SALT PRODUCTION DYNAMICS, TRENDS AND FORECASTS

Since 1970, and every 10 years thereafter, the following quantities of salt were produced worldwide:

	1970	1980	1990	2000	2010	2020
World total (mt/y)	146.6	172.8	187.2	216.6	282.6	338

Source: USGS (Ref. 1), BGS, Roskill, Salt Partners

Between 1970 and 2020, world salt production grew 131% with an average annual growth rate was 1.71% (Chart 1).

The salt production growth can be put into context with the human population growth during the same period.

According to the UN Statistics (Ref. 2), the world population grew 111% from about 3.7b in 1970 to an estimated 7.8b in 2020, an average annual growth rate of 1.51%.

When the salt consumption figures are adjusted to grams per day and divided by the world population, and assuming the salt production and consumption are about equal, we obtain the following salt consumptions per capita:

	1970	1980	1990	2000	2010	2020
World consumption (g/person/d)	109	106	96	97	111	118

Source: USGS (Ref. 1) and UN DESA Population Division (Ref. 2)

The world salt consumption per capita has been fluctuating between 90g and 120g per day and experienced a small average growth rate of 0.2% a year (Chart 2).

The minimum human physiological salt intake, required for bare survival, is about five grams a day.

The excess consumption facilitates production of a myriad of products including synthetic fibres, plastics, aluminium, glass and other materials that enhance our comfort and standard of life.

World Salt Production Capacity, Trends and Forecasts

The world salt consumption per capita has been more or less constant. It follows that the main driving force behind the growth of salt production is the increase in the world population.

Assuming that the world population growth rate will not change, the world salt consumption around 2029 will reach about 400mt/y.

The salt industry must have the capacity to produce the salt that the world needs. So, what will have to be the production capacity needed to produce the required salt?

Industrial production capacity utilisation is, on average, a slightly below 80%.

Salt is produced as brine and vacuum salt, as rock salt and as solar salt.

Whereas solution mining and vacuum operations are steady, rock salt production fluctuates depending on de-icing salt demand. However, solar salt production depends on the climate and the weather.

Therefore, solar saltworks need high capacity reserves to achieve the required average production.

This reduces the utilisation of the overall salt production capacity to only 76%.

In 2019, the total available salt production capacity was 435mt/y (Chart 3, end of full red line).

In 2014, 20mt/y of new salt projects were announced (beginning of the full green line). The end of the green line shows 73mt/y of new salt projects announced in 2019.

If only a half of the announced projects are implemented and the time period between announcement and full production is six years, in 2020 there will be 10mt/y additional production capacity.

This would bring the total to 445mt/y, which, utilised to 76%, will facilitate the production of 338m/t.

However, already in 2021, the predicted salt production of 343m/t will require 451mt/y production capacity, which is 16mt/y more than available in 2019.

In 2015, 22mt/y new salt projects were announced. If 11mt/y actually come on stream, there will be a shortage of 5mt/y.

It follows that six years earlier, in 2015, 10mt/y additional production capacity should have been announced, shown as the green dotted line.

Expanding this to 2029, it follows that in the year 2023, 164mt/y of additional salt projects should be initiated, whether announced or not, to provide 82mt/y additional production capacity needed to produce 393mt in 2029. Shown as the red dotted line, without new projects, the production capacity deficit would grow to 82mt/y.

Salt Prices

Without new projects, there would be a salt supply shortage and prices would rise. This would increase the profitability of salt production, which would attract investments into new salt production facilities.

Therefore, most forecasts predict only minimum salt price changes, just in line with the general rate of inflation. The least expensive source of salt is salt in solution mined brine, available in the USA and in Europe at about USD$6/t.

More expensive is rock salt in bulk, available at mines for truck or rail delivery at USD$10-15/t. Solar salt supplied by the major producers in Australia, Mexico and India, sells at USD$18-25/t on a Free On Board (FOB) bases.

With overseas trade, much depends on the shipment, which can vary between 10,000t and 150,000t. It can also depend on other factors like the salt quality or whether it is a long- term contract or a spot sale.

Highest bulk prices are paid for vacuum salt, which vary in the countries of the northern hemisphere between USD$60-90/t. Dry packaged refined salt in big bags and table salt in small packages is much more expensive.

The >99.999% Suprapure® salt for laboratory use sells at almost USD$1000/kg.

Increasing Salt Production Capacity

There are three basic ways of increasing salt production capacity. One way is to build new facilities. New, grassroots projects are the most expensive and time-consuming option. Explorations, land acquisition, planning, obtaining numerous approvals, securing finance, et cetera, take years of focused efforts. When publicly quoted companies embark on such projects, their progress is well documented. For example that of BCI Minerals, referred to in the ASX publications, such as the latest one available under the link given in Ref. 3. The other way is to expand the existing facilities, where possible. Such brown roots projects are less expensive and faster because all the project elements are known and approvals exist.

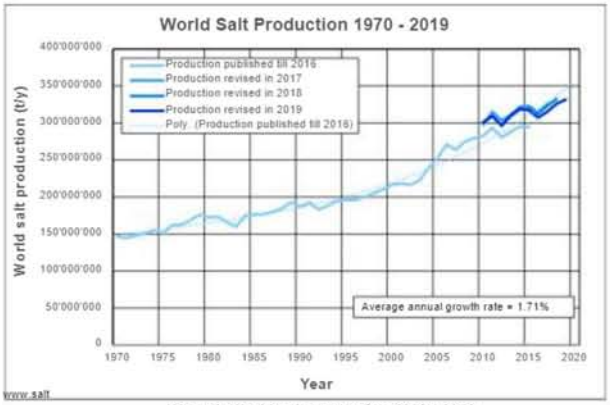

Chart 1 World salt production 1970 - 2019

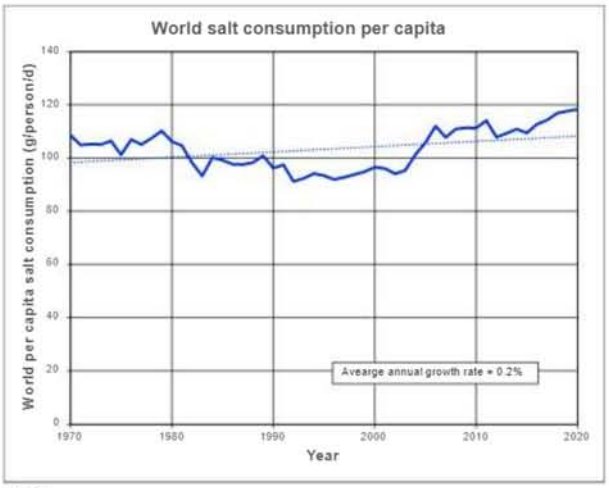

Chart 2 World salt consumption per capita

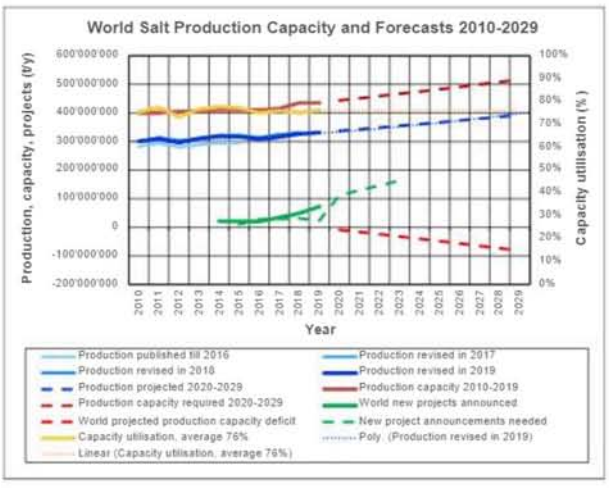

Chart 3 World Salt Production Capacity and Forecasts

However, planning, procurement and construction are the same. Finally, advanced technologies can increase productivity and thus expand production capacity.

For example, the HYDROSAL-XP® technology can reduce salt processing losses in solar saltworks producing high quality salt, from frequently experienced 18-20% down to 3 4%.

Thus, HYDROSAL-XP® technology can increase production capacity by 14-17%, at a fraction of a new saltworks cost. At the same time, the salt quality is improved and the achievable price is increased. AMR

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REFERENCES

1. US Geological Survey: https://minerals.usgs.gov/minerals/pubs/commodity/salt/
2. World population: https://esa.un.org/unpd/wpp/
3. Mardie salt and potash project: http://clients3.weblink.com.au/pdf/BCI/02250069.pdf

MILESTONE FOR MARDIE

BY KATE CHRISTIAN

Sunrise over the Mardie Project camp.

BCI Minerals is set to start early construction work on its flagship project next month after a study demonstrated it has the potential to be a "globally significant" Tier 1 operation.

The positive Definitive Feasibility Study (DFS) released on July 1 demonstrated the Mardie Salt and Potash Project could produce 4.4Mtpa of high purity salt and 120ktpa of premium sulphate of potash (SOP) fertiliser.

BCI Minerals managing director Alwyn Vorster said another important parameter established by the study was the mine has an "infinite" life as it would run off an inexhaustible seawater resource, due to its ideal location on the west Pilbara coast in the heart of Australia's key salt producing region.

"We are working to a 60-year mine life but its arguably a 100-year mine life or longer because it is different from inland SOP projects that pump water from ancient aquifers underground," he said.

"The economic results from the DFS include a pre-tax NPV of more than $1b.

"Importantly for most investors who look at this type of project, it has an annual Earnings Before Interest, Taxes, Depreciation and Amortisation (EBITDA) of nearly $200m, which for an annuity for the next 100 years, is quite significant.

"We are really pleased with the result of the DFS and really the confirmation that Mardie has the potential to be a globally significant Tier 1 salt and potash fertiliser project."

The project has received major project status from the Federal Government following a six-month process with the Departments of Resources and Industry.

It is the first large scale solar evaporation salt project to be undertaken in Australia in two decades.

"It is important to reflect on the fact that there hasn't been a project of this nature constructed for more than 20 years in Australia," Mr Forster said.

"Mardie is a relative novelty in the Australian industry so the Department of Industry looked at it from that perspective and measured it in terms of what benefits it can bring to the community."

The project ticked the boxes on six major criteria, including the economic benefits to WA and Australia through taxes and royalties as well as the creation of 500 new construction jobs.

From a regional development point of view, KPMG produced a study showing the project would contribute a Gross Regional Product of more than $2b to the Pilbara region over 60 years.

The project would also be powered by renewables, deriving 99 % of its energy from natural solar and wind energy.

It would also provide new infrastructure such as a new port facility.

"We will also be the first Australian salt project where we are planning to do a secondary processing for the salt waste, which will be converted into the SOP fertiliser on site," Mr Vorster said.

The WA-based BCI Minerals successfully completed a $48m capital raise in October which will enable early construction work on Mardie to start next month (December).

This would involve construction of a trial pond to test different construction materials and methodology.

It would also involve the construction of major roads, a large accommodation village, power and communications infrastructure needed for the final construction work.

The early construction program is due for completion in May 2021, to coincide with when BCI wants the main capital raising completed by.

"The DFS shows the project has a $780m capital cost, so if we assume two thirds of that comes from debt and one third from equity, we are talking about $250m that needs to be raised by April or May next year for final construction to start," Mr Vorster said.

The plan is for BCI to obtain all required funding and approvals allowing full project construction to commence by May 2021.

"It is a three-year construction program and that is the nature of a solar evaporation project," Mr Vorster said.

"It is a three-year period from filling the first pond to putting the first salt on ship, so it is a long natured project, and that is why we're focusing on a certain type of shareholder who is patient and prepared to wait.

"Investors will get decades-long annuities but they will need to understand it takes a while to get into production."

The company's major shareholder Wroxby Pty Ltd (Wroxby), which currently has a voting power of about 29%, has committed to taking up its full pro rata entitlement of approximately $14m.

An ASX statement released on August 20 stated that with a cash balance of $41.5m at June 30, zero debt and ongoing Iron Valley royalty earnings, BCI is in a strong position to advance the Mardie Project to a final investment decision targeted by early 2021.

The Iron Valley iron ore mine delivered strong earnings for BCI in the year ending June 30, with a record EBITDA of $23m off the back of high iron ore prices.

"The Iron Valley royalties is valuable at the moment for BCI for doing all the studies and the initial de-risking for the project," Mr Vorster said.

"But given the history of Iron Valley royalties is between $10-20m a year, it is clearly not enough to fund the Mardie development.

"So while it will always be a very healthy supporting funding mechanism for the company it is not the main funding source for Mardie."

Mr Vorster said he was still "absolutely comfortable" with the company's decision to diversify beyond iron ore. BCI had earlier emerged from a fight for survival due to operating a high cost iron ore mine (Nullagine) at a time when the iron ore prices were declining rapidly.

"As BCI found 10 years ago with the Nullagine deposit, it looks excellent when the prices are $100/t, but once they drop below $50/t then the company is in trouble so we never wanted to be in that position again," Mr Vorster said.

He said there were many important milestones to look forward to over the next six months, such as the EPA assessment which would pave the way for final environmental approval.

"Then we also have important target milestones for the debt component of the project so we hope we can have an announcement with the banks we are negotiating with," he said.

"That will give investors some confidence to see we have made tangible progress on the funding.

"We are also hoping to show more regional presence by opening an office in the Karratha towards the end of the year, to have people on the ground there to assist us in our regional engagement and make sure local contracting becomes a priority for us."

Mr Vorster said BCI had reached "a very important pivot point" after making the transition from being an exploration company three years ago.

"We are now at the cusp of developing into construction and then hopefully into being an operating company and with that will come big changes," he said.

"We are appointing significantly more people into the company and with that transition comes a change in culture so it is a very exciting time for BCI."

Mr Vorster said Mardie would supply the salt and potash growth markets in Asia over many decades, with the salt to be used to create tens of thousands of end products, including PVC piping for the construction industry and electric vehicles, glass, paper, paints, parts for aircrafts and more.

"Anything that you touch on an everyday basis that isn't wood contains an element of salt," Mr Vorster said. AMR

Natural salt visible on the Mardie Project mudflats.