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Data Center Cooling Done Differently – Perspectives

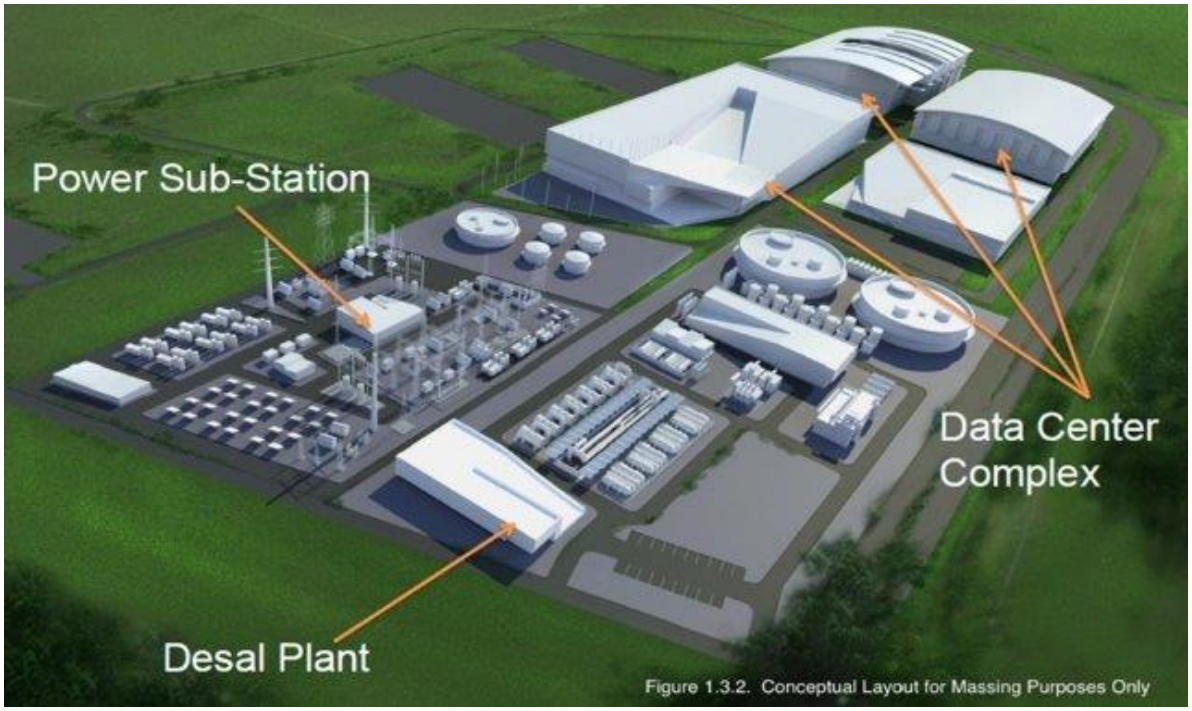
4-5 minutes

Over the last 10 years, there has been considerable innovation in data center cooling. Large operators are now able to operate at Power Usage Efficiency of 1.10 to 1.20. This means that less than 20% of the power delivered to the facility is lost to power distribution and cooling. These days, very nearly all of the power delivered to the facility, is delivered to the servers.

I would never say there is no more innovation coming in an but most of the ideas I've been seeing recently in data center cooling designs are familiar. Good engineering and often more somewhat more efficient than pass approaches but still largely the same as previous work. However, in recent discussions with DeepWater Desal, I came across an idea that I really think has potential. In this approach the co-location of a desalination plant and data centers is used to reduce the power consumption of both.

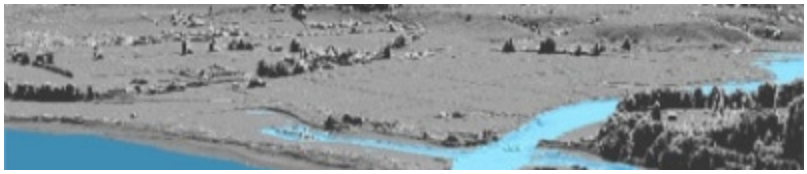
DeepWater Desal plans to build a desalination plant at Monterey Bay. Desalination produces drinking water from sea water. Given the abundance of sea water in the world and the shortage of drinking water in many parts of the world, these plants are becoming more common. They are fairly power intensive

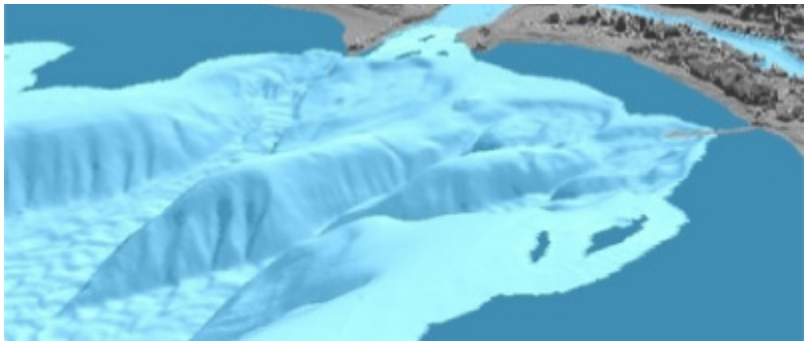
techniques but still used extensively throughout the world especially in the Middle East.



Deep Water Desal proposes to mitigate the power consumption of desalination in a very creative way. Rather than reduce the power required to desalinate water, they proposed to co-locate up to 150MW of data center facilities on site and reduce the power required to cool the data center. Essentially the desalination plant and data centers would be symbiotic and the overall power consumption of the combination of the two plants together would be lower.

Here's how it works. In order to avoid plankton and other life forms that plug up the plants filters and increase operating costs, the desalination plant will be drawing water from 100' below the surface in Monterey Bay. This water will have upwelled from even deeper down the canyons of Monterey bay and will be quite cold.





Taking water from lower in the bay reduces the potential for negative impact on the local ecosystem by putting the intake below the majority of it but this has the downside of sourcing much colder water. Cold water is less efficient to desalinate and, consequently, considerably more water will need to pumped which increases the pumping power expenses considerably. If the water is first run through the data center cooling heat exchanger, at very little increased pumping losses, the data center now gets cooled for essentially free (just the costs of circulating their cooling plant). And, as an additional upside, the desalination plant gets warmer feed water which can reduce pumping losses by millions of dollars annually. A pretty nice solution.

There have been many examples in the past of data centers cooled by deep water cooling. For Example: 46MW with Water Cooling at a PUE of 1.10. There have also been examples of data centers cooled using salt water: Google Opening Saltwater-cooled data center. What's different and interesting in this case is someone else is covering most of the data center pumping costs and there are additional and quite substantial gains in delivering warmer water to the co-located desalination plan.

Since Desalination, even when done efficiently, is a power intensive business, a new municipal utility is being created that will delivery to the co-located data center facilities, power at 6 to 8

cents per kWh which is higher than some geographies but is actually quite a good rate for data center commercial power in California.

If you are interested in siting a data center in Monterey that is better for the environment, cheaper to operate, and not a bad place to live, contact Grant Gordon, COO of DeepWater Desal (grant@dwdesal.com).

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