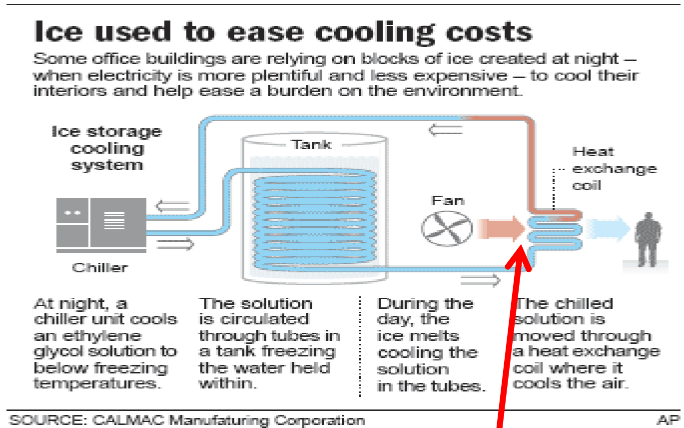
HEAT ENERGY

Unit 20 Dr. John P. Cise, Professor of Physics, Austin Com. College, 1212 Rio Grande St., Austin Tx 78701 jpcise@austincc.edu & NYTimes October 18, 2013 by Matthew L. Wald

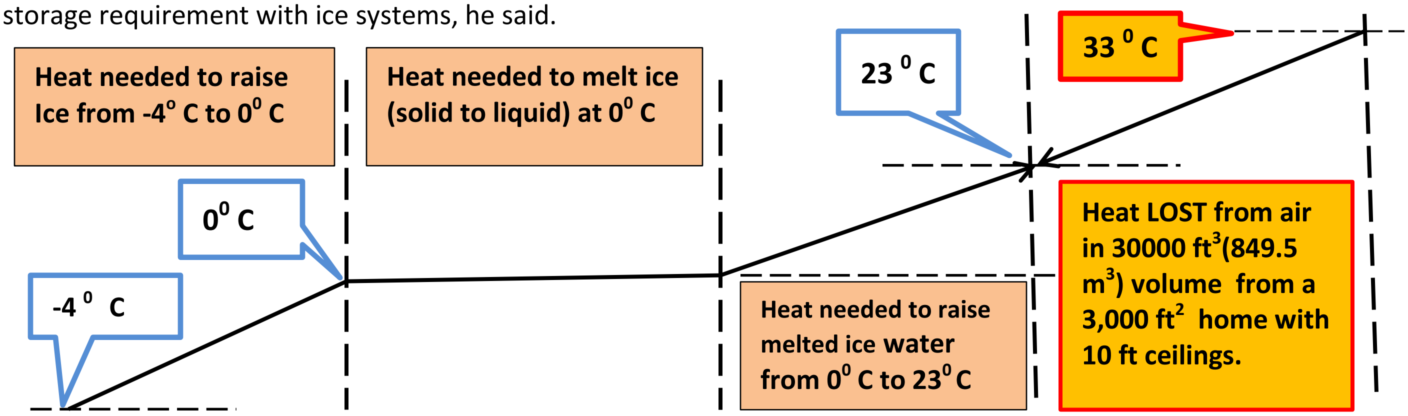
Arizona Utility Tries Storing Solar Energy for Use in the Dark

The trough-shaped mirrors of the Solana project in Arizona.



In a closely watched new solar project called Solana, the energy is gathered in a three-square-mile patch of desert bulldozed flat near Gila Bend, about 50 miles southwest of Phoenix. **A sprawling network of parabolic mirrors focuses the sun's energy on black-painted pipes, which carry the heat to huge tanks of molten salt. When the sun has set, the plant can (((draw heat back out of the molten salt to continue making steam and electricity.)))**

Thermal storage does not have to be storing heat. Calmac, based in Fair Lawn, N.J., installs systems(((that use off-peak electricity to make ice, and then uses the ice to run air-conditioners))) Mark MacCracken, the chief executive, said he installed a system in Rockefeller Center that could reduce the center's energy demand by one megawatt for six hours. Some California companies will meet the new storage requirement with ice systems, he said.



INTRODUCTION: **Here we want to find amount of ice(M_{ice}) at -4° C is needed to cool ~ 850 m³ of air from 33° C down to 23° C ? We assume the amount of ice(M_{ice} = ?) will absorb the heat in the air as it warms up from -4° C to 23° C.**

QUESTION: **The first sentence in introduction is the question.**

HINTS: **air density = 1.2 Kg/m³, specific heat of air = 1 KJ/Kg °K , specific heat of ice = 2.108 KJ/Kg °K , specific heat of water = 4.186 KJ/kg °K , L = Latent heat of water = 334 KJ/Kg. , density = M/V , $C = Q_{heat}/m\Delta t$, L = Q/m , Q = heat**

ANSWER: **M_{ice} = ~ 23.24 Kg**