Phosphorus Stewardship in Industrial Applications

European Sustainable Phosphorus Platform

1st EU Raw Material Week

1st December 2016, Brussels

Phosphorus Recycling Initiatives in a multi-sector P Company

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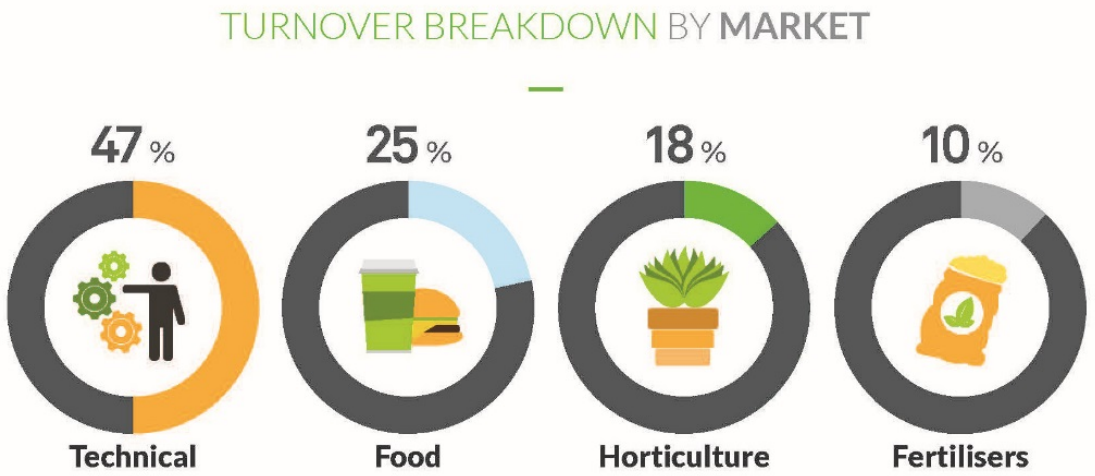
- Products & Technologies
- Managing risks: SEVESO, H&S, Quality, Environment, Food Safety, etc.
- Rational Use of (raw) Materials & Energy (CO_2, LCA, wastes,…)

2015 KEY FIGURES



- B2B
- Shift from laundry and dishwashing
- Source > 400 kT rock and > 100 kT(P_2O_5) MGA

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R&D projects' focus:

- Energy
- Precision Farming / Agriculture
- Specialities



- P Technology

↳ P Recovery

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P recovery

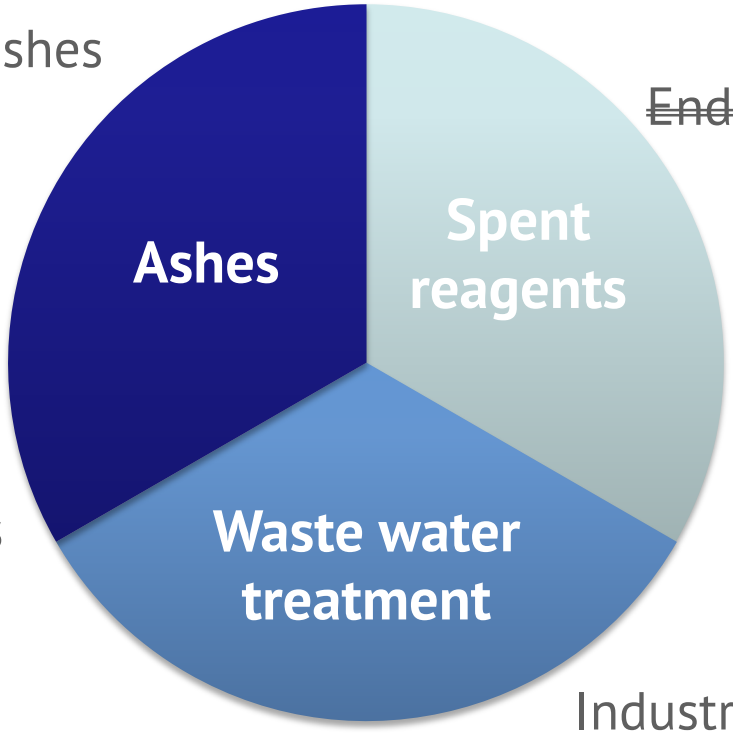
About **20** specific studies:

06/2014 → today

- Mostly B2B related
- From partners, customers and others
- Confidential

Biomass → energy → ashes

~~End of life~~ → second life

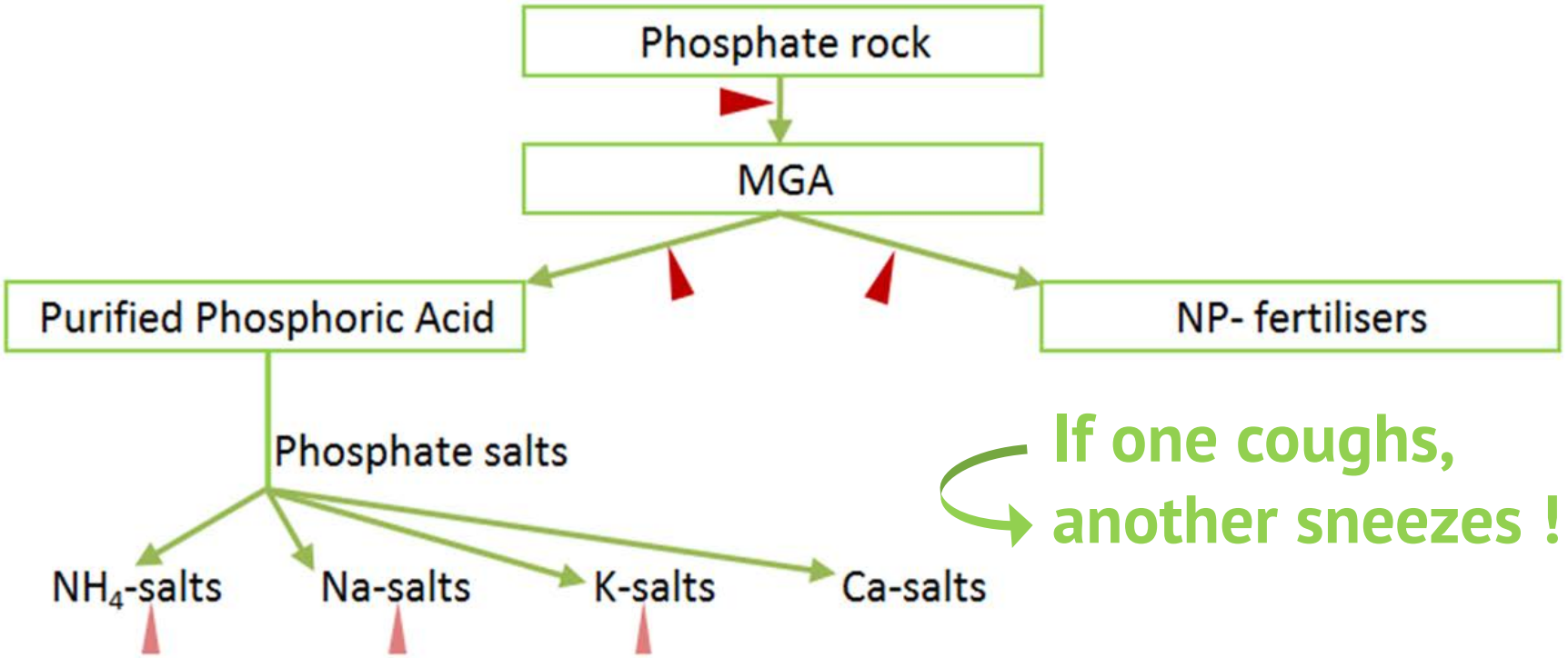


Municipal sludges

Industrial sludges
Food sector

Incorporating… with constraints

- Into existing units (integrated processes)



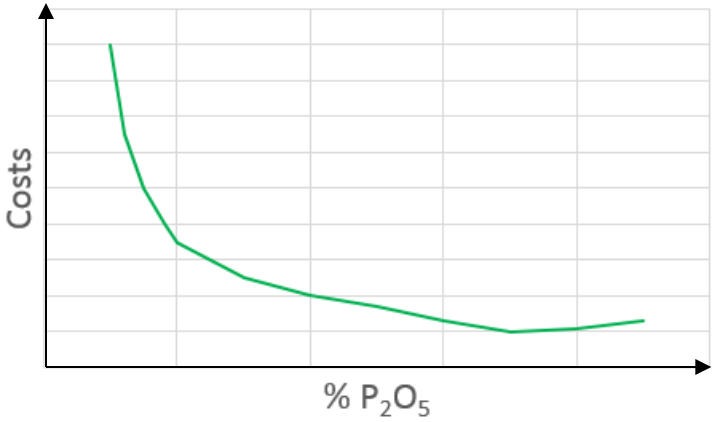
Incorporating… with constraints

- Win win situation
  - overall profitability
  - over the complete chain
    (materials, logistics, process costs, wastes, etc.)

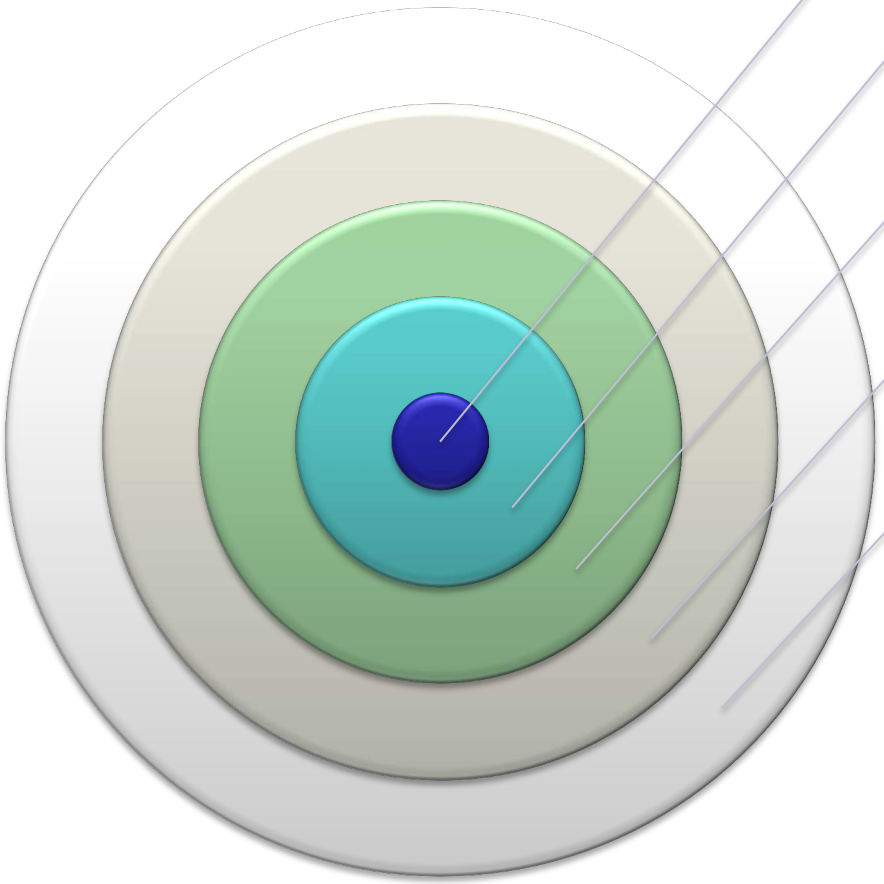
Risk assessment

Risks

- Quality of our productions
  - + Safety and environmental issues
- For our installations : often (too) low P_2O_5
  - ↳ Reagents & Energy
  - ↳ Maintenance
  - ↳ By-products & Wastes
  - ↳ Water balance
  - ↳ etc.



Each product requires its own evaluation:



Nature of products and by-products

Physical aspects and properties

Quantities, time, localisation

P-content and impurities

Variability

Phosphoric acid

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Spent acids recycling since Y2K

Variability according to the source (process, etc.)

Drift regarding the specs
(metals such as Na & Mg, heavy metals, organic matters)

Phosphoric acid

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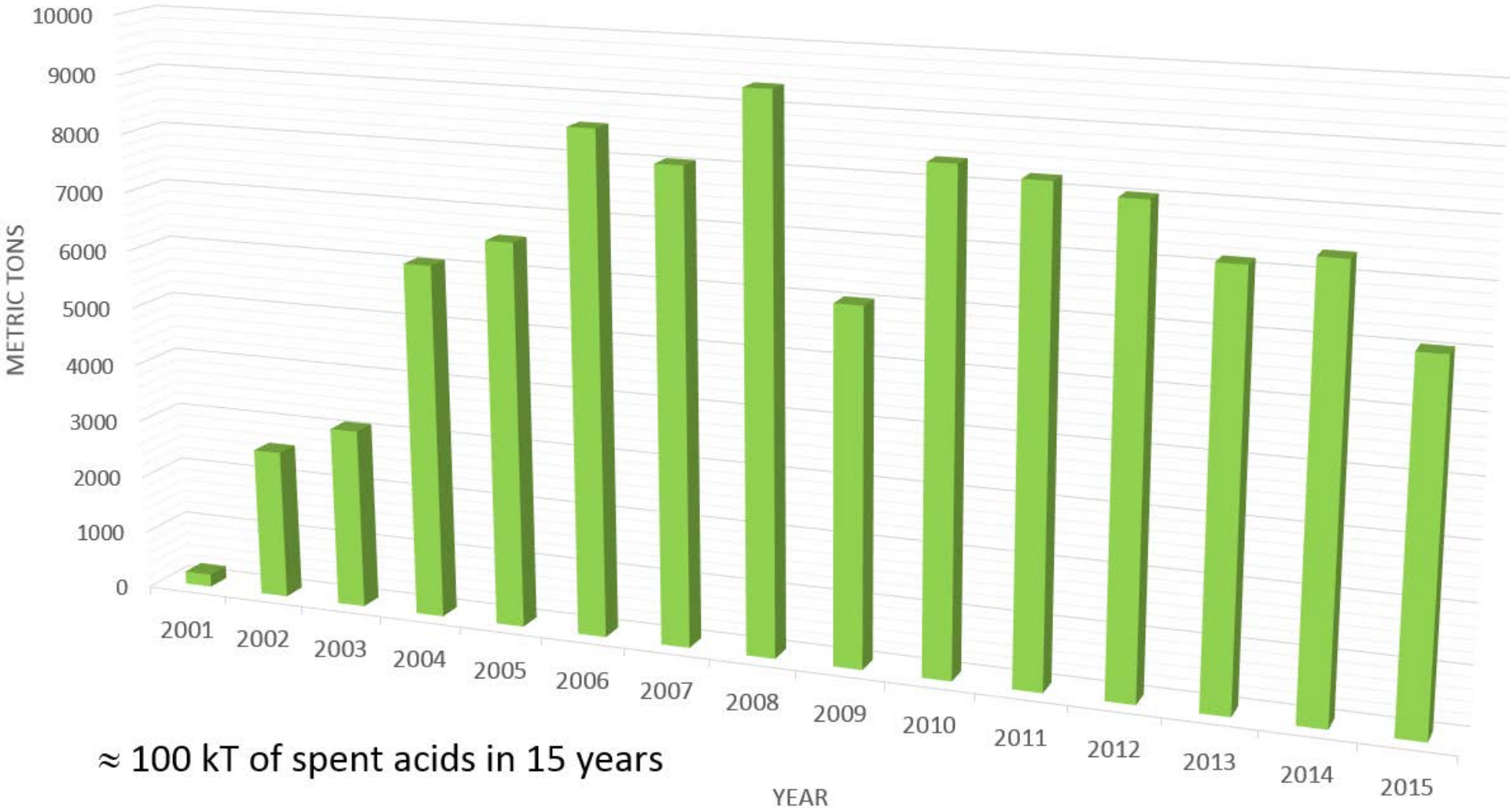
RECOVERY OF SPENT ACIDS



≈ 100 kT of spent acids in 15 years

Phosphoric acids

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Some discarded cases:

Incompatibility with

- process
- materials resistance
- raw materials specs
- internal client specs
- final products specs

Phosphoric acids

Currently, 4 recent projects approved by R&D

- 4 out of 7
- other Departments: approval pending

- metal surface treatment
- water treatment

- DE, BE

Phosphate salts

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1. Calcium phosphate

Substituing calcium phosphate for phosphate rock (> 400 kT)
Actually, 2 R&D projects still running (NL)

2. Struvite

Risk of market overflow due to municipal P recovery
A convenient raw material for a combined production of phosphoric acid and NP-fertilisers ?

3. Others

Currently, 2 R&D projects running (FR, DE)

P-Recovery R&D Studies

Stats and Summary

Logistics, pricing	1
Carbon and organic matters	3
Heavy metals	1
Other metals	1
Much too low P_2O_5 content	1
Contact person retired	1
OK	6
Still running	5

Additional hurdles

Legislation & Regulations

Croesus' Myth

Acceptance & Reputation

Additional hurdles

- Legislation & Regulations
  - Waste, by-product
  - Transportation, border crossing
  - Fertilisers Directive
  - …
- Croesus' Myth
  - Will my residue become a gold mine ?

Additional hurdles

- Acceptance & Reputation
  - For the general public, P is the environmental enemy (after the excesses of its use in 60-70's)
  - Is P replacement in laundry really a green solution in case of Circular Economy ?
  - Are we ready to change 40 years of communication about P in order to support the Circular Economy ?

Additional hurdles

- Acceptance & Reputation
  - The «Lavoisier Syndrome»:

    P from my waste into my plate again ?

    How good does one accept it ?

- An organic threat: bioactive molecules
  - drugs, hormones, endocrine disruptors, etc.
  - from municipal sludges, pharmaceutical industrial waste, manures from intensive farming, etc.

Is there any other solution than a thermal process ?

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Introspective conclusions

Obvious limits of our current approach

- Existing processes
  → investments required
- Risk assessment studies
  → tedious, costy

Internal debate

- Dedicated unit ?
- Specific new technologies ?

For further debate

Win win win conditions

- A high(er) P-content allows a reliable recovery with operating technologies
- A low P-content means investments to close the loop

Today the P recovery is more expensive than the phosphate rock.
A sustainable solution should take this into account…

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Thank you for your attention