ALL ABOUT AIR series White Paper #29 Air Underground © Tom Kreher

I believe that under ground, below the permafrost level, the earth maintains a moderately cool temperature and never freezes. My only first hand experience with this is our “daylight basement” house. Because the lot is sloped the ground level entrance in front is one level above the back entrance. In the summer when it is too hot on the main level the lower level, half below ground, is remarkably cooler. Is this an opportunity?

The air discharged by most compressors is hot and it is saturated at the discharge temperature. This hot air is carrying all the water vapor that it can hold. Most mid size to large compressed air systems use an after cooler, a heat exchanger with either water or ambient air to extract heat from the flowing compressed air. Condensate that drops out when the temperature is reduced is discharged by a water trap or auto drain filter/separator.

Next, the dryer, refrigerant, regenerative, or deliquescent is used to remove additional water vapor and reduce the dew point. The expense of a dryer, operating cost, maintenance and up keep might be eliminated by a heat exchanger buried in the cool subterranean earth. Until or unless this idea gets popular you will have to devise your own heat exchanger. This might be large pipe buried in the cool clay, a receiver or other unit with generous surface area.

Before you bury the heat exchanger and pave over it, be sure it has no leaks and add a drain line from the bottom of the main pipe or heat exchanger. Direct this drain line up above the surface. Connect a Time Drain valve to the end of this line. Each time the drain valve opens compressed air will drive condensate out.

If the underground pipe is sloped 1 to 2 degrees for each 10 feet the condensate will collect at the lower end where the drain valve is located. I have seen air lines laboriously suspended high over head to transport compressed air from the compressor room to remote buildings to prevent interference with ground traffic. Bury that pipe and enjoy the secondary benefit of dryer air that won’t freeze condensate in an exposed pipe.

Routing the compressed air underground like a utility has several advantages. Area air access points inside the building or work area would allow large pipes to be located under instead of over head. In case of an earth quake huge pipes won’t fall on people below. The cool air would warm quickly in the work environment and become dryer. Independent area loops can be monitored for leaks or replaced if excess pressure drop occurs. A ruptured pipe in one sector can be isolated to maintain the functional air for the other areas.

Seasonal compressed air routing might direct hot air to help heat or direct under ground to cool at appropriate times like a heat pump that heats and cools.