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Salt

Salt is used every single day. It is used in food, drinks, even on the road in a snow storm. Salt comes from the ocean and underground bodies of water. To obtain this commodity, part of the environment is destroyed and CO2 emissions increase. Salt comes in many shapes, forms, and qualities. Table salt is how food is flavored, making it a precious commodity. It is a staple in every household, making it part of the daily routine. This chain analysis covers Cargill's production of table salt. It is estimated that the average American consumes 3,400 mg of salt daily. [1] The consumption of table salt is something that is taken for granted, and we forget that salt truly is what gives life flavor.

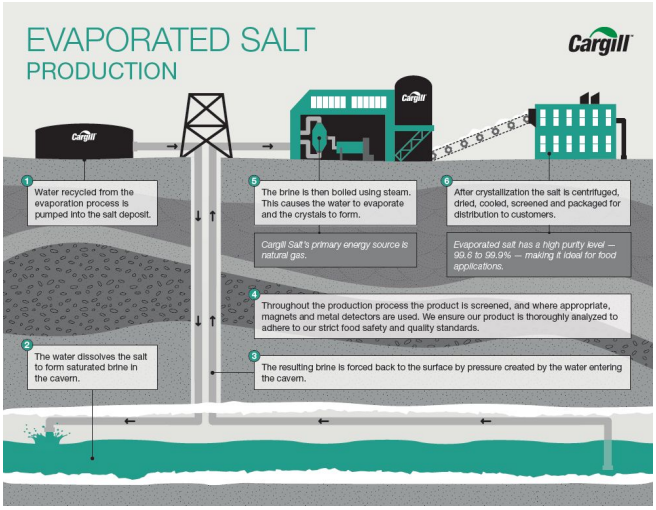
There are three ways in which salt originates, deep-shaft mining, solution mining, and solar evaporation.[2] More than 200 million tons of salt were produced worldwide in 2006. The purest salt is the one that is nearly 100% sodium chloride.[3] Salt originates from rocks on land. Through condensation, when rain falls it comes with dissolved carbon dioxide from the air, which makes rain acidic. Acids in the rainwater break down the rocks on the ground which creates ions. [4] These ions are then carried in runoff water to streams, rivers, and the ocean. The ions that are not used by living matter, concentrate on the ocean, or other bodies of water, creating salt. The salt content represents 3.5% of the total mass of the ocean water on average. Sea salt is naturally produced when water evaporates from shallow ponds. However, when producing salt on the large scale it is placed in concentrating ponds. [5] Their length is from 40 to 200 acres with a foot-thick floor of salt. [6]

The world only ingests 6% of the total salt produced, "12% is used in water conditioning processes, 8% goes [toward] de-icing highways and 6% is used in agriculture. The rest (68%) is used for manufacturing and other industrial processes. PVC, plastics and paper pulp are all obtained with the use of salt."[7] The whole process of salt harvesting can take up to 5 years.[8]

Massachusetts Bay Colony was the first company to patent and produce salt in America, supplying salt primarily to New York. Initially, salt was transported by mules.[9] To facilitate the trade, salt began to be transported by boat. To further the trade, Joshua Foreman created a "canal that would connect New York City and the Atlantic Ocean with the western part of New York State,"[10] this is known as the Erie Canal.

Cargill is one of the biggest manufacturers of salt in the U.S. supplying different types of salt under the brand name Diamond Crystal Salt.[11] Cargill has been operating since 1865, however, they have been distributing table salt as Diamond Crystal Salt as of 2014. [12] They have salt mines all over the USA, getting all of their supply from within the country. Their locations being: Arkon, OH, Avery Island LA, Breaux Bridge LA, Cleveland OH, Freedom OK, Hersey MI, Lake Point UT, Lansing NY, Hutchinson KS, Newark CA, St. Clair MI, and Watkins Glen NY. [13] However, their production facility and headquarters are located in Hersey, Michigan. [14] During the summer months, they bring in water from oceans or lakes and then salt is collected using the evaporation method. They harvest 500,000 tons of salt a year.[15] Then the salt is washed, refined and stocked up in piles that get to be 80 feet high. [16] They refer to this salt as evaporated salt, because the water is heated and then evaporated to create crystallized salt. [17]

Table salt is produced with solution mining. It starts when wells are injected with water to dissolve the salt. [18] The solution that forms from the combination of salt and water is called brine. This is later pumped out and taken to a plant for evaporation. The brine is treated to remove all other minerals or impurities. Then the brine is boiled until the salt is left behind. Then it is dried and refined. The following diagram shows how Cargill produces table salt.



Salt has sparked wars and protests globally. Starting with Gandhi's 23-day protest; the Salt March in 1930. The British understood the importance of salt production as an economic advantage. The British government prohibited Indian natives "from manufacturing or selling the

mineral and forcing them to buy it at high cost from British merchants." [19] As a protest, Gandhi and his supporters marched for 23 days. Gandhi did the unthinkable when he broke the law by "boiling a chunk of salty mud."[20] This triggered a series of protests that led to Indian independence. The new economics of India encouraged American salt manufacturer Cargill to invest in India's salt in the 1990s. Cargill "obtained approval from the government's Foreign Investment Promotion Board to set up a 100% export-oriented unit to produce one million tonnes of high quality sun-dried or solar industrial salt a year in Kandla Port." [21] However, such investment was protested by commemorating Gandhi's salt march. Indian civilians felt like their salt trade was being oppressed again by a foreign country. The big protest caused Cargill to retire investments and production of salt in the region. [22]

In the U.S., Cargill's salt production profit was $3.2 billion in 2018.[23] However, they only pay $12.55 per hour to the farmers. A production farmer makes an average of $25,000 per year, not being a livable wage.[24] Cargill employs a total of 160,000 employees. Cargill claims to give their employees plenty of benefits; medical, tel-doc, dental, vision, retirement account, tuition reimbursement, adoption assistance, flexible spending accounts, short-term and long-term disability, life insurance, accidental death or dismemberment, business travel accident, paid family leave, paid time off, holidays, PerkSpot, Milk Spot, and Personal Travel Assistance.[25] The extensive benefits and insurances show the high-risk job that Cargill's employees have.

Before the industrial and technological advances, obtaining salt was "one of the most expensive and dangerous operations for natural resources."[26] Salt was dangerous to obtain due to rapid dehydration of miners, and short life expectancy. This was a result of constant contact and the inhaling of salt. Hence, salt production was initially a job for slaves and prisoners. [27] Being a salt miner comes with many risks. First, there is the use of explosions in order to loosen the salt, leaving salt pillars to hold up the roof.[28] There is also the risk of getting stuck in an underground mine. In 2016, 17 miners got stuck in one of Cargill's underground salt mines in Lansing N.Y. They were stuck for 10 hours. The incident happened because one of the cables of the transporting elevator broke.[29] As part of the rescue process, "Cargill made counselors available for families of the miners." [30] Other risks of salt mines include the collapse of the mine ceiling or the infiltration of water converting the mine into an aquifer.

In 2002, 165 salt miners in Ohio went on strike. Cargill bought the salt mine where they had been employed for years, some of them for decades. They were arguing that Cargill was violating their job descriptions, scheduling, and subcontracting rules. Cargill tried to impose new changes on their job contracts. The miners stayed on strike from May until August. Cargill attempted to eliminate the workers union through a neo-fascist group.[31] Cargill proceeded to hire permanent replacements, leaving 165 miners without a job. The miners reached out to councilman Nelson Cintron. This sparked a solidarity movement, the town was encouraged to boycott Cargill salt and held a huge rally at the mine. However, the pressure of the winter forced the town to end up buying Cargill salt for the roads. Cargill turned to buyout the miners, and in total lost around $10 million trying to dismantle the union. Unfortunately, the union was left unsuccessful, disrespected, jobless, and defeated.[32]

In terms of international trade, Cargill has benefited from multinational pacts like the Trans-Pacific Partnership (TPP) and The North Atlantic Free Trade Agreement (NAFTA). "Open international trade and functioning markets are vital for moving products and services from areas of surplus to areas of need, and ensuring food security, job creation, and economic growth."[33] Cargill has outwardly spoken against Trump's America First policy. Cargill's CEO David Mac Lennan said that Trump's administration does not have "a full enough understanding of the complexity of negotiating [trade] agreements."[34] Cargill on average makes 250,000 cross-border movements of goods in about 60 countries a year. [35] "Cargill's fundamental belief that access to food is a basic human right and that food should flow freely across borders and not be used as a political weapon."[36]

As of 2017, the U.S. has a debt-to-GDP of 105.4%, this is the countries capability to pay off its debt.[37] As of 2016, the GINI was 41.5, as a measure of reference the higher the GINI number, the higher of income inequality the country has.[38] The number being 41.5 shows the deep income inequality in the U.S. This is not surprising given that multi-billion-dollar companies, like Cargill, pay low wages to their employees. The U.S. has a high HDI of 0.924 as of 2017. This ranks the U.S. at "13 out of 189 countries and territories."[39]

Cargill's export profile of salt is resilient and diversified. This is due to the different types of salt that Cargill produces, it's never-ending demand, and Cargill's exportation of other

agricultural goods such as grains and meat. The salt industry has been in the U.S. since the 1850s, however, Cargill started table salt production in 1955.

Cargill has an extensive way to store their products. Storage is what ensures the capacity to mass-produce a supply. In terms of transportation, Cargill priorities having access to American waterways. Once the salt is collected, it is transferred to a final processing facility. Their biggest market is North America, hence having mobility in the Hudson, Snake, and Columbia rivers are essential. Cargill completely depends on taxpayer money to keep the waterways open. [40] Cargill owns several ports along the way, yet it still depends on other ports built with taxpayer money. This reduces expenses for Cargill, and they are able to profit from public infrastructure. [41]Cargill also invested in building industrial elevators in ports in Albany and Mississippi. Cargill owns its own trucks and is involved in the shipbuilding industry, being able to construct its own steel barges and even produced ships for the U.S. Navy in the 1940s.[42] As of 2000, Cargill owns 600 vessels, 6,630 towboats, 682 barges, and 1,600 railroad tanks, exclusively used for the transportation and storage of its products. [43] Their vessels stop at around 4,500 ports per year and move over 200 million tons of product.[44] Their truck types include refrigerated, temperature-controlled, dry vans, bulk trailers, flatbeds, containers, livestock haulers, and over-dimension haulers.[45] Diamond Crystal Salt can be purchased online through Amazon, or at popular supermarkets such as Walmart and Whole Foods.[46]

Cargill has made changes to be more eco-friendly. They changed their salt packaging to be 100% recyclable, or so they claim.[47] They stopped producing the round salt canisters and now produce a slimline box. The new container is cheaper and its production "equates to 74.3 acres of United States forests preserved, 7,100 gallons of gasoline worth of CO2 emissions saved, and 69,037 pounds of coal left unburnt annually."[48] The production of salt has led to the destruction of wetlands across America. As a conservation effort, in 1994 Cargill sold a wetland of 1⁄3 the size of San Francisco to the California Wildlife Conservation Board for $10 million, when the original price of the land was $34 million. The difference was to be donated to the state for the reconstruction of the wetland. [49]Cargill recognized that due to its massive industry and constant use of shipment, they make a big contribution toward CO2 emissions. In 2016, they pledged to reduce their total CO2 emissions by 10%. They aim to decarbonize the shipping sector by

exploring "solutions like zero-carbon fuels, energy efficiency measures, efficient vessel designs, and better ship utilization backed by deep technical knowledge, solid data, and analysis."[50] Since 2016, Cargill has been able to reduce its CO2 emissions by 12.1% and aims to do a total of 15% in 2020. They claimed to have reduced a total of 350,000 tons of CO2 emissions.[51] Using this statistic, I calculated Cargill's carbon footprint using the cross-multiply method.

$\frac{350{,}000}{x} = \frac{12.1}{100} \Rightarrow 12.1x = (350,000 \times 100) \Rightarrow 12.1x = 35,000,000 \Rightarrow x = \frac{35{,}000{,}000}{12.1} \Rightarrow$ x=2,892,561.98

This means that prior to 2016, their carbon footprint was 2,892,561.98. Following this calculation, from 2016 on their carbon footprint is 2,892,561.98-350,000=2,542,561.98. Their carbon footprint today must be almost, if not already, reduced by 15% of the original number, assuming they are on track with their plan and given the fact that it is November. Their carbon footprint must be 2,458,678.68. I obtained this number using the following calculation.

$2{,}892{,}561.98 \times .15 = 433{,}883.297 \Rightarrow$ 2,892,561.98- 433,883.297= 2,458,678.68

The disposal of table salt is through the digestive system. The human body process it by retaining water. The salt we normally consumed is pure white, which means it is refined and not nutrient-dense. [52] The human body disposes of it through urine and sweat.

The production of salt comes with environmental degradations. In order to harvest salt, wetlands have to be destroyed to be converted into salt farms. The method of producing table salt is by the evaporation method that causes CO2 emissions and alters the temperature of an underground layer of soil. This technique is the most energy-efficient. The steam generated is regulated and reused when possible. However, it does come with water waste, the water is heated up and has a higher salinity concentration that when disposed on the wetland, affecting the likelihood of the fauna and flora to survive.[53] Regardless, Cargill does try to recycle the water in the mining process. The use of machinery to extract the salt destroys any living orgasm both above and underground. [54]A way to produce table salt more eco-friendly is to completely stop the use of underground salt harvesting. An alternative is to 100% switch to sea salt consumption. This has environmental impacts of their own, such as decreasing the salinity level of the ocean, which would affect the quality of life of oceanic species. There would also be the use of machinery, which would have CO2 emissions of its own. A side effect would be that there are a

lot of unknown substances in seawater. Unfortunately, humans made the ocean their dump, therefore we would not know exactly what comes in sea salt. However, this more organic production of salt would have less CO2 emissions. Another solution is to decrease overall salt consumption. There are condiments that can be used to give food flavor such as rosemary, nutmeg, basil, cardamon etc.[55] In addition, there are products that are designed to be salt substitutes that contain potassium chloride. Regardless, the production of this product will also have environmental impacts. There is also the option to switch to hand-harvesting salt using solar evaporation. Although this practice is sustainable due to the lack of machinery, using this method, the production of salt would not be able to keep up with the demand. It would also be more expensive since it will all be hand labor, increasing the overall price of salt.

Throughout my research, I encountered deadends and difficulties. In the beginning stages, my research got repetitive. All websites contained the same information about salt. It was when I specified on one specific manufacturing company that I was able to dig deeper. However, there were not enough outside sources that have researched salt, this forced me to rely a lot on Cargill's own website, which makes the information bias. The lack of information on salt production is limited because it is run by big salt hegemons like Cargill and Morton. Therefore, the only information available is the one that they provide. I only encountered one book that had previously research Cargill, and even the information it provided seem rather superficial.

I know salt miners collect the salt, however, I was unable to find the total amount of salt miners that they employ, and the number of hours each miner works a week. I submitted a contact request asking those questions on both their Diamond Salt website and the Cargill website and got no response.

I was unable to find if the government implements any type of tax over salt production, sell, and exportation. This is because every search with "salt tax" showed results for the State and Local Tax deduction, for short SALT. However, I am assuming that the tax on table salt is the same as the tax on groceries, which varies from state to state. Some states exempt groceries, and some others have a tax of up to 5%. [56] I also could not find how much Cargill sells their salt to grocery stores. I once again attempted to contact Cargill via their website asking for these numbers and got no response.

I was also unable to find Cargill's salt route. They had information about their sugar, and grain route but nothing solid on the salt trade route. I did not find who they were trading with, or where they were distributing in the U.S. either. They claim to do 250,000 cross border trading, yet, there was no information on what they were trading, who they were trading with, and how much. I was able to access their salt profiles, however, the format and language used caused me to not understand what the numbers meant, therefore I was unable to use this information.

The production of salt is a complex process. Being a very desired commodity, salt is one of the biggest businesses. Writing this paper I learned how salt was produced and the different types of salt, and I began to appreciate its value. I did not expect salt to have that big of an environmental impact to the point that wetlands are destroyed. I realized how being a hegemon of a commodity causes the information to be limited. Even Though I know that salt comes with a deep environmental cost, there would have to be a cultural change to eradicate its use. This is because it is directly tied to food, and food is a cultural practice. However, I am hopeful for the future due to the green initiatives Cargill has started. From now on I will manage the amount of salt that I use and encourage the use of other seasonings for flavor in my food.

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