STATUS OF P-RECOVERY AND LOW-GRADE ROCK PROCESSING ECOPHOS PLANT IN DUNKERQUE, FRANCE

ROB DE RUITER
HELSINKI, FINLAND

June 12, 2018

ecophos

ECOPHOS GROUP

BELGIAN GROUP ACTIVE IN DIFFERENT PHOSPHATE FIELDS SINCE 1996

1 group, 4 activities

ECOPHOS® TECHNOLOGIES

Solution provider for phosphate industry

ECOPHOS® PILOT & DEMO

Technology and excellence center

ECOPHOS® Engineering

Project and engineering services

ECOPHOS® OPERATIONS

The Name in feed ingredients

Private company owned by Mohamed Takhim

300 Employees in Belgium, France, Bulgaria, The Netherlands

€150 Mio turnover, €50 Mio EBIDA in 2017

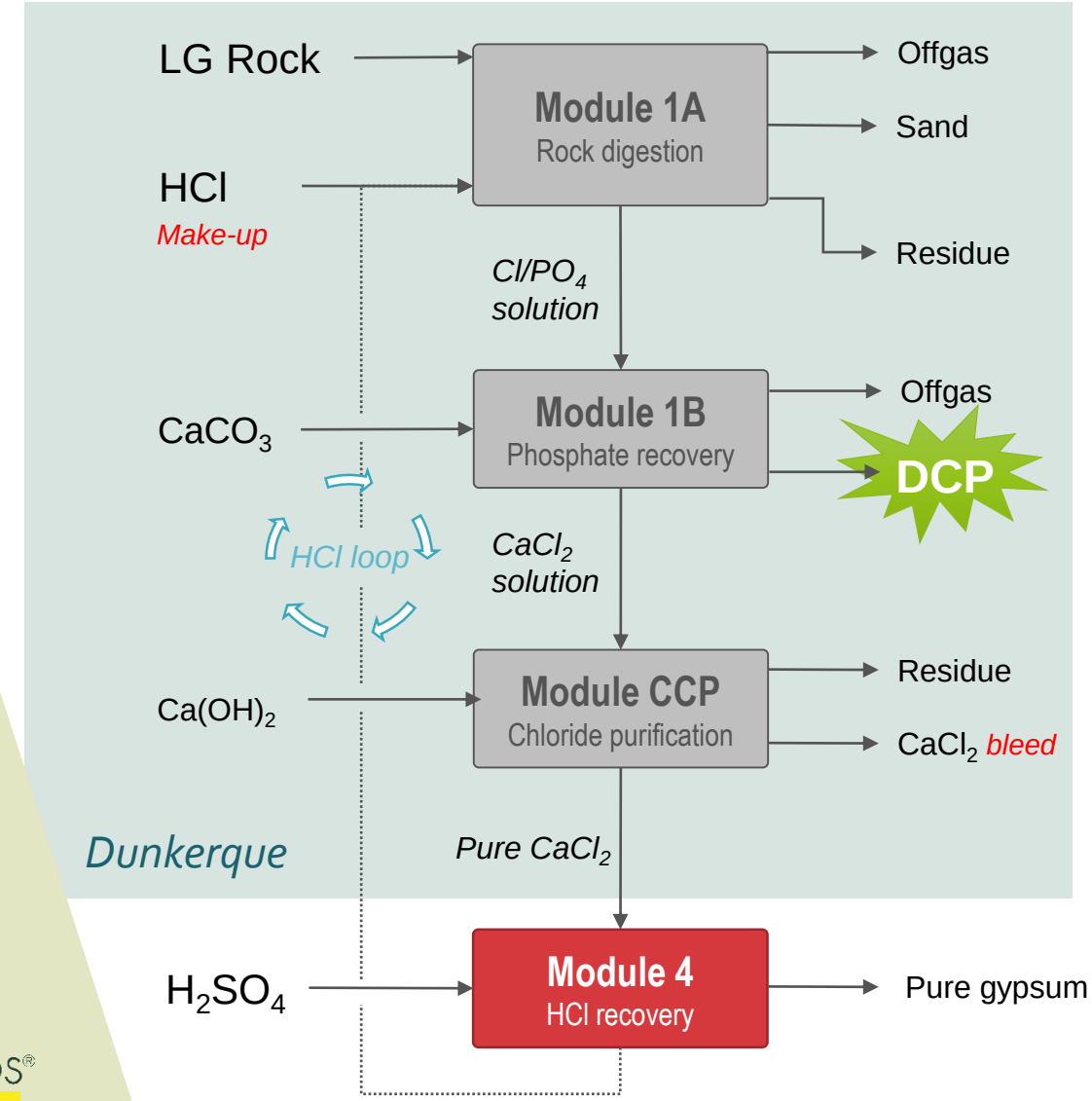
2 business models

→ **Production** of animal feed phosphates: Aliphos

→ **Technology supplier**: license, engineering and equipment supply

ChemBe: CHEMICAL BENEFICIATION

MAKING DCP, A NEW ROOT TO PRODUCE ALL P PRODUCTS



LOW GRADE rock + H_2SO_4

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DCP + PURE gypsum

Low grade rock

No beneficiation

Low water consumption

Low energy consumption

Robust process

High yield

High flexibility

High quality products

Valuable co-products

ecophos®

DUNKERQUE PLANT

AT THE HEART OF EUROPE, ACCESS TO ALL MAJOR MARKETS

In Dunkerque harbor

Access to sea ships, trucks, barges, railway

Industrial environment

ecophos®

DUNKERQUE PLANT

THE BIGGEST DCP DIHYDRATE PLANT IN THE WORLD

Technology:	EcoPhos
EPC:	EcoPhos Industrial Services
Operation:	Aliphos
Product:	Dicalcium Phosphate di-hydrate feed grade
Capacity:	220 ktpa DCP (100ktpa P2O5)
Investment:	$ 100 million

DUNKERQUE PLANT

FAST PROJECT EXECUTION

Key milestones

- Project kick-off: Apr 2015
- End of Engineering: Feb 2016
- Construction finished: Aug 2017
- End of cold commissioning: Nov 2017
- End of hot commissioning: Jan 2018
- Plant startup: Jan 2018

ECOPHOS KEY REFERENCES

WORLDWIDE REALISATIONS

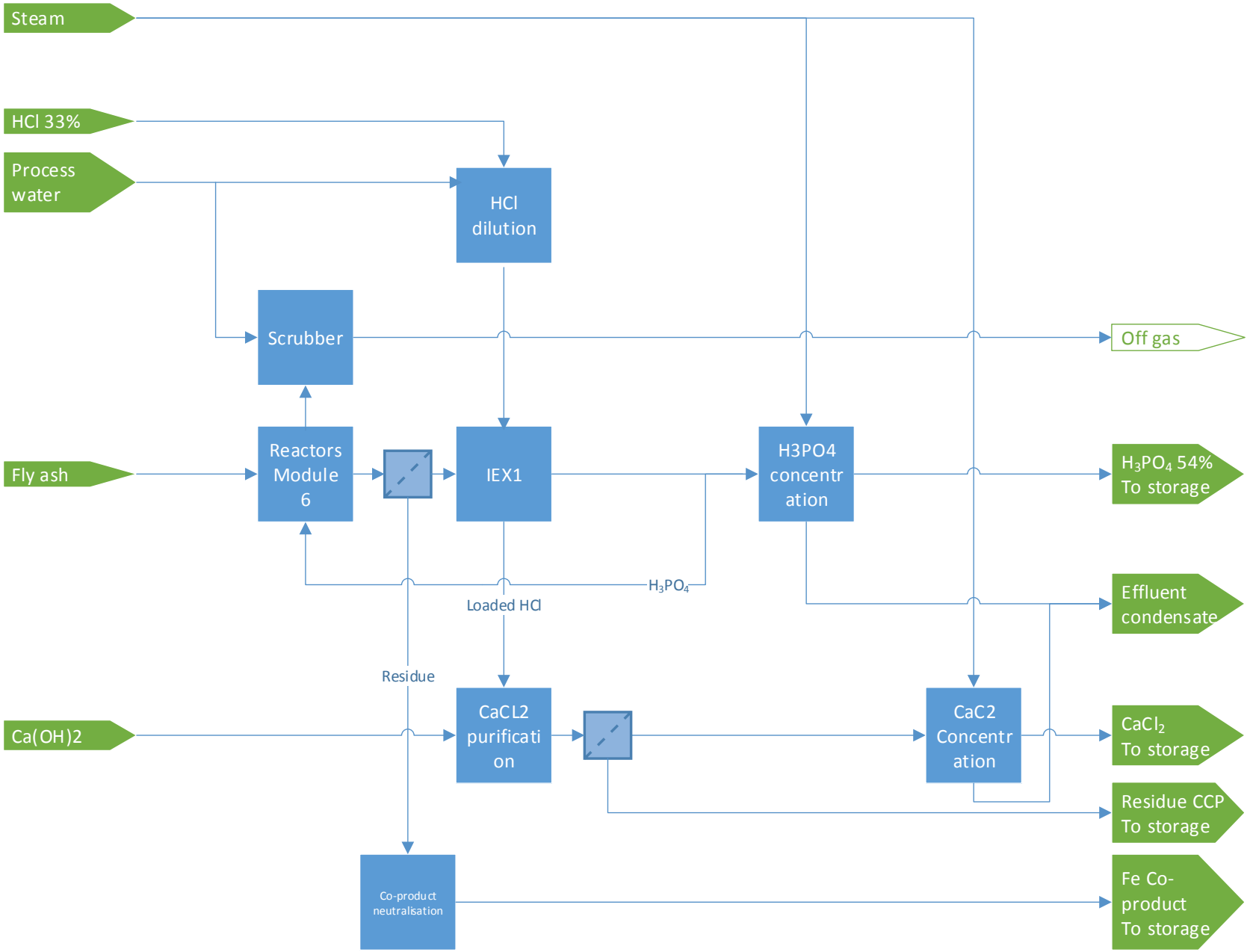
Plant name	Year	Country	Capacity	Product	Modules	Status
Decaphos (Aliphos Varna)	2006	Bulgaria	60ktpa	DCP/MCP	1A/1B	In operation
UCCI	2010	Syria	60ktpa	DCP	1A/1B/CCP/4	In operation
Quimpac	2014	Peru	60ktpa 25Ktpa	DCP Phosphoric acid	1A/1B/CCP/3	In operation
Eurochem (Basic engineering)	2014	Kazakhstan	660ktpa	DCP	1A/1B/CCP	Under design
LLNP (pilot plant)	2015	Namibia	1ktpa	DCP/phosphoric acid	1A/1B/3/4	Commissioned
Technophos (pilot plant)	2016	Bulgaria	1ktpa	DCP/phosphoric acid	1A/1B/CCP/3/4	In operation
Aliphos Dunkerque	2017	France	220ktpa	DCP	1A/1B/CCP	In operation
Evergrow	2018	Egypt	110ktpa 50ktpa 100ktpa	DCP Phosphoric acid CaCl2 96%	1A/1B/CCP/3 + CaCl2 drying	Under construction
Evergrow SSP	2019	Egypt	100ktpa	SSP	SSP	Under design
EGIL	2019	India	200ktpa	DCP	1A/1B/CCP	Under design
Dunkerque 2 (fly ash)	2020	France	35ktpa	Phosphoric acid	6/Ion echange/4/CCP	Under design
Everphos	2020	Egypt	440ktpa	DCP	1A/1B/Dry DCP/CCP/ 4/ + CaCl2drying	Under design
Chaneco	2020	China	220ktpa	DCP, MCP, food grade PA	1A, 1B, 4, CCP, 3, 3C, IEX, DCP, MCP	Under concept


Evergrow


Technophos


Quimpac


UCCI


Steam
HCl 33%
Process water
HCl dilution
Scrubber
Off gas
Fly ash
Reactors Module 6
IEX1
H3PO4 concentration
H3PO4 54% To storage
Effluent condensate
H3PO4
Loaded HCl
Residue
Ca(OH)2
CaCL2 purification
CaC2 Concentration
CaCl2 To storage
Residue CCP To storage
Co-product neutralisation
Fe Co-product To storage

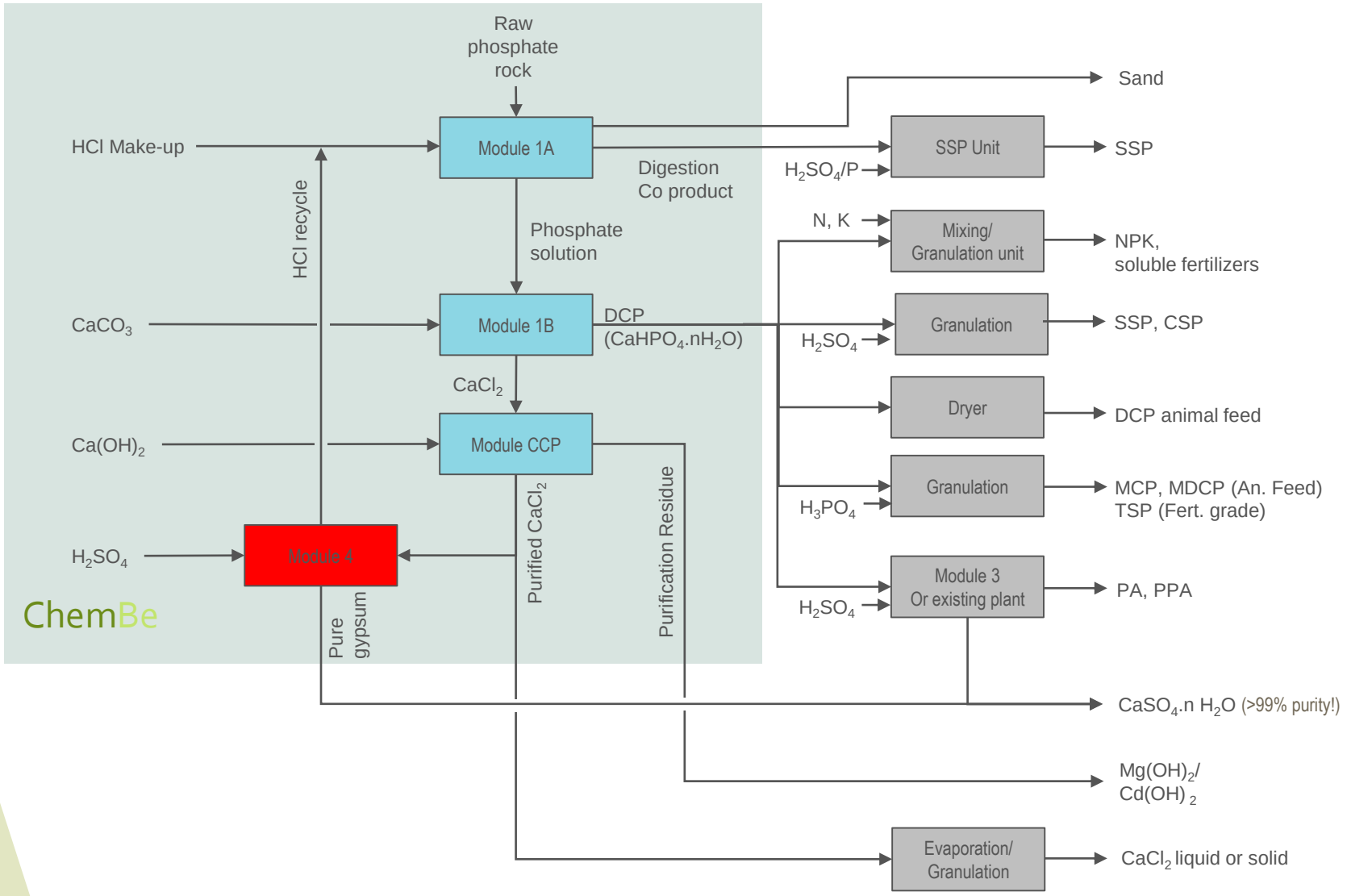
THANK YOU FOR YOUR ATTENTION

Mohamed Takhim
CEO of EcoPhos

BACKUP

ChemBe: CHEMICAL BENEFICIATION

MAKING DCP, A NEW ROOT TO PRODUCE ALL P PRODUCTS



CADMIUM FREE

Environmental Friendly

SOLVENT FREE

WET Process

ecophos®

DUNKERQUE PLANT

RAW-MATERIALS AN PRODUCTS

INPUT

Phosphate rock:	0.5-2.0t/t DCP	1.2-4.9t/t P_2O_5
HCl as 100%:	0.3- 1.0t/t DCP	0.7-2.4t/t P_2O_5
$CaCO_3$:	0.65-0.75t/t DCP	2.4/2.8t/t P_2O_5
$Ca(OH)_2$:	0.003-0.005t/t DCP	0.007-0.012t/t P_2O_5
Process water:	3.7-4.2t/t DCP*	9-10t/t P_2O_5*

OUTPUT

DCP:	1 t/t DCP	0.41t/t P_2O_5
Dicalgypse:	0.15-0.3 t/t DCP (dry)	0.36-0.72t/t P_2O_5
CCP residue:	0.005-0.01t/t DCP	0.012-0.025t/t P_2O_5
$CaCl_2$ effluent:	4.5-5t/t DCP*	11-12t/t P_2O_5*

**Process water consumption and effluent emission decreased <1t/t DCP (<2t/t P_2O_5) if HCl recycled using Module 4*

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