



/ K-UTEC AG Salt Technologies | Sondershausen | Germany

BEYONDIE SOP PROJECT EXAMPLE

Digital Fact-Finding Mission for buyers and multipliers from Australia in the field of mining and raw materials, Theme Day Mineral Processing, 17.11.2021

K-UTEC
SALT TECHNOLOGIES

BEYONDIE SOP PROJECT CASE STUDY

Agenda

- Company introduction
- Beyondie project summary
- Role of K-UTEC and German involvement
 - Project history
 - Execution approach
 - Project financing & offtake
- Project status and outlook



K-UTEC AG SALT TECHNOLOGIES

History and Fact Sheet

Foundation of Potash Research Institute of GDR

1951

Foundation of K-UTEC GmbH

1992

Spin-off of K-UTEC AG Salt Technologies

2008

Management Board

Dr. Heiner Marx
Dr. Markus Pfänder

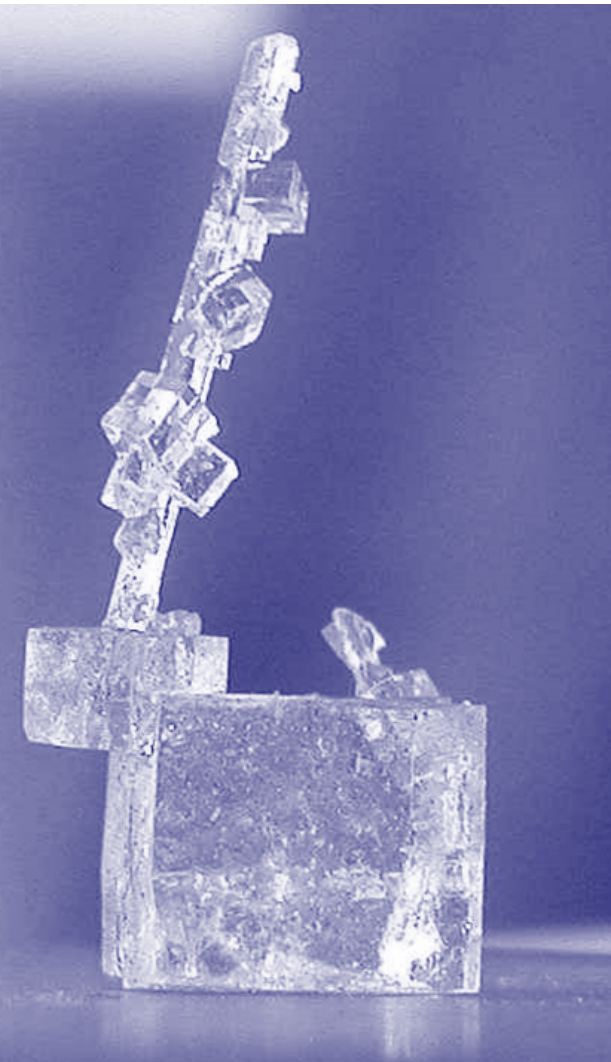
Employees

approx. 100



OVER 7 DECADES EXPERIENCE IN MINERAL SALT INDUSTRY

From classic potash processes over waste water beneficiation to Lithium from solids and brines...



K-UTEC'S PROJECTS WORLDWIDE

International footprint

Australia
Argentina
Austria
Belarus
Bolivia
Botswana
Brazil
Chile
China
Egypt
Eritrea
Ethiopia
France
Ghana
Hungary
India
Iran
Laos
Mexico
Peru
Russia
Saudi Arabia
Spain
Thailand
Tunisia
United Kingdom
USA



● Brine resource ● Solid resource

K-UTEC'S BUSINESS UNITS

All knowhow that you need form a single source



GEOPHYSICS



Visualize the apparently invisible...

GEOMECHANICS, MINING AND WASTE MANAGEMENT



Save is save! In Mining, this saying...

CHEM-PHYSICAL PROCESS ENGINEERING



The best for our customers...

CHEMICAL-PHYSICAL ANALYTICS



We want to know it exactly...

DEPARTMENT OF CHEMICAL AND PHYSICAL ENGINEERING

Fields of activities



- Laboratory and pilot scale test work
- Process Development and Process Design
- Economic project evaluation according to AACE
- Basic and in selected areas Detailed Engineering
- Supply of key-equipment packages
- Support in plant construction, commissioning and training of staff



DEPARTMENT OF CHEMICAL AND PHYSICAL ENGINEERING

Bench and pilot testing facilities



DEPARTMENT OF CHEMICAL AND PHYSICAL ENGINEERING

Bench and pilot testing facilities



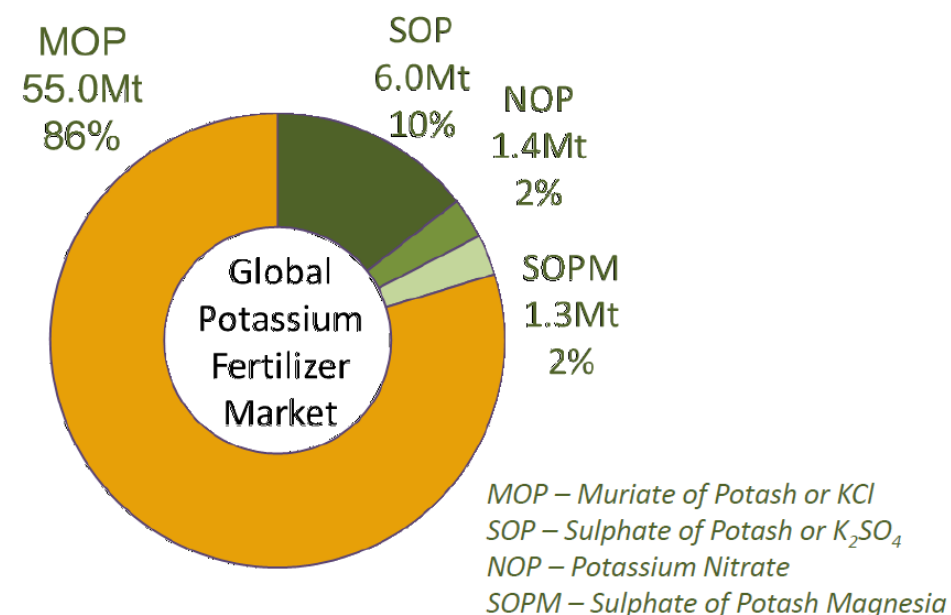
Demonstration plant for production of lithium carbonate based on Lithium bearing clays

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Australia's First Sulphate of Potash Operation

What is Sulphate of Potash (SOP)?

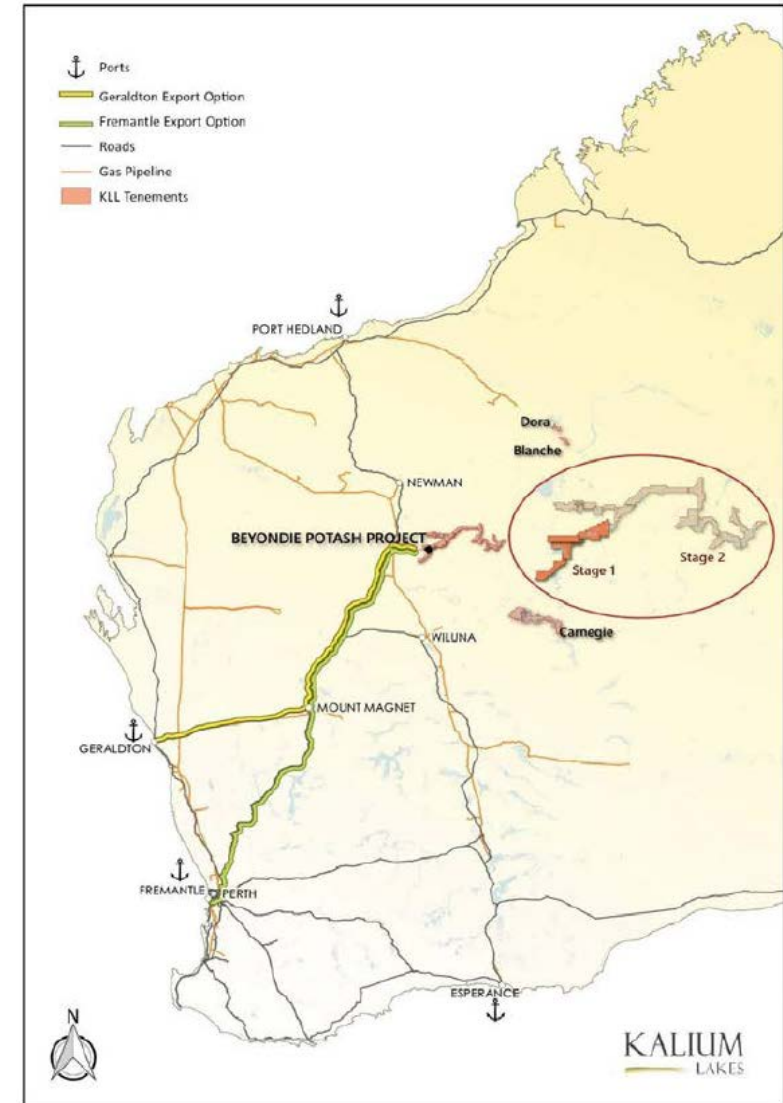
- Potassium is one of three essential plant nutrients
- The two main types of potash fertilizers are Muriate of Potash (MOP, KCl) and Sulphate of Potash (SOP, K_2SO_4)
- SOP has two active components and is a premium fertilizer for high value crops with an historic premium of approx. 200US\$/t over MOP.
- In contrast to MOP, there is hardly any natural mineral occurrence of SOP and SOP thus has to be produced in chemical reactions
 - Mannheim process via KCl and H_2SO_4
 - Based on potassium containing brines and double salts via conversion and decomposition reactions
- As a result global usage of SOP is supply constrained



PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Project Fact Sheet

- One of Australia's Highest Grade Potassium Brine Deposits
- Located in Western Australia, 160 kilometres south east of Newman in a region with the highest evaporation rates in Australia and worldwide
- Project capital expenditure of approx. 280 million AUS\$
- Total production of 90 ktpa of SOP with a project expansion to 120 ktpa planned for 2022
- First Australian SOP producer
- Over 50 year mine life with significant potential – extended mine life, increased production, magnesium by-products



Source: Kalium Lakes

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Production Principle



Bores and Trenches Brine Pumping



Brine Solar Evaporation



Salt Harvesting



Agriculture Production



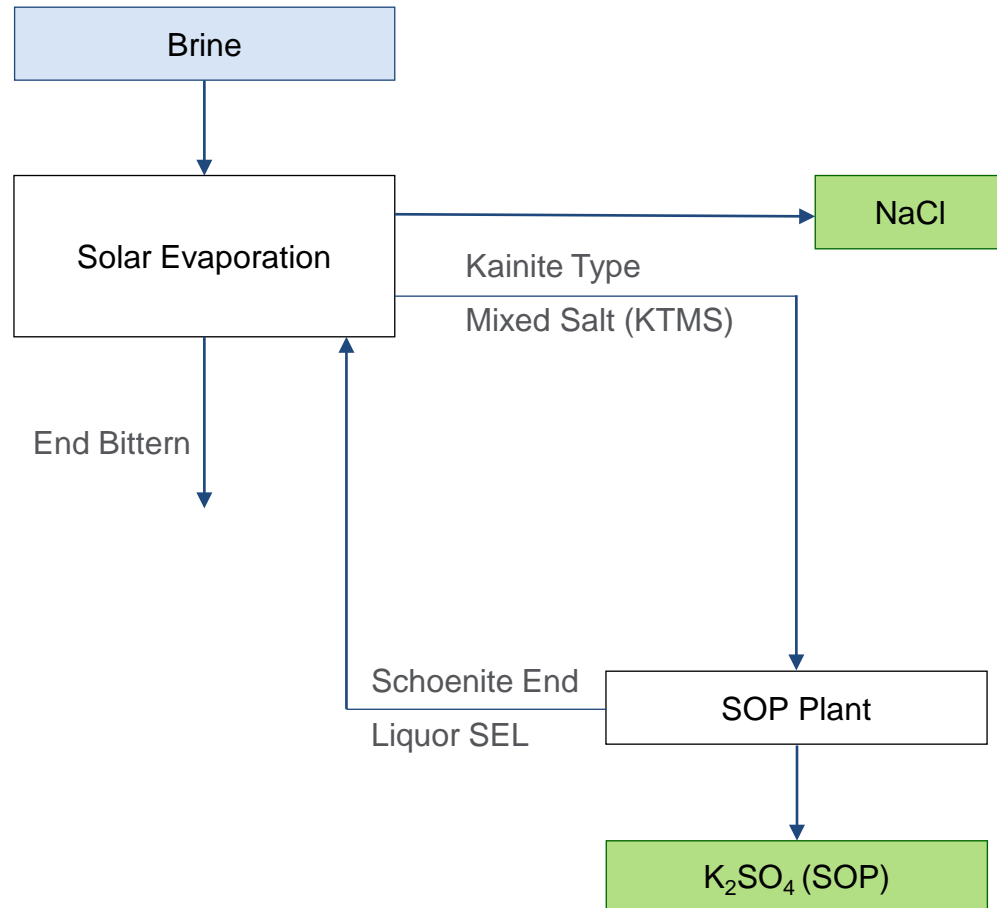
Premium SOP Fertiliser



Purification Processing

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

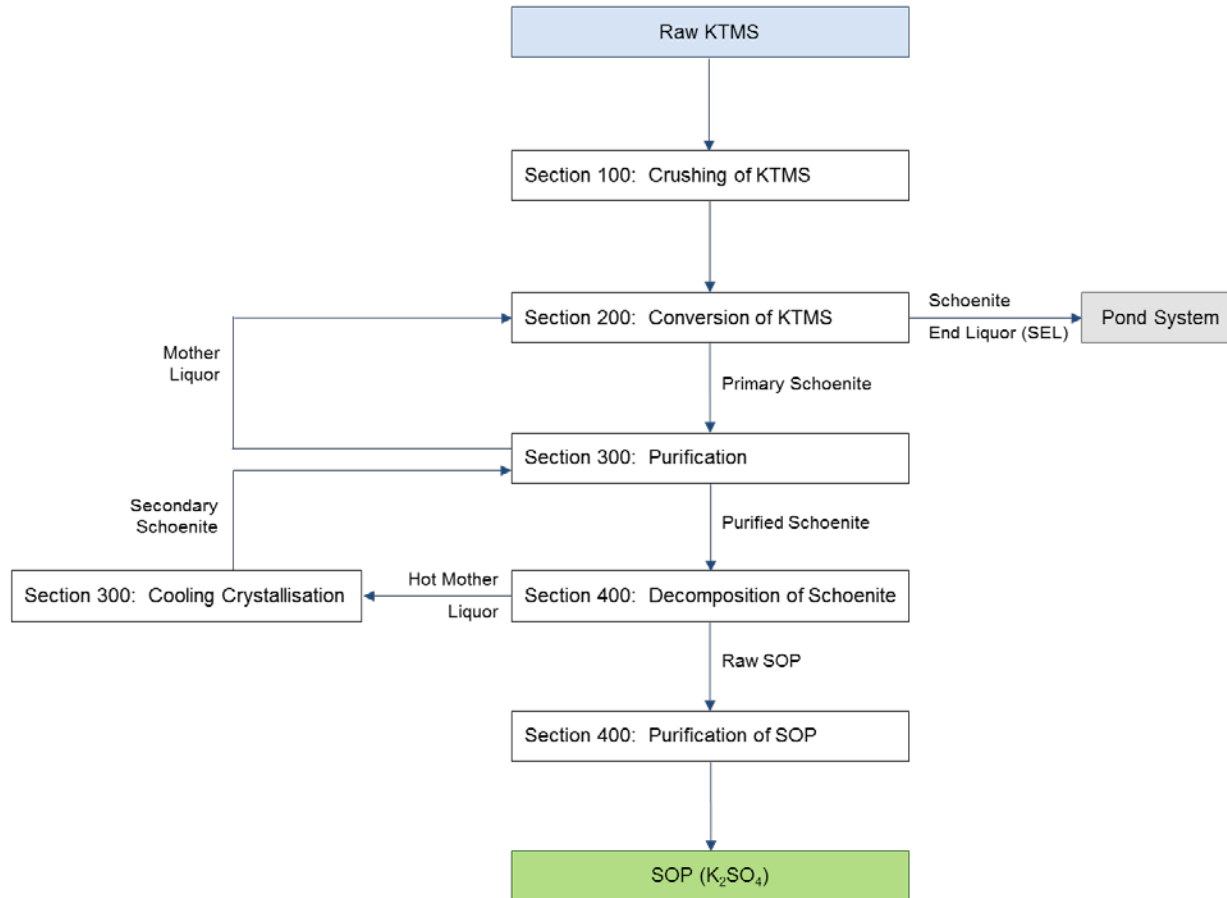
Production of Potassium containing raw salt (KTMS)



Source: Kalium Lakes

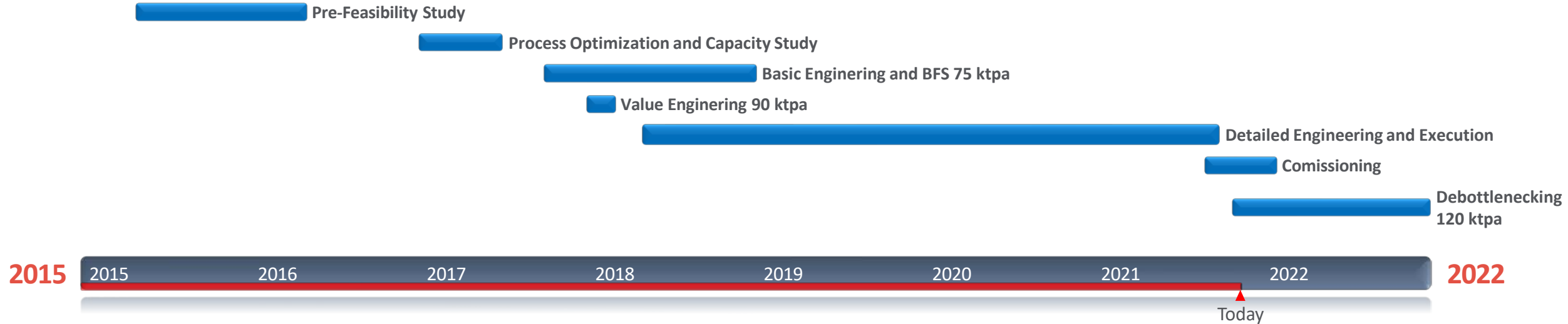
PROJECT EXAMPLE: BEYONDIE SOP PROJECT

SOP production in process plant



PROJECT EXAMPLE: BEYONDIE SOP PROJECT

K-UTEC's contribution in the different development phases of the project



Exploration Supervision
(QP, NI 43 101)



Lab Testing



Pond Demonstration Testing






Process Plant Demonstration Testing



Product Samples

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Role of K-UTEC and German involvement

Resource	Independent review and sign-off as qualified person
Bankable process with respective guarantees	– Know-how and experience in similar processes
	– Extensive demonstration testing
	– Teaming up with the right partners  <p>The logo shows the K-UTEC Salt Technologies logo followed by a plus sign, the E=ebner logo with the tagline 'engineering manufacturing establishing', an equals sign, and the E=ebTEC Salt Plant Technologies logo.</p>
Offtake Agreements	 <p>The K+S logo is a blue square with white text 'K+S'.</p> <ul style="list-style-type: none"> – 10 year take or pay offtake agreement with biggest German potash producer
Financing	 <p>The logos for KfW, IPEX-Bank, Euler Hermes, and NAIF (Northern Australia Infrastructure Facility) are displayed.</p> <ul style="list-style-type: none"> – Hybrid Export Credit backed Project Finance – Long Tenor 10-15 year loan life – Low Cost ~4% Average Interest Rate

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Euler Hermes backed export financing facility → Requirements on German equipment supply



For most equipment required for the Beyondie SOP process as crushers and mills, conveyor belts, reactors, pumps, flotation cells, centrifuges, thickeners, cooling crystallizers, dryers, etc, German suppliers can offer first class solutions. Amongst others we have used in this project:



PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Project Status – first SOP production



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Source: Kalium Lakes

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Project status – process plant running 24/7 in commissioning



Source: Kalium Lakes

PROJECT EXAMPLE: BEYONDIE SOP PROJECT

Outlook – Completing commissioning, first product shipment, optimization of pond regime and process plant operation and debottlenecking to 120 ktpa SOP production



Source: Kattum Lakes

THANK YOU FOR YOUR ATTENTION !

Proven positive effect of potash fertilizers on development growth



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