HAVER & BOECKER NIAGARA

Zementwerk der Zukunft

Mehr Produkte für mehr Ertrag

Produkterweiterung für die Biolandwirtschaft

HAVER & BOECKER

NIAGARA

… quick reminder …

1 Lukas im Zementwerk:

Der Steinbruch

Die Geschichte von Zement fängt mit Kalkstein an. Kalkstein hat sich vor vielen Millionen Jahren in der Erde abgelagert. Er ist ziemlich hart und wenn man ihn ausgraben will, geht das oft nur mit Sprengstoff.

Hier siehst du, wie Heiko den Bohrer in der Hand hält, um Löcher für den Sprengstoff zu bohren. Den Sprengstoff gibt es in runden Stangen. Schau, ich habe ihn gerade in der Hand. Durch die Explosion reißt der Fels in Stücke. Dann kommt Lothar mit seinem großen Bagger und lädt den Schwerkraftlastwagen von Werner voll.

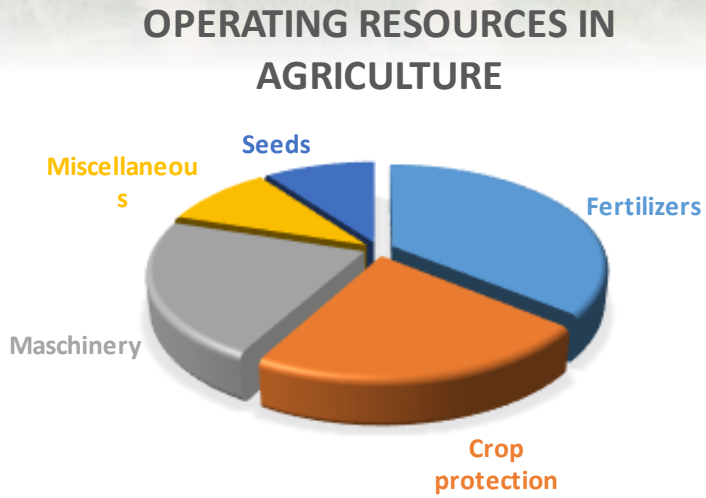
PHOENIX
ZEMENTWERKE

Need for Fertilizers

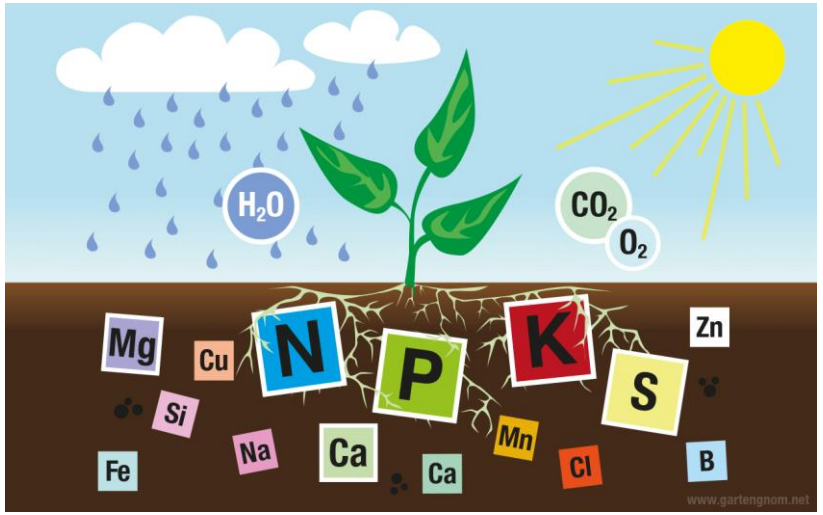
Quelle: Amazone

Quelle: Rauch

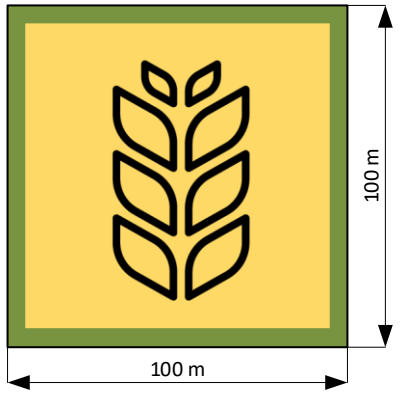
Quelle: Naturkalk



Fertilizers - background



Quelle: Gartengnom

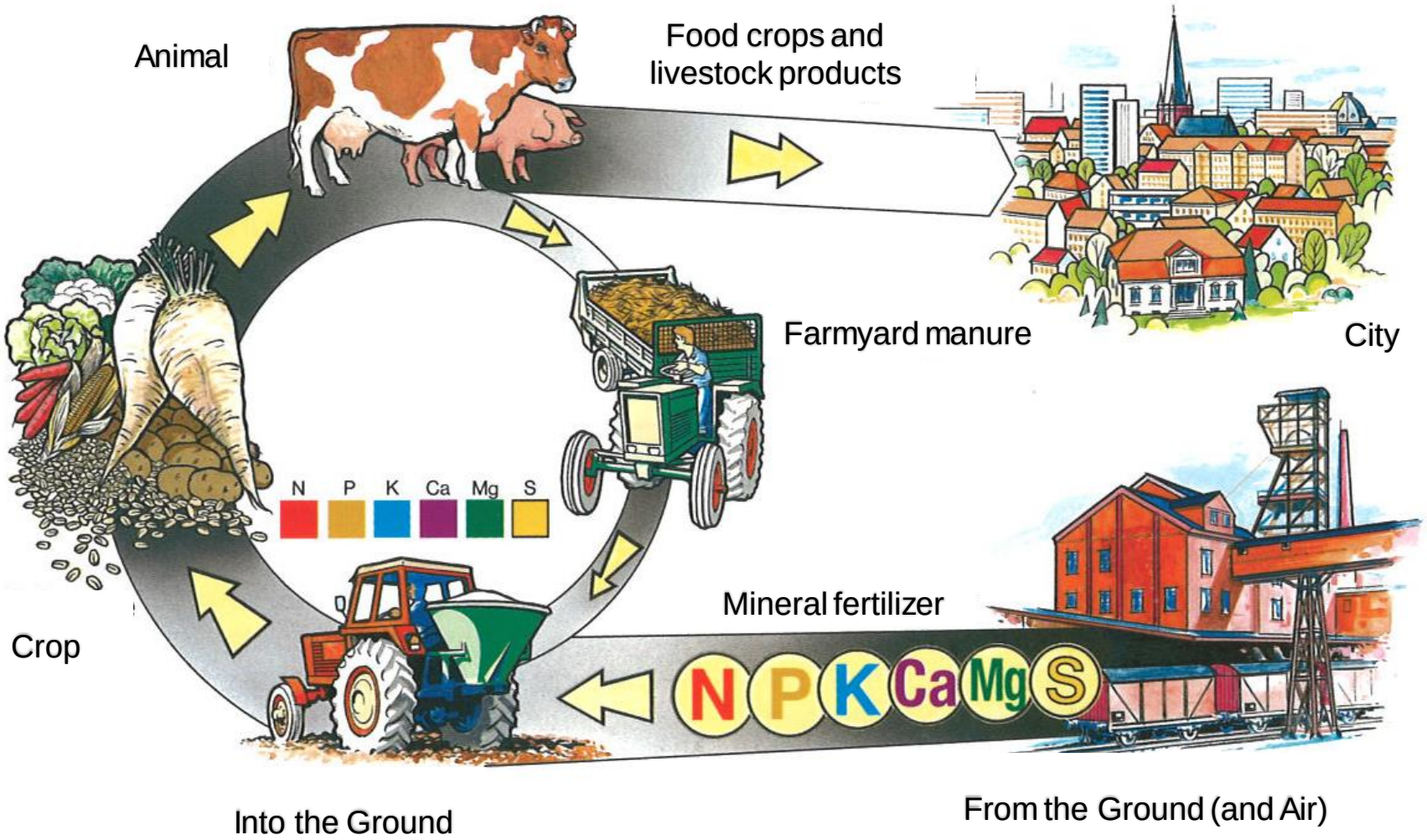


1950

2030

Symbol	Element	Essential function
N	Nitrogen	Gr
P	Phosphorus	Me s; Pho
K	Potassium	Wa apacit
Ca	Calcium	*Soil improving*; Functiona rane
S	Sulphur	Key component of Production: Protein, Vitamins, Enzymes
Mg	Magnesium	Key component of Chlorophyll → Photosynthesis

Open Nutrient Cycle



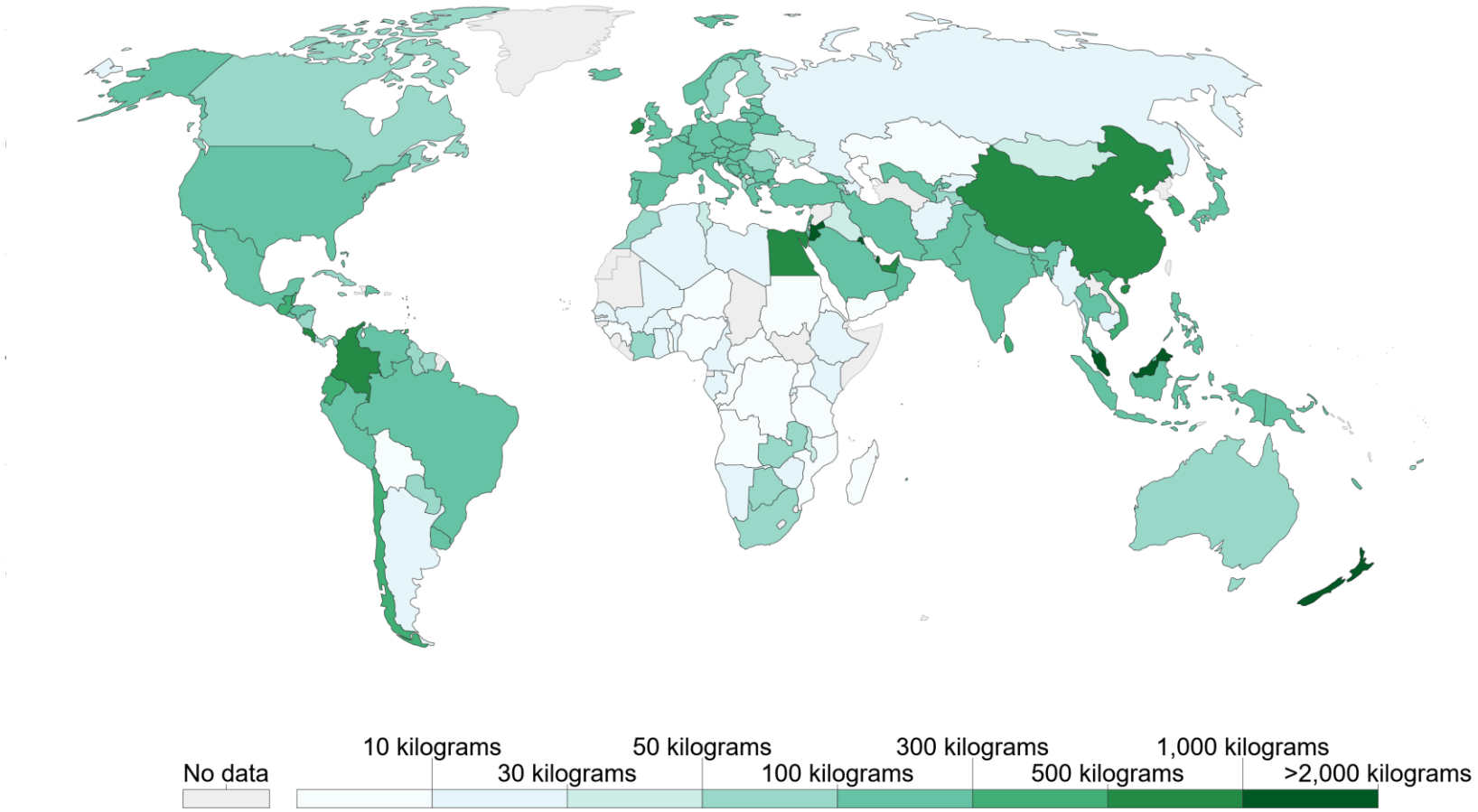
Source: K+S AG

Global needs by statistics

Fertilizer use per hectare of cropland, 2015

Fertilizer products cover nitrogenous, potash, and phosphate fertilizers (including ground rock phosphate). Animal and plant manures are not included. Application rates are measured in kilograms per hectare.

Our World in Data



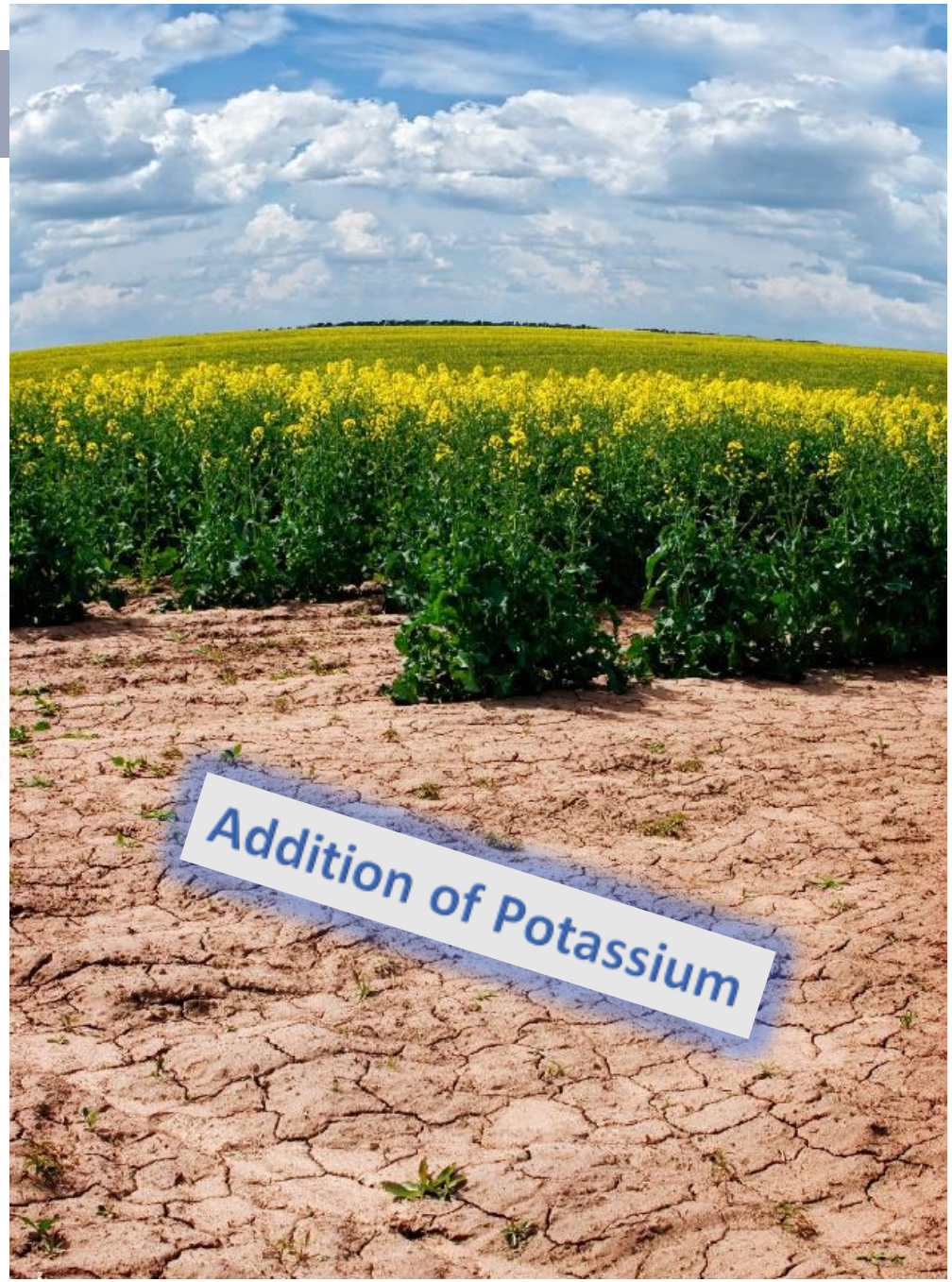
Source: World Bank

OurWorldInData.org/fertilizers • CC BY

Consequences of nutrient loss

Lack of nutrients at rapeseed plants

Source: K+S AG



Consequences of nutrient loss

Kerner

Dornfelder

Various colors of french fries due to different fertilizing.

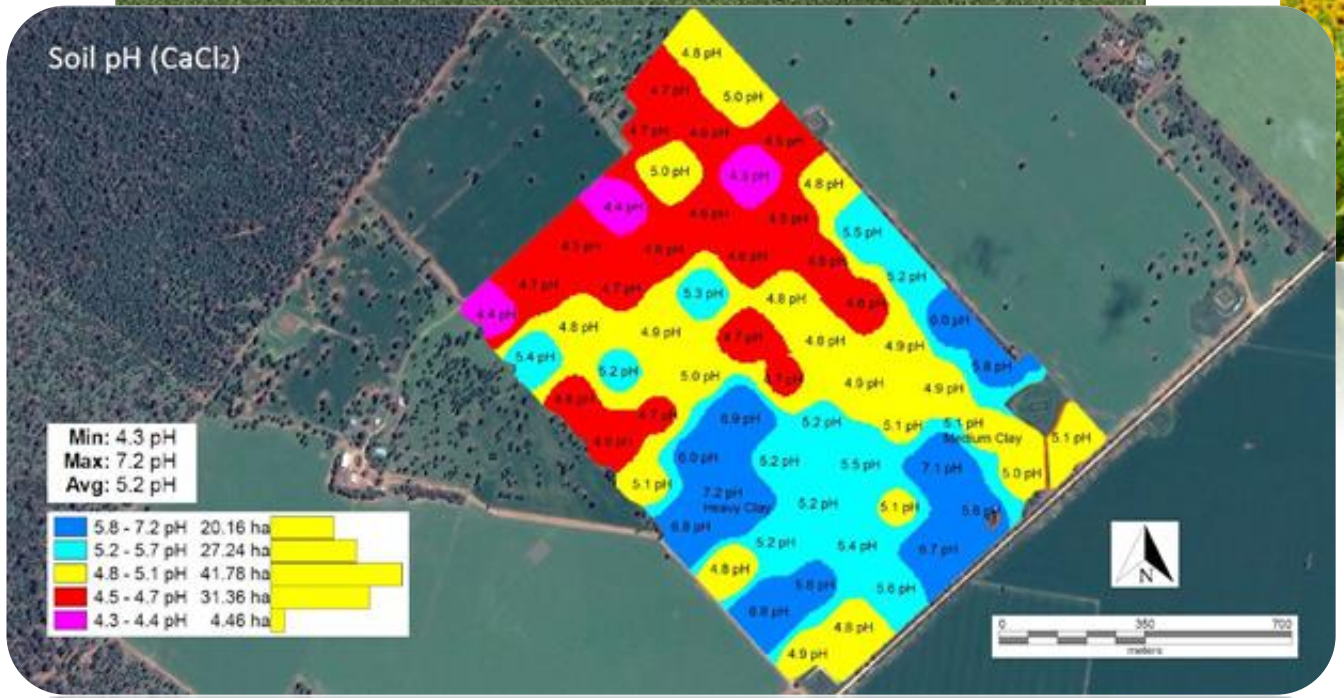
Source: K+S AG

HAVER & BOECKER
INSTITUT

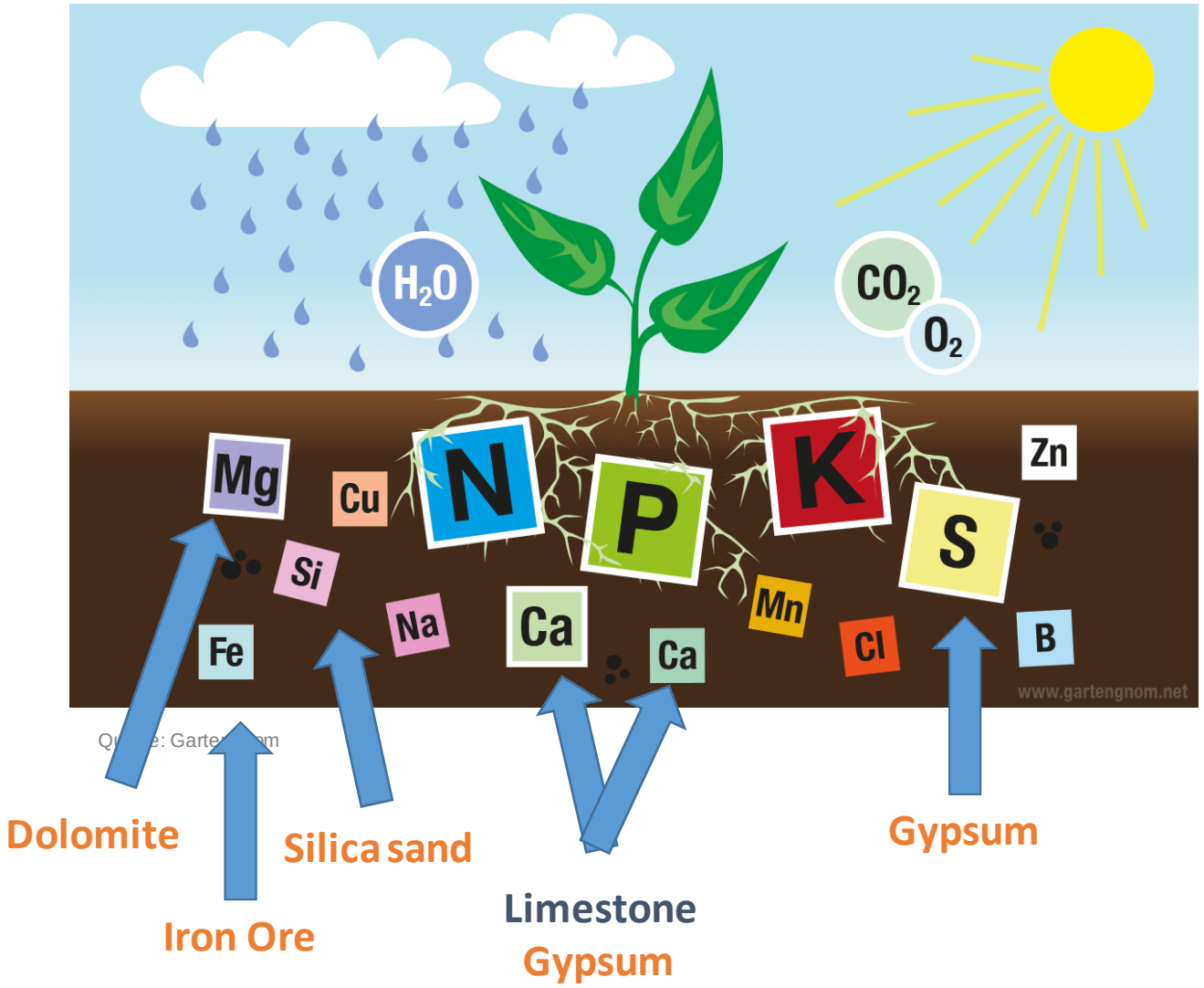
Costs of fertilizers

Fertilizer	Price in Germany (08.2020)	Range
Lime fertilizer		
Kohlensaurer Kalk, 80% + 5%	36,00 EUR/t	25,00 - 50,00
Konverterkalk, feucht, 38% + 5%	35,00 EUR/t	27,00 - 42,00
Granucal, granulated Limestone	75,00 EUR/t	70,00 – 120,00
Potash fertilizer		
Kornkali 40 % K2O,	249,00 EUR/t	225,00 - 300,00
Kornkali 60 % K2O,	307,00 EUR/t	280,00 - 363,00
Kalimagnesia, 30% + 10%	365,00 EUR/t	339,00 - 399,00
Magnesia Kainit, 11% + 5%	133,00 EUR/t	100,00 - 150,00
Multi-Component Fertilizer		
NPK 13/9/16/4	349,00 EUR/t	330,00 - 365,00
NPK 14/10/16/5	324,00 EUR/t	310,00 - 365,00
NPK 15/15/15	301,00 EUR/t	280,00 - 335,00
Phosphate fertilizer		
Triple-Superphosphat (TSP), 46 % P2O5	295,00 EUR/t	260,00 - 349,00
Diammonphosphat (DAP), 18 % N, 46 % P2O5	344,00 EUR/t	312,00 - 389,00
Nitrogen fertilizer		
Kalkammonsalpeter, 27 % N	189,00 EUR/t	170,00 - 215,00
Harnstoff 46% N, geprillt	309,00 EUR/t	270,00 - 375,00
Harnstoff 46% N, granuliert	306,00 EUR/t	265,00 - 340,00
Ammoniumnitrat-Harnstoff-Lösung, 28 % N	170,00 EUR/t	140,00 - 200,00
Ammonsulfatsalpeter, 27 % N	216,00 EUR/t	190,00 - 245,00
Schwefels. Ammoniak, 21 % N, 24 % S	196,00 EUR/t	163,00 - 249,00
Alzon, 46 % N	350,00 EUR/t	270,00 - 389,00

… quick reminder …



Plant nutrients – biological sources



Mineral	Chemical formula
Apatite	$Ca_3(PO_4)_2$
Sylvin; Carallit	KCl; $KMgCl_3 \cdot 6H_2O$
Limestone	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Gypsum	$CaSO_4 \cdot 2H_2O$
Iron Ore	e.g. Fe_2O_3; Fe_3O_4
Silica Sand	SiO_2

The law of the minimum

Source: Landi

The law of the minimum

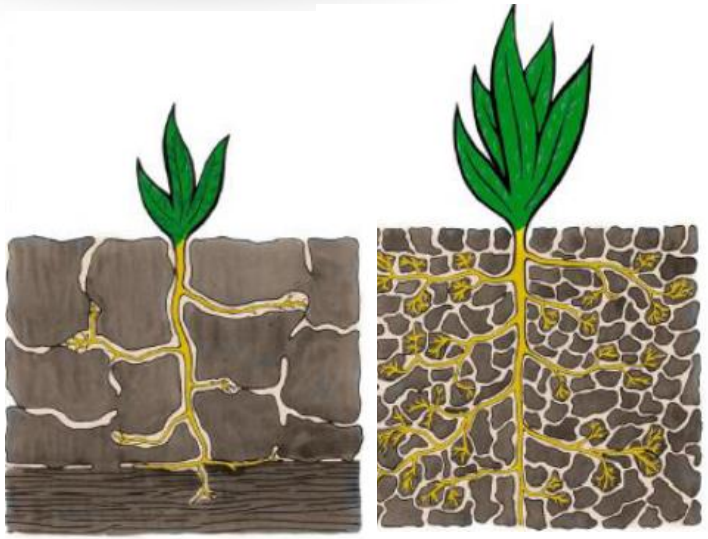
Every organism can only use its genetic potential to the extent that the smallest available resource allows.
Justus von Liebig, 1855

Limestones ($CaCO_3$) are used as a fertilizer

Limestones act as Soil improvers

Soil liming at Canterbury Agriculture Collage 1949

Source: Wikipedia



pH-value	Utilisation rate of the used substances (pH 7,0 = 100 %)		
	Nitrogen	Potassium	Phosphate
7,0	100	100	100
6	89	100	52
5,5	77	77	48
5	43	53	31
4,5	30	33	23

Source: Rheinkalk KDI

1) Improved soil structure by limestone addition
2) Improved ultilization of macronutriens by variation of ph-value

Fertilizers - Liming

Type	Content	Description
Carbonic lime	80 … 95 % $CaCO_3$; MgO_3	Almost insoluble in H_2O, conversion to $Ca(HCO_3)_2$ therefore slow effect
Quick lime	70 … 95 % CaO	Conversion with H_2O to $Ca(OH)_2$ for fast de-acidification, expensive
Hydrated lime	60 … 70 % CaO; MgO	Similar to quicklime more expensive than carbonic lime
Mixed lime	60 … 65 % CaO	Mixture of the three above mentioned fast and lasting effect
Slag lime	47 % CaO; 32 % SiO2; 7 … 10 % MgO	Slow effect
Converter lime	40 … 50 % CaO	Similair to slag lime
Residual lime	30 … 40 % CaO	Observe dusts, sludges, residues of AT pollutants (Pb, Cd, Ni, Hg, Tl; ...)
Carbocalk	45 % CaCO3	Clarification of sugar beet raw juice with $Ca(OH)_2$ - like carbonic lime

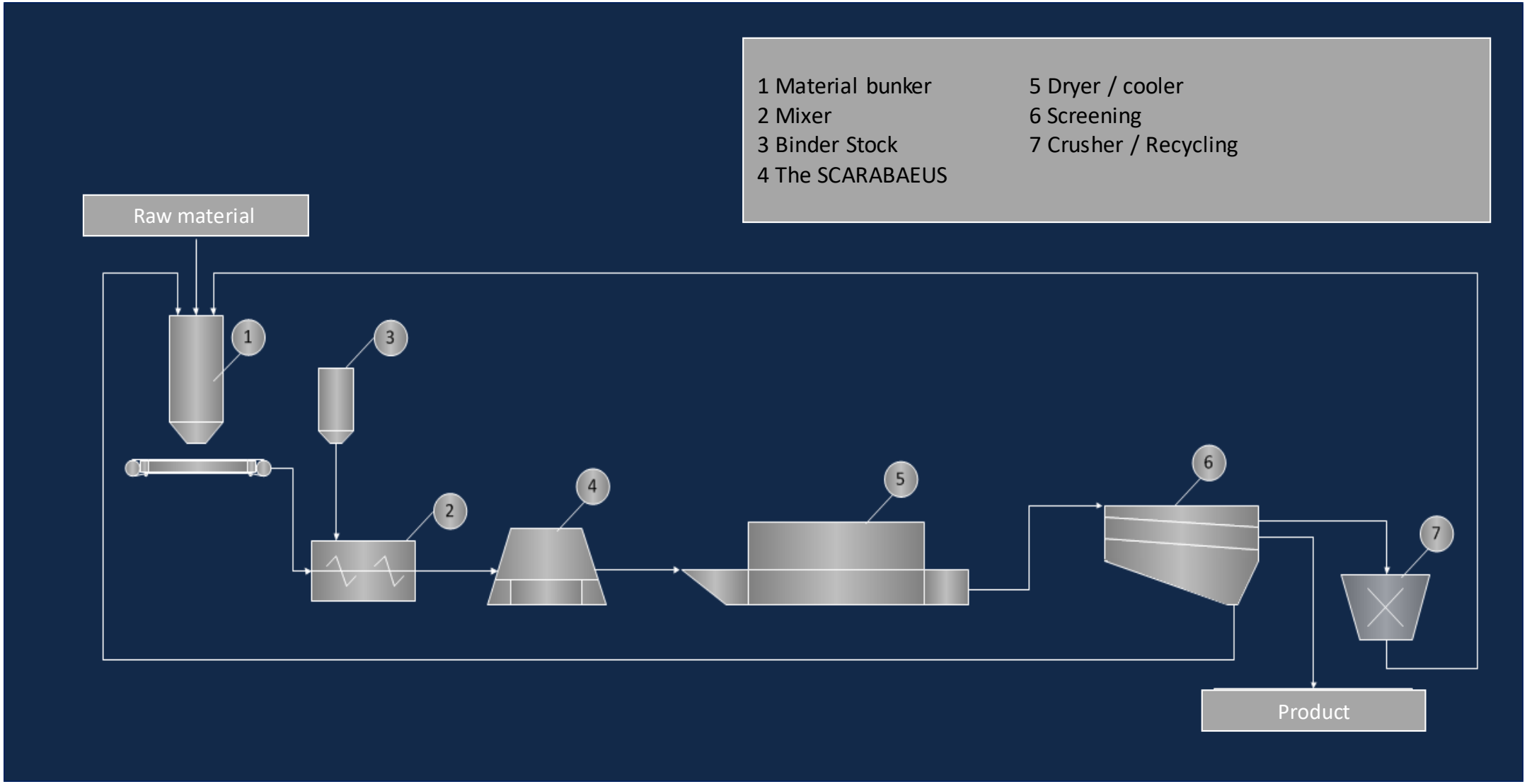
FOR ORGANIC FARMING
acc. to
(EU) 2018/848
(EC) No 889/2008

Agglomeration

Tailor-made product properties

- Improved storage and transport properties
- Defined particle size and shape
- Production of narrow particle size distributions
- Avoidance of segregation effect
- Adjustment of porosity or density
- Improvement of flowability
- Increased market value

Fertilizers - Pelletizing



Fertilizers - Pelletizing

- The Scarabaeus® pelletizing disc with precise production for significantly tighter pellet size distribution.

- The Scarabaeus® pelletizing disc gives the operators a full range of influencing parameters by the machine itself.

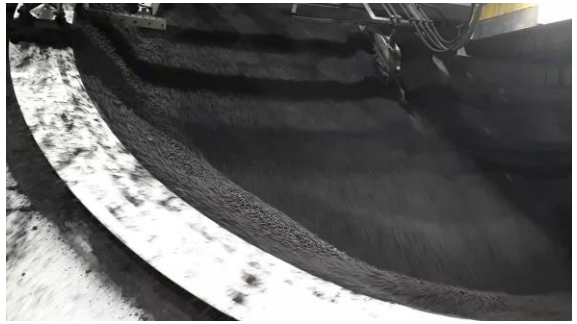
- Desired pellet quality could be achieved by changes of machine parameters, no longer only by addition of more and more binders and additives.

HAVER Engineering GmbH

Our process know-how – proofed experience – in laboratory and production!

Feasibility study

Pilot study

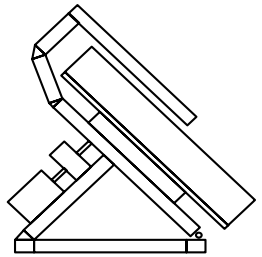


Scale-up

- Development and Optimization of processes, machines and plants
- Objective of HAVER Engineering is to meet your technical requirements and economic benefits
- Observing whole pelletizing process
  - Raw materials preparation, binders and additives
  - Chemical analysis
- Tailor-made processes creating production process that saves energy and resources!

Fertilizers - Pelletizing

Configuration example:

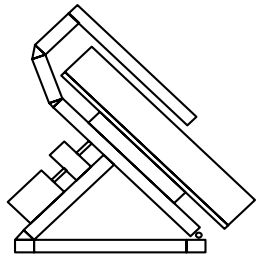


HAVER Pelletizing disc

- The Scarabaeus® SC4200
- Limestones 16 t/h in Europe

Fertilizers - Pelletizing

Configuration example:



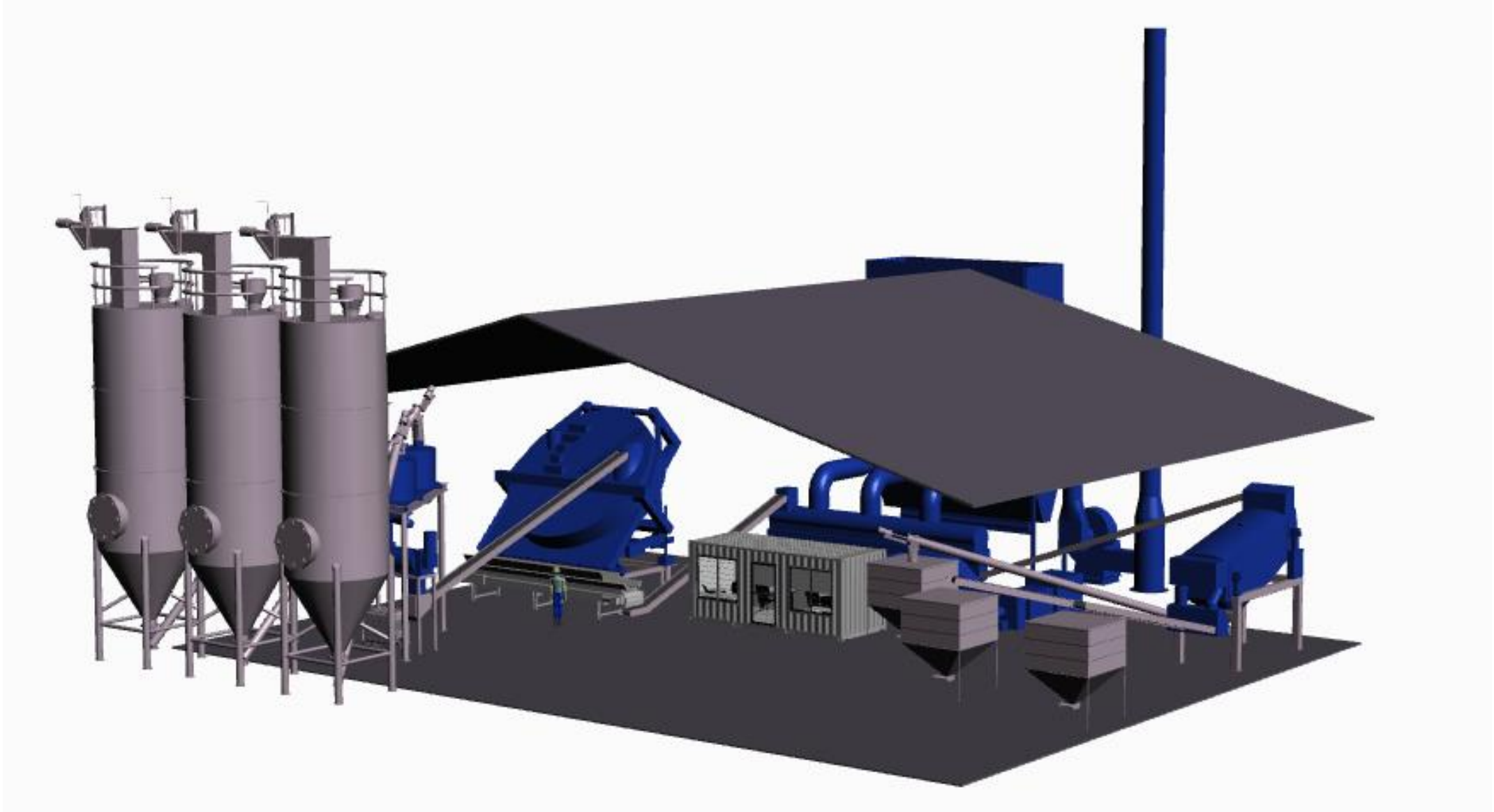
HAVER Pelletizing disc

- The Scarabaeus® SC4200
- Blended Fertilizer 15 t/h in Australia

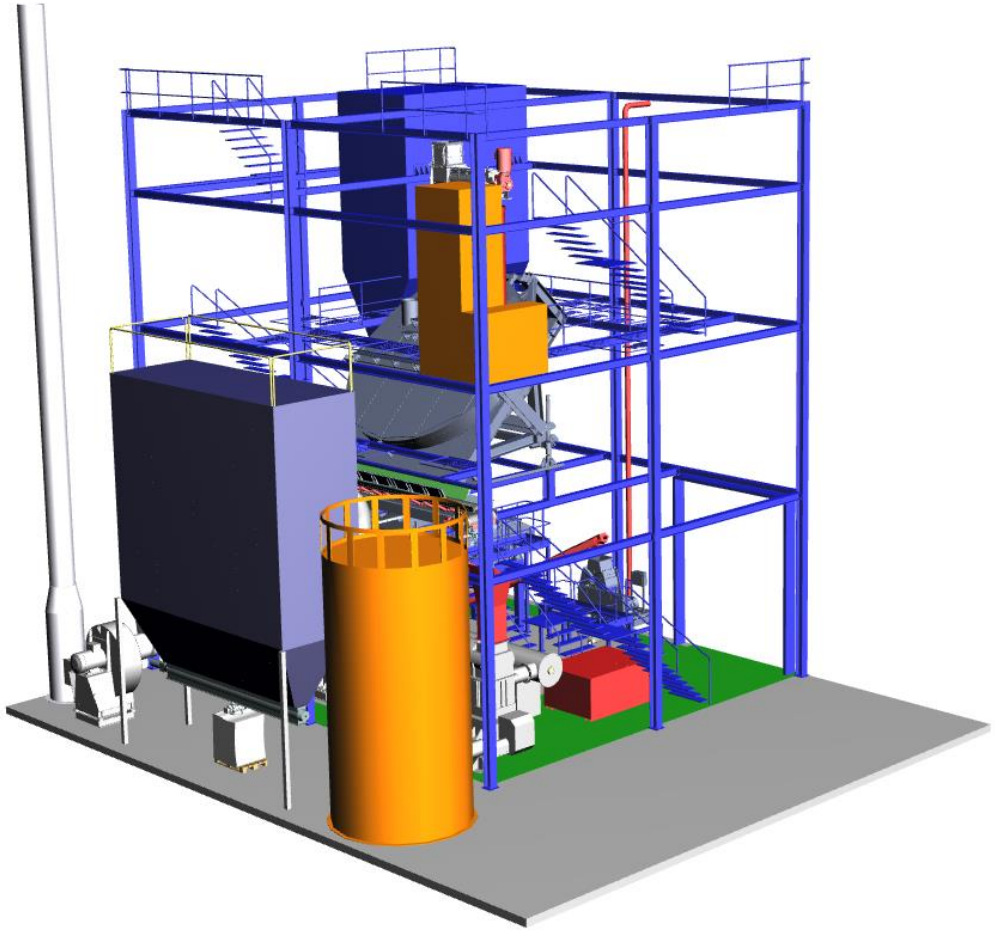
Drum vs. Disc

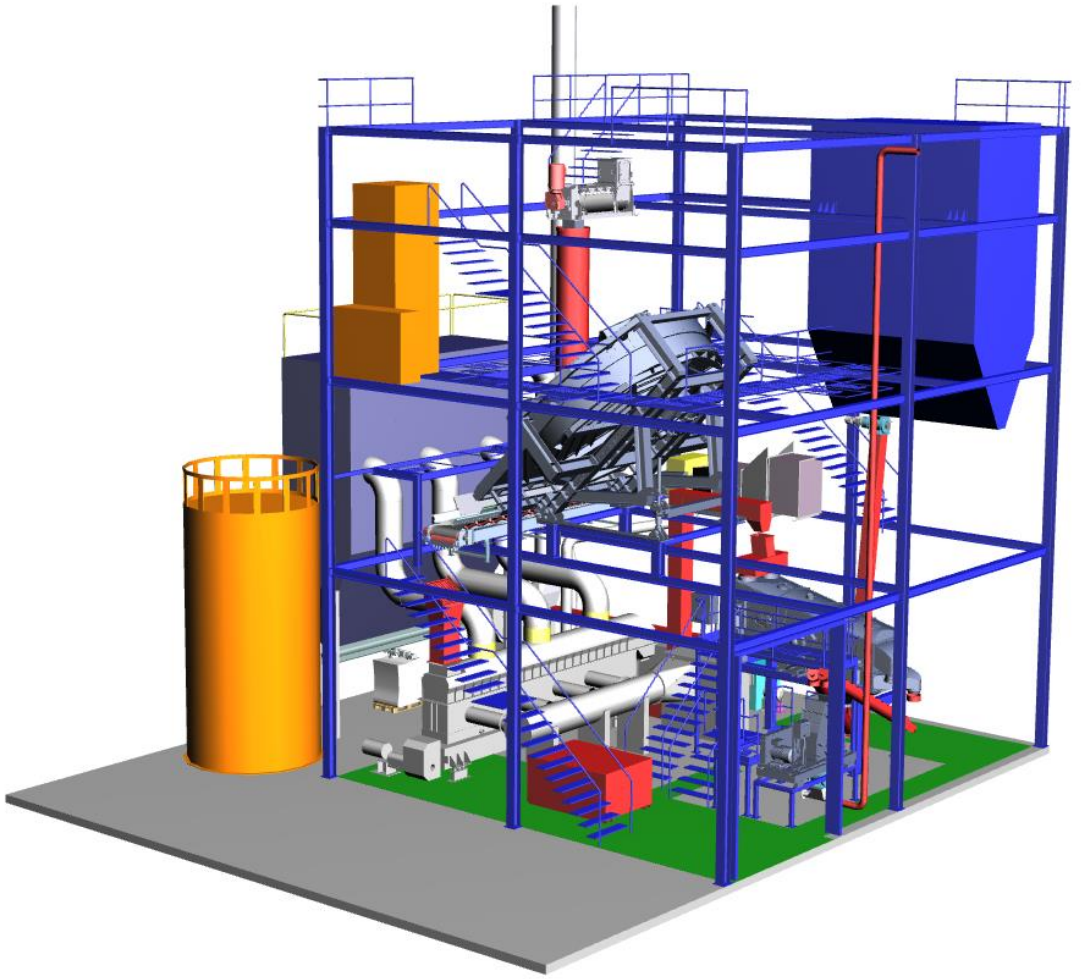
	Drum	Disc
Product fraction	1 to 7 mm	1 to 7 mm
Max. yield of production	60 wt.-%	80 wt-%
Total capacity	7.7 tph	15 tph
Production capacity	4.6 tph	12 tph

Fertilizers - Pelletizing

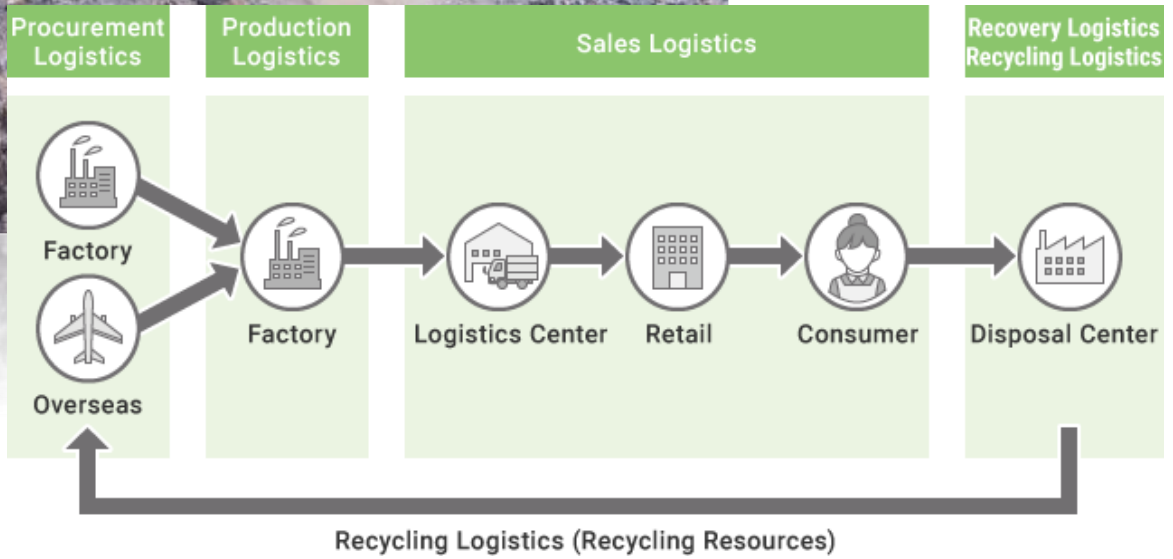


Fertilizers - Pelletizing

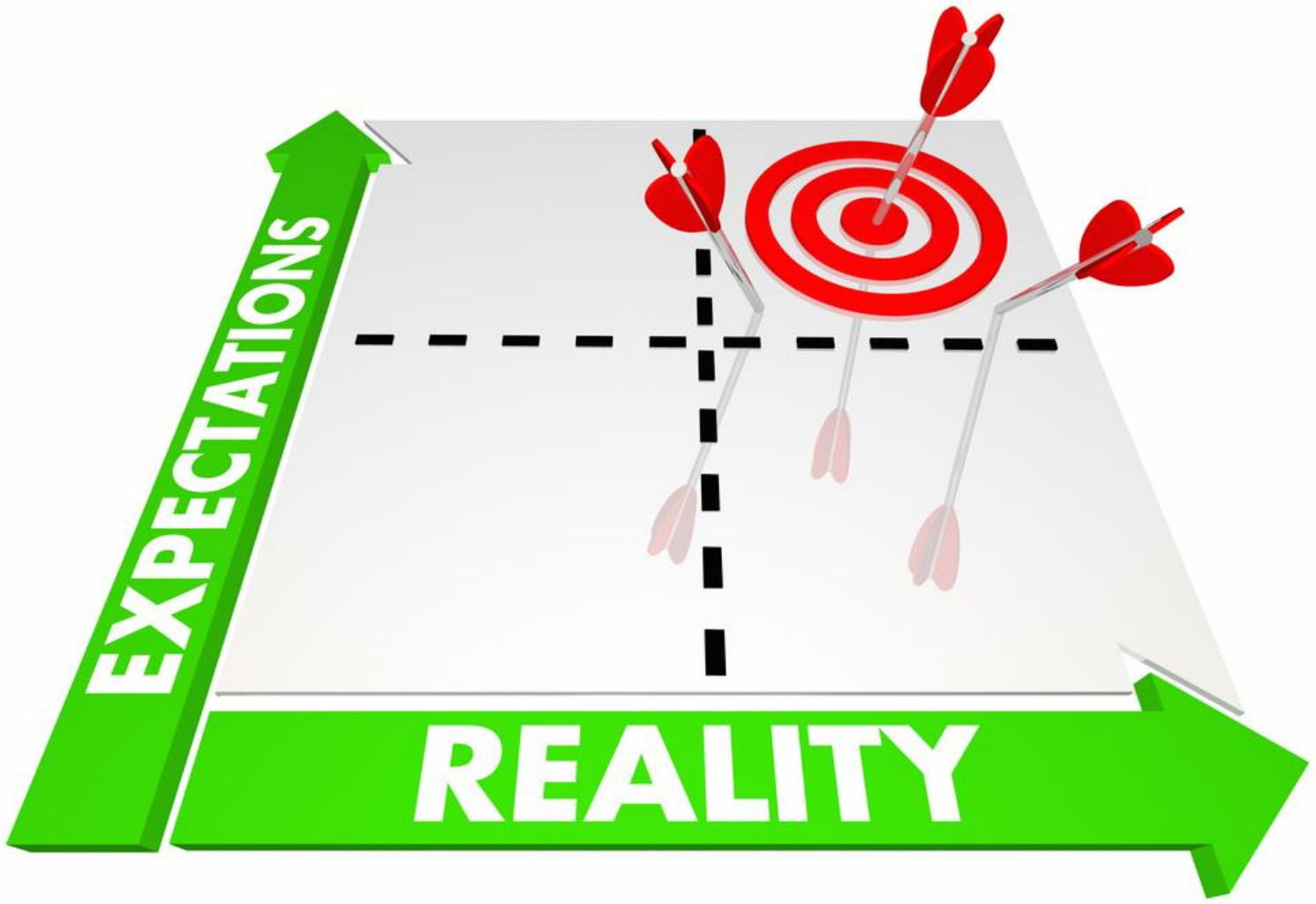




Why could Cementers act also in bio-fertilizers?



What we expect from You?



Identify potentials in Your Markets

Ask them this question:

What hinders you to make more profit by diversification of the portfolio?

Draft a Plan of Action with us…

… and SELL!

Contact us!

Dr.-Ing. Jan Lampke

J.Lampke@haverengineering.de

Tel. 0049 151 151 958 17

HAVER ENGINEERING GmbH

Associated Institute of TU Bergakademie Freiberg

Halsbrücker Str. 34
09599 Freiberg
www.haverengineering.de
www.haverniagara.de/pelletizing
Tel. 0049 3731 419700