

Austin Hull
EGEE 497
Dispatch – Tuesday PM

Tuesday, March 7: Arapuni Dam on Waikato River

After finishing our tour of the Te Uku Windfarm, we took our Covid tests and started travelling to our next location: the Arapuni Dam, located along the Waikato River. The Waikato river runs 264 miles (425 kilometers) across New Zealand's north island, passing through Lake Taupō and Huka Falls before emptying in the Tasman Sea. Arapuni is one of several hydroelectric power stations located along the river, all of which have to work with one another to produce part of the energy supply for New Zealand. After a long drive to this power station, we were welcomed by Keil Adlam, the site lead at Arapuni and the guide for our tour of the power plant. The dam, which is the largest along the Waikato River, was first constructed and began operations in 1929, making it nearly 100 years old now; today, it is owned and operated by Mercury Energy. Arapuni has eight turbines in the station, produces about 805 GWh of energy per year, and runs with an efficiency of 2.7 m³/MW. The amount of power generation depends on the amount of water coming through and how much the dam can handle; the Waikato river spans from about 115 meters to 52 meters above sea level at each end, and the dam spans across part of the river that drops from around 111 meters to 108 meters above sea level. The amount of water flowing through the river depends on the water level of Lake Taupō, and has to be carefully monitored and controlled to ensure the dam can handle the amount of water passing through; If the level is too high or too low, it can hinder the dam's energy generation and even the dam's overall operation. Controlling the water from lake Taupō is just one of four redundancies used to ensure the dam operates smoothly and efficiently, the other three are a standalone diesel generator, four spillway gates with hydraulic power banks, and a gate that controls diversion from the river. In addition to these, Arapuni must work with the other hydroelectric plants along the Waikato River to ensure they all maintain their individual water levels and generation capabilities.

During our tour of the Arapuni Dam, we were shown the control room, transformer bay, turbine room, and other areas used for maintenance. In the control room, we discussed how the dam operators can determine if and where an issue has arisen, based on the voltages of the cords (indicated by color, red or white) and transformers. This is also where we discussed the levels of redundancy and other operational precautions, and the different measures taken to achieve them. Adlam and the other operators at the plant also talked about other checks done on the water quality and ensures they have minimal to no impact on marine life in the Waikato River: these include factors like not drastically changing the water temperatures and checking for bacterial development in the water. After the tour concluded, we briefly walked across the Arapuni Swing Bridge, giving us a much wider look at the Waikato River and the scope of the Arapuni Dam, as well as where the generated power is transported away from the dam and towards areas for residential use.

