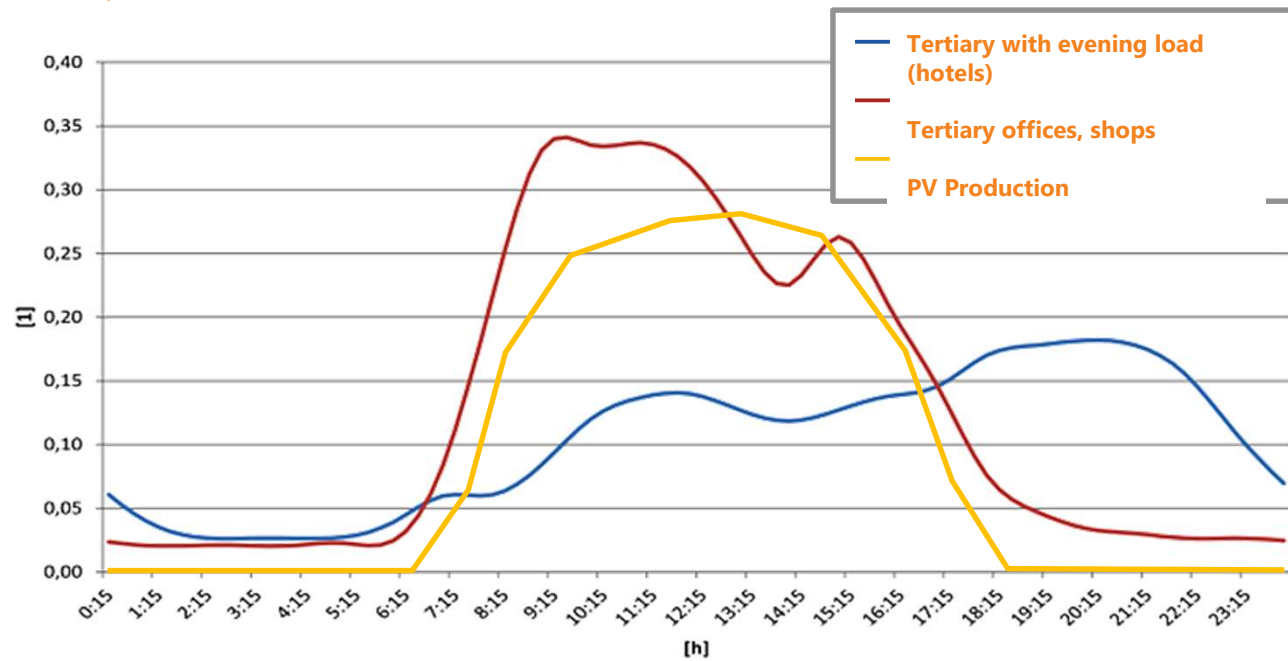
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PV Production well matching daily (H&C) load



% of the daily consumption



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Emblematic example : GICB Banyuls Vinery (FR)



Historical Solar thermal cooling system since 1991

52 kWcooling with 130 m² solar collectors

35 kWp PV + 50 kWcooling HP in 2021

Direct coupling (electronic device)

PV production : 50 MWh/y

Self consumption : 100%

Solar PV fraction : 15%

Simple payback : 7 years

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Solar PV H&C offers big opportunities



- * Smart way to increase self consumption rate for PV, especially in tertiary building
- * Thermal storage possible (ice or hot water) to buffer extra PV electricity
- * Several big actors in the air conditioning / Heat pump world are including the PV ready electronic feature
- * A lot of opportunities in Europe where PV self consumption in building is rapidly increasing : how to better make load shifting ?
- * Big push from EPBD EU Directive (2018/844) : in France, « Décret Tertiaire »
 - 40% in 2030
 - 50% in 2040
 - 60% in 2050 } PV selfconsumption in building is compulsory .. and will be boosted
- * At the same time, feed in tariffs will rapidly die and old contracts as well..



Important need to massify PV among the HVAC sector



- * Systematic standardized PV ready control for HP and Aircond
- * Develop smart and cost competitive thermal storages (ice in Countries from the Sunbelt Regions for instance)
- * Create incentives to enhance the use of Green electricity for H&C (bonus/grants/certificates for very high SEER reversible HP)

Integrated PV in buildings will be one of the major solution for smoothing the growing cooling load !



www.iea-pvps.org

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