News Release

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Past innovations pioneered the future of deep seawater cooling technologies

Cramped and perspiring in the stifling heat of his small Keahole laboratory van nestled amidst an endless expanse of lava, University of Hawai‘i Sea Grant College Program (UH Sea Grant) funded researcher Dr. Arlo W. Fast worked diligently on his most current aquaculture project: growing Pacific Northwest salmon using cold, deep seawater pumped from the depths. In their cool water habitat at the site, the salmon were thriving. In his oppressively humid work surroundings, Dr. Fast was in need of relief from the heat.

After several months of high electricity bills using an unreliable and mostly non-functioning conventional air conditioning unit, Dr. Fast took action. He was already familiar with the benefits of using deep seawater for aquaculture applications, so Dr. Fast began experimenting with it for another use. It was at this point, in the early years of the 1980’s that Dr. Fast successfully created the world’s first Sea Water Air Conditioning Unit (SWAU).

The prototype SWAU consisted of two components, an old truck radiator and a household box fan. It worked by pumping cold seawater through the radiator’s coils and blowing hot room air over the same coils. The radiator transferred heat from the hot lab air into cold seawater flowing through these coils, while the box fan circulated air over the coils. The system also dehumidified air in the van as moisture condensed as freshwater on the outside of the cold coils.

This SWAU used the same cold seawater at 40°F that was pumped from 2,000 foot ocean depths on the leeward coast of the Big Island by Natural Energy Laboratories of Hawai‘i Authority (NELHA) where Dr. Fast was conducting his fish research. “At the end of the month, our air-conditioning costs with the SWAU system were only about 30 percent of what they had been while using conventional air-conditioning that usually did not work”, noted Dr. Fast. Years later, NELHA, a pioneer in Ocean Thermal Energy Conversion (OTEC) research, successfully employed a larger-scale version of the SWAU at their facilities using the same cold seawater.

Today, deep seawater cooling technology is recognized as a sustainable and economic way to cool entire buildings and, in some cases, entire cities. From its humble beginnings as Dr. Fast’s innovative SWAU using deep seawater while working on a project for UH Sea Grant, to the implementation of such technology into Downtown Honolulu buildings and cities around the world, the future of deep seawater cooling technology will provide environmental and economic benefits to a growing number of coastal communities.

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