



2017

IYNT

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PROBLEM 9
SALT
PRODUCTION



SALT
PRODUCTION IN
(NaCl)

01

Solar Evaporation Method

02

Rock Salt Mining Method

03

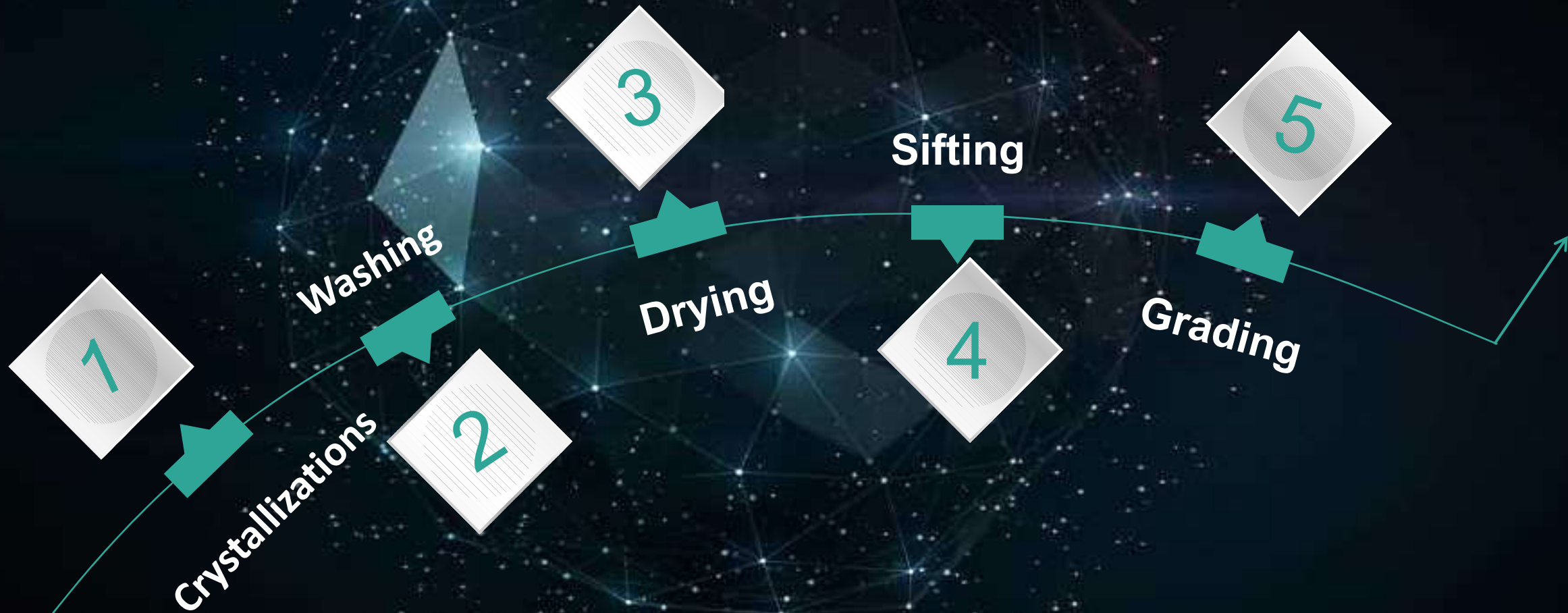
Vacuum Evaporation Method



SOLAR SALT



SOLAR SALT



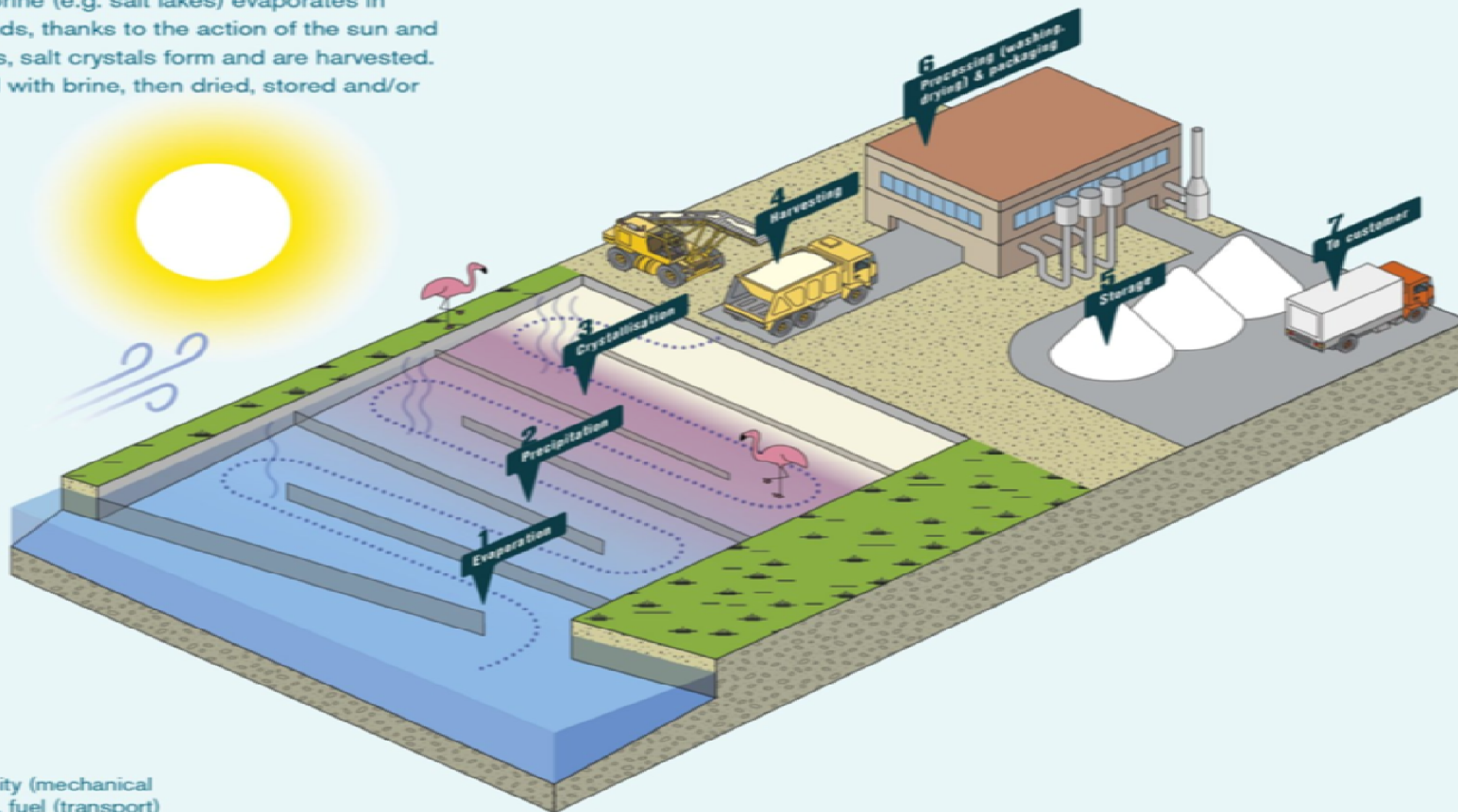


SOLAR SALT

01

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Sea water or natural brine (e.g. salt lakes) evaporates in subsequent open ponds, thanks to the action of the sun and wind. In the last ponds, salt crystals form and are harvested. They are then washed with brine, then dried, stored and/or packaged.



Main resources:
land & seawater



Energy:
solar, wind, electricity (mechanical part of processing), fuel (transport)



SOLAR SALT

Concentrating Pond

The salty water from the ocean or salt lake is concentrated



Crystallizing Pond

One salt is actually produced HERE



Brine

A saturated brine solution, containing as much salt as it can hold, so pure salt crystallizes out of the solution as the water evaporate

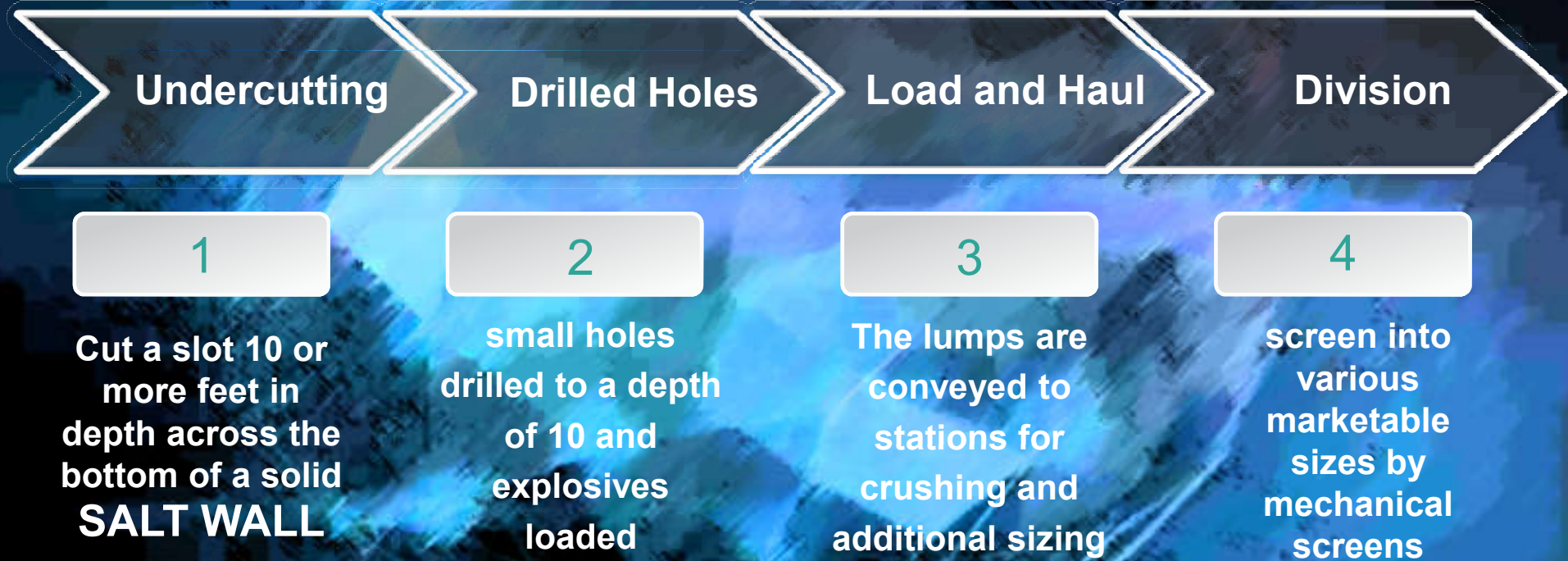


ROCK SALT

02

ROCK SALT

The method of producing rock salt - UNDERGROUND MINING



This is probably the most dramatic method of gathering salt.

Salt mines are among the safest of mines

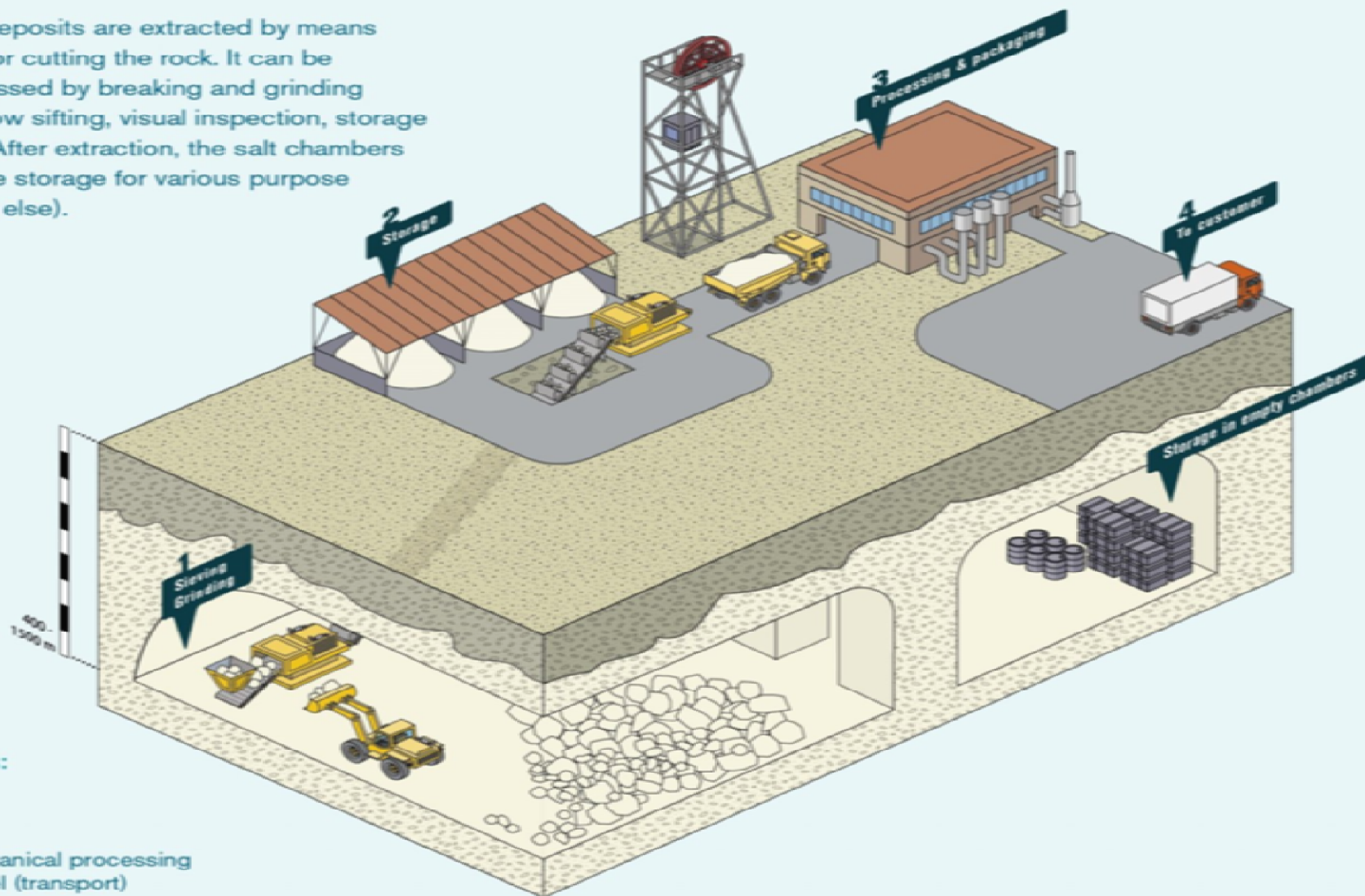


ROCK SALT

02

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Underground salt deposits are extracted by means of drilling, blasting or cutting the rock. It can be mechanically processed by breaking and grinding the salt lumps. Follow sifting, visual inspection, storage and/or packaging. After extraction, the salt chambers can be used as safe storage for various purpose (archives, waste, or else).



Main resources:
land



Energy:
electricity (mechanical processing and hauling), fuel (transport)

02

ROCK SALT



Rock salt may be extracted using traditional shaft mining or via solution mining. (Shaft mining is concerned)



CUT AND BLAST : Cutting slots charged with explosives and the face is blasted



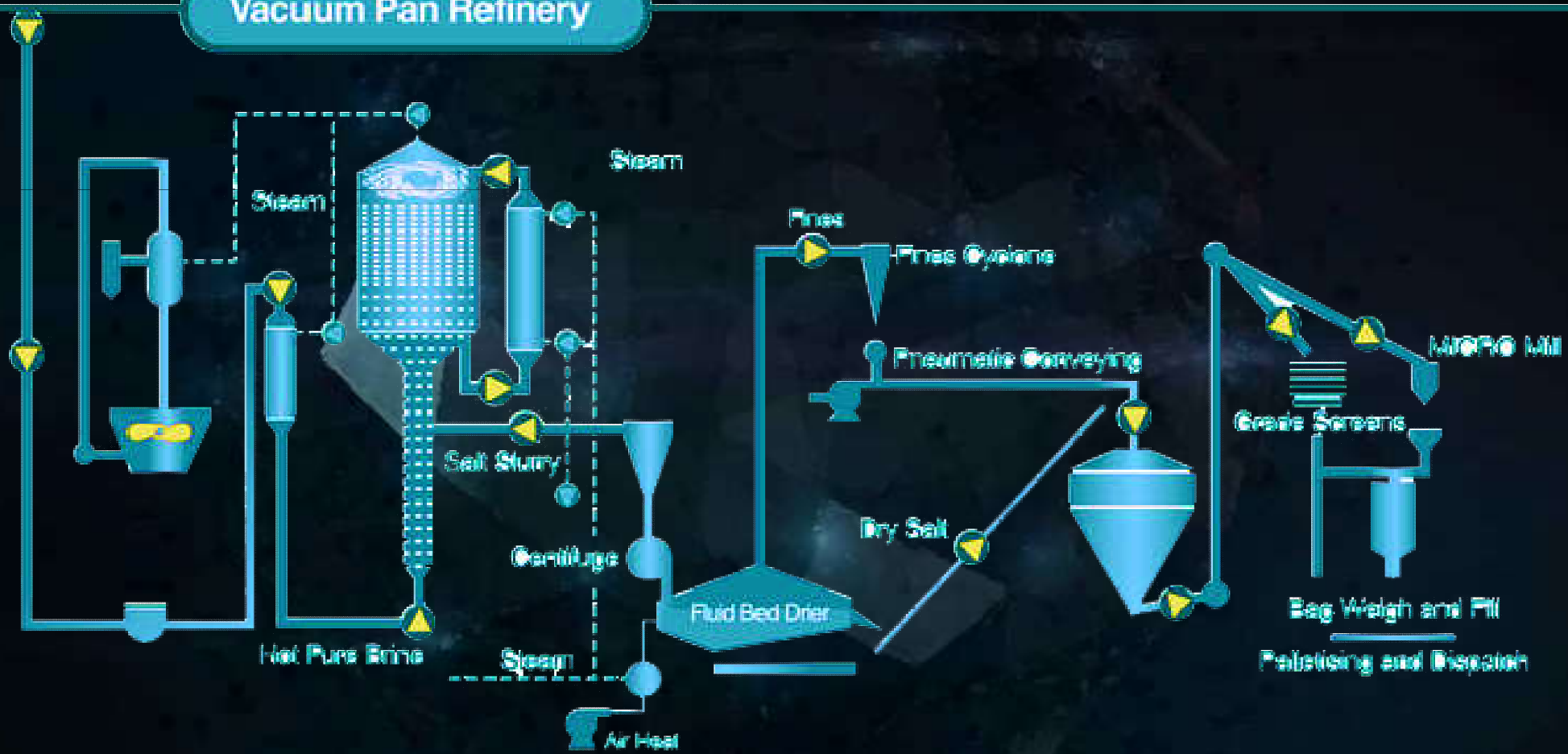
CONTINUOUS MINING
Produces smaller lumps of rock using a machine similar to that used for building tunnels





VACUUM SALT

Vacuum Pan Refinery



Vacuum Packaging




VACUUM SALT

Another method of salt production used by Morton Salt is the evaporation of salt brine by steam heat in large commercial evaporators, called vacuum pans. This method yields a very high purity salt, fine in texture, and principally used in those applications requiring the highest quality salt.

03

VACUUM SALT

SOLUTION MINING




Wells are drilled from several hundred to 1,000 feet apart into the salt deposit. These wells are connected via lateral drilling, a recently developed technology. Once the wells are connected, the solution mining operation begins: water is pumped down one well, the salt below is dissolved, and the resulting brine is forced to the surface through the other well. It is then piped into large tanks for storage.


VACUUM PANS

This series of vacuum pans operates on a very simple principle: Whenever pressure is lowered, the temperature at which water will boil is also lowered.

STREAM



In the vacuum pan process, steam is fed to the first pan. The steam from the boiling brine is then used to heat the brine in the second pan. The pressure in the second pan is lower, allowing the steam made by the boiling in the first pan to boil the brine in the second pan. The pressure is reduced still further in each succeeding pan. While the boiling operation could be done with just one pan, several pans in a row produce more salt per pound of steam, thus allowing greater energy efficiency.



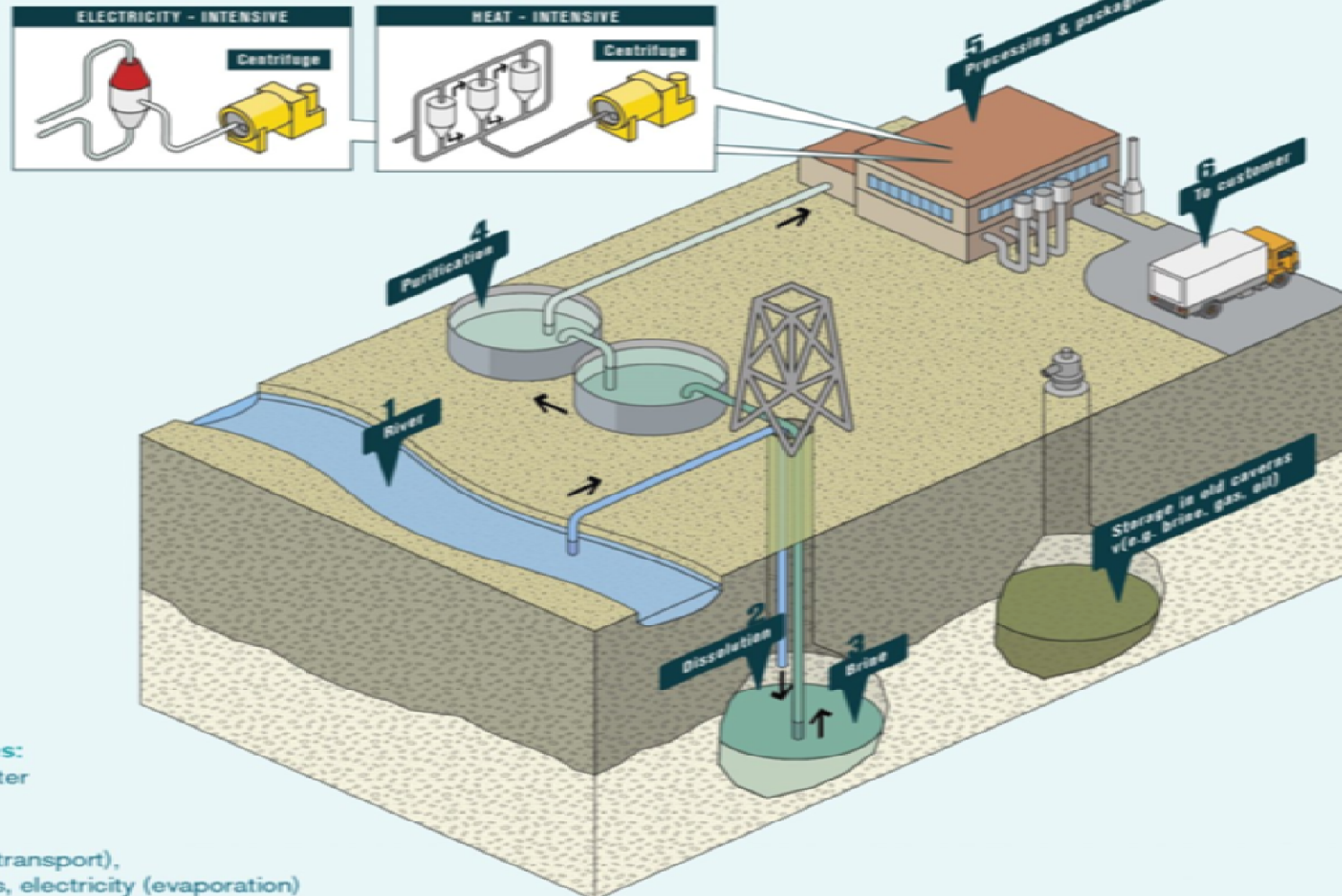


VACUUM SALT

03


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DRYING



Rock salt deposits are mined through boreholes. Water is injected into the underground salt layer to create a highly saturated brine. The latter then goes through mechanical evaporation and cooling. Follow sifting and storage and/or packaging. The caverns left after extraction can be used to store gas or hydrocarbons, for instance.

 Main resources:
land & freshwater

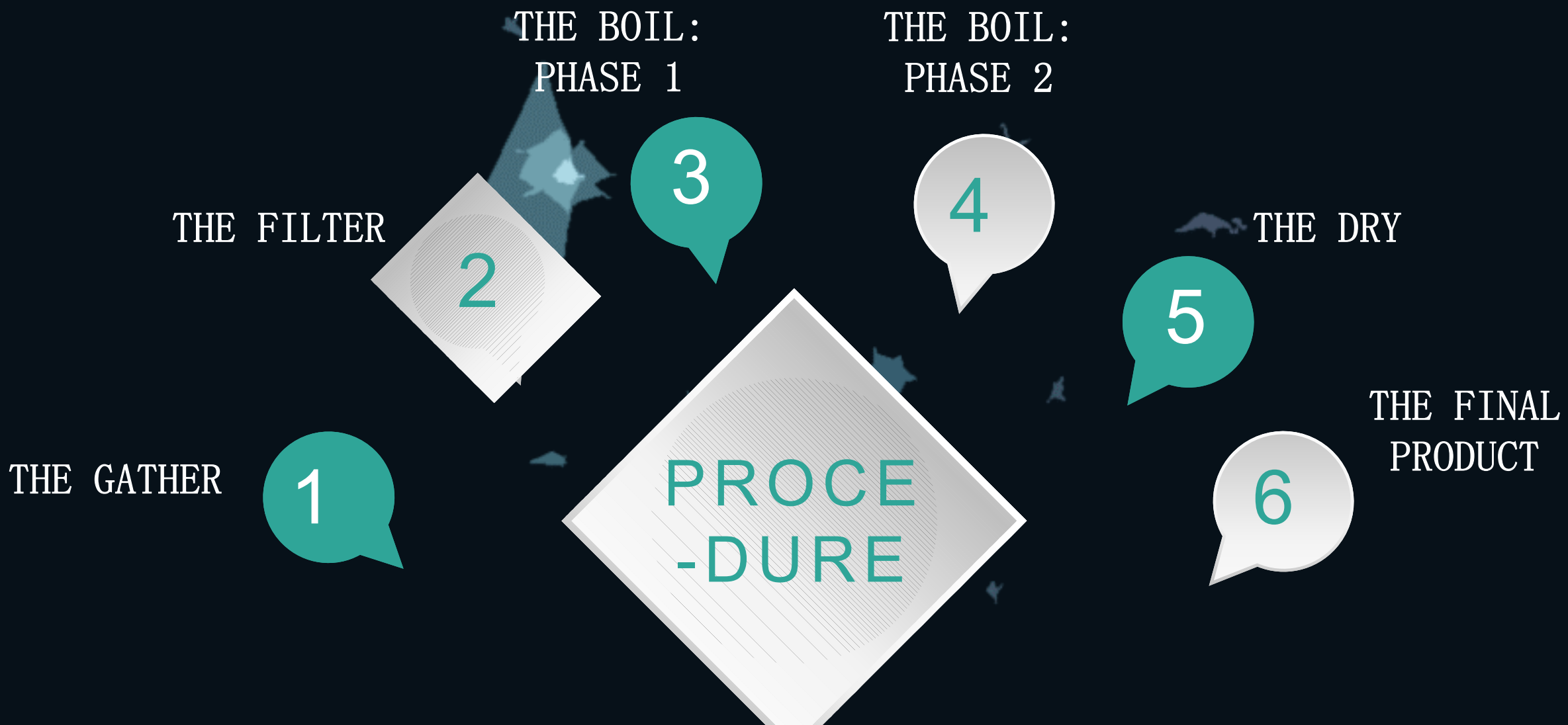
 Energy:
fossil fuel (incl. transport),
and/or biomass, electricity (evaporation)



OUR EXPERIMENT:
HOW TO MAKE
YOUR OWN SALT

04

OUR EXPERIMENT



04

STEP 1: THE GATHER



04

STEP 2: THE FILTER



04

STEP 3: THE BOIL PHASE 1



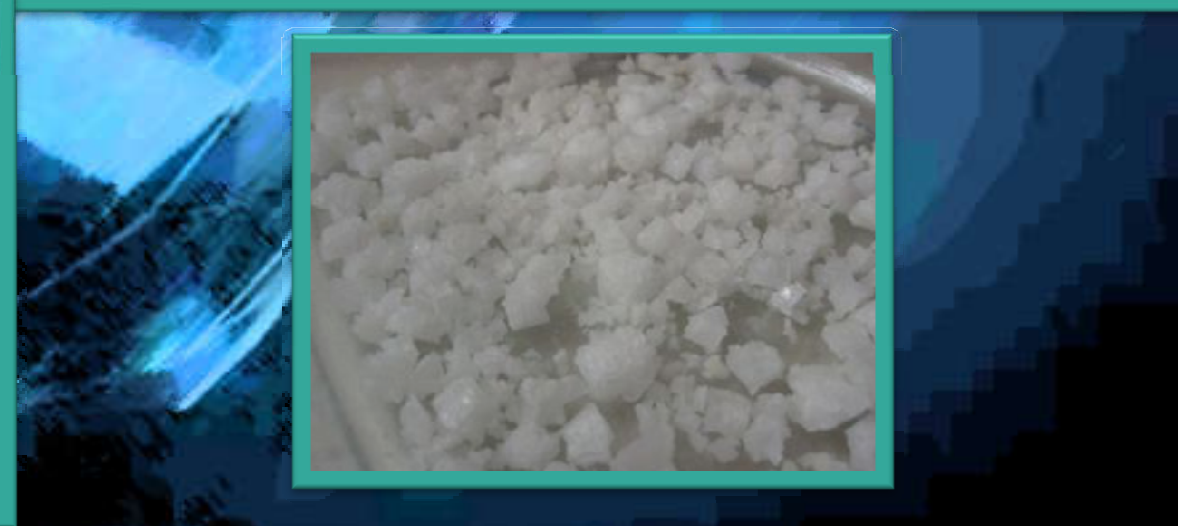
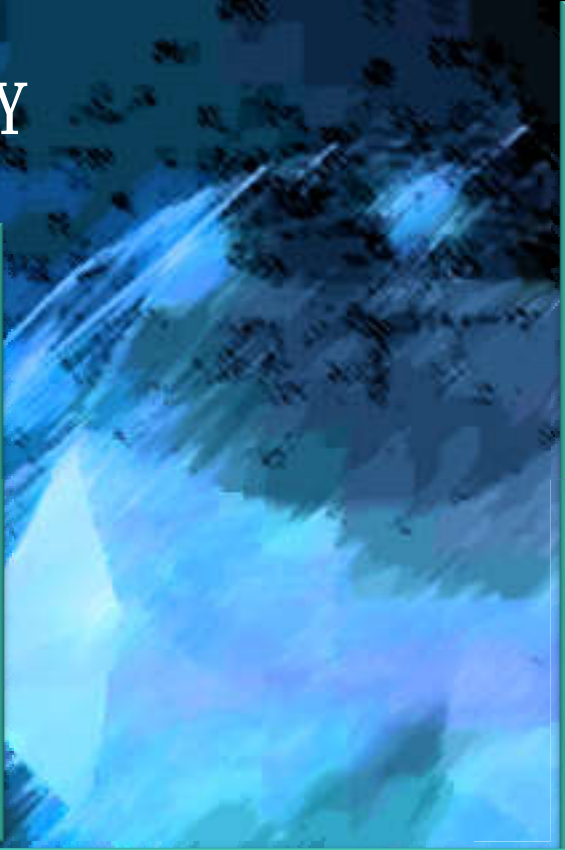
04

STEP 4: THE BOIL PHASE 2



04

STEP 5: THE DRY



04

STEP 6: THE FINAL PRODUCT





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**THANK YOU FOR
YOUR TIME**