SALT FORUM 2023
Strand Hotel Swakopmund, Namibia
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The new conference for global salt supply and markets

Southern African & Walvis Bay Salt Development and Production

- Andre Snyman

WALVIS BAY SALT

a Bud Group Company

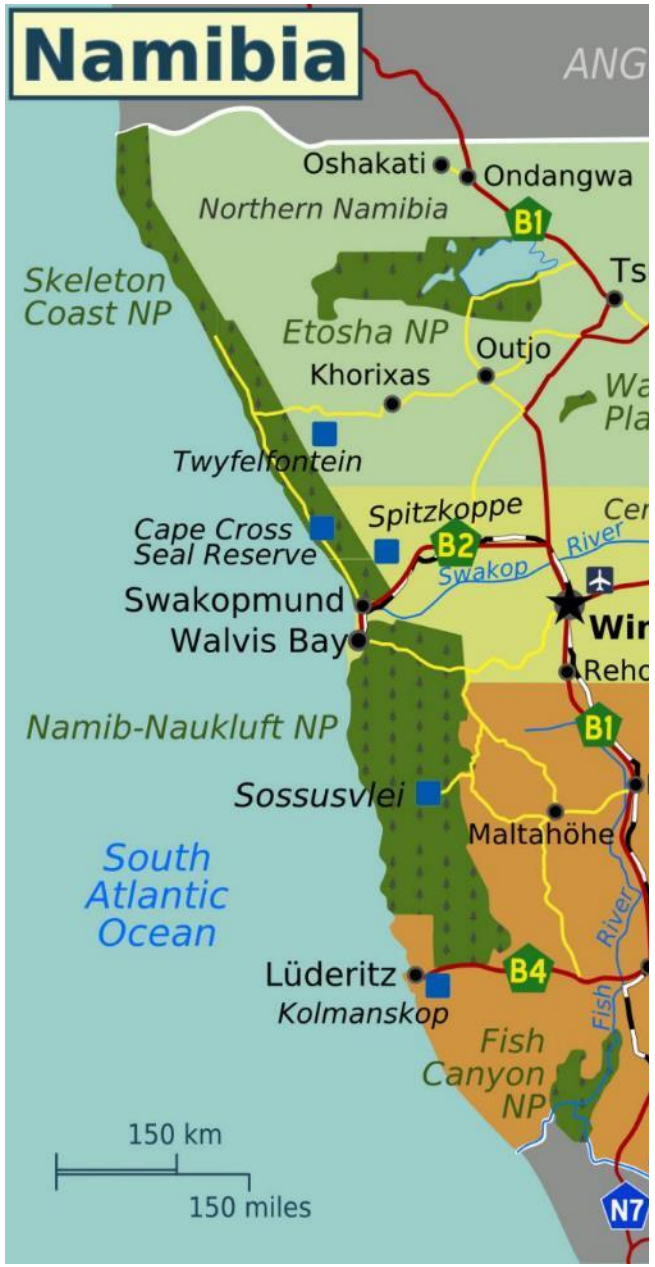
WALVIS BAY
SALT

at its best

a Bud Group Company

overview Namibia

- Namibia’s modern international boundaries were established when Germany annexed the territory as South - West Africa in 1890.
- In 1915, during the WW1, South Africa assumed “temporary” control of South - West Africa, and making it the 5th Province.
- Namibia achieved its independence in March 1990 from South Africa, through the successful involvement of the UN.
- Namibia comprises more than 800,000 km^2 in size and is flanked by the Atlantic Ocean in the West, Botswana in the East, Angola and Zambia in the North, and South Africa in the South.



overview Namibia

- The Namib Desert (55 mil. years - oldest desert on earth) spans most of the western part of the country; with the Kalahari Desert on the east.
- Namibia has some of the highest sand dunes in the world. Dune 7 near Walvis Bay is more than 380m high.
- Namibia has a population of only 2.7m people, a population density of ~ 3 persons per km^2
- Namibia has the world's largest population of free – roaming cheetahs
- Namibia is home to 13 ethnic groups.
- Namibia is a stable country, and a safe investment destination

windhoek

- Namibia's **capital city**, situated in the centre of the country
- Population: **300,000**

the ports

- **Walvis Bay** is the country's main port with a population of 80,000

- **Lüderitz** is a smaller port in the south of the country

southern african salt market

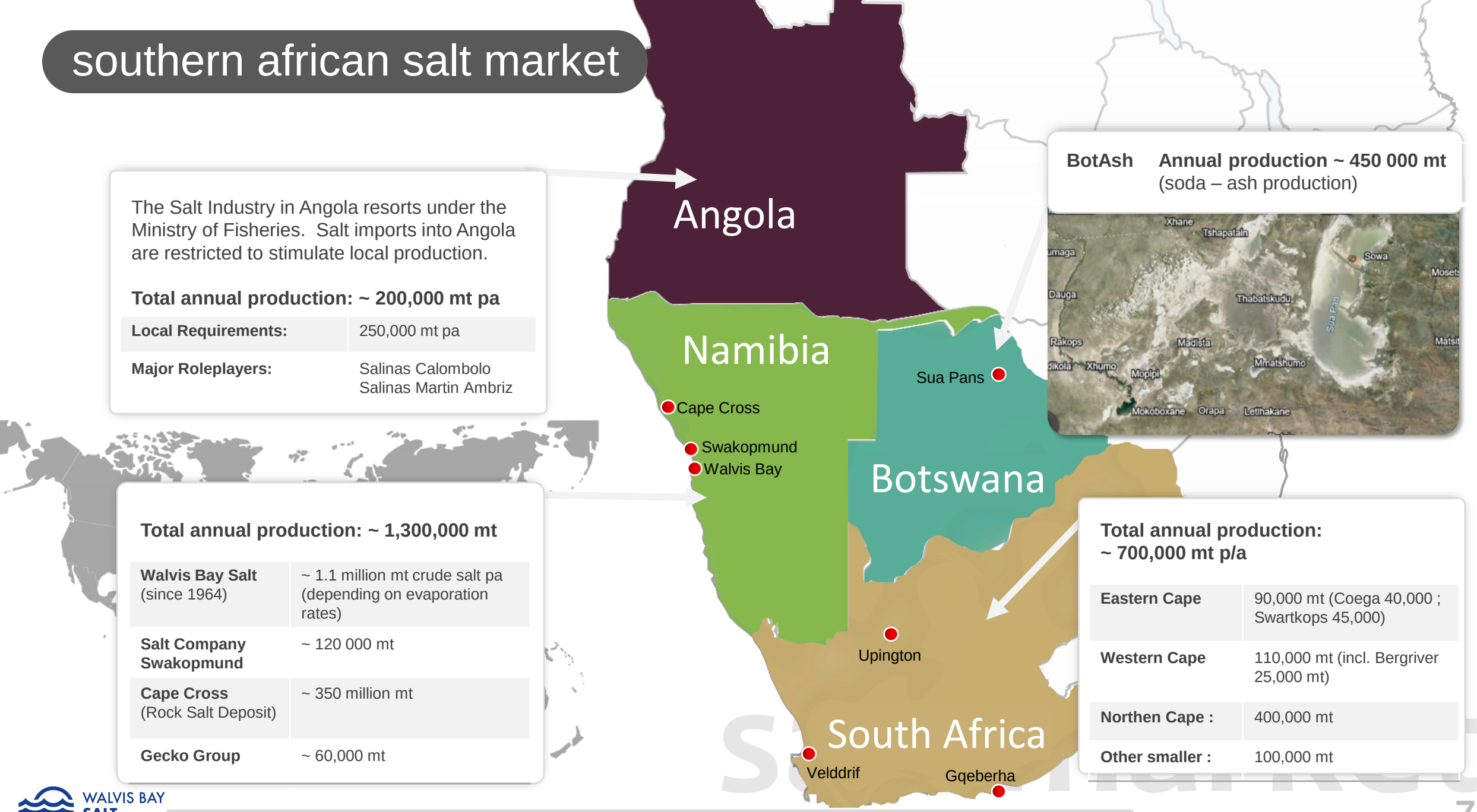
The Salt Industry in Angola resorts under the Ministry of Fisheries. Salt imports into Angola are restricted to stimulate local production.

Total annual production: ~ 200,000 mt pa

Local Requirements:	250,000 mt pa
Major Roleplayers:	Salinas Calombolo Salinas Martin Ambriz

Total annual production: ~ 1,300,000 mt

Walvis Bay Salt (since 1964)	~ 1.1 million mt crude salt pa (depending on evaporation rates)
Salt Company Swakopmund	~ 120 000 mt
Cape Cross (Rock Salt Deposit)	~ 350 million mt
Gecko Group	~ 60,000 mt

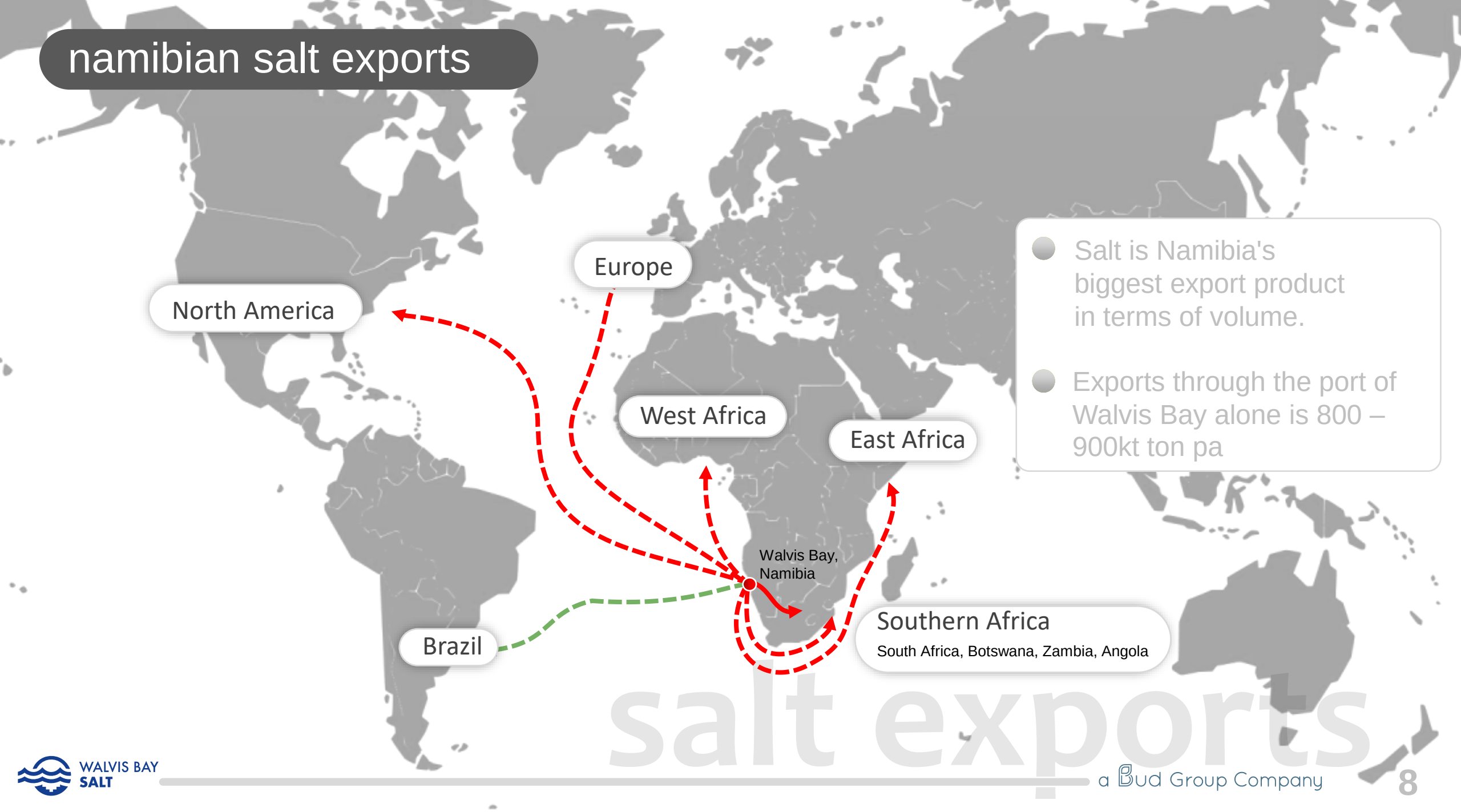


BotAsh **Annual production ~ 450 000 mt**
(soda – ash production)

Total annual production:
~ 700,000 mt p/a

Eastern Cape	90,000 mt (Coega 40,000 ; Swartkops 45,000)
Western Cape	110,000 mt (incl. Bergriver 25,000 mt)
Northen Cape :	400,000 mt
Other smaller :	100,000 mt

namibian salt exports



- Salt is Namibia's biggest export product in terms of volume.
- Exports through the port of Walvis Bay alone is 800 – 900kt ton pa

salt exports

about walvis bay salt

overview

about walvis bay salt

- Walvis Bay Salt ….
  - established in 1964
  - is a Namibian registered company

- Part of the BUD Group of Companies

- Largest solar salt producer in sub – Saharan Africa

1,1 million

- Permanent employees

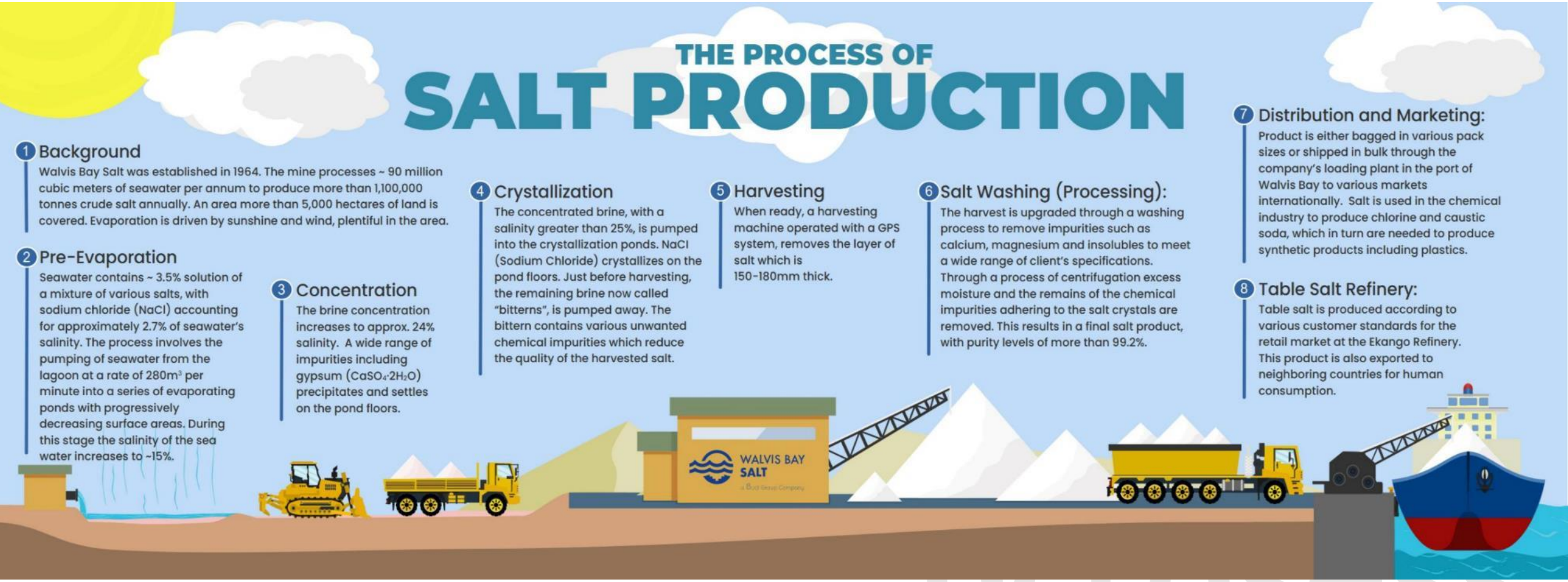
130

- The company operates under a Mining License (ML), which was recently renewed.

- Certifications include NSF; ISO9001; HACCP; Halaal; Kosher

- The business also operates within a proclaimed nature reserve (RAMSAR), forming an important element in the conservation of wetlands.

salt production process

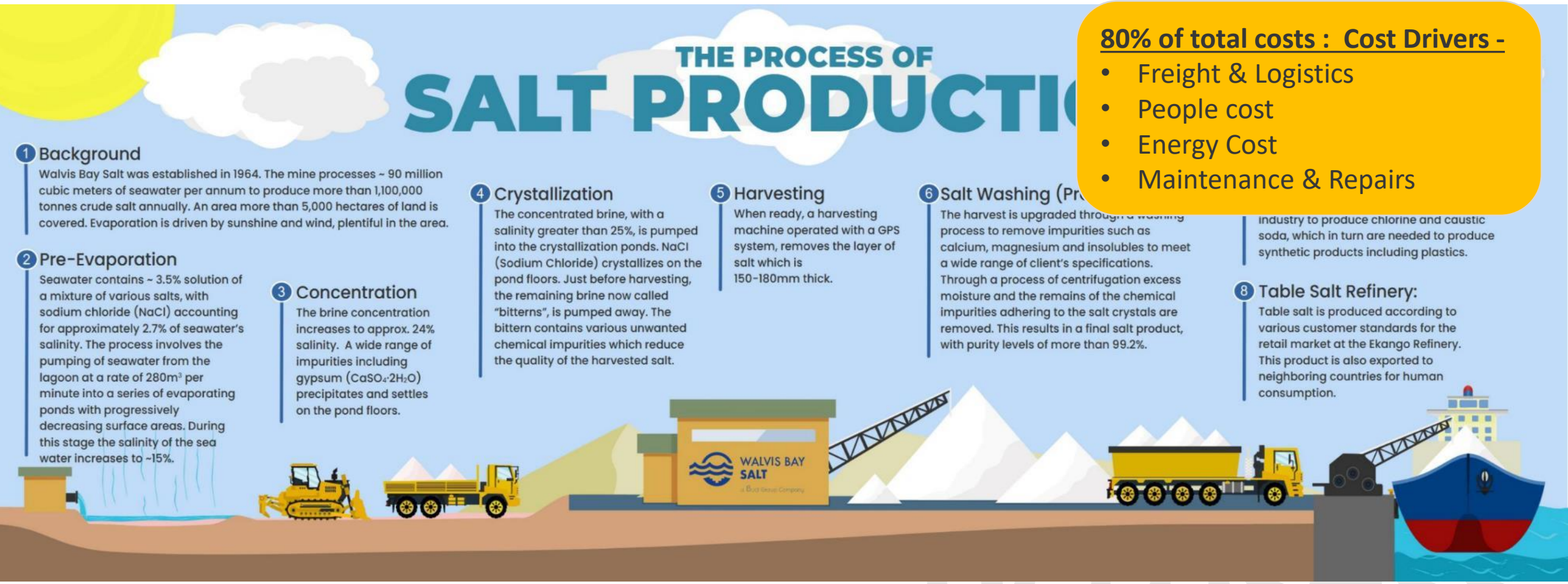


salt production process

- Principles of activity-based costing is used throughout the process

80% of total costs : Cost Drivers -

- Freight & Logistics
- People cost
- Energy Cost
- Maintenance & Repairs

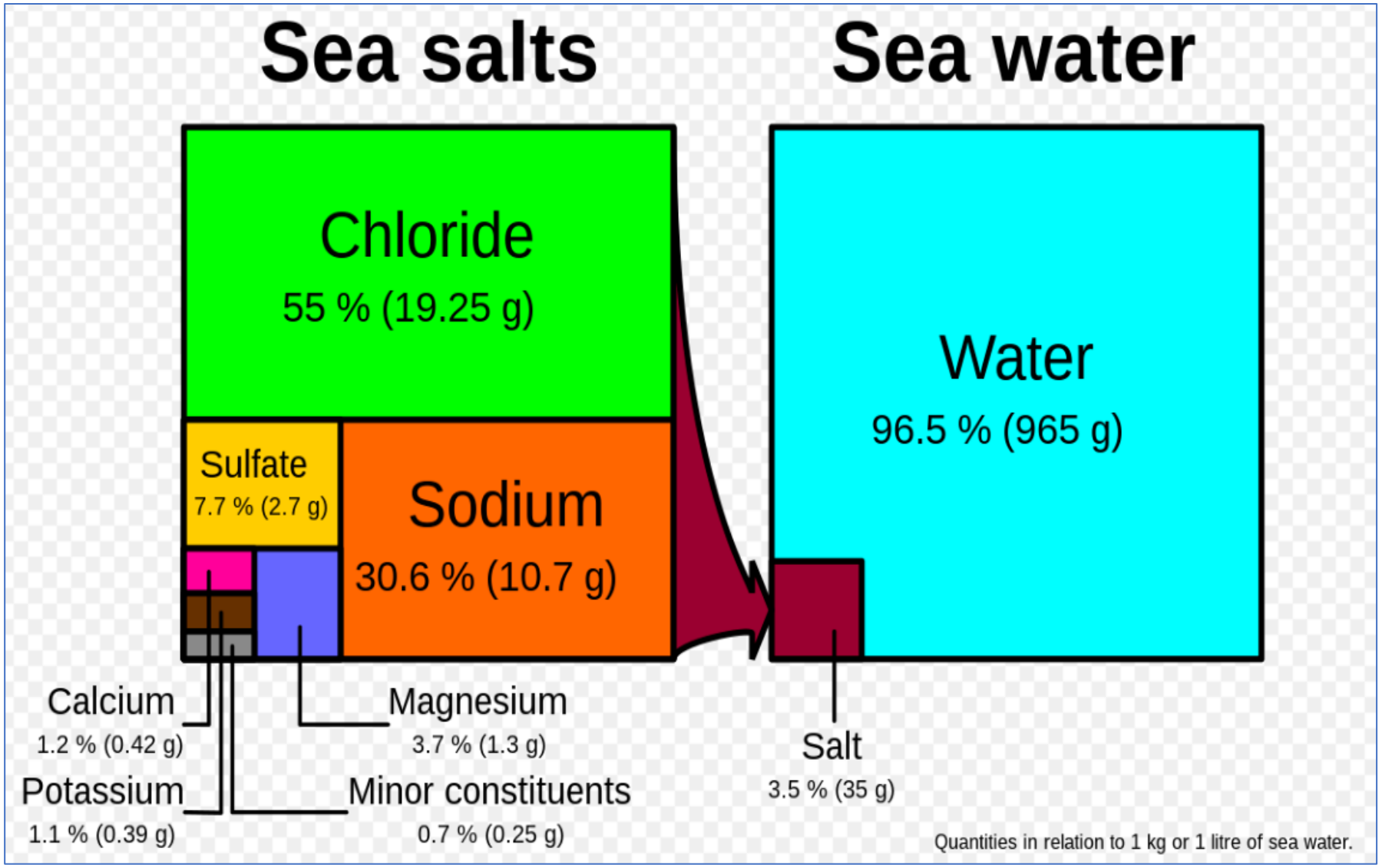


walvis bay salt field production system

Seawater intake point

	Units	Total
Jetty pump rate	m^3/min	280
Annual Sea Water volumes	m^3/a	90 - 100M

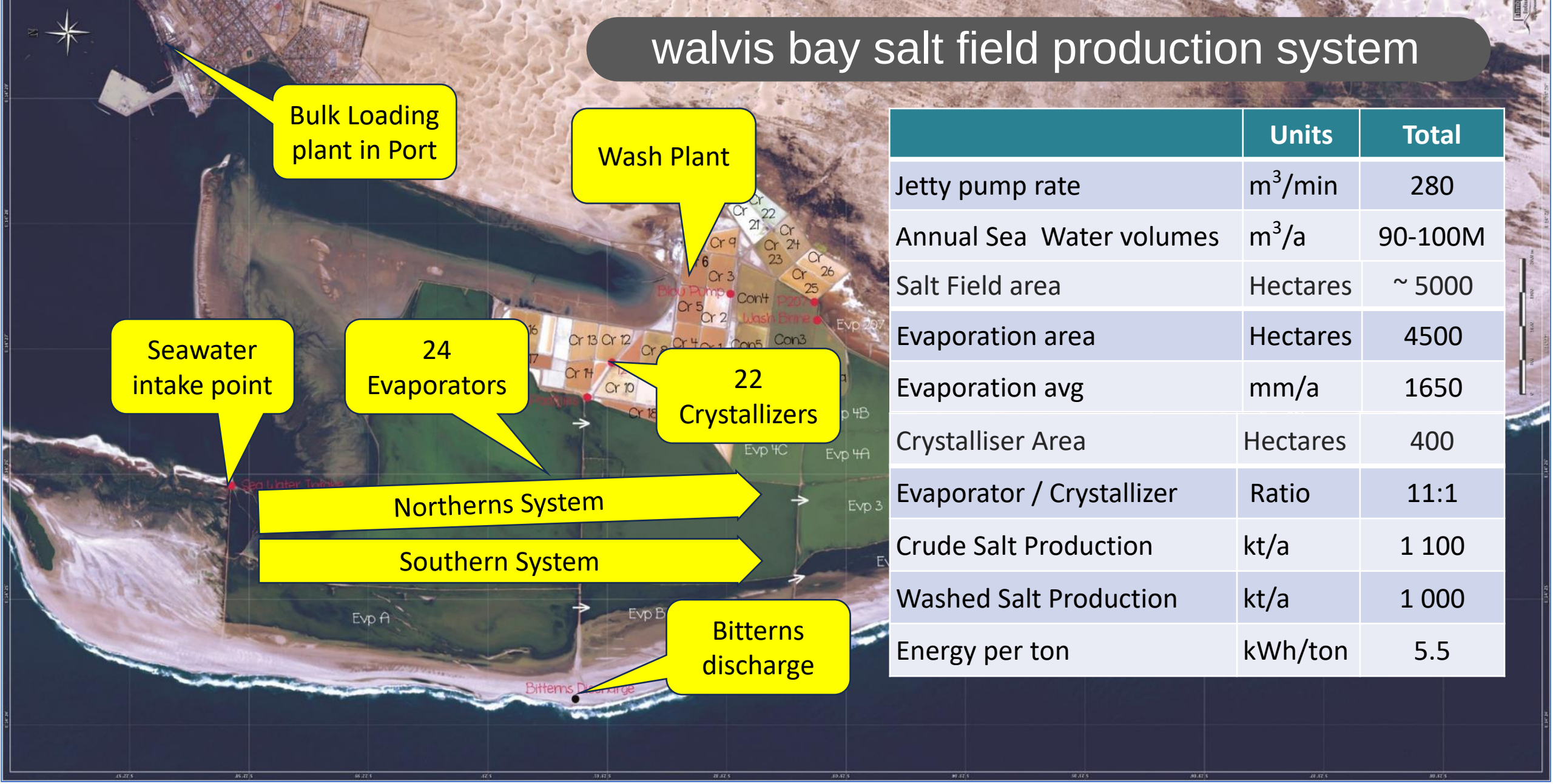
sea water composition



- The composition of seawater is consistent on earth, unless affected by local conditions such as near river inflows, etc. or other contamination sources

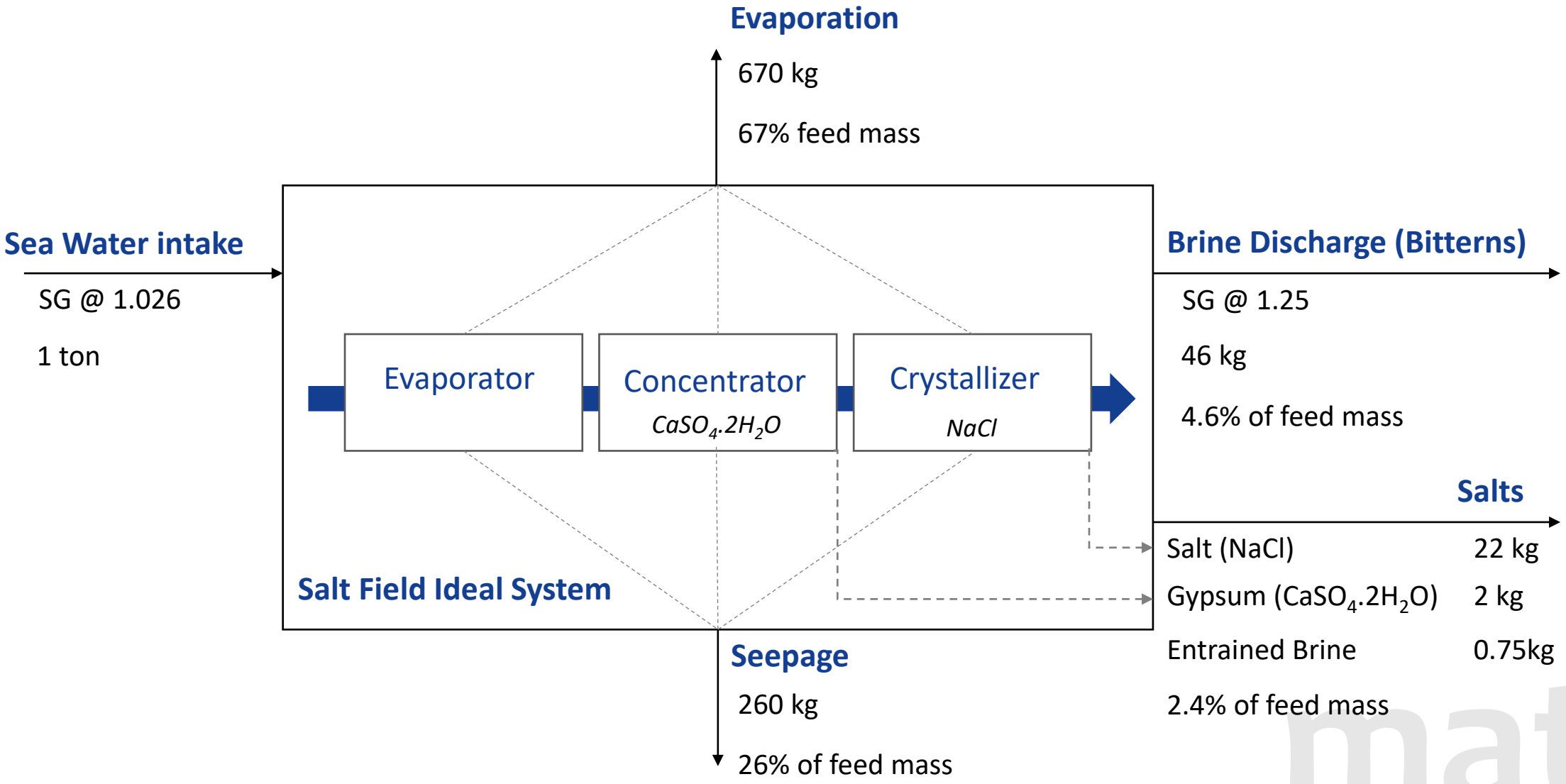
- The Walvis Bay Salt system is fed by Benguella current which is one of the most unpolluted sources of seawater with low levels of micro plastics, oils & industrial effluents)

walvis bay salt field production system



	Units	Total
Jetty pump rate	m^3/min	280
Annual Sea Water volumes	m^3/a	90-100M
Salt Field area	Hectares	~ 5000
Evaporation area	Hectares	4500
Evaporation avg	mm/a	1650
Crystalliser Area	Hectares	400
Evaporator / Crystallizer	Ratio	11:1
Crude Salt Production	kt/a	1 100
Washed Salt Production	kt/a	1 000
Energy per ton	kWh/ton	5.5

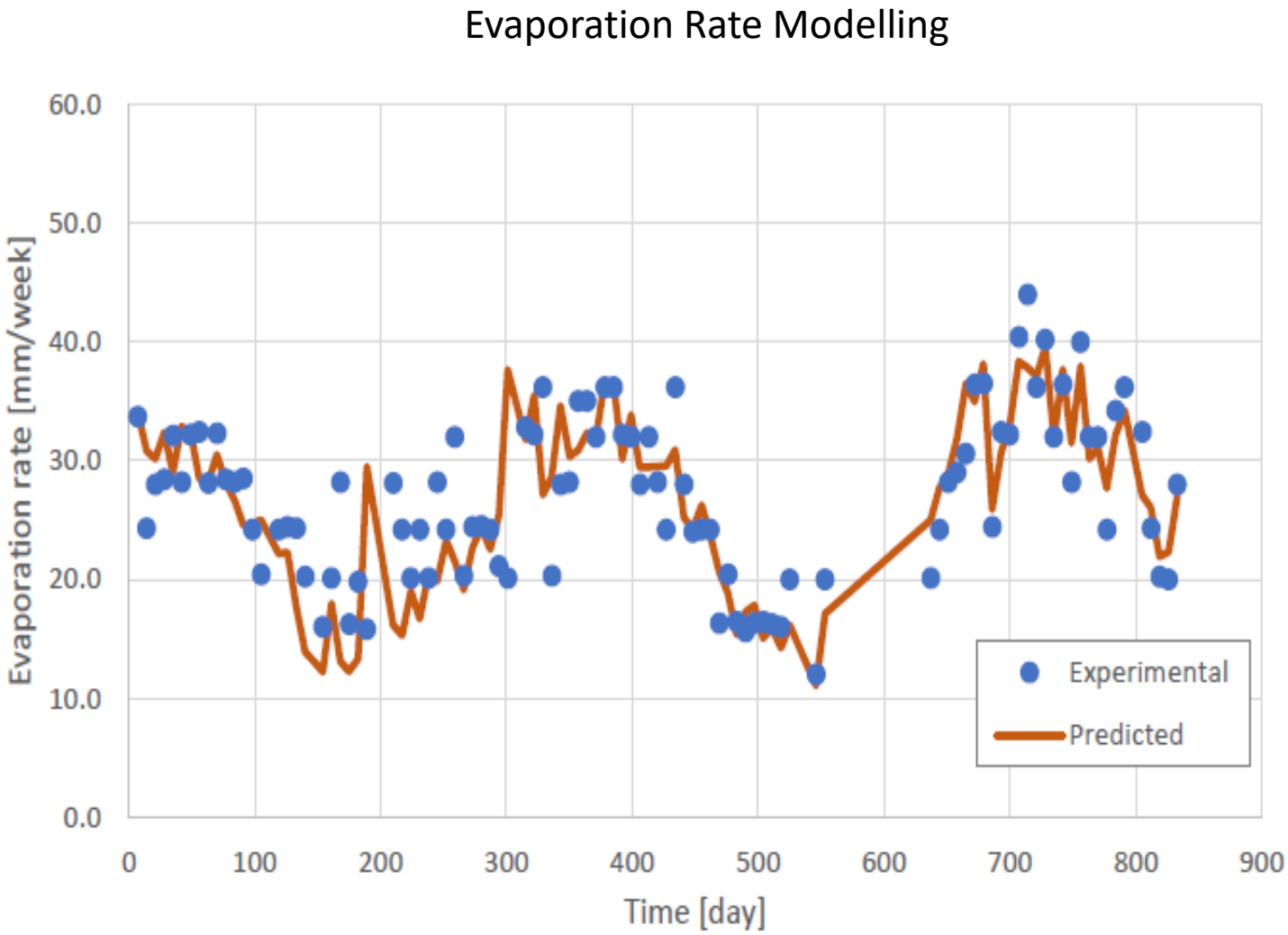
salt field mass balance



math

salt field modelling

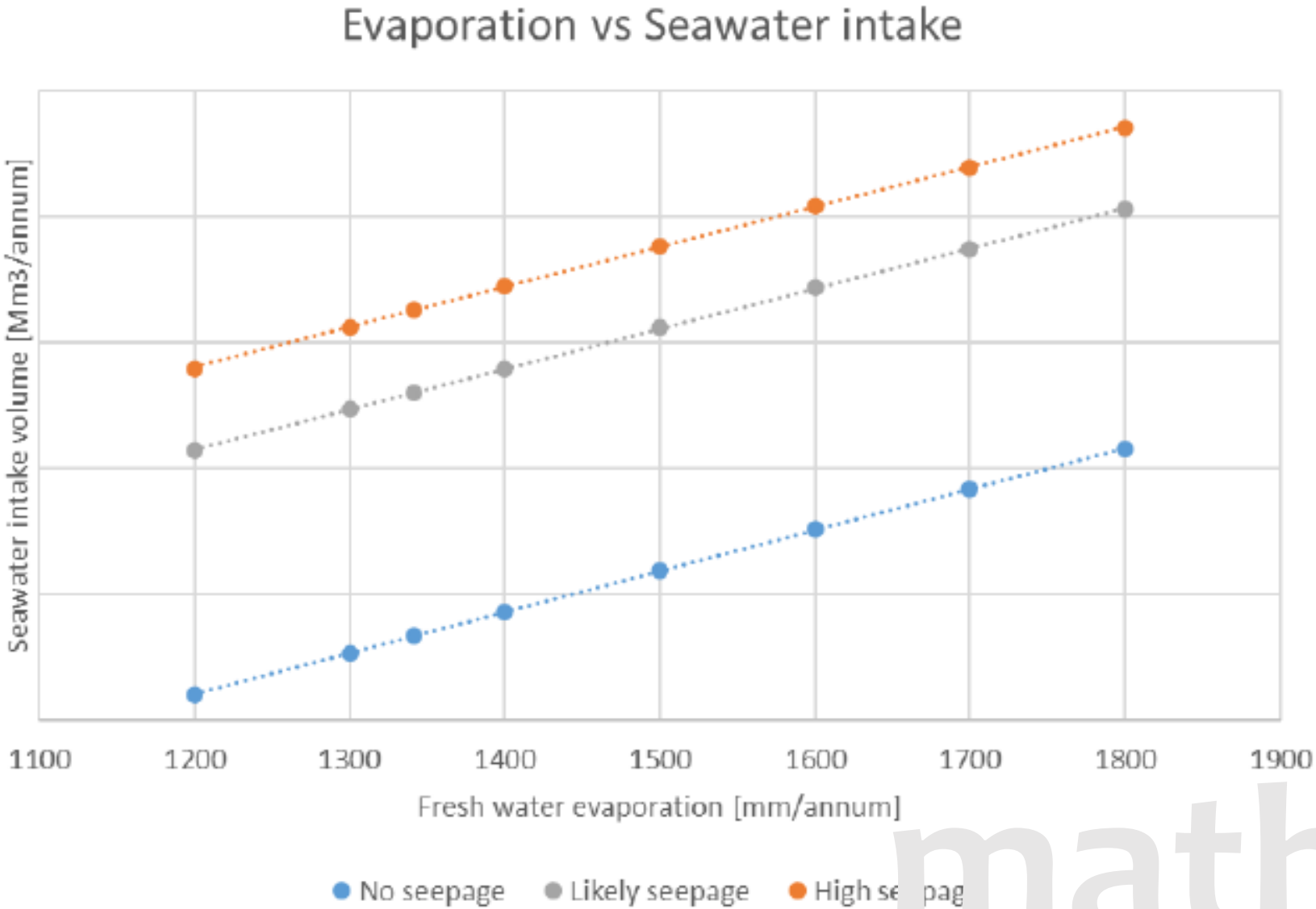
- The salt field performance is influenced by various variables and uncertainties, including:
  - Weather forecasts
  - Environmental conditions
  - Process uncertainties (seepage; seawater intake…)
- This result in planning difficulties and inaccuracies with regard to budgeting and forecasting.
- In order to establish more accurate salt field key process parameters, a successful salt field modelling study was conducted SIEMENS – PSE.
- The model facilitates better salt field management and performance.



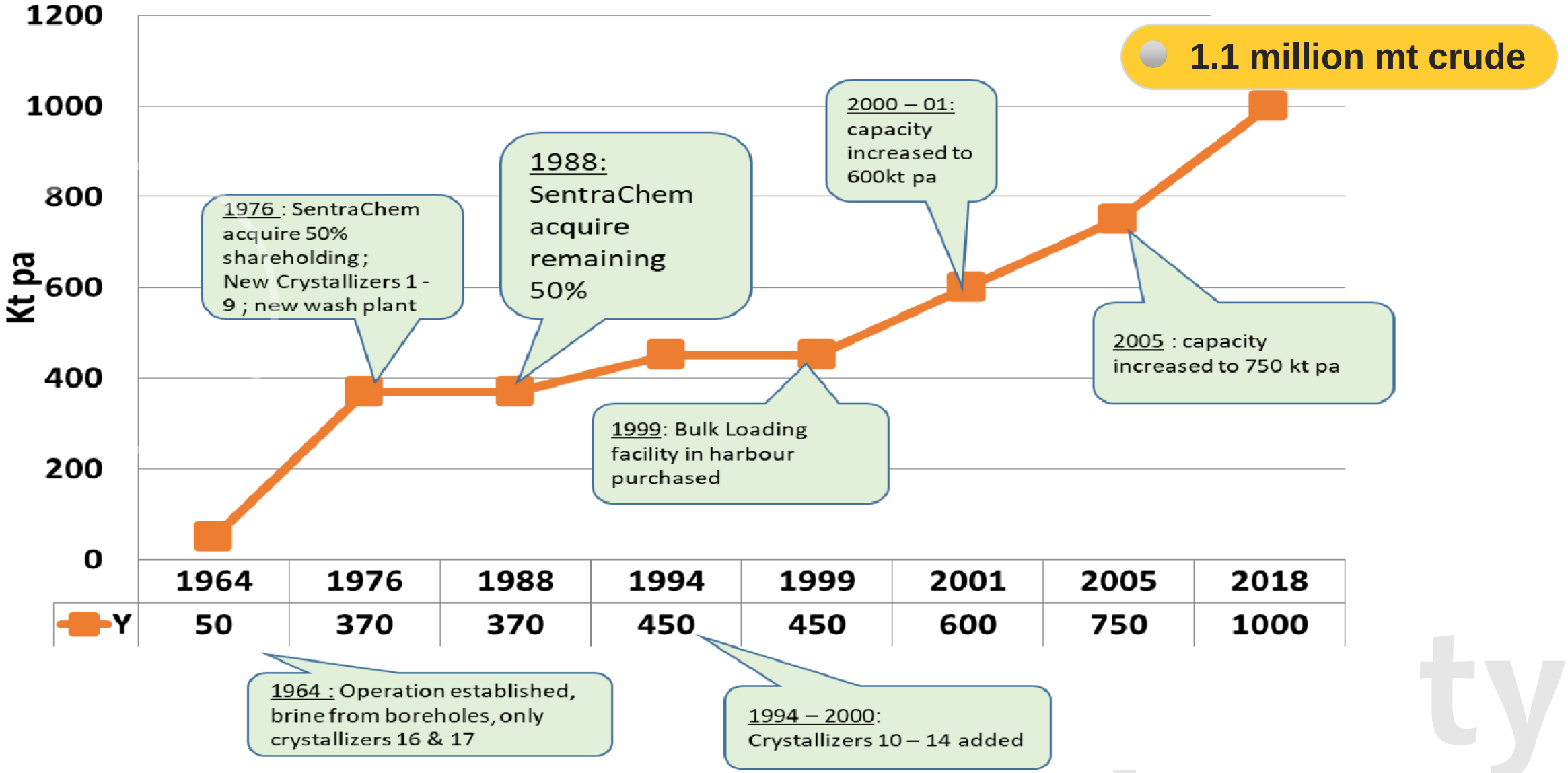
salt field modelling

The modelling can be used to show the effect of varying evaporation rates…

… in terms of maiden brine production per seawater intake, for different seepage scenarios.



salt field capacity increase



successful projects

STEP 1:

Salt Field Expansion 2016

5000ha

32%

- Salt field expansion… from **3800 to 5000 ha** ... building and enhancing on existing strength of economy of scale.
- Increase annual raw salt output from **750kt to > 1.1m ton**
- Payback period less than 6 years

projects

successful projects

- before expansion

- after expansion

challenges of the lagoon delta

successful projects

STEP 1:

Increased salt field

5000ha

32%

- Initial strategy to grow the size of the salt field from **3800 to 5000 ha** ... building and enhancing our existing strength of economy of scale.
- Increase annual raw salt output from **750kt to > 1.0m ton**

STEP 2:

Improve salt washing capacity & efficiency

220t/h

8.75%

Improve our processing ability, investing in a new Wash Plant with capacity of 220t ton/h. Additional yield … reducing washing losses from **20% to < 9%**

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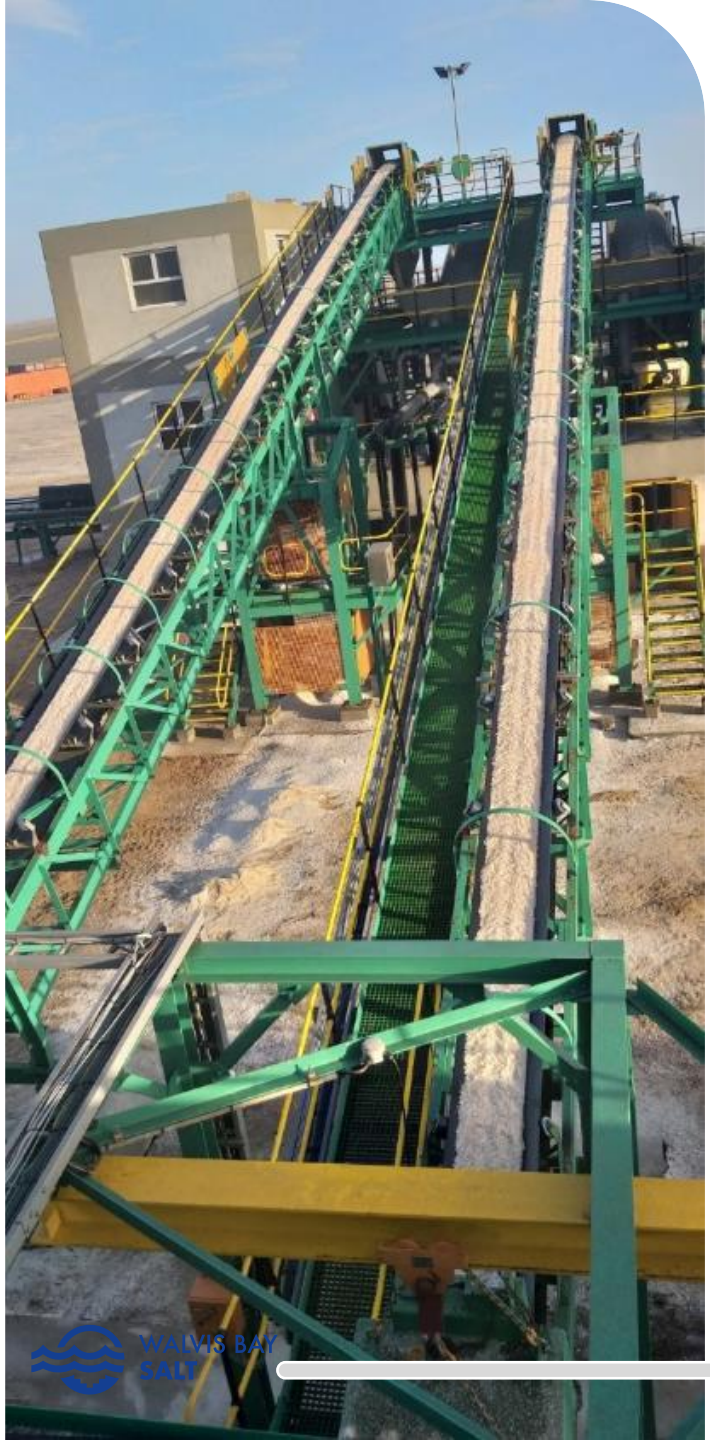
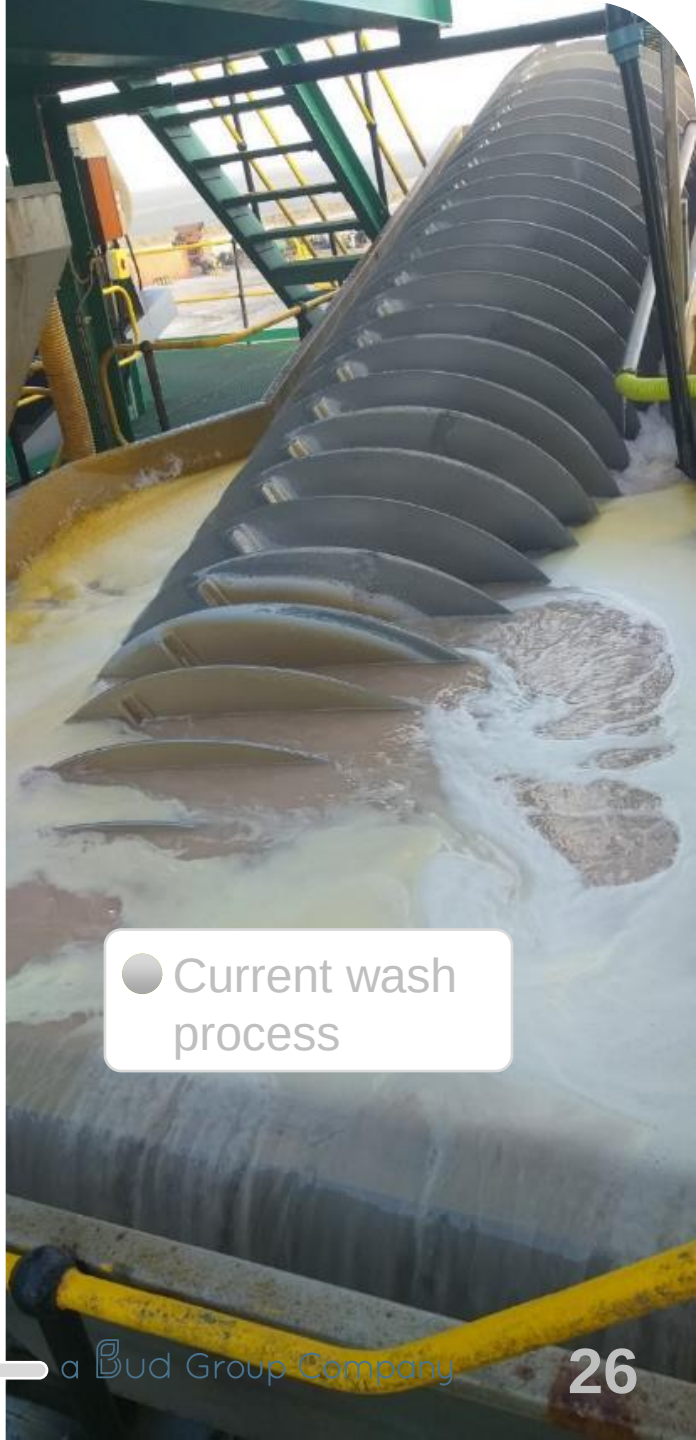


new wash plant

- Commisioned in: **2019**
- Redundancy with **2** identical lines
- Moisture content: **< 3.0%**
- Improved washing efficiencies
- **220 t/h** Capacity (instantaneous) washed salt
- Improved efficiencies, washing loss reduced from: **20% to < 9%**
- Project Payback Period of less than: **4 years**



- Current wash process

successful projects

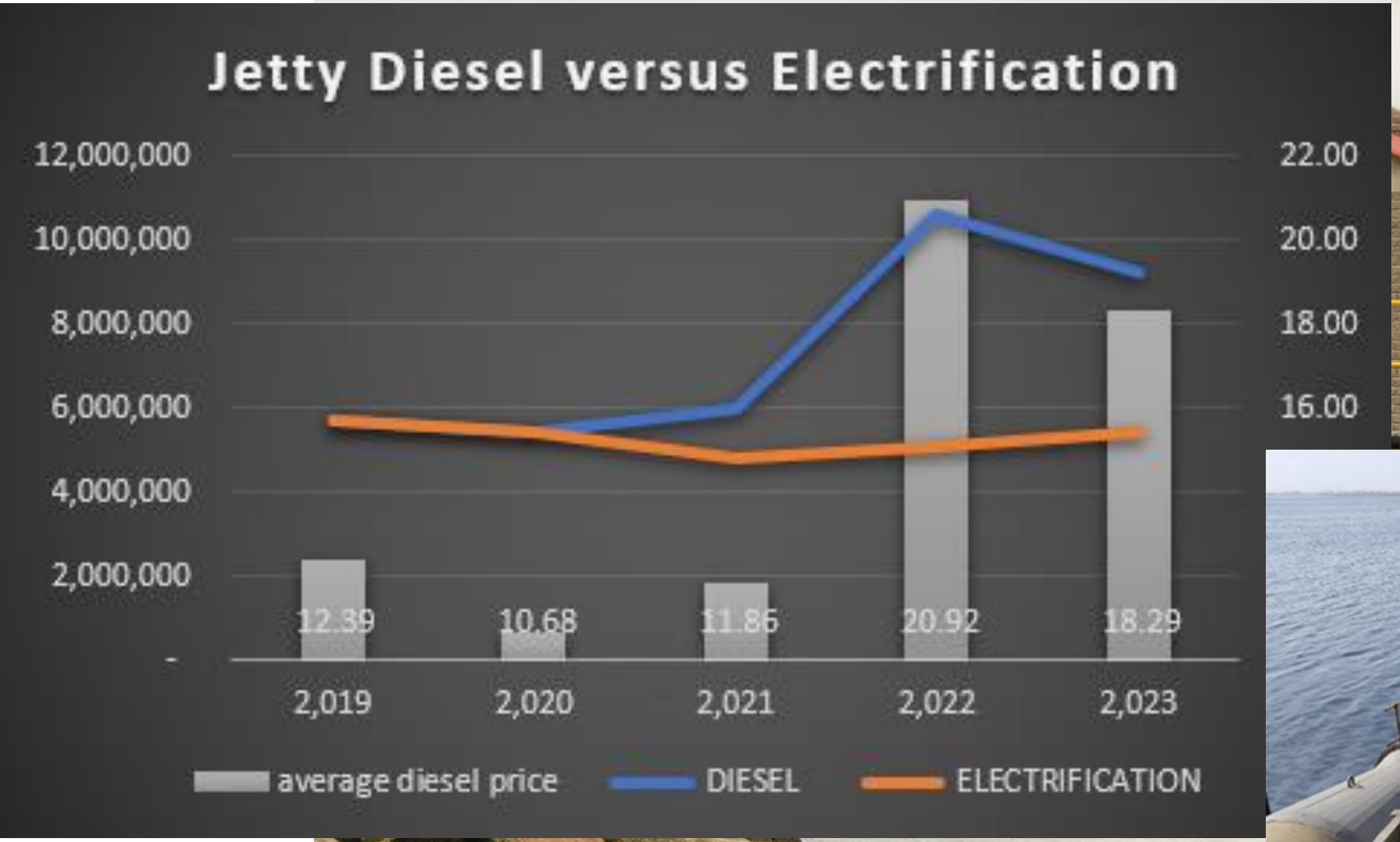
- 2 x New vibrating centrifuges **200 t/h**

- **Washed salt stockpile**

offices and facilities

facilities

electrification of seawater intake

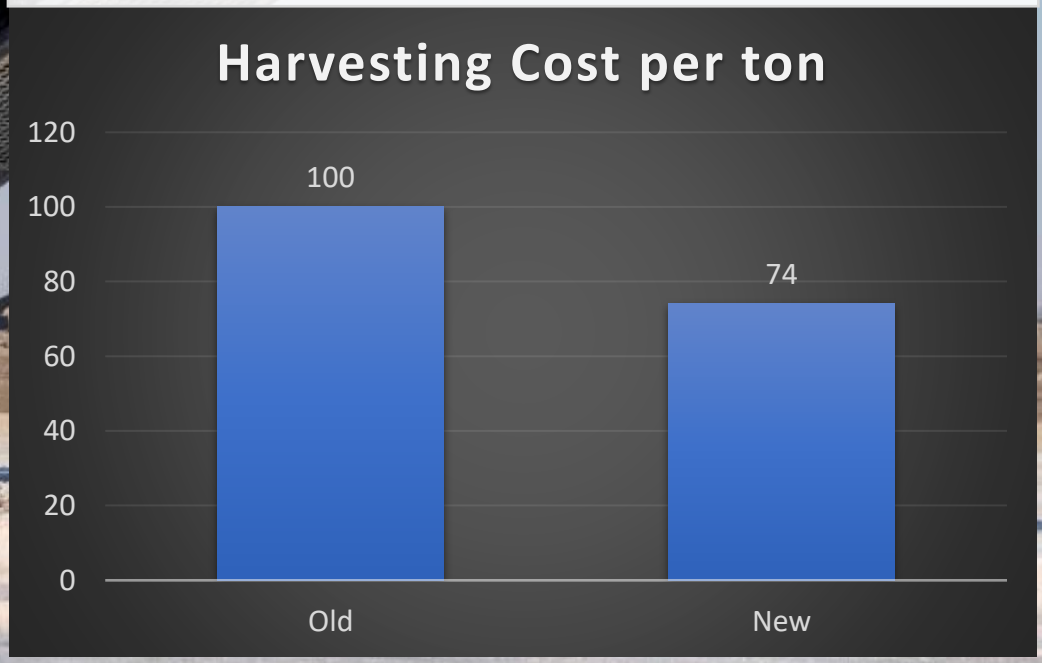


- Electrification of seawater intake: **2020**
- Project payback of less than 2 years

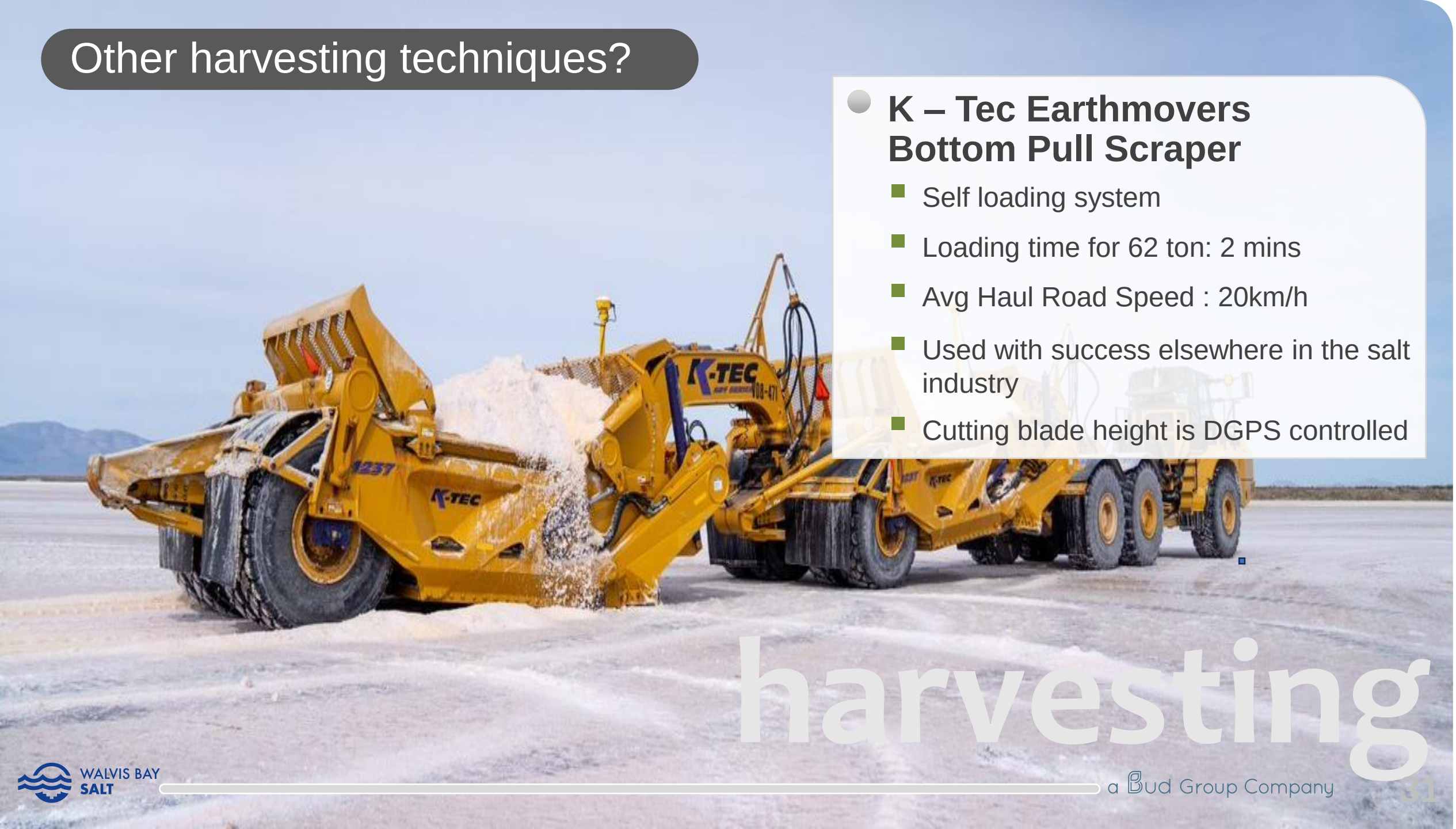
WALVIS BAY SALT

salt harvesting

- Wirtgen W210F salt harvester acquired & commissioned during May 2022.
- Able to produce salt crop cuts with high precision, ability to control PSD (particle size distribution).
- Intelligent engine & drive management ensures salt harvesting occurs at optimum load rate, fuel consumption and wear & tear rate.



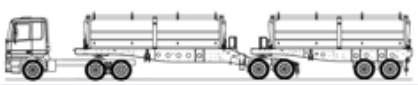
Other harvesting techniques?



- **K – Tec Earthmovers Bottom Pull Scraper**
  - Self loading system
  - Loading time for 62 ton: 2 mins
  - Avg Haul Road Speed : 20km/h
  - Used with success elsewhere in the salt industry
  - Cutting blade height is DGPS controlled

harvesting

introduction of PBS trucks



Performance	Interlink	PBS B-Double	Difference
Payload	34 ton	64 ton	88% ↑
90° Swept path	9.5 m	9.3 m	2% ↓
Rollover threshold	0.29 g (16° tilt-angle)	0.38 g (21° tilt-angle)	31% ↑
Road wear	0.18 LEF*/ton	0.16 LEF*/ton	11% ↓
Total trips per day	80	44	45% ↓

*LEF = Load Equivalency Factor

- Product destined for exports are transported to the port of Walvis Bay by means of road trucks

- During 2020 approval was obtained from authorities to introduce PBS trucks, increasing payload from 34 tons to 64 tons per trip.

port bulk loading capability

- The Port lease is currently renewed for another:

25 years

- Loading is done via a conveyor belt that loads at a rate of

600 t/h

10,000

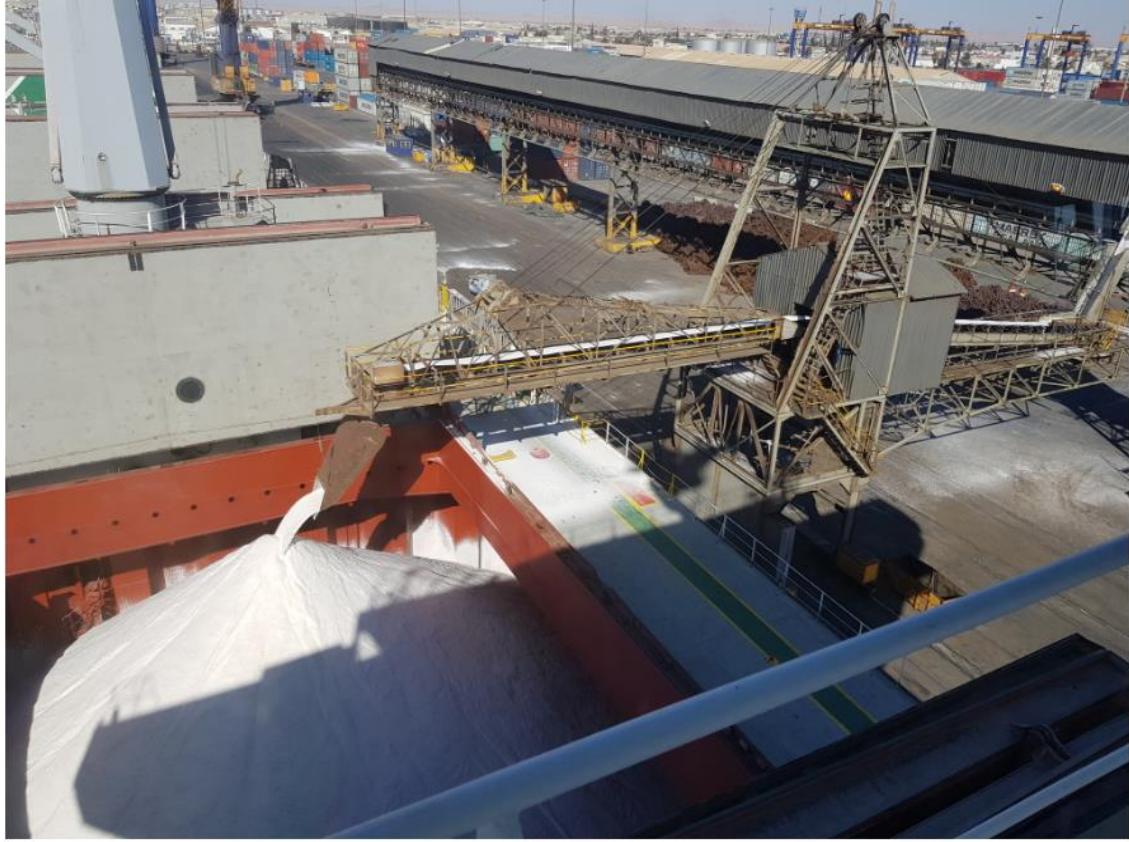
mt/wwd SSHINC basis

- The draft alongside

12.8 m

The airdraft from water line to under side of the loading boom is:

12.72 m



- Vessels sizes between

20,000 - 57 000 mt

For vessels like Supramax, some vessels need to take on heavy ballast (pumping seawater into hold no. 3) in order that she is able meet the airdraft restriction.

turnaround at salt refinery

Ekango
SALT REFINERS
a Bud Group Company

turnaround at salt refinery

- During 2011 the company invested in a salt refinery with an expected outout of:

80,000 mt per annum

- The initial performance of the refinery did not live up to shareholder expectations, until a combination of the following strategic interventions resulted in a turnaround of this business

- A Re – design and simplification of the plant resulted in lower maintenance costs and energy costs
- Improved plant availability and utilization
- Improved quality of infeed material, supported by better salt field management & harvesting practices
- Reduction in process losses, resulted in yield improvement

turnaround

turnaround at salt refinery

- Introduction of a narrower product range
- Supply to customers only where it made commercial sense.

  Measure profitability per product line per customer.
- Association with the premium Cerebos brand
- This resulted in higher volumes, resulting in lower unit production costs
- Focus on training of employees

product range & specifications

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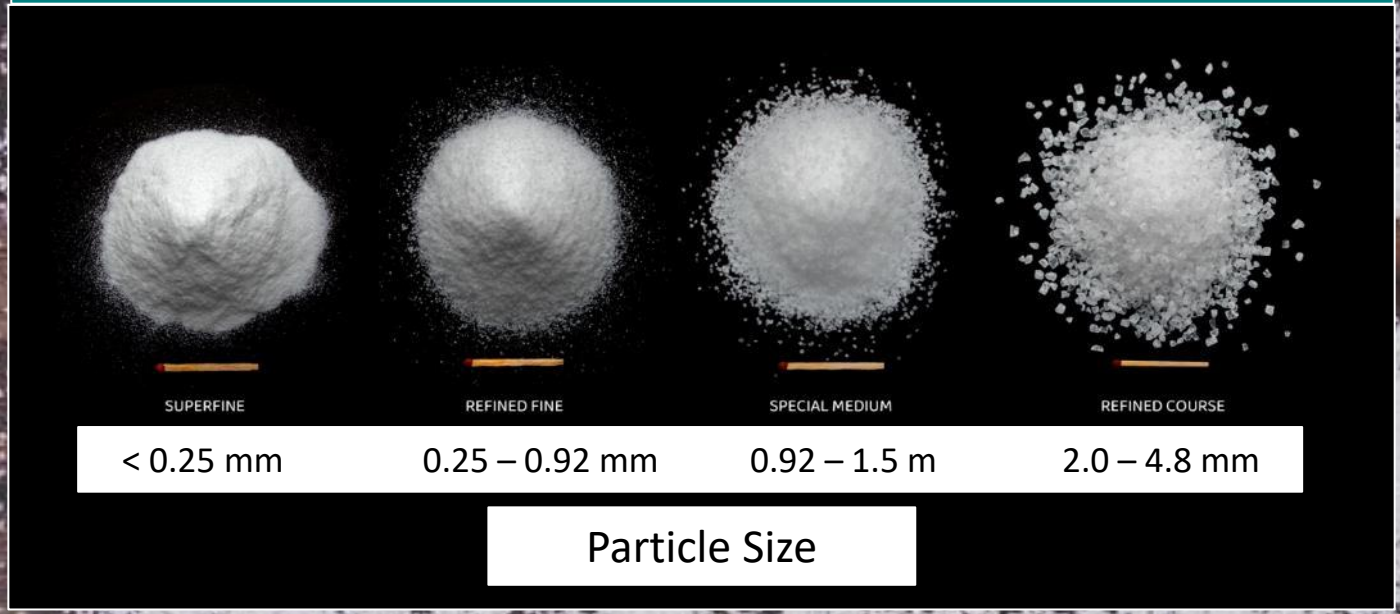
REFINED



BULK

GRADE	TYPICAL PURITY	Ca/Mg Ratio
Chemical	99.5	1.95:1
All Purpose	99.2%	1.53:1
De – icing	98.5%	
Refined	99.6%	

biggest operational challenges: Dust Storms

- **Strong winds blowing over the Namib desert sometimes results in an increase of insoluble levels.**

dust

future projects & opportunities

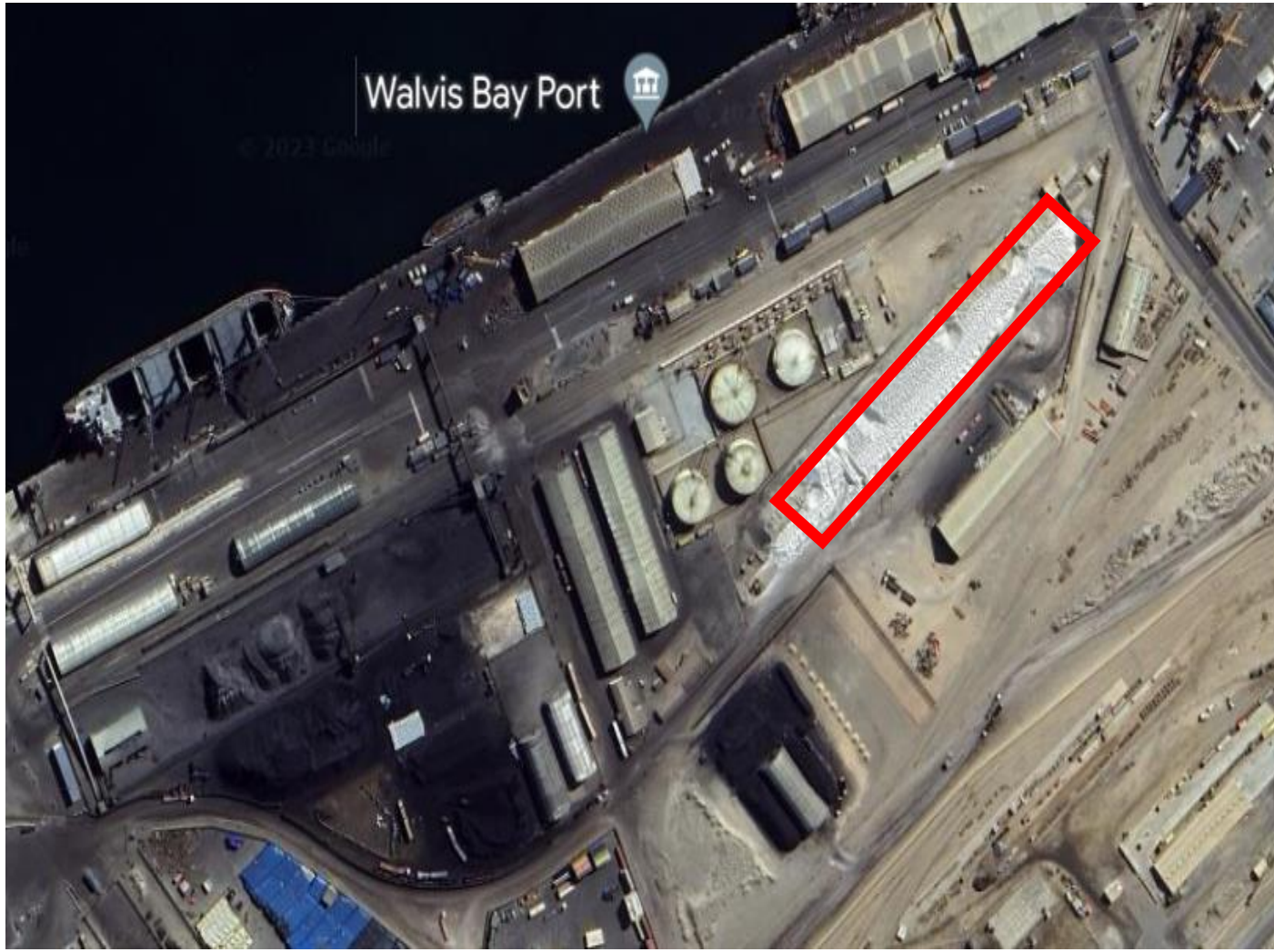
2024 - 2025

Port of Walvis Bay

18,000m²

Port lease renewal conditions

- **New Port Warehouse**
  - **Size:** 18,000m2
  - To prevent dust pollution in the Walvis Bay Port
  - Support high purity project



capex

biggest operational challenges: Climate Fluctuations

- Glaciers and ice sheets worldwide are melting and adding water to the ocean.
- The volume of the ocean is expanding as the water warms.
- Projections : a median SLR of 30 cm (= one foot) by 2050.
- Impact on low lying salt producing areas worldwide

biggest operational challenges: River Flooding

- **The salt field is situated in the Kuiseb river delta, and during 2012 heavy inland rains resulted in flooding, causing damage to our operations.**

biggest operational challenges: Pond Wall Breaches

- **Significant reverse brine flow for wind speeds exceeding 20 kph.**

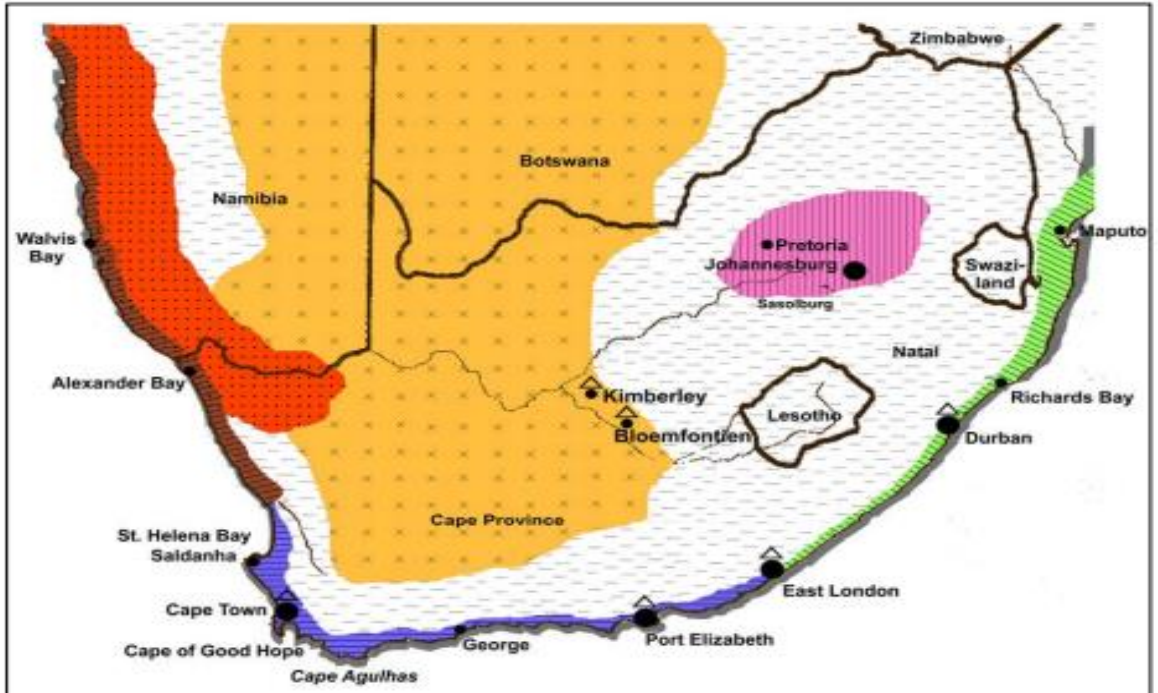
- **Pond wall breaches between non-successive ponds.**

biggest challenges: Corrosion

- Worldwide Corrosion Authority 2016: worldwide cost of corrosion = 3.4% of global GDP
- 15 – 35% of corrosion costs can be saved through effective preventative measures
- South African Study: Corrosion preventative measures = 5% of South Africa's GDP
- Namibia:
  - West coast of Namibia: "Severe marine corrosion"
  - Use of West Coast paint spec @ 7x normal cost

$$\text{Corrosion rate of metal} = \frac{\Delta m}{Atp} \qquad \text{Equation 1}$$

where: Δm is the mass loss in grams (g); A is the exposed surface area in m^2; t is the exposure time per annum; and ρ is the density of the metal



Key	Description	Type of corrosion	Mild steel corrosion rate µm/year	Galvanised steel sheet life in years
	Inland arid	Semi desert	5 – 10	> 30
	Inland	Rural	10 – 20	> 20
	Inland dry	Desert	< 5	> 30
	Inland urban	Inland industrial	15 – 40	5 – 15
	Inland	Industrial	10 – 30	5 – 15
	Sub-tropical marine	Medium to severe marine	50 – 80	3 – 5
	Desert marine (mists)	Severe marine corrosion	80 – 100	0.5 – 2
	Temperate marine	Marine	30 – 50	3 – 7
	Intertidal to 5 km inland	Severe marine corrosion	100 – 300	Up to 3

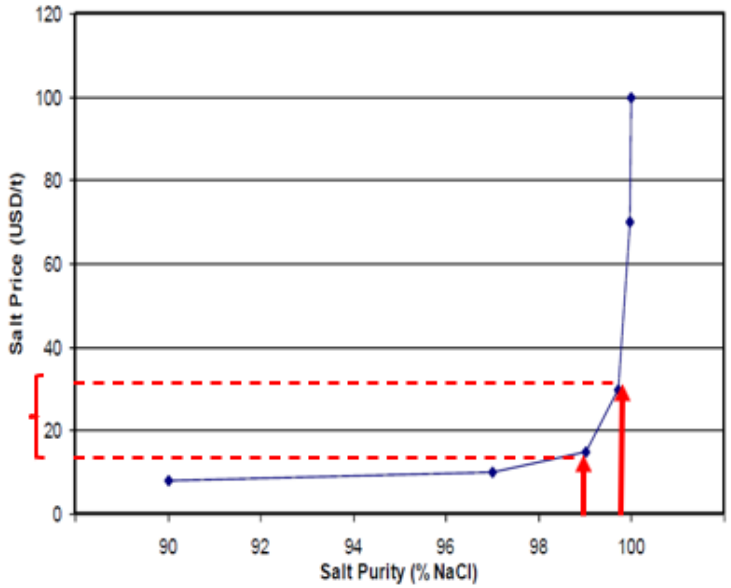
Figure 1: Atmospheric corrosion map of southern Africa – adapted from the Callaghan 1991 map[1] and taken from Janse van Rensburg (2010)[7].

future projects & opportunities

Bitterns Beneficiation

- ~ 900 000m3 Bitterns currently being pumped away into the ocean as a waste stream from salt field.
- Converting bitterns into magnesium chloride or magnesium metal for export.
- Contains ~18 000 tons Mg

Moving up the value chain



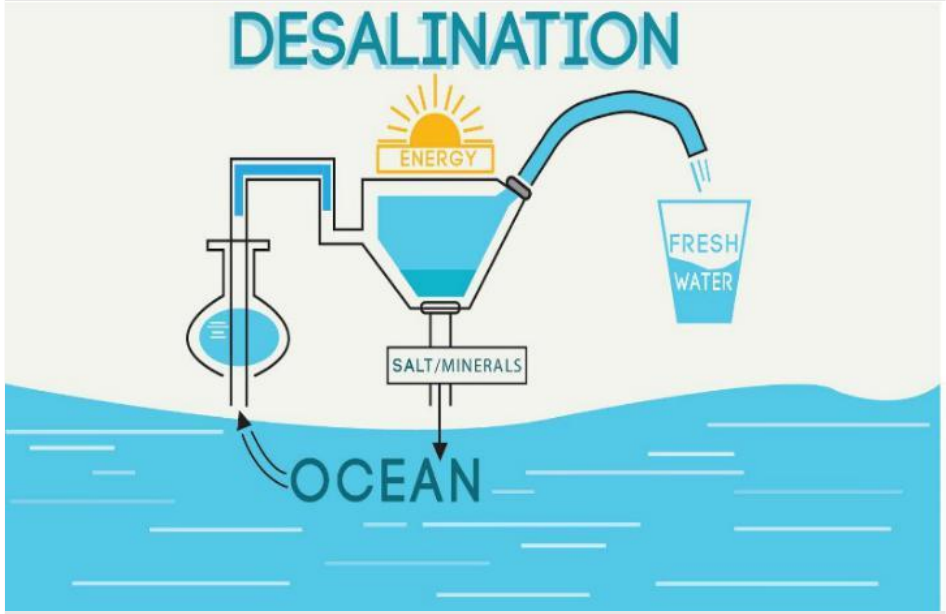
- Increase of 0.5% in salt purity expected to bring a price advantage
- Competing with PVD on a price basis

Salt Pipeline Loop to Port

- Pumping of salt slurry via 11km pipeline loop to Port, with saturated brine as carrier material
- First investigated in 2019; project paused due to other priorities, bulk power constraints & long payback period.
- With higher fuel prices this project to be reopened.

future projects & opportunities

Desalination



Renewable Energy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