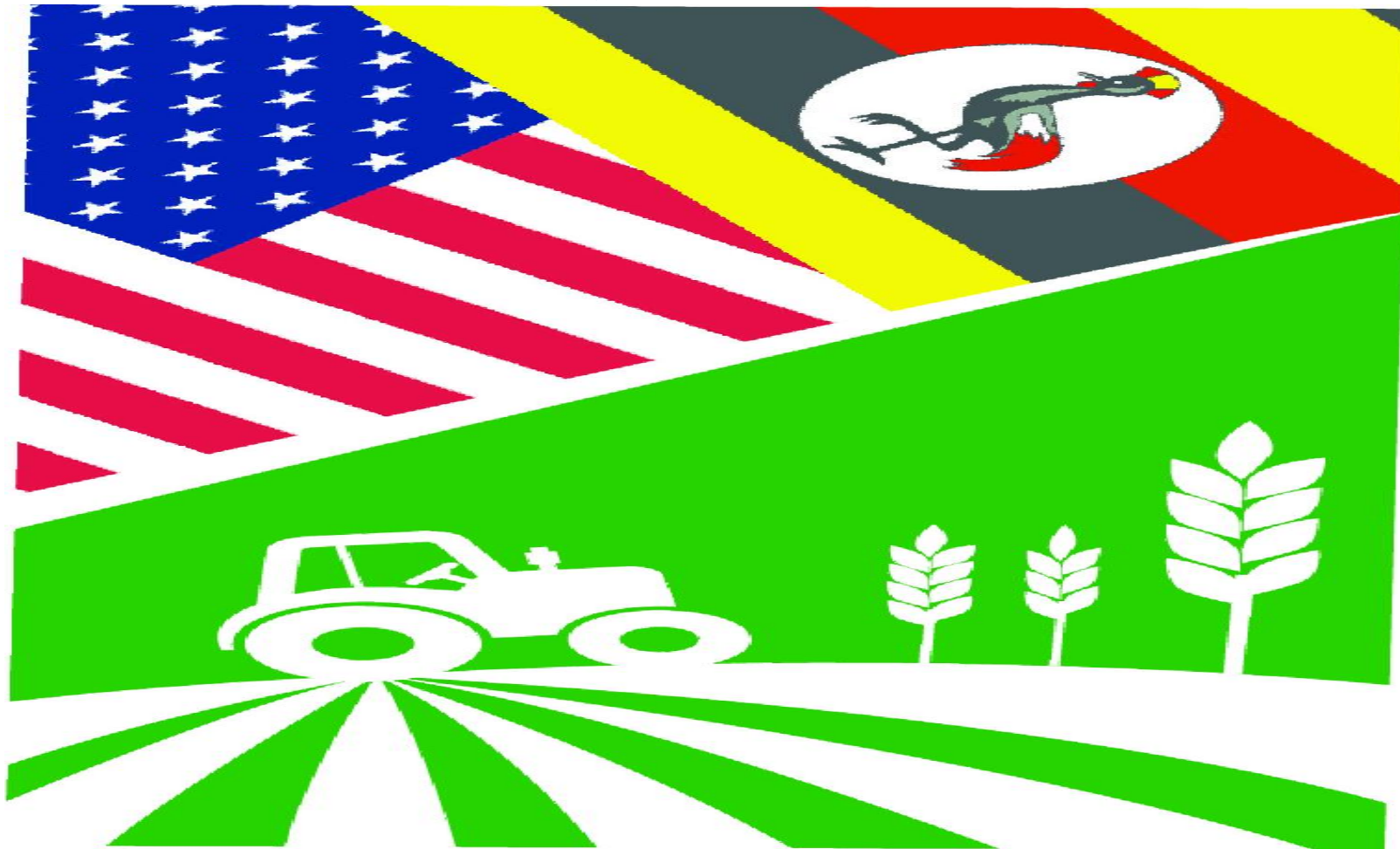


RIGHT EXPERIENCE IN COOLING TO PRESERVE TO INCREASE
FOOD, FRUITS, VEGETABLES AND MARINE PRODUCTS TO
GET MORE MONEY FOR THE FARMERS, PRODUCERS AND
BUSINESSMAN TOO ... *Expertise & Experience Counts for you*



Basic Refrigeration &
Post Harvest Technology
now offered with
GREEN ENERGY

**Engineered Refrigeration Supplies Inc. Mesa, AZ.
presented with green energy in association with
GLOBAL ENERGY COLLABORATIONS, Haledon, NJ**

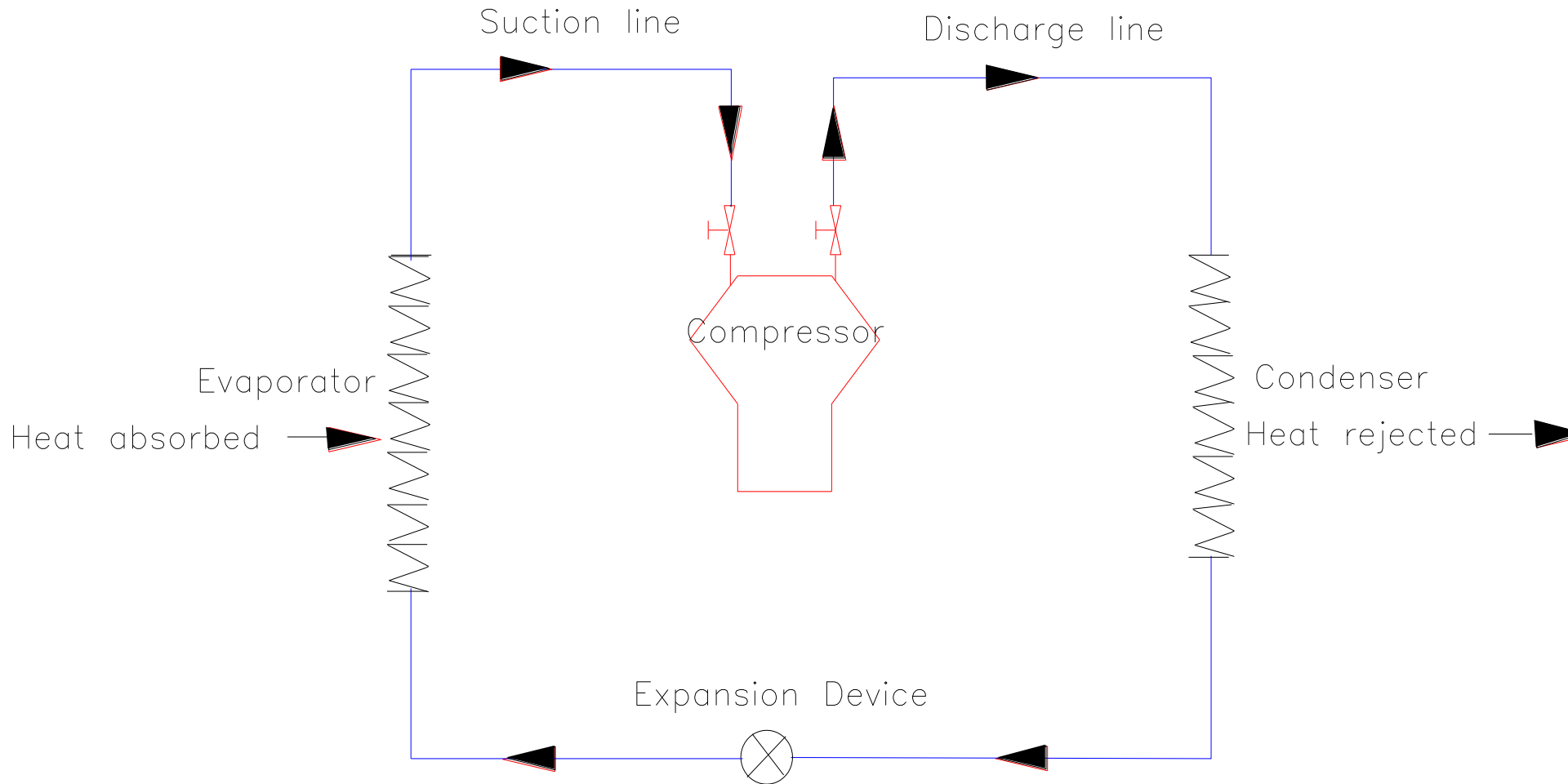
Why is Post Harvest Cooling very Important

- In some countries it is estimated that about 30 to 50% of fruits and vegetables are spoilt before they reach a human being. This is a staggering crime which we are guilty of by not adopting modern methods of post harvesting fruit & vegetables.
- ***Food insecurity for our children is a big problem too. How long can we afford to ignore it?***



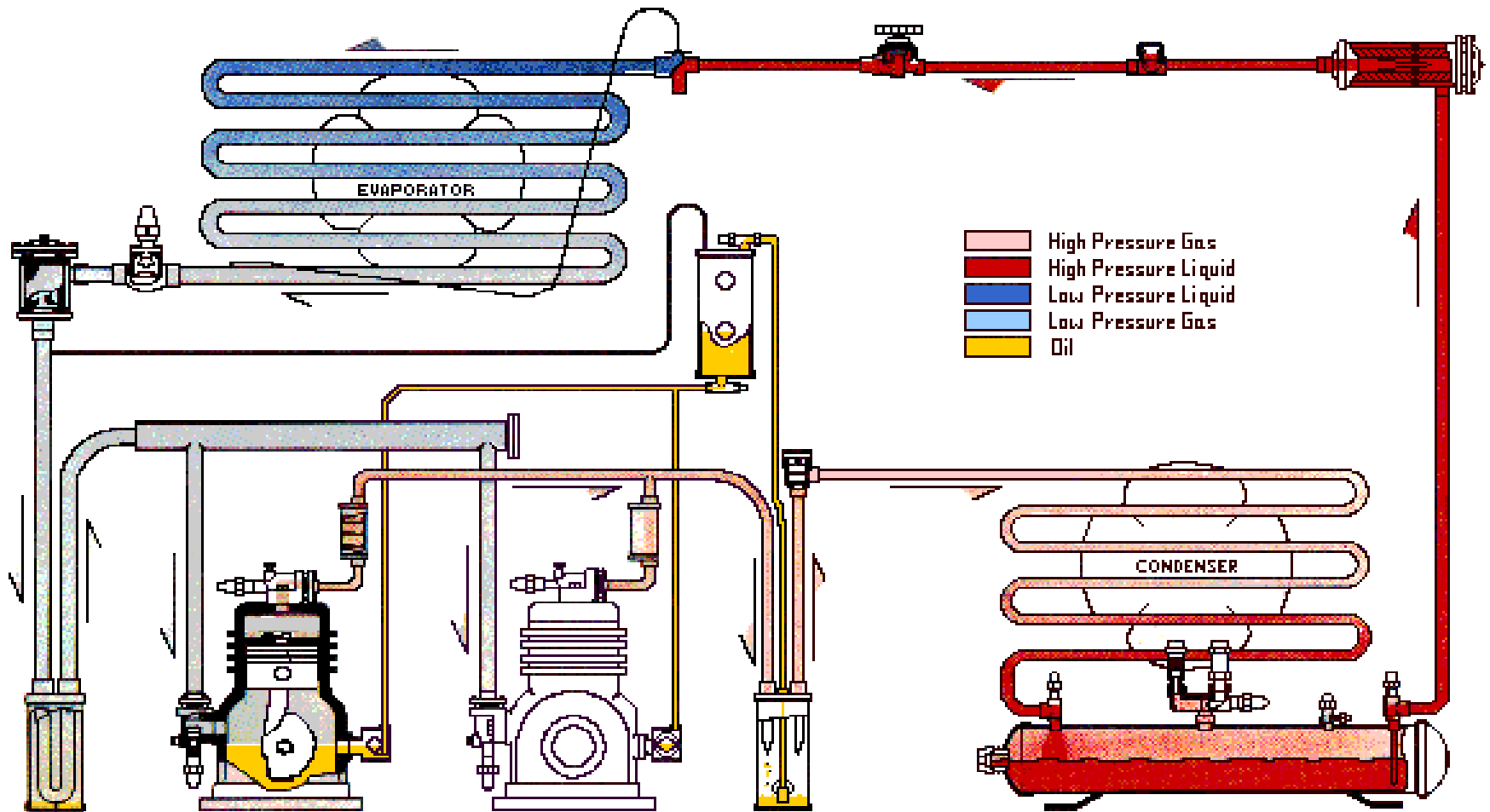
ERS Inc.AZ, USA and Global Energy Collaborations, NJ USA

Piping of basic system



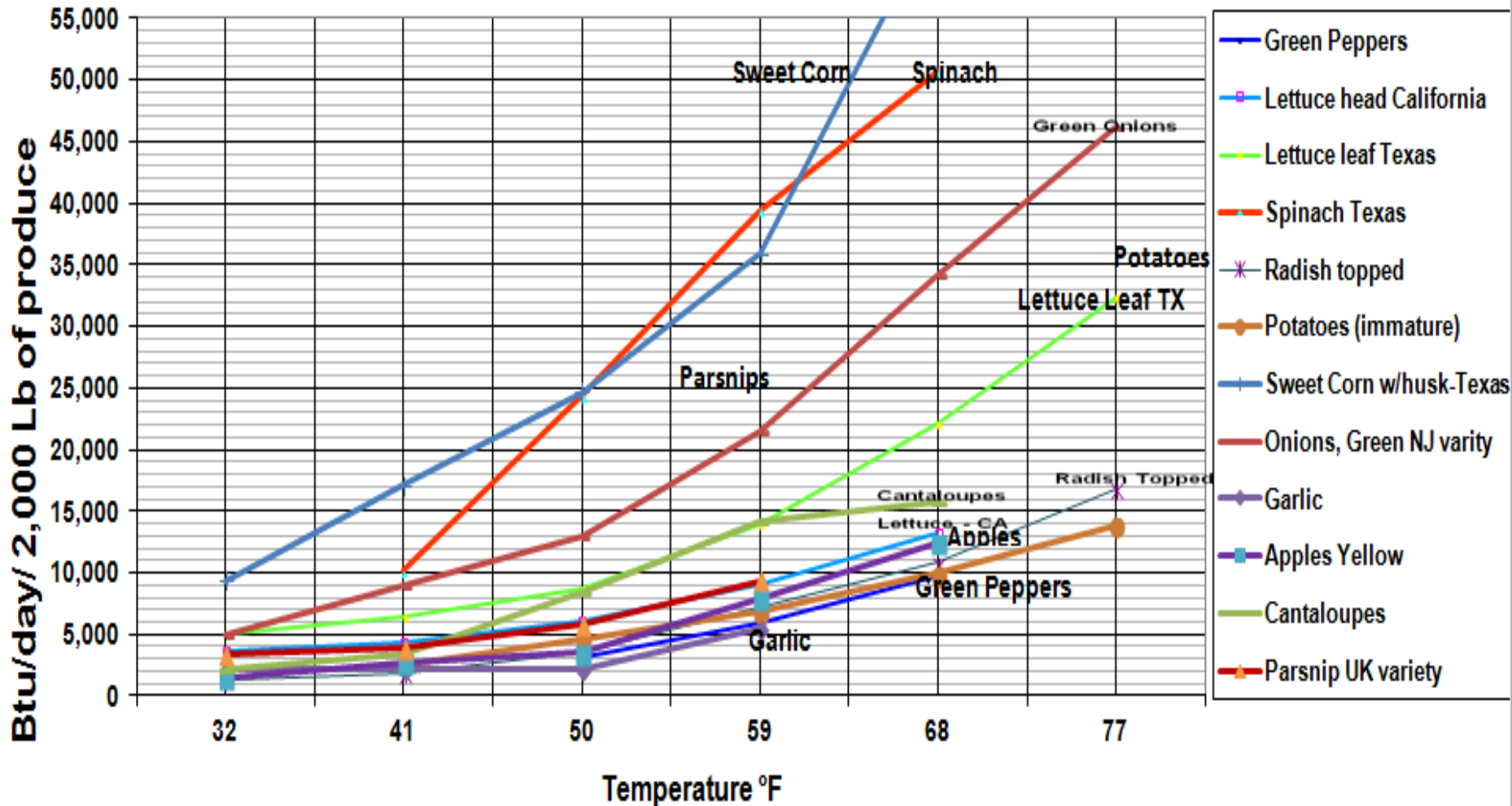
Let us look at the components of this domestic refrigerator

- All mechanical refrigeration systems have the following: -
- A compressor – {located at the bottom and rear}
- A condenser - {located at the back – grid like}
- An expansion device – {Capillary tube near the floor}
- An evaporator – {located inside the refrigerator}
- **We want to remove heat from inside & throw it outside. i.e. removing heat from one place and dispersing it some where else. That is how simple refrigeration is.**



Heat of Respiration for various products

Heat of Respiration Btu/day per Ton of product



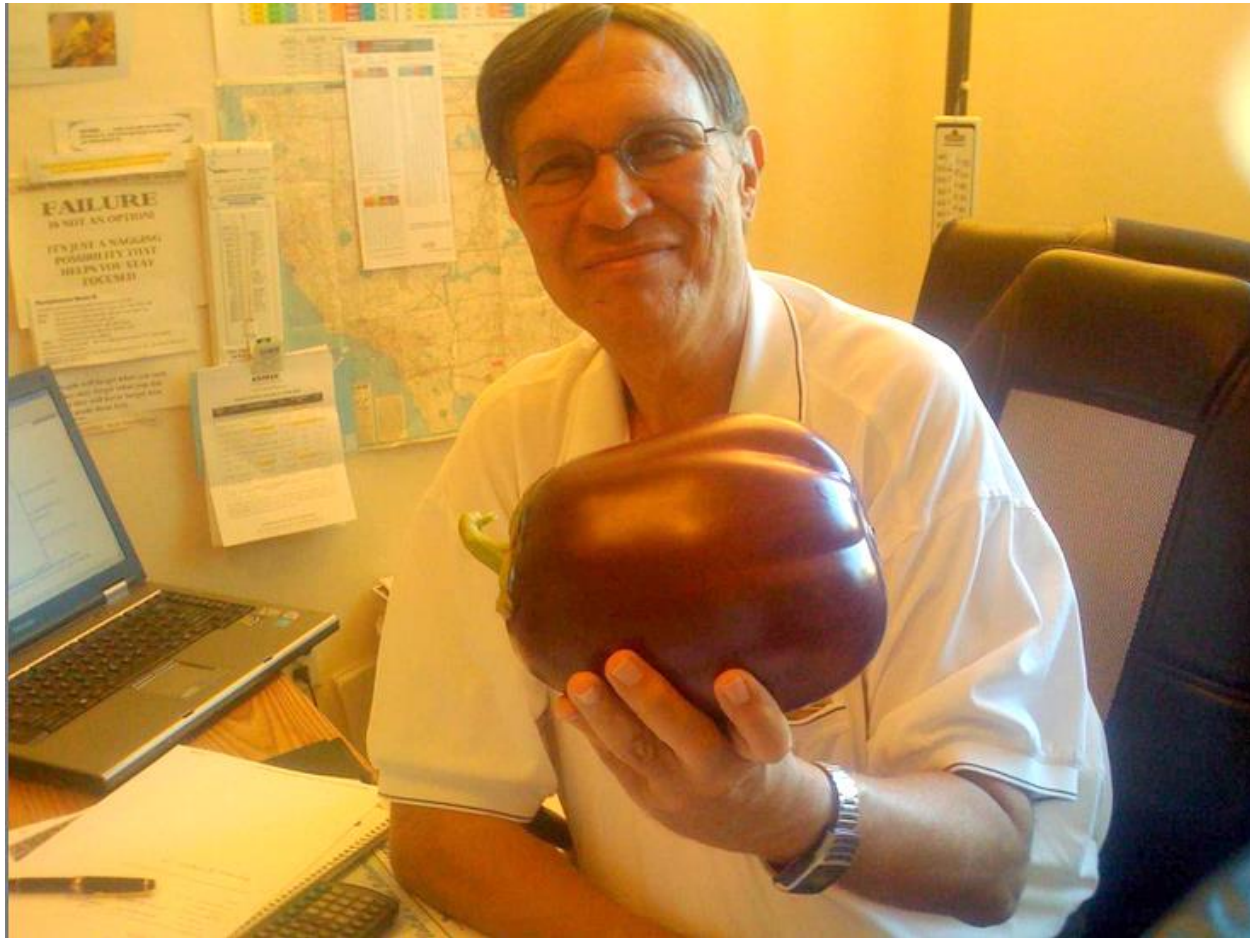
Would you hydrocool these to extend the self life?



Hydrocooling Chilies.



Or hydrocool the Eggplant? Of course



Hydrocooling carrots.



Asparagus Cooling with falling Film Chiller



What items can be hydrocooled?

- Tomatoes, Squash, Plums, Pears, Peaches, Eggplant, Cucumber, Radishes, Potatoes, Peas (in pods), Sweet Corn (in husks), Celery, trimmed Cauliflower, Carrots, Cabbage, Brussels Sprouts, Broccoli, Asparagus, Artichokes, Avocados, Green Beans, Cherries, Kale, Kiwi Fruit, Apples, Nectarines, Okra, Green Onions, Watercress, Spinach, Leeks, mangoes & many other products.

Pressure cooling is another effective & efficient method for cooling some products

- In tropical countries fruits & vegetables are at higher temperature when harvested (since they are growing in high ambient temperature) & they must be cooled to storage temperature as soon as possible (in say 20 to 30 minutes) to maintain quality, otherwise it starts spoiling quickly.
- Pressure cooling allows farmers to sell more fruit & vegetables with extended shelf life to make extra profit. This extra amount of fruit & vegetables can be exported for **ready cash!!!**.

How is pressure cooling achieved? What items can be pressure cooled?

- Pasteurized products from the farms are packed in corrugated boxes stacked on the pallets with sufficient holes & slots for the cold & high pressure air to pass through before returning to the refrigerated coil. Plug fans suitable for high external static pressure are used.
- Cantaloupes, grapes, stoned fruit, strawberries, [pineapples](#) & many more fruits are pressure cooled in USA.

Unique & Patented Pressure Cooler Designed by a “young” man in the picture.



Strawberries being loading into the pressure cooling tunnel using a fork lift

Temperature recorder with probes

Notice the construction of the boxes there is space for air moving through it cooling product effectively



Which one would you buy?



Would you buy this cantaloupe?

Site of first mold
developing



Lettuce picking from the farm in Yuma



Vacuum Tubes in Yuma Arizona



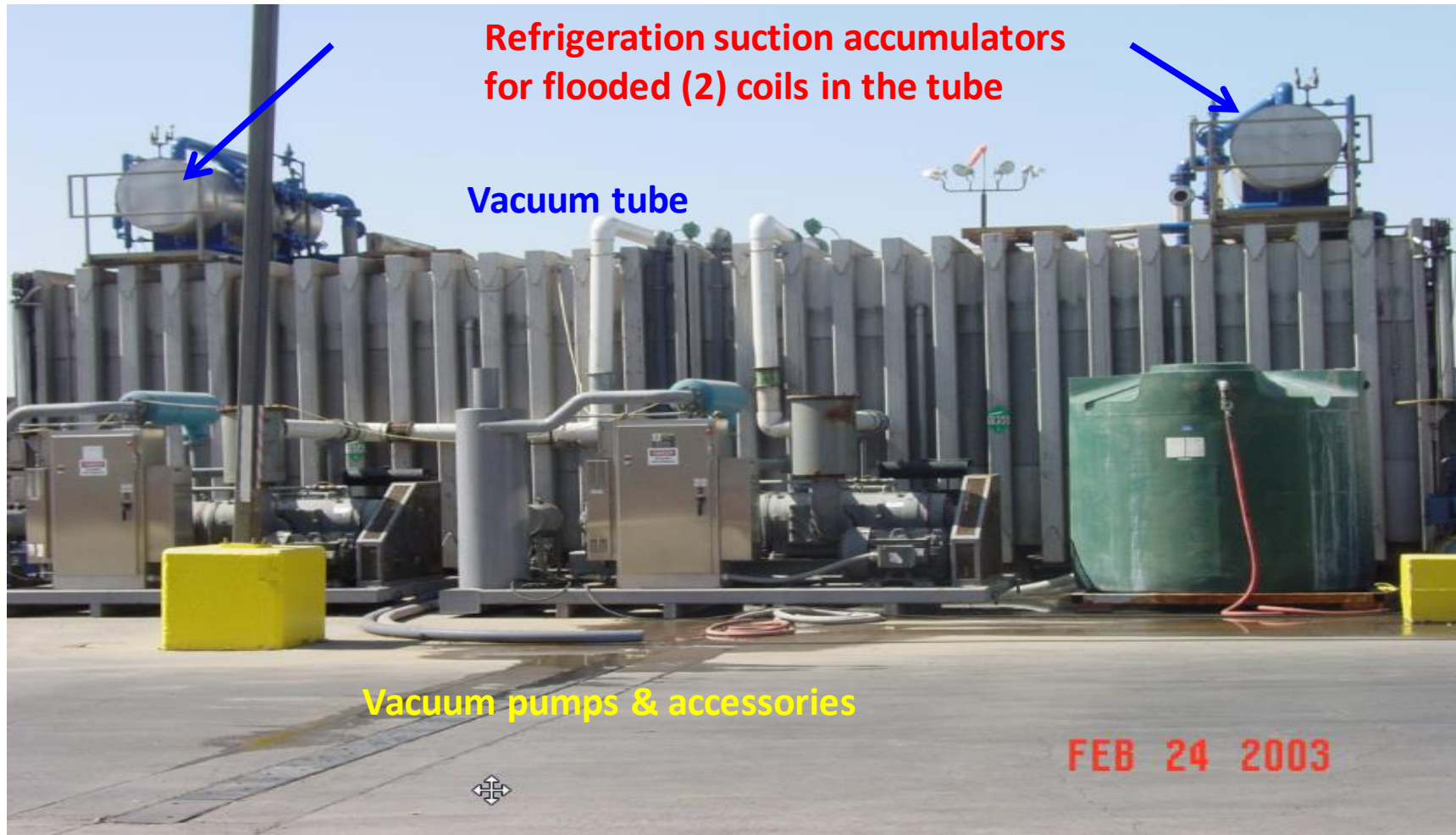
Vacuum Cooling for leafy items like lettuce in Yuma, Arizona



Absolute Pressure Gage is used to make sure the exact pressure we have in the vacuum tube.



Vacuum Equipment for Lettuce cooling Tunnel



Very large Produce facility with (24) recirculated Ammonia air units - 450 Tr. in Yuma, Arizona.



Ammonia Flooded Accumulator with control for a falling film chiller

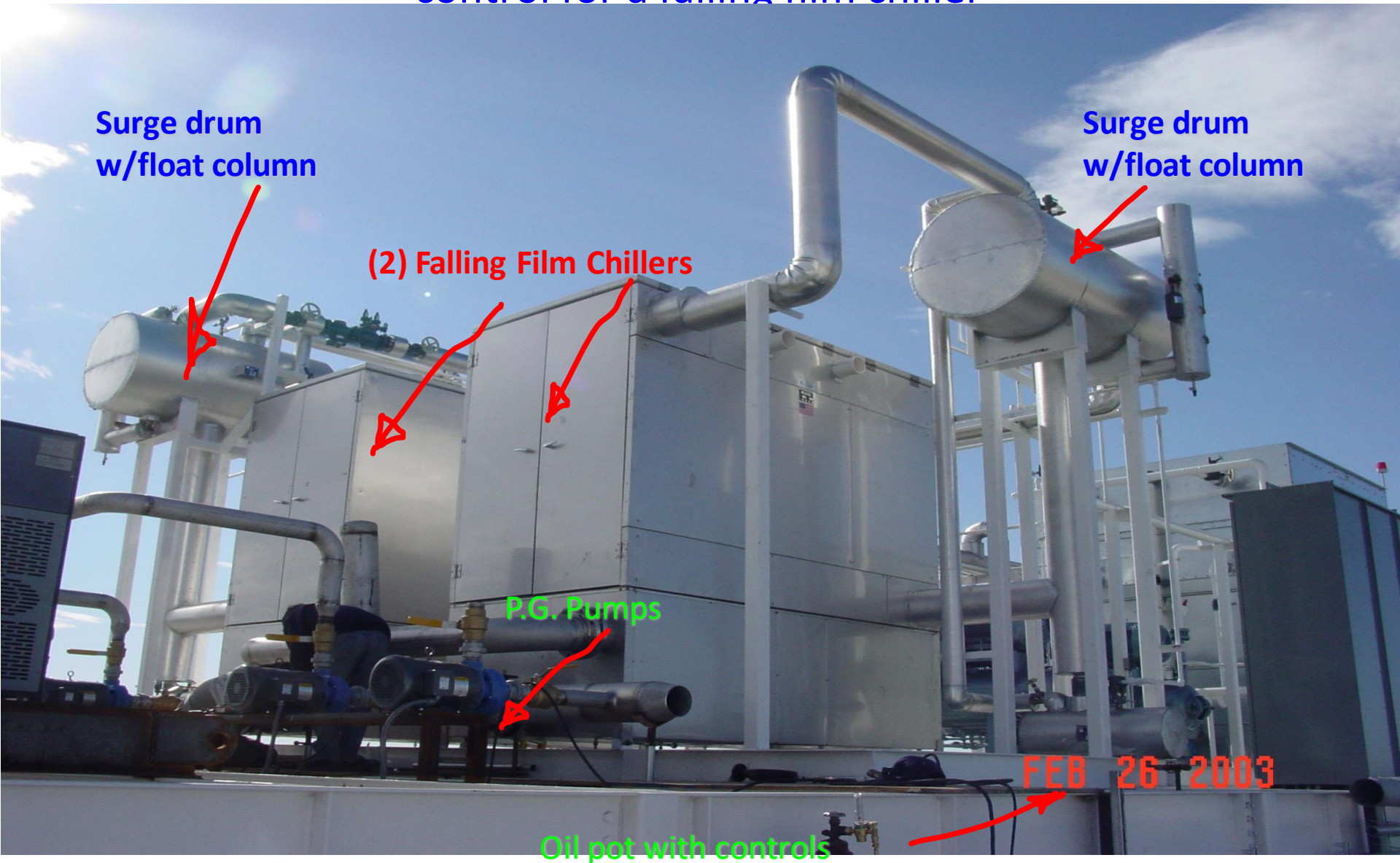


Photo of a Falling Film with (28) wings in El Paso TX



PG air unit for 34°F Milk Room

Air Unit
can use
Glycols
Instead
Of
Refrigerant



Large TD of air unit coil = Large magnet for moisture from product being cooled

- An air unit with larger TD is like a larger magnet for moisture which is removed from product being stored or cooled. As moisture is lost the fruit and vegetables lose customer appeal and look awful in a short time. The reason why refrigeration contractors use these smaller air unit coils with large TD is because the air unit coils are cheaper to supply and install and the customer suffers without knowing why this is happening to their products that are stored in the cold room. *If proper post harvest treatment is not applied almost immediately after harvesting then this can happen to fruit & vegetables in any part of the world say in China or India or USA.*

Real example of consequences of using air unit with large TD

One apple farmer in Wilcox Arizona got quotes for the design for short term apple storage room. He got a quote for a refrigeration system which was the lowest & he opted to install it without doing research (which was beyond him or hiring a professional engineer to review the design of the refrigeration equipment) in spite of being told to do so. After installation he stored quality Apples for 2-1/2 to 3 months in this room and when he opened the room he found these apples had turned into prunes (due to lot of loss of moisture from the apples). He then sued the supplier of refrigeration equipment for US\$ 1 Million.

Upon investigation it was found that the equipment was selected by this supplier just over 15'FTD. Eventually the law suit was settled with the supplier giving the farmer 100% more equipment for installation. In my opinion it was not enough to maintain 90% humidity in the room, since I took humidity reading of 80 to 85% later on after adding more refrigeration equipment.

Bananas ripening room



These cooling coils can be DX “Freon” coils or Ammonia coils which can be either DX, flooded or Recirculated or use Food grade Propylene glycol to cool the coils.

Air Bypassing any product is a major problem in cooling

- **Photo of partially filled banana room. All spaces for the pallets have to be filled before starting the cooling or ripening process, otherwise air bypass takes place defeating the purpose. The cold air must pass through the holes in the boxes to cool the bananas before returning to the refrigerated coil.**

80% of R717 is used as a fertilizer

Human production: 198 million tons annually (2012)

- Second most produced chemical (after petroleum)
- ~80% is produced for fertilizer
- NH₃ (R-717) refrigerant 99.98% pure ~ 2% of total production
- Cheap affordable refrigerant



Ammonia storage tank



**15 to 30% water added to Ammonia as a
fertilizer**

- I do not understand why farmers have to use fertilizers that pollute ground water. Ammonia is all natural and normally evaporates slowly after doing its job.**
- Ammonia is all natural NH_3 . (1) part Nitrogen & (3) parts Hydrogen.**

Mini-Spiral Freezer



2006 8 23

Black berries frozen in in line freezer



Frozen Raspberry in a in-line freezer





Addition of Solar Power is important in many countries

- Adding Solar power to a cold storage is like adding **Fragrance to gold.**



It is a false belief in many countries that you do not have to maintain of the cold storage temperature at night. Solar panels can provide power when sun is shining only. The power produced needs to be stored in batteries or use a diesel generator set to produce power at night to run the refrigeration equipment.

- Pleasureful part is SOLAR POWER NOT EXPENSIVE these days supply & install, since you have to pay for solar panels up front, then enjoy free power for the next 20 to 25 years.

How can we help?


Please let us know how we can help you to maximize the results and profits of your operations.

If you need help then please give us a call we have over 66 years of combined of experience.

Mr. Dhiren Mody excels in Post Harvest Refrigeration and Cooling systems & structures.

Call at: +1-212-655-5432

eMail: services@globalenergycollaborations.com

A photograph of a sunset over a body of water, with the sun low on the horizon and its light reflecting on the water. The sky is filled with orange and yellow clouds. The entire image is framed by a blue border.

**LET ALL OF US ENJOY THE POWER OF GRACIOUS SUN
AND BENEFIT MANKIND WITH GREEN ENERGY AND
WITH RIGHT COOLING AND HELP FARMERS & GROWERS**

The End

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