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Innovation in Action – Microgrids and Hybrid Energy Systems
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At Alaskan Brewing Company, we brew the way we brew because of where we brew. That very simple concept goes to the core of every beer we produce, and to the innovative steps we have had to take to grow and thrive as a company. Living on the Last Frontier has always forced pioneers to be innovative. In the past and today, we look at things differently when faced with the challenges of conducting business in Alaska. Because many processes have not ever been done up here, we do not default to “it’s always been done this way”. In our case, it has made us look at ways of turning what would otherwise be a waste product, into a source of efficiency and energy.

I’d like to mention just three of the steps we have taken because our location made us think in a novel and inventive way about how we could be more energy efficient.

The first is our process of Beer Powered Beer – where we are able to use a waste product to create the steam that helps runs our brewing system. Beer is created by mixing grain with hot water to extract the liquid that eventually becomes beer. The residual grain that is left over from this process is called spent grain and it is the consistency of wet oatmeal. Many breweries in the US are near a cattle farm or other agriculture producer that will buy the spent grain for feed and we are aware of other brewers who dispose of spent grain in their local municipal land fill. But we had a problem – there are no cows in Juneau and landfilling our waste was just not in our minds a reasonable option. So we barged our spent grain to a Washington State farmer that bought it from us. That required us to dry our grain, because wet grain spoils in a few days. By becoming the only brewery in America that dries all of its spent grain, we had a solution for a while, but we were relying heavily on that farmer.

Which brings us to our second innovation. In 2008 we installed a new piece of equipment called a Mash Filter Press that allows us to grind up our grain very fine, so we get a 5% higher yield from our grain, and we also use much less water every year. This reduced the impact and energy cost to our city water and wastewater utilities, while improving our company’s financials by reducing our energy consumption, it reduced the amount of grain we needed to brew the same amount of beer and it improved our efficiency. We were the first craft brewery to use this novel technology while continuing to successfully produce internationally recognized award winning beer, and now dozens of other craft breweries have followed suit across the United States due to our pioneering this new approach to brewing craft beer. When we dried that very fine spent grain, we noticed it looked like sawdust. We had used spent grain as a small portion of our fuel to dry our grain, but always in combination with fuel oil. With this new finer grind we renewed our efforts to more fully utilize this as a primary fuel instead of shipping it south. It took 5 years, but in 2013 we were able to begin operating our spent grain boiler – in which we use the dried spent grain as 100 percent of the fuel in the furnace that produces the steam that helps run our operations. Our objective is to replace 60% of our fuel consumption using this new fuel source, and there’s every indication that we are going to achieve that and I am expecting to exceed it. Using what would otherwise be a waste product and producing steam that runs our brewing system is what we call Beer Powered Beer, and we just received a US patent on this one-of-a-kind process. Other brewers much larger than Alaskan have tried to accomplish this throughout the world and have failed, not to lessen our achievement but this innovation came about because it was necessary due to our location.

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Those two innovations – our Mash Filter Press and Spent Grain Boiler was built on earlier work that paved our way toward seeing that innovative approaches often pay unanticipated dividends. One of our first large-scale technical innovations had to do with Carbon Dioxide (CO₂). CO₂ is used in various stages of the brewing process – including bottling, tank cleaning, pressurizing tanks and carbonating beer. The source of the vast majority of the commercially available CO₂ is from fossil fuels. So breweries pay to have liquid CO₂ delivered to their facilities – typically by big tanker trucks delivering to their plant's holding tanks. We did that for a while too – but our location made us innovate because we had to barge our CO₂ in, we had a single supplier, with little option for us to control the quality of this raw material supply. This was expensive and created quality concerns with the supply of the CO₂ we received. The irony of this situation is that yeast produces CO₂ when it ferments beer – a lot of CO₂. So much so that we were off-gassing 800,000 pounds of perfectly good CO₂ into the atmosphere in 1998, and as good stewards of our state that didn't feel very responsible and we were paying high prices to ship CO₂ "North to Alaska". So we took the step of being the first craft brewery in the world to install a system that recovered all of the CO₂ we needed for our operations from fermentation, clean it, compress it, condense it, store it, and then use it for all our CO₂ needs. Since 1998 we have had a closed loop on CO₂, and do not buy tankers of liquid carbon dioxide. The carbon dioxide we gather is from grain that came from the atmosphere, not from fossil fuels we use our local electricity to compress and process this renewable source of CO₂. We were the first to use this renewable technology decades before any other craft brewery and now others are following our lead because we were able to pave the way by pushing the normal boundaries of traditional plant operations and pioneering our own way.

Sometimes it is painful to not be able to fall back on how things have always been done. In the freshness of looking at new approaches, we have had to make our own tradition. Those new approaches can have additional benefits. For instance, we are now in the engineering phase of adding an electrical generator to be coupled to the steam generated by our Beer Powered Beer process, turning waste into electricity, which we will use internally.

We are only the most recent in a long line of pioneers in Alaska that worked the way they worked because of where they worked. In Juneau in 1917, the miners of Juneau installed the first high-alpine lake tap, a project that still gives energy to Juneau today. That created the technology that supplies Juneau with one of the cleanest sources of constant and renewable electrical power in the world. That's Alaskan innovation, and it happens because when people are pushed to achieve under difficult circumstances, they invent new ways of solving problems. And sometimes those solutions can help change the world.