# FP7 project - SAM.SSA

Sugar Alcohol based Materials for Seasonal Storage Applications

**Workshop and Onsite Demonstration– CiCenergigune**

**Miñano, Alava, Spain**

# Background and Objectives of SAM.SSA Project

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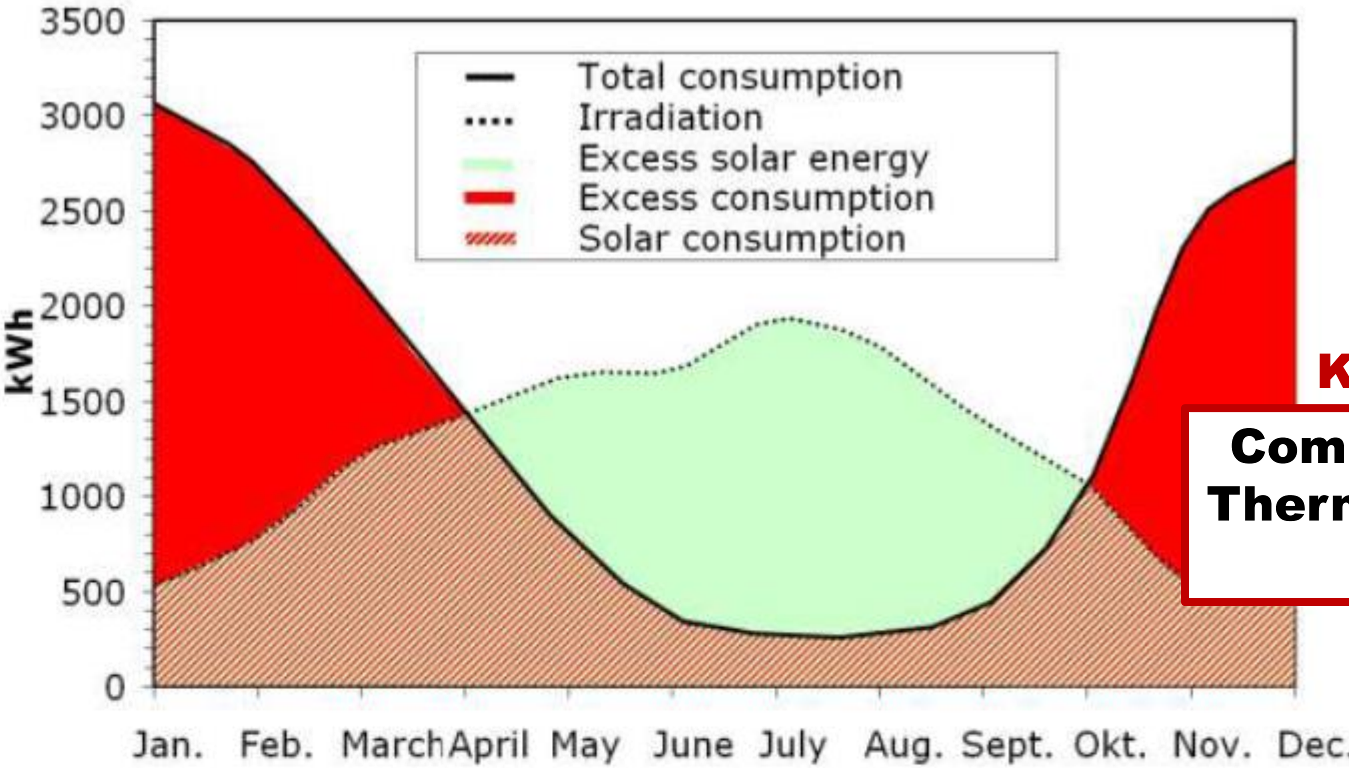
## DEALING with Thermal Energy Storage in a Seasonal Basis for heating and DHW supply in buildings




**KEY ISSUES**

**Compactness**
**Thermal losses**
**Cost**

**GENERAL OBJECTIVE**

**To develop new storage materials with potential to significantly improve the state-of-the-art**

| | Sensible heat | Latent heat | Thermochemical |
|---|---|---|---|
| TRL | Commercial | Prototypes | Laboratory |
| Effective energy density<br>Thermal losses | Low (**30** – 70 kWh/m3)<br>Significant | Medium<br>Usually significant | **High**<br>**Reduced** |
| Charging temperature | < 100 °C | **< 100 °C** | Generally > 100°C |
| Technology | Simple | **Simple** | Complex |
| Investment cost (€/kWh) | **low** | medium | Too high |

**Sugar Alcohol Based Materials**

## PCM materials with high undercooling

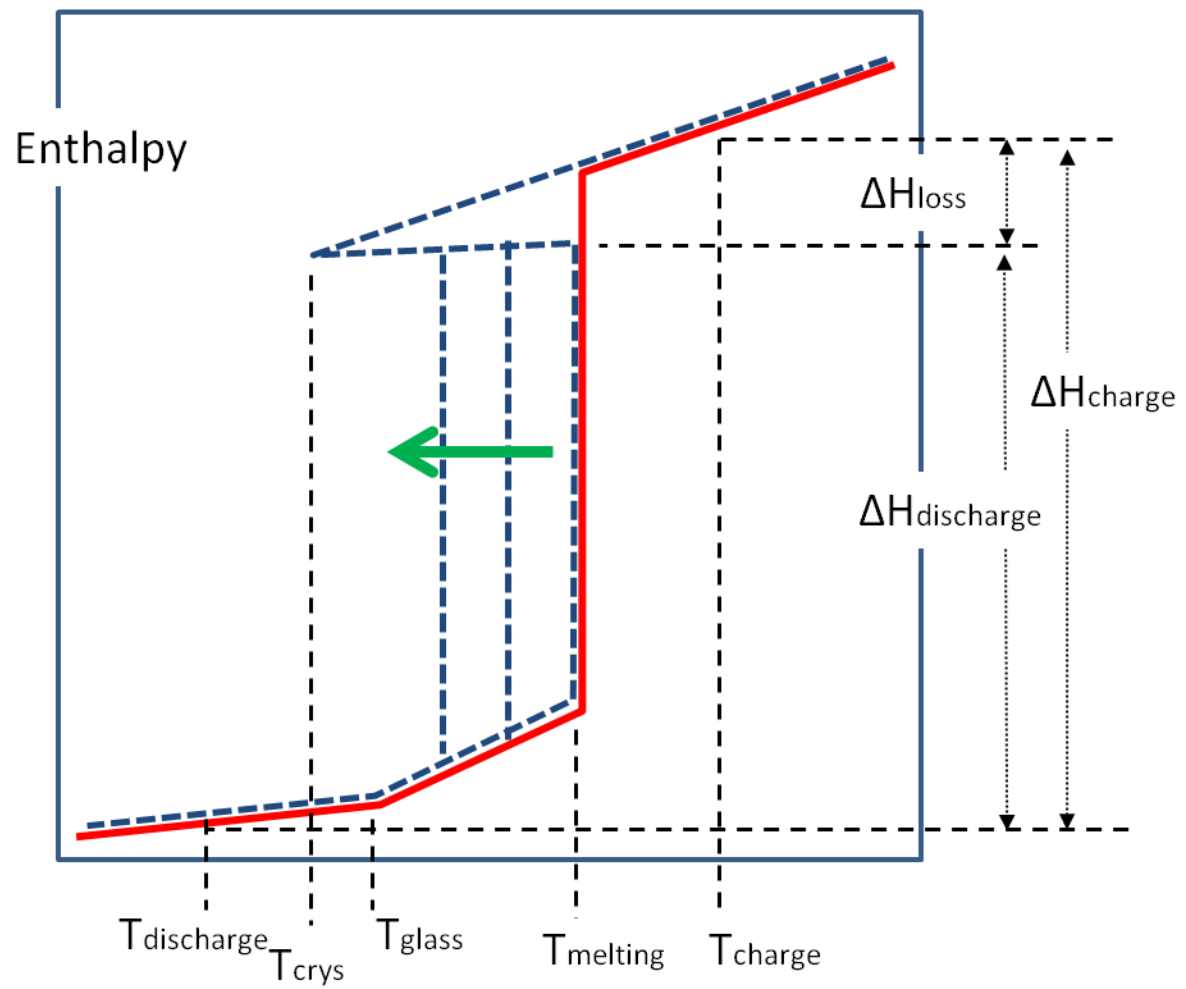
**Could provide**

High storage energy density at T <100°C with limited thermal losses due to undercooling

**Moreover**

Safe materials, non corrosive, coming from renewable resources & can have acceptable price

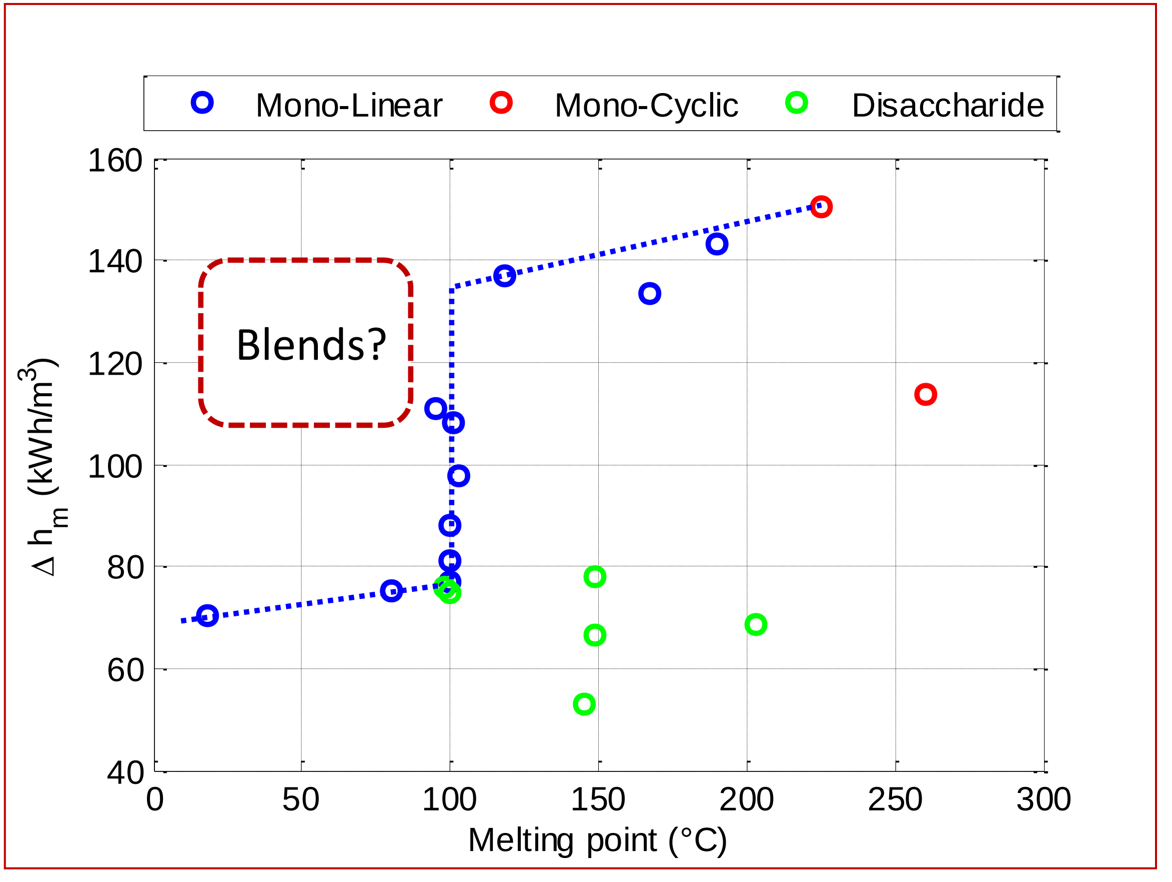
## How they can work as PCM for long-term TES



**SAM.SSA project has been designed around FOUR MAIN CHALLENGES**

## CHALLENGE #1

To identify SA or to produce SA-blends with melting point below 100°C, potential to provide high energy density (close to 200 kWh/m3), and with high and stable undercooling



**CHALLENGE #2**

Heat transfer enhancement by increasing the thermal conductivity of the SA in a cost-effective way

Using conductive carbon porous structures as carrier material has been proven to be a very efficient way to increase the thermal conductivity of PCMs

## What exists in the market

**Purely graphitic foams**

Very high thermal conductivity >>> 2-7 W/m/K

Made from non renewable resources

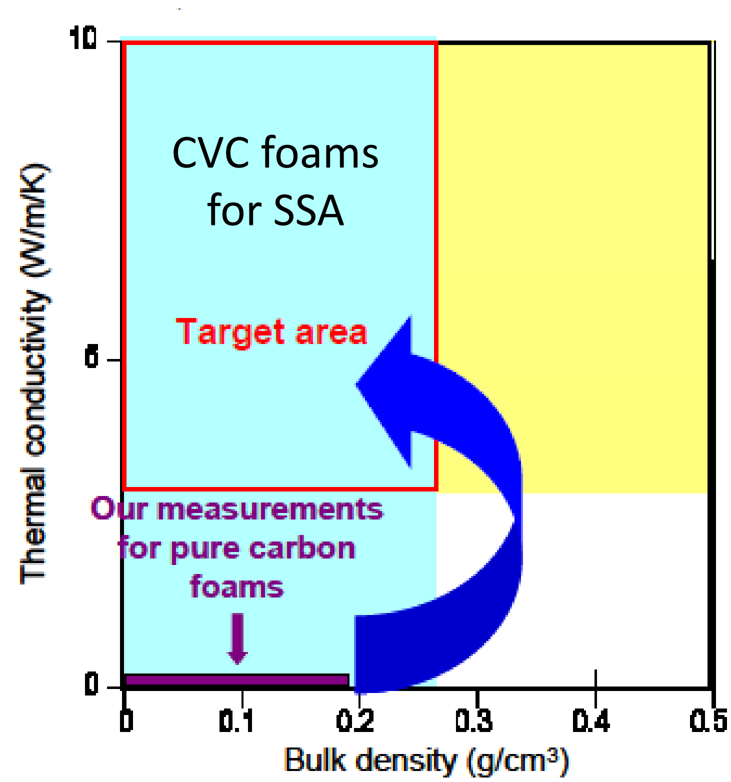
Prohibitive cost

**Biosourced CVC and RVC foams**

Low thermal conductivity

Made from renewable resources

Low cost



## CHALLENGE #3

Heat transfer enhancement by SA microencapsulation
(increasing the specific surface area between the PCM and the HTF)

### THE PROBLEMS

**Polar substances with very reactive –OH groups**

**Often, needle shaped crystals**

### SEVERAL ROUTES IN PARALLEL

**Microencapsulation with organic shells**

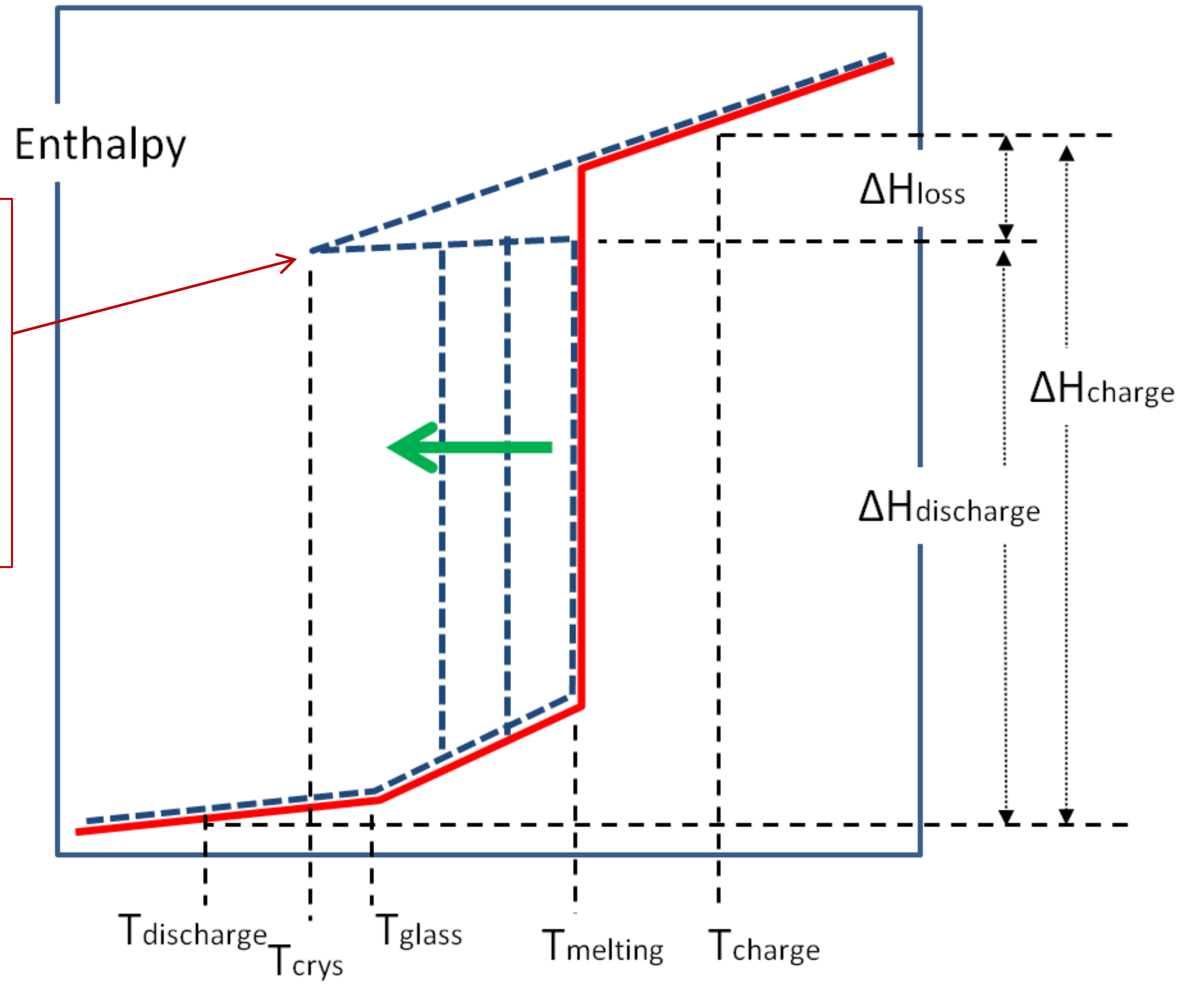
**Microencapsulation with inorganic shells**

**Microencapsulation with hybrid shells**

# CHALLENGE #4

To discharge de system when needed providing suitable power

**To come up with a suitable, practical and cost effective solution for activating crystallization**



# Thank you for your attention
# Enjoy the workshop!