Salt Production Dynamics, Trends and Forecasts

Abstract

In this paper, the author presents the figures concerning world salt production in the past 50 years in general and in the period 2010-2019 in particular. On the bases of per capita salt consumption, the author shows how the salt production depends on the population growth and forecasts the salt production in the period 2020-2029. Data on production capacity utilization are used to forecast the establishment of new and expansion of existing salt production facilities worldwide.

The paper compiles the facts and figures in tables and charts. Links to references mentioned in this paper are listed in Section 5. Website link http://salt-partners.com/salt_producers.htm leads to salt producers considered in this paper.

The author, Vladimir M. Sedivy, devoted almost 50 years of his life to salt. He is the founder and President of Salt Partners Ltd., salt consultants and engineering contractors, active in the field of salt and chloralkali production and processing. Salt Partners emerged in 2003, consolidating the salt expertise gained since 1972 with the famous Swiss companies Escher Wyss and Krebs in Zurich. Salt Partners advise on building salt production facilities, supply equipment and implement salt projects on all continents.

Keywords: Salt Production, Salt Processing, Forecast

1. Salt Production since 1970

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

Table 1 World salt production 1970 – 2020

	1970	1980	1990	2000	2010	2020e
World total (t)	146'600'000	172'800'000	187'200'000	216'600'000	282'600'000	338'000'000

Source: USGS (Ref. 5.1), BGS, Roskill, Salt Partners

Between the years 2010 and 2019, several revisions of published statistics have taken place. Whereas the earlier figures were based on reports by government departments only, since 2010 attempts were made to include the production by informal sectors and artisan producers. The production figures were revised, mostly upwards. These production figures, together with the figures published for the intermediate years, are shown in the following chart:

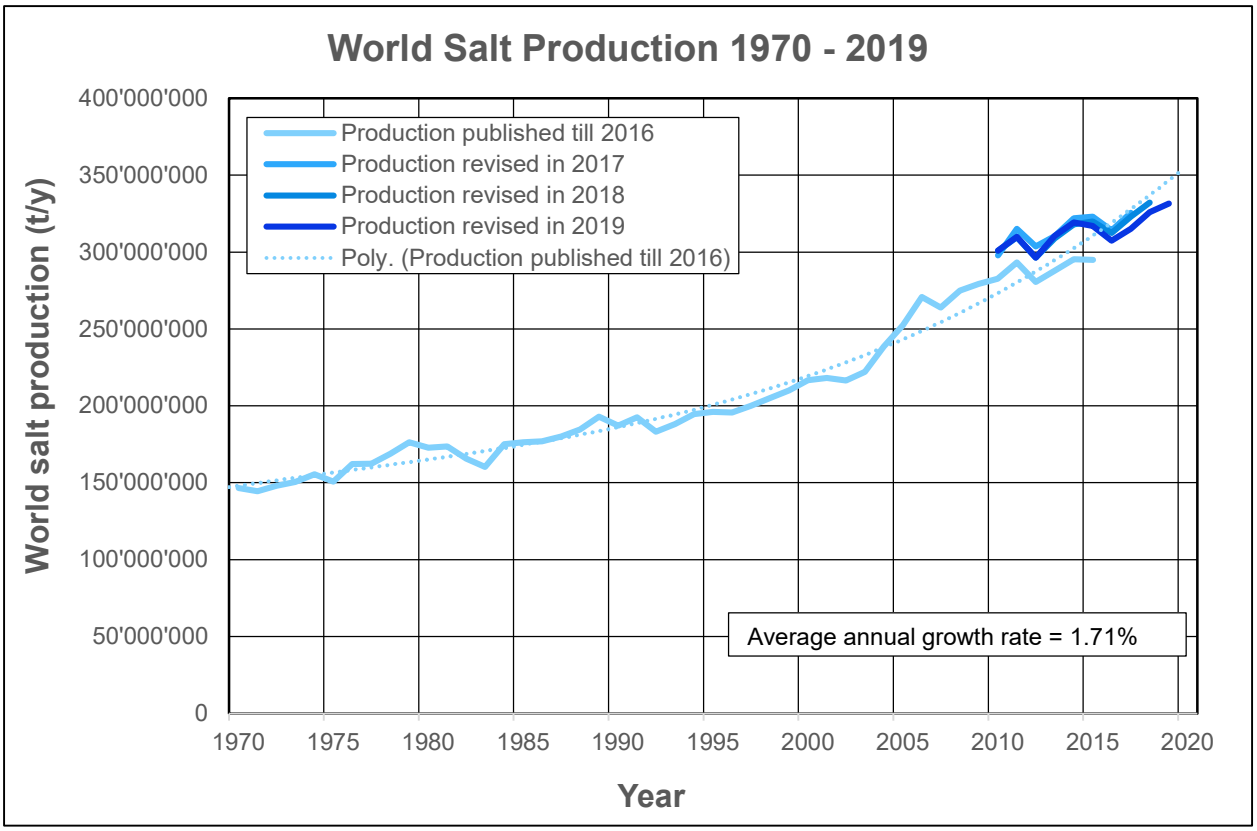

Chart 1 World salt production 1970 - 2019

The average annual growth rate based on production figures published till 2016 is 1.71%. the negative effect of the Great Financial Crisis in 2009 is visible but insignificant.

The same figures, expressed in percentage terms and re-based to 1970, to visualise the salt production growth, are shown in the following table:

Table 2 World salt production growth 1970 - 2015

	1970	1980	1990	2000	2010	2020e
World salt production growth	100%	118%	128%	148%	193%	230%

Source: USGS (Ref. 5.1), BGS, Roskill, Salt Partners

In the fifty years between 1970 and 2020, the world salt production more than doubled.

For better understanding of the salt production growth figures, they can be put into context with the growth of human population in the world during the same period. According to the United Nations, Department of Economic and Social Affairs, Population Division (Ref. 5.2), the world population developed as follows:

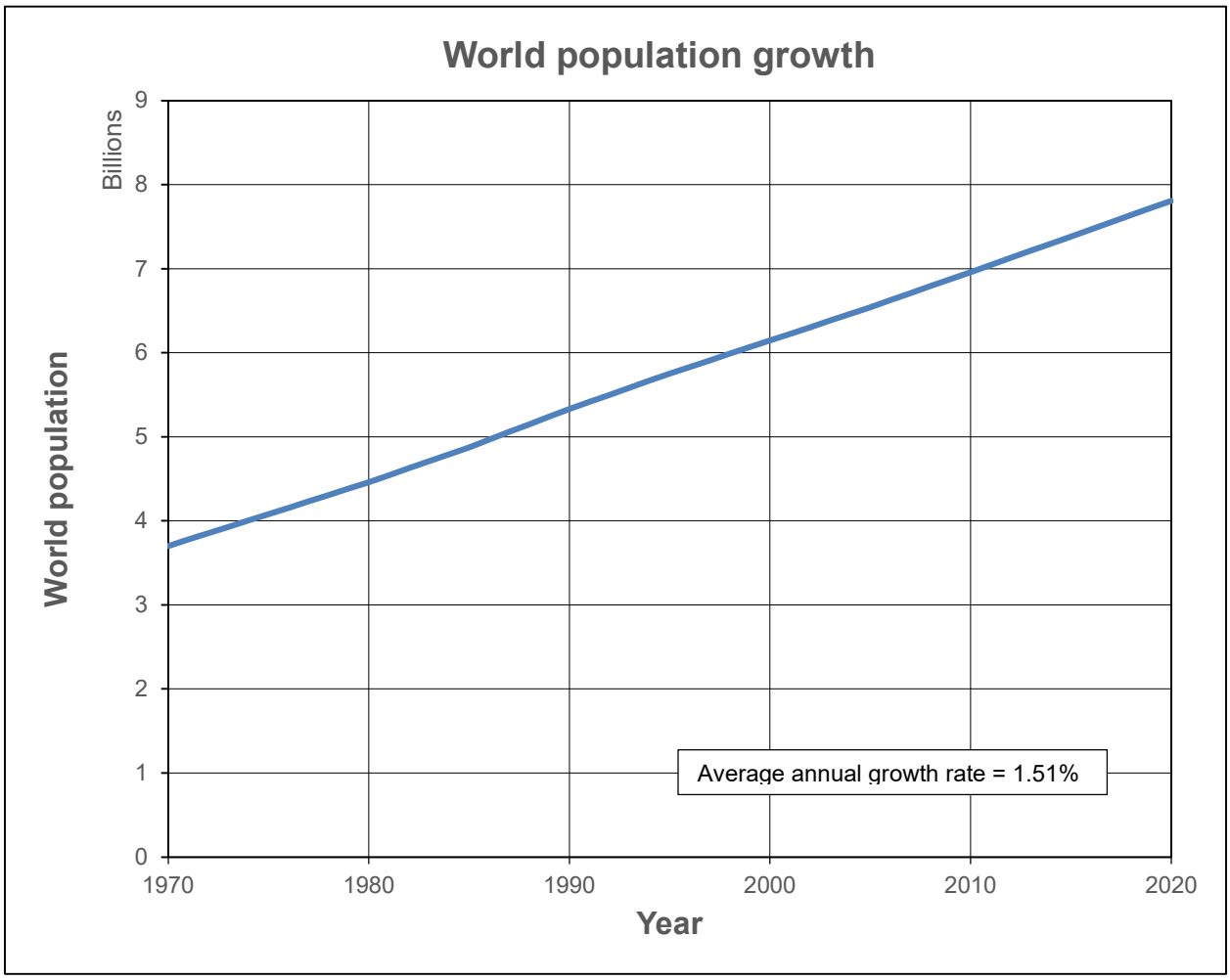

Chart 2 World population growth 1970 - 2020

The average annual growth rate based on the United Nations published figures is 1.51%. There is no visible slow down effect of any political or environmental influence during this period.

Table 3 World population growth

	1970	1980	1990	2000	2010	2020e
World population growth	100%	120%	144%	166%	188%	211%

Source: UN DESA Population Division (Ref. 5.2)

In the long run, the salt production and consumption are equal. When the salt consumption figures are adjusted to grams per day and divided by the number of people living in the world, to obtain the salt consumption figures per capita, we get the following results:

Table 4 Per capita salt consumption in the world

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

Source: USGS (Ref. 5.1) and UN DESA Population Division (Ref. 5.2)

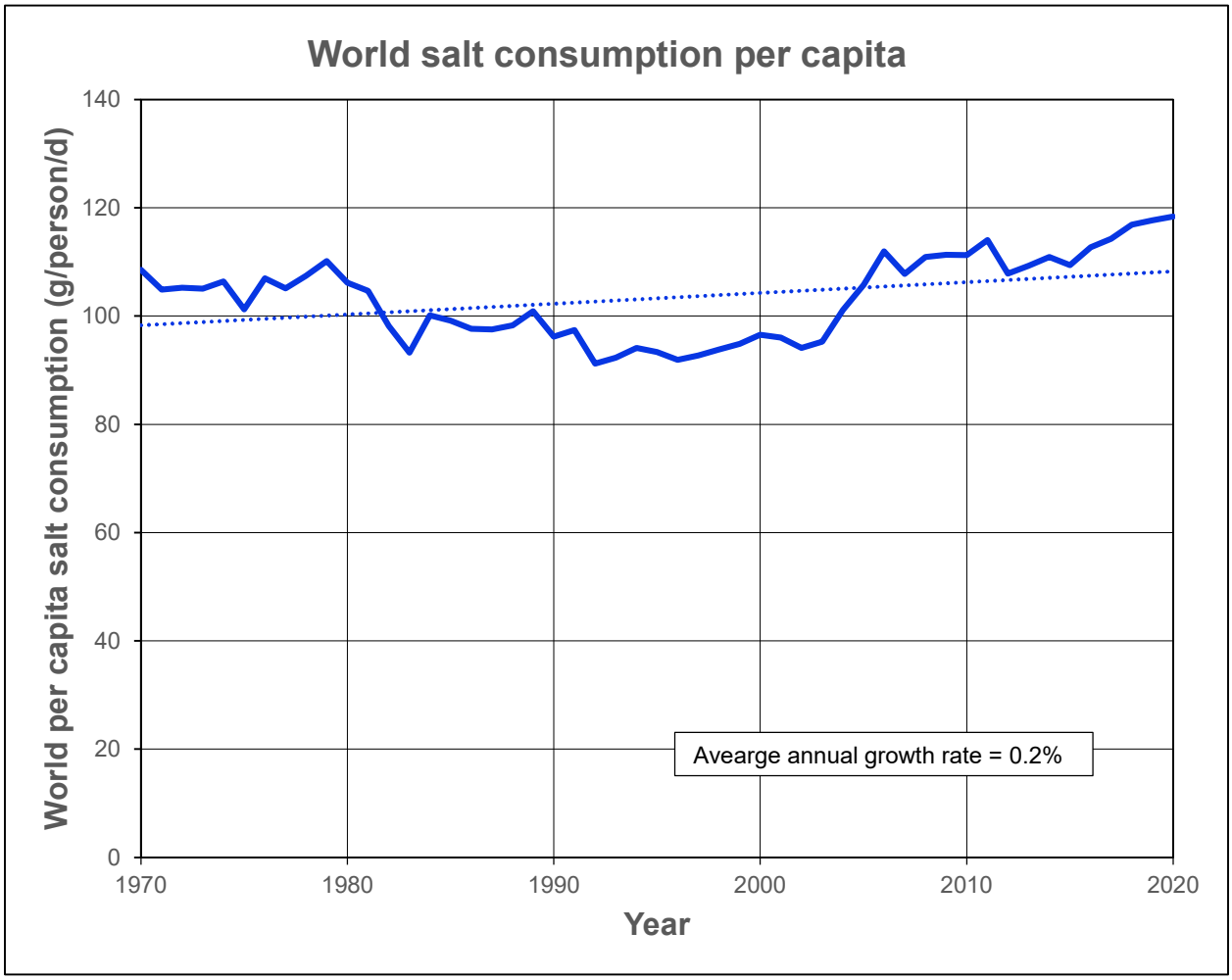

Chart 3 Per capita salt consumption in the world

The figures show that the world per capita salt consumption has been fluctuating between 90 and 120 gram per day and experienced a small average growth rate of 0.2% per annum over

the whole period of 50 years. The minimum human physiological salt intake, required for bare survival, is about 5 gram NaCl / day. The world salt consumption exceeds by far the minimum human physiological salt requirement. The excess 95% consumption facilitates production of fibres, aluminium, glass, etc., that enhance our comfort and standard of life. Consumption / production of salt, being an essential commodity, is an indicator of human economic progress.

2. Salt Production, Trends and Forecasts

It is difficult to make forecasts, especially about the future. However, forecasting salt future is easier because salt dynamics are slow and steady and therefore better predictable.

Looking at the Table 4 and Chart 3, the world per capita salt consumption has been more or less constant, rising from 109 to just an estimated 118 gram NaCl / day in 50 years. It follows that the driving force behind the growth of salt production, from 146.6 million tonnes in 1970 to an estimated 337.4 million tonnes in 2020, has been mainly the increase in world population, which, looking at Table 3 and Chart 2, has been growing almost along a straight line. Do we have a reason to assume that the rate of world population growth will change? Assuming that it will not change, the world salt consumption around 2029 will reach some 400'000'000 t/y.

What does it mean for the salt industry, which must have the capacity to produce the salt that the world needs? And what will have to be the production capacity needed to produce the required salt reliably? To answer that, let us have a look at the following chart:

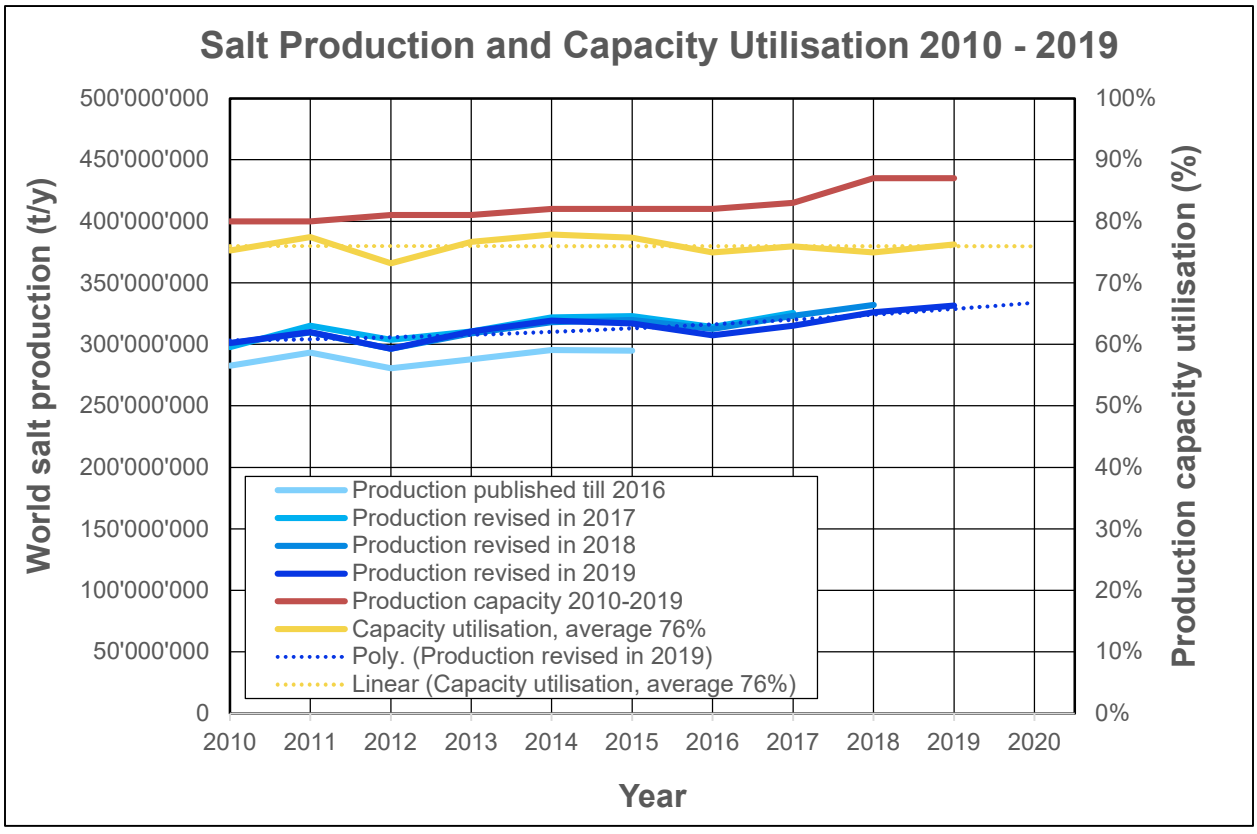

Chart 4 World Salt Production and Capacity Utilisation

Generally, industrial production capacity utilisation is, on average, a little below 80%. When this is exceeded, the inflation starts rising. 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 can fluctuate depending on demand. However, because solar salt production depends on the climate and the weather, which are rather unpredictable, solar salt production facilities need high capacity reserves to achieve the required average production. This lowers the utilisation of the overall salt production capacity. Thus, the 76% average world salt production capacity utilisation, calculated from the figures available for the past 10 years, appears plausible.

The above considerations lead to the following trends and projections:

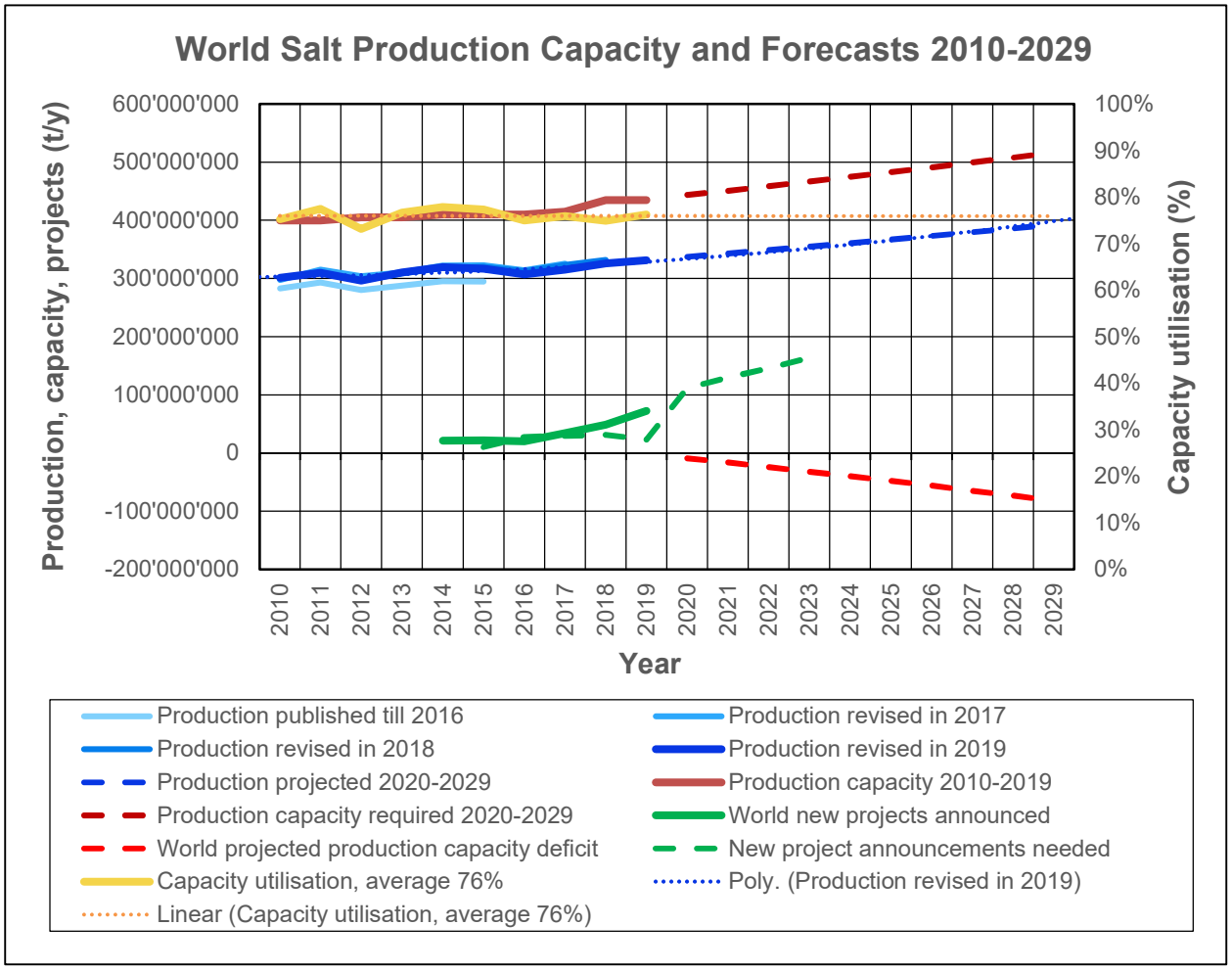

Chart 5 World Salt Production Capacity and Forecasts

In 2019, it was estimated that the total available salt production capacity amounted to 435’000’000 t/y (end of full red line). In 2014, new salt projects, totalling about 20’000’000 t/y, were announced (beginning of the full green line). The end of the green line shows 73’000’000 t/y new salt projects announced in 2019.

To estimate how these new projects will increase the world salt production capacity, let us assume that only a half of the announced projects is actually implemented and that the time period between announcement and full production is 6 years. On that bases, in 2020, there will be 10'000'000 t/y additional production capacity, bringing the total to 445'000'000 t/y, which, utilised to 76%, will facilitate the world salt production of 338'000'000 t/y (compare Table 1).

However, already in 2021, the predicted salt production of 343'000'000 t/y will require 451'000'000 t/y production capacity, i.e. 16'000'000 t/y more than available in 2019. In 2015, 22'000'000 t/y new salt projects were announced. If a half of these new projects, i.e. 11'000'000 t/y will come on stream, there will be a shortage of 5'000'000 t/y salt production capacity in the world. It follows that 6 years earlier, i.e. in 2015, 10'000'000 t/y more additional production capacity should have been announced, so that in 2021, 5'000'000 t/y more production capacity would be available. These "should have been announced" capacities are shown as the green dotted line on the Chart 5 above.

Expanding this – admittedly somewhat complex – calculation to 2029, it follows that in the year 2023, 164'000'000 t/y of new additional salt projects should be initiated (whether publicly announced or not) to provide 82'000'000 t/y additional production capacity in 2029, in addition to the existing 435'000'000 t/y capacity in 2019, bringing the total to 517'000'000 t/y capacity needed to produce 393'000'000 t/y in 2029.

Without these new projects, the production capacity deficit of 5'000'000 t/y in 2021 would grow to a deficit of 82'000'000 t/y in 2029. This is shown as the red dotted line on the Chart 5.

3. Salt Prices

Without new projects, there would be shortage of salt supply and the salt prices would rise. This would increase the profitability of salt production, which would attract investments into new salt production facilities. For that reason, most salt price forecasts predict only minimum changes, mostly just in line with the general rate of inflation.

The least expensive source of salt is salt in solution mined brine, available at approx. 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 FOB bases. In the overseas trade, much depends on the size of shipment, which can vary between 10'000 and 150'000 tons, further on the salt quality, whether it is a long term contract or a spot sale, etc. Highest bulk prices are paid for vacuum salt, which vary in the countries of the northern hemisphere between USD 60 and 90/t. Dry packaged refined salt in big bags and table salt in small packages is much more expensive. The >99.999% Suprapure® NaCl for laboratory use sells at almost USD 1'000 per kilogram.

4. Increasing Salt Production Capacity

There are three basic ways how to increase salt production capacity:

One way is to build new facilities. New, grass roots projects are the most expensive and time consuming option. Explorations, land acquisition, planning, obtaining numerous approvals, securing finance, etc., take years of focussed 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, for example the latest one available under the link given in Ref. 5.3.

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. However, planning, procurement and construction are the same.

Finally, advanced technologies can increase productivity and thus expand production capacity. For example, the HYDROSAL® technology can reduce salt processing losses from 18-20% to 3-4%, thus increasing production capacity by 14-17% at a fraction of a new plant cost. At the same time the salt quality is improved and the achievable price is increased.

5. References

5.1. US Geological Survey: https://minerals.usgs.gov/minerals/pubs/commodity/salt/

5.2. World population: https://esa.un.org/unpd/wpp/

5.3. Mardie Salt and Potash Project: http://clients3.weblink.com.au/pdf/BCI/02250069.pdf