International Fertilizer Industry Association

PHOSPHATE POLICY ISSUES FROM THE INDUSTRY'S PERSPECTIVE

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- The P Cycle – What Are the Issues?
- Industry's Perspective
  - Understanding the P cycle
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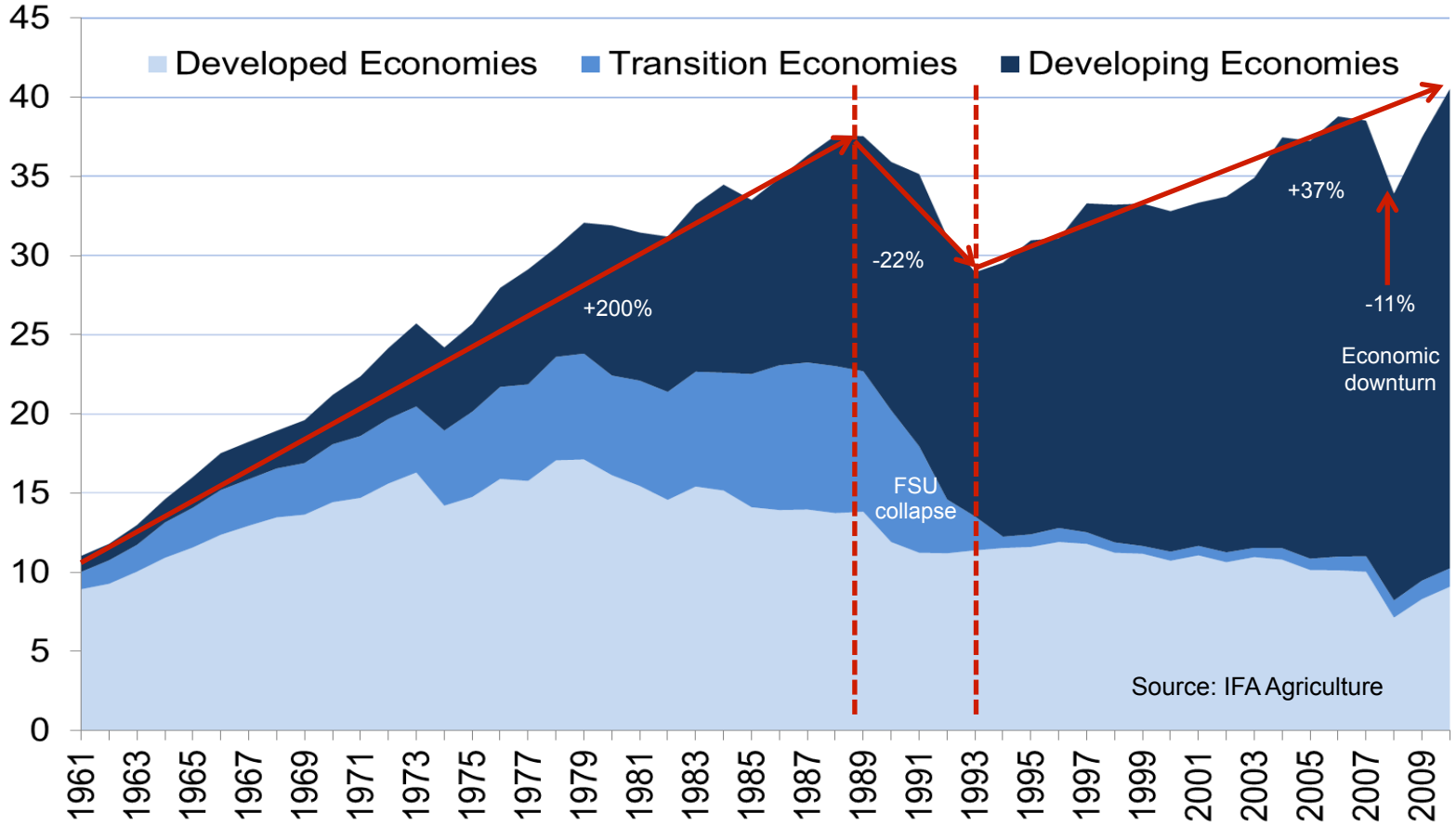
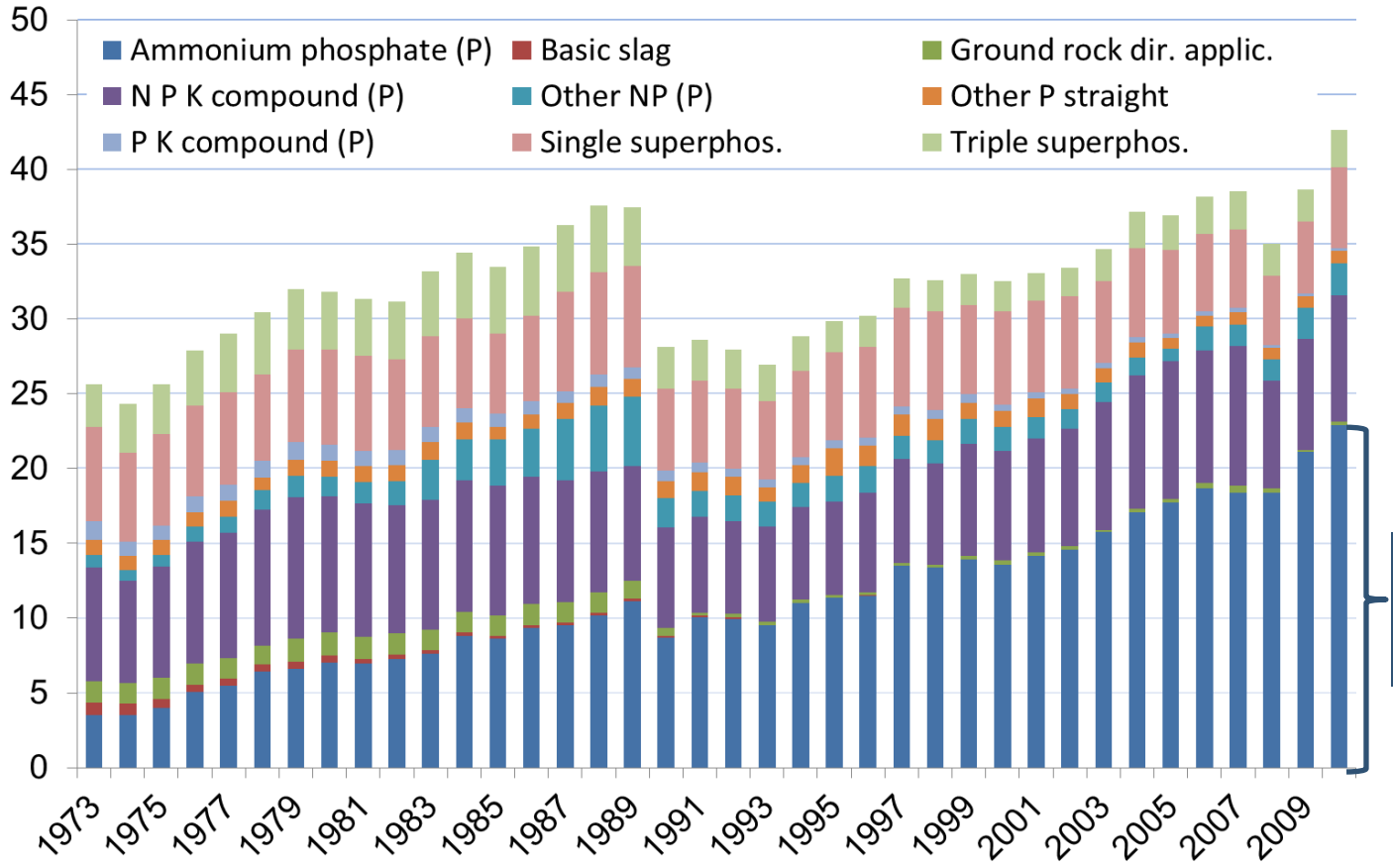
MARKET UPDATE

Historical Evolution of P Fertilizer Consumption (Mt P_2O_5)

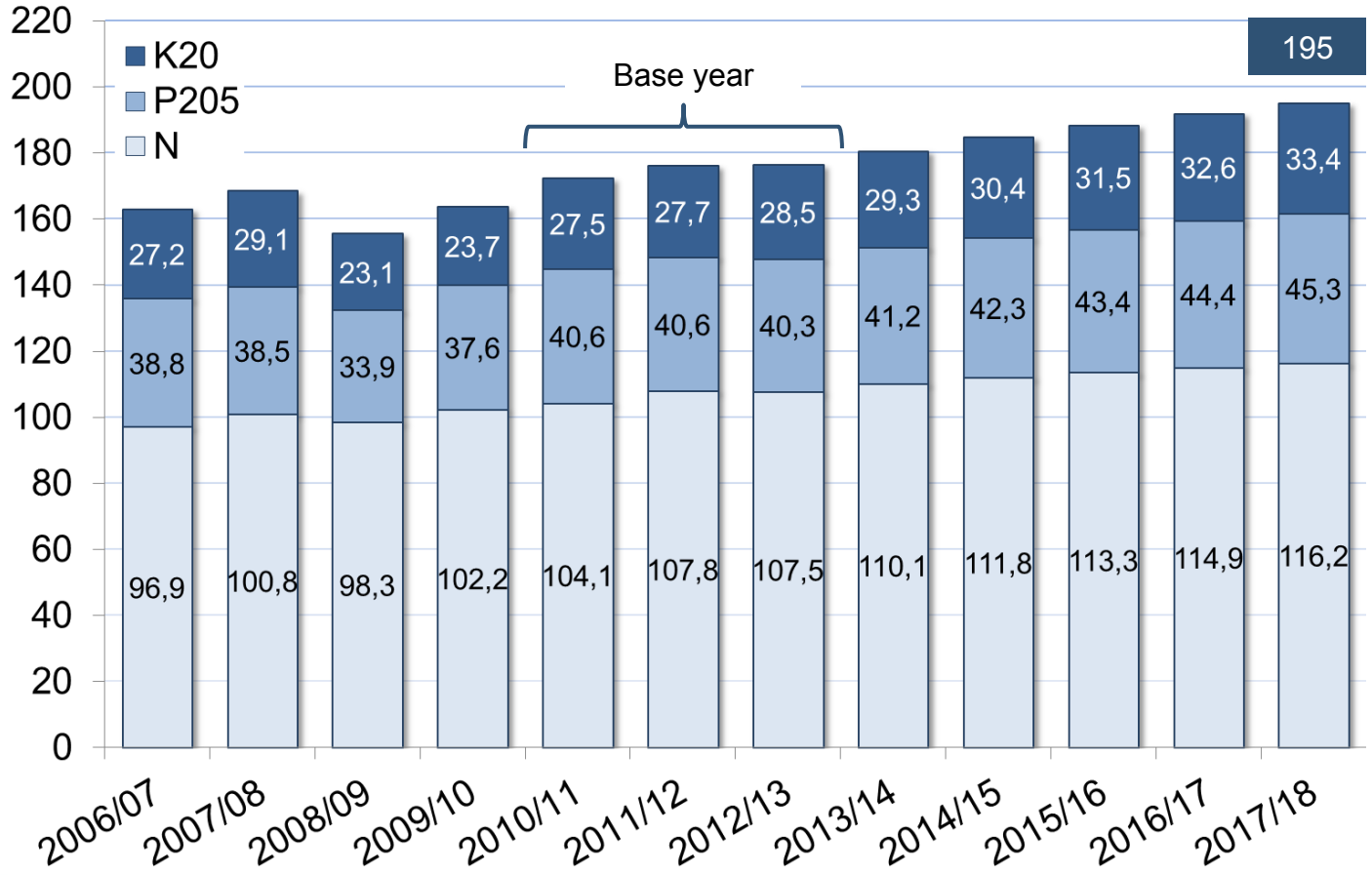


Historical Evolution of P Fertilizer Consumption by Product (Mt P_2O_5)



Source: IFA Agriculture

Global Fertilizer Demand
Medium-term Outlook (Mt nutrients)

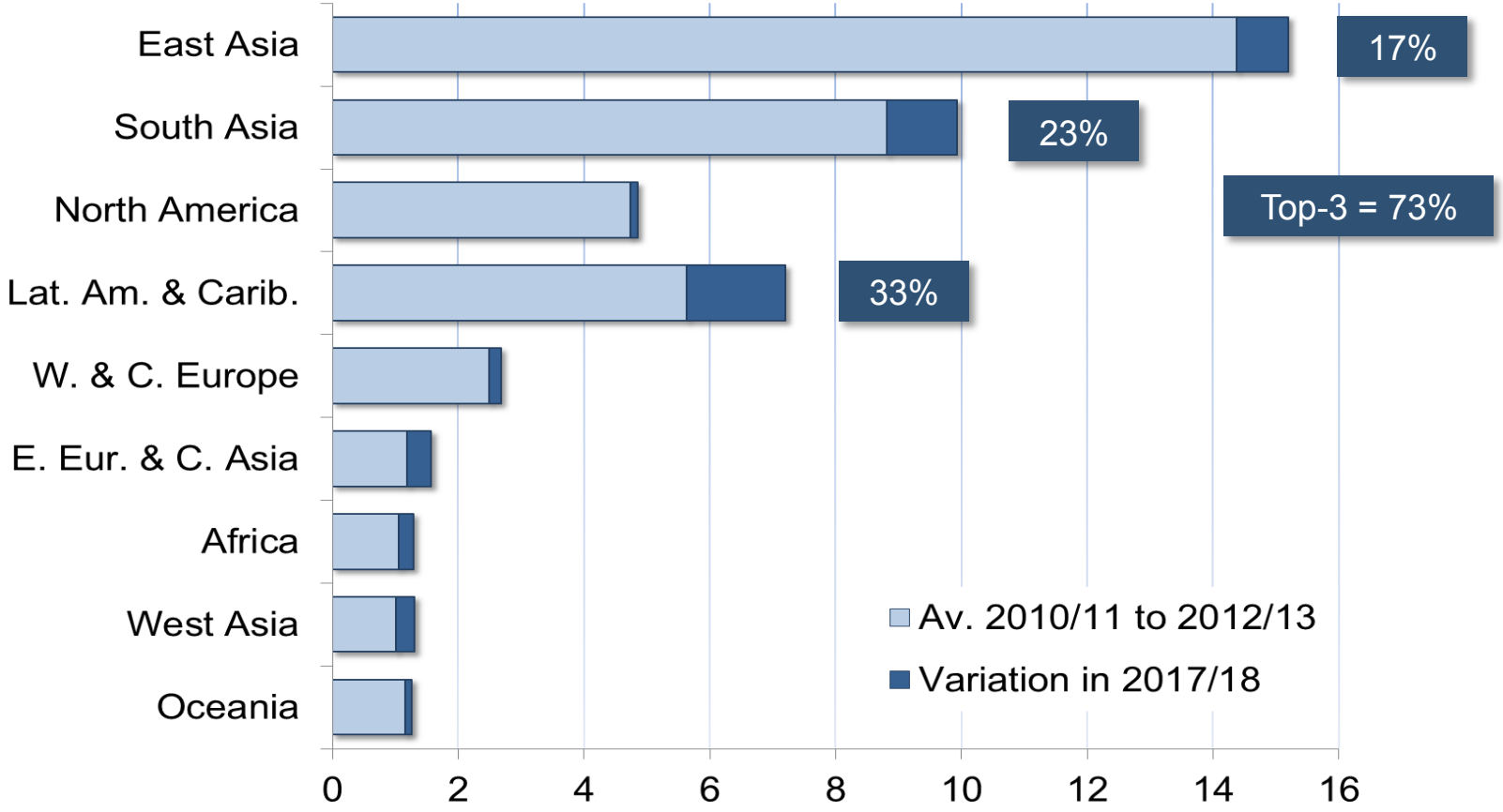


Average Annual Change Base Year → 2017/18	
N	*+1.5% p.a.*
P_2O_5	*+1.9% p.a.*
K_2O	*+3.0% p.a.*
Total	*+1.8% p.a.*

Source: IFA Agriculture

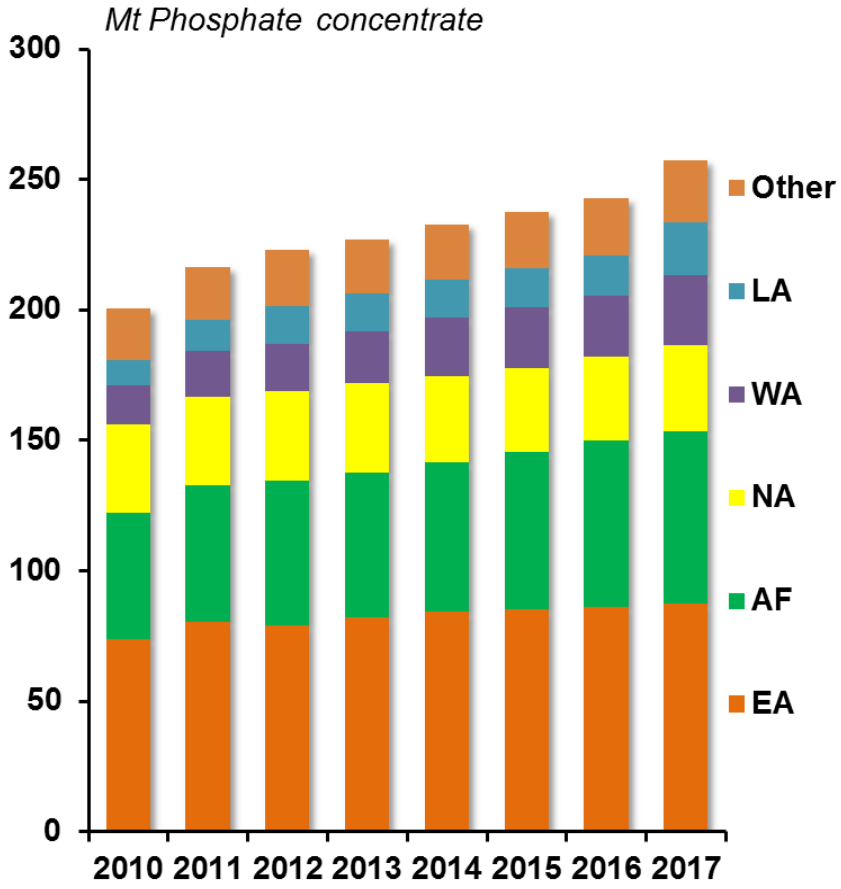
Regional P Fertilizer Demand

Medium-term Outlook (Mt P_2O_5)



Source: IFA Agriculture

Phosphate Supply Evolution



Capacity Evolution Medium-Term

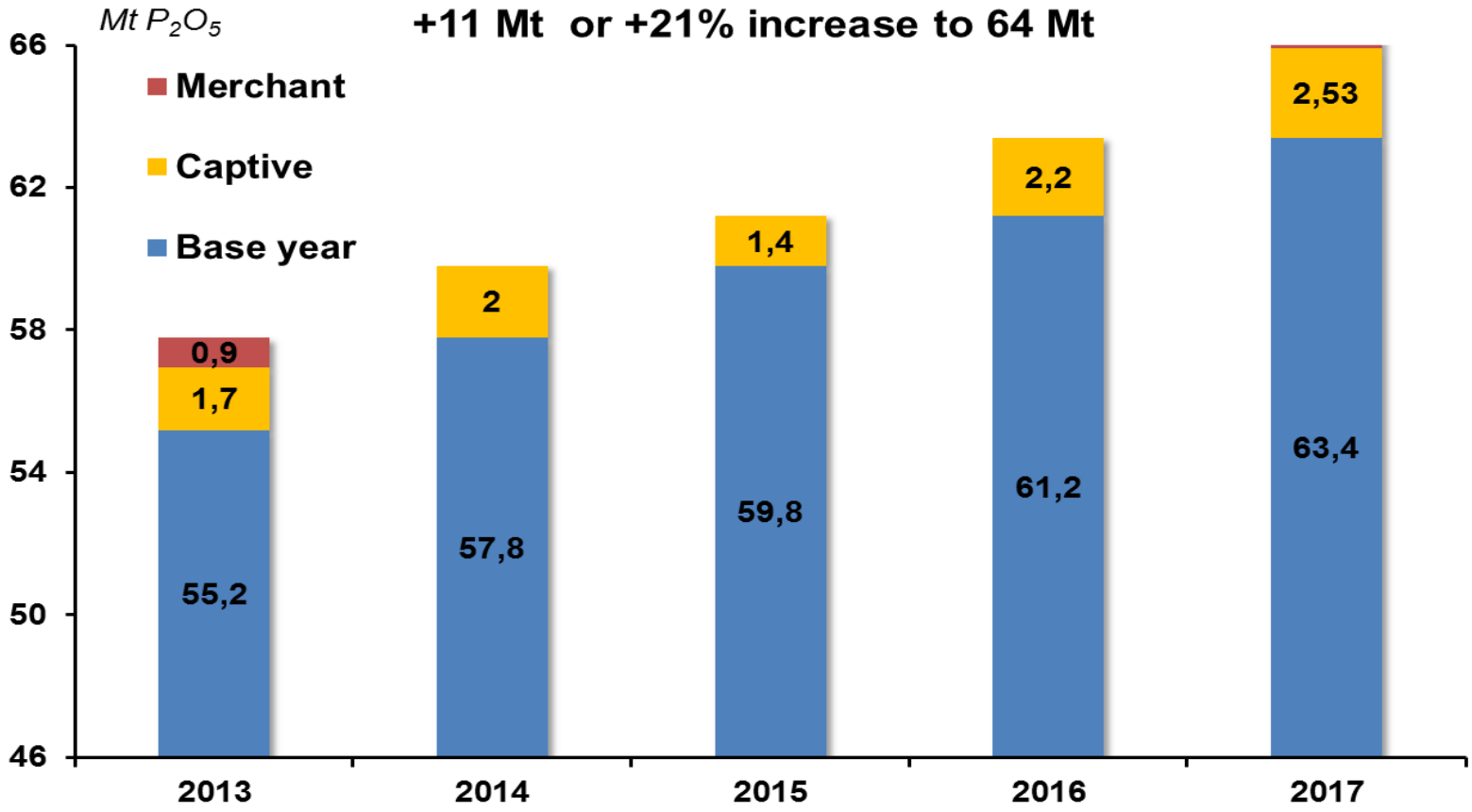
Mt P rock	2013 to 2017	2013 to 2017 %	*Annual growth*
World	35 to 257 Mt	16%	*3%*

P Rock Potential Supply Growth

Africa	*11*	*20%*	*4%*
West Asia	*8*	*44%*	*9%*
East Asia	*8*	*10%*	*2%*
Latin America	*6*	*45%*	*9%*

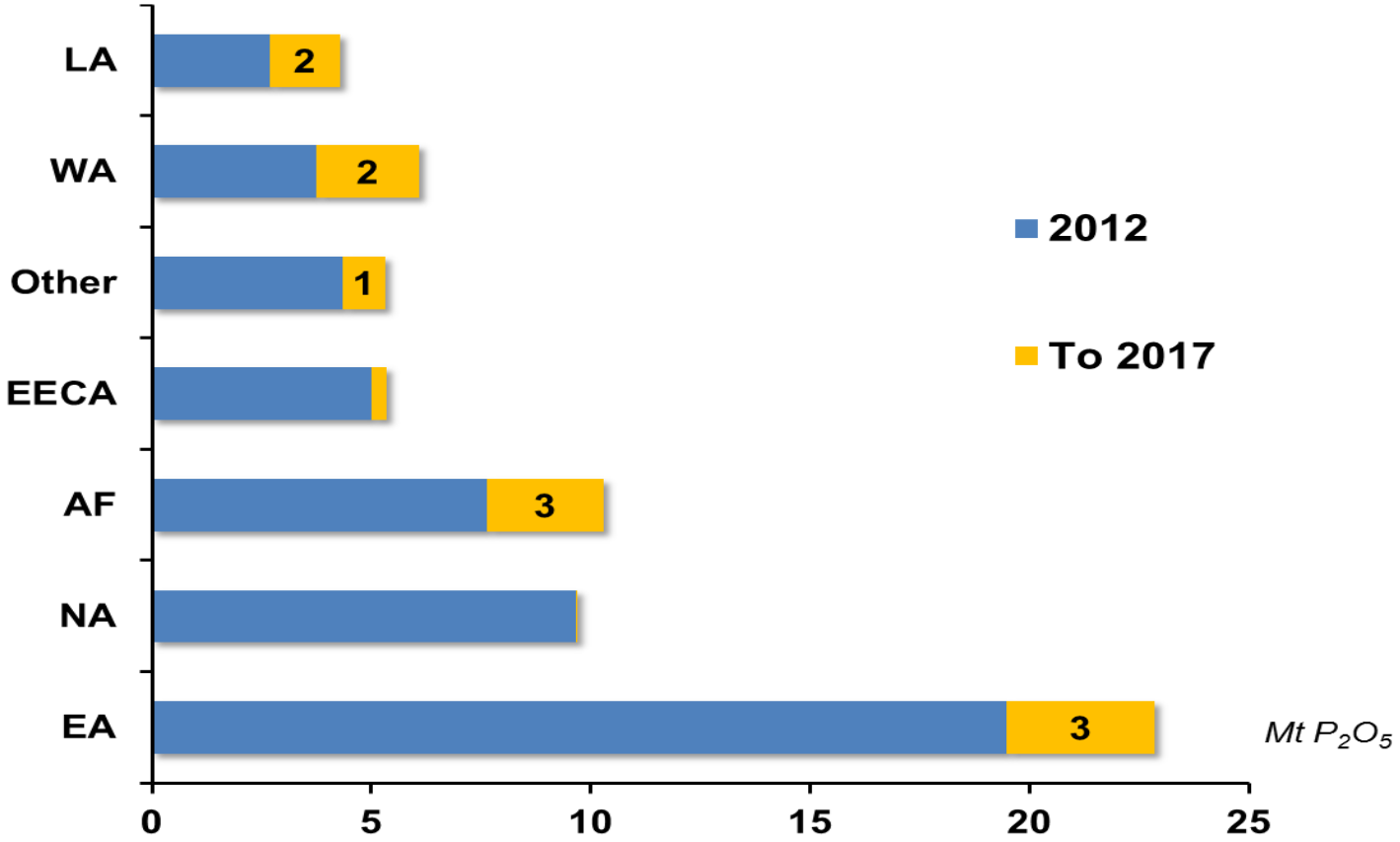
Source: IFA PIT

World Phosphoric Acid Capacity Changes



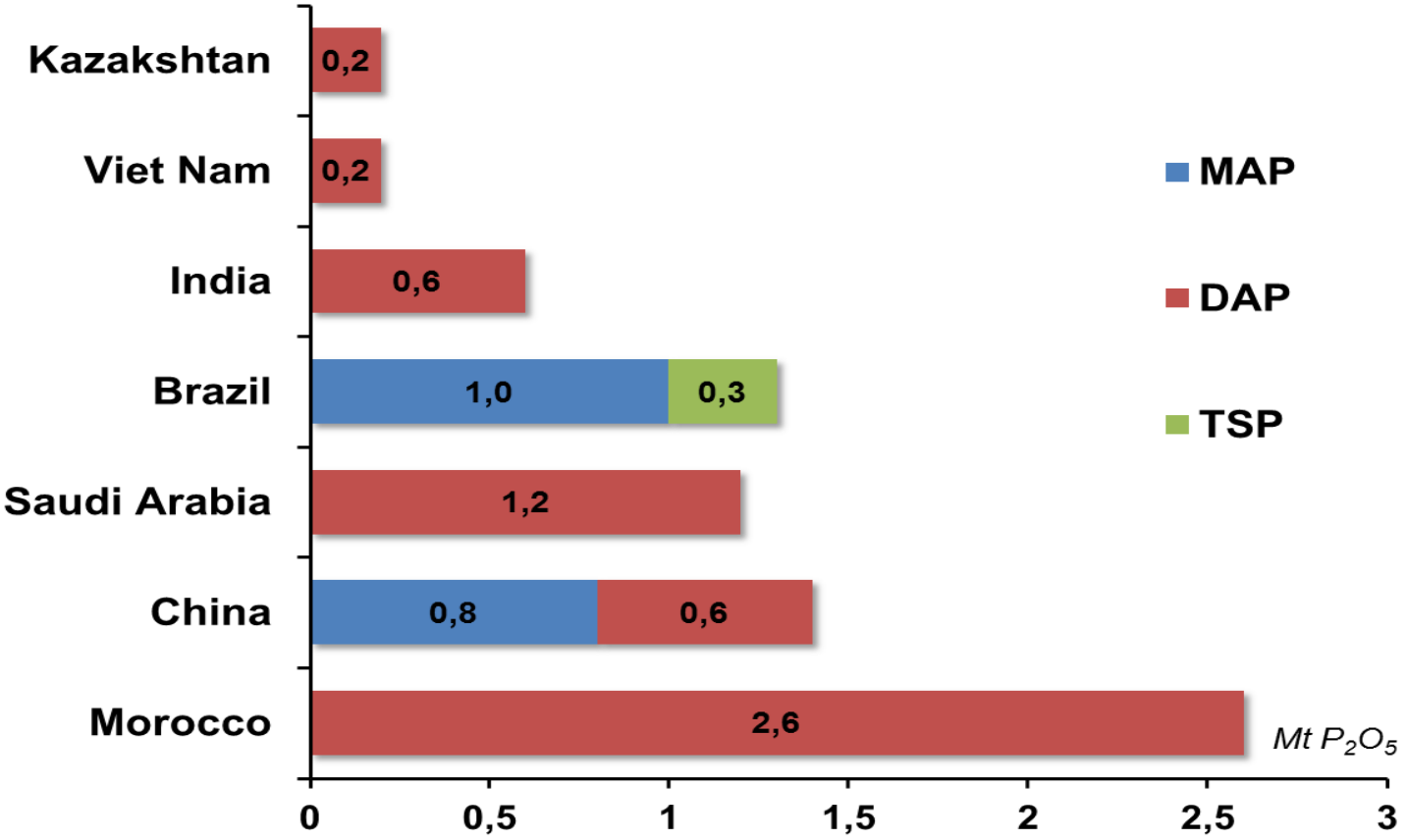
Source: IFA PIT

Regional Phosphoric Acid Capacity Changes



Source: IFA PIT

Main Processed Phosphates Capacity Changes



Source: IFA PIT

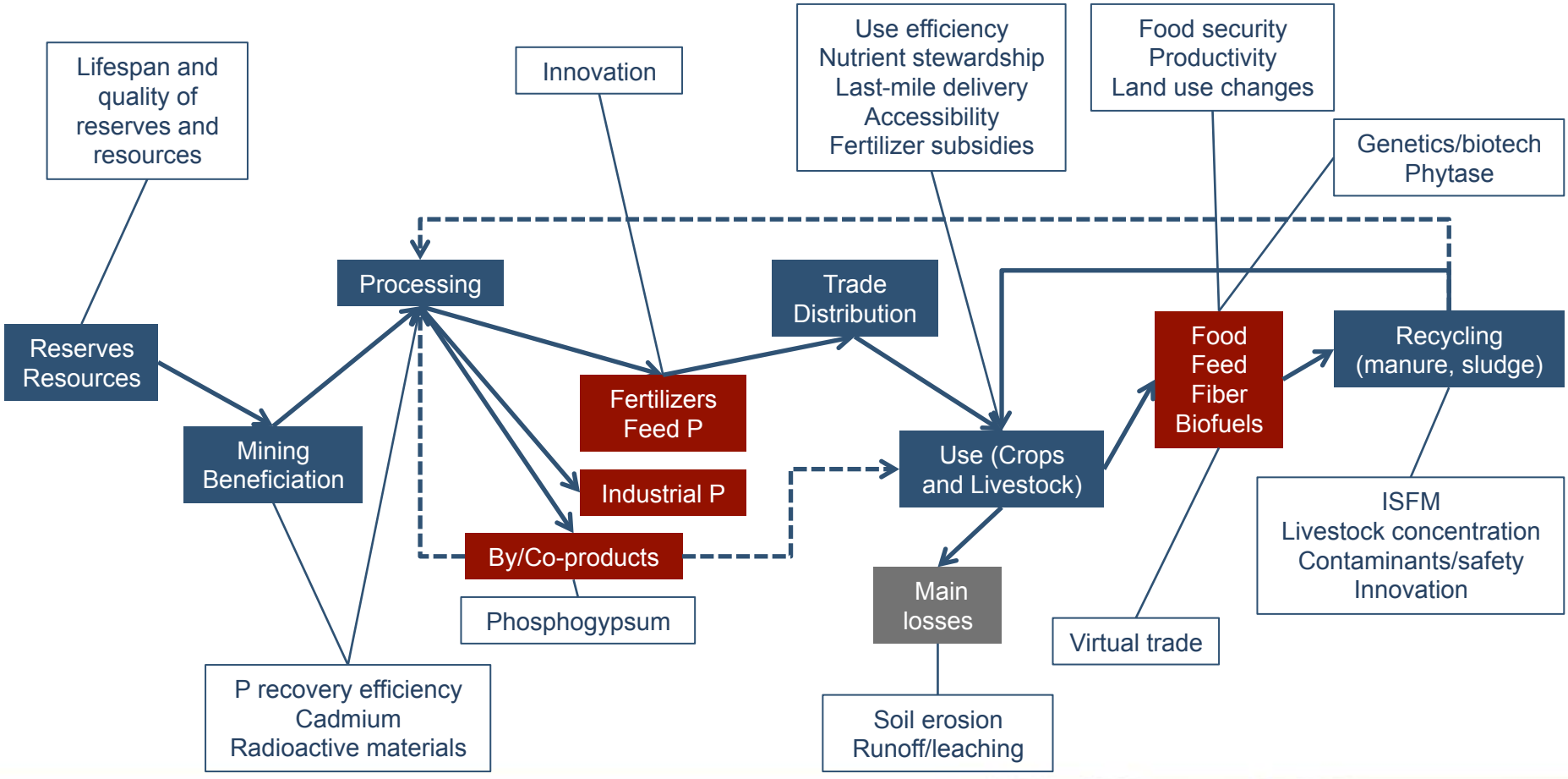
Industry Invests Heavily to Meet Rising Demand

Between 2012 and 2017:

- 220 new fertilizer units
  + 20 projects related to P rock mining expected to come on stream
- Equivalent $150 billion investment (of which ~$23 billion in P sector)

THE P CYCLE
WHAT ARE THE ISSUES?

Simplified P Cycle and Related Issues

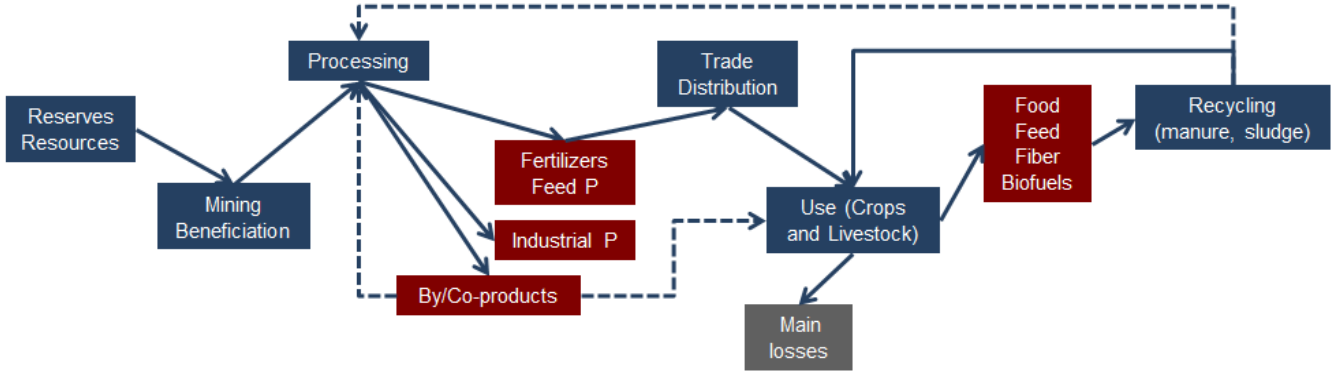


INDUSTRY'S PERSPECTIVE

Understanding the P Cycle

Understanding the P Cycle

- Disproportionate attention paid to reserves and resources
- Essential to better understand other P pools and flows at different scales:
  - Erosion/runoff losses: amounts
  - Manure/sludge recycling: amounts, recycling rate, use efficiency
  - Virtual trade with agricultural commodities: impact on requirements
- Prerequisite to sound decisions/responses

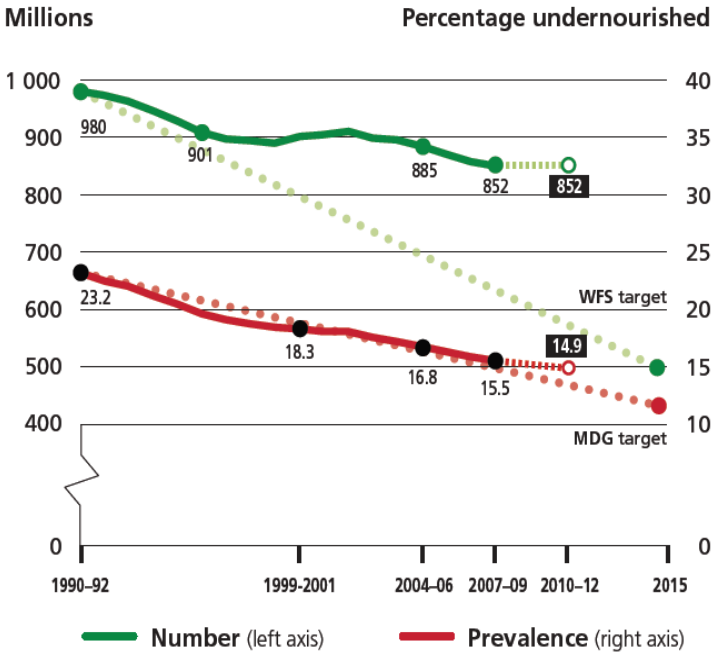


Nutrient Stewardship

Managing Nutrients to Meet Sustainability Goals

- Improve profitability
- Increase productivity
  - → Reduce hunger
  - → Prevent land use changes
- Minimize nutrient losses to the environment

World Undernourishment

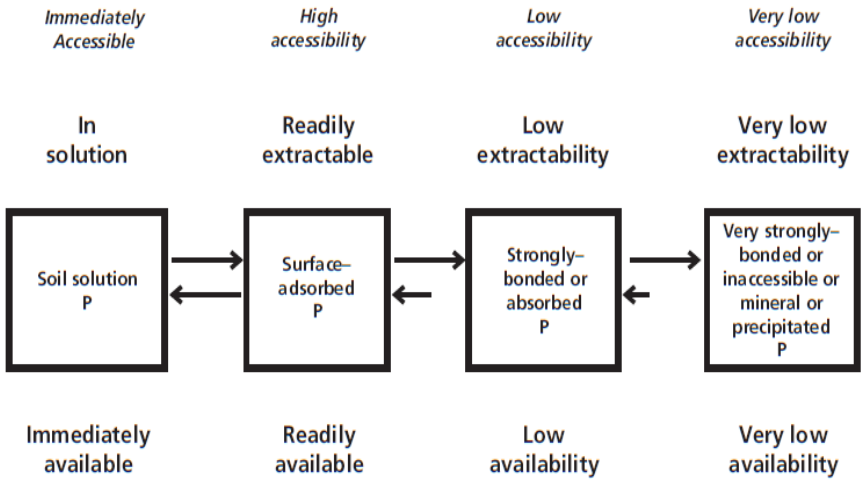


Source: FAO

Improving P Use Efficiency

- Desirable but shall not be to the detriment of productivity and soil fertility (effectiveness)
- How to measure it?
  → Output/input ratio over sufficiently long period of time
- Losses mostly through soil erosion and in concentrated livestock farming areas
- Low PUE in year of application, BUT can reach up to 90% using the balance method over at least a decade in temperate countries

Conceptual diagram for the forms of inorganic P in soils categorized in terms of accessibility, extractability and plant availability



Source: Syers *et al.*, 2008

Nutrient Stewardship

- Inappropriate fertilizer practices are widespread:
  - Blanket recommendations
  - Unbalanced fertilization (fertilizer subsidies)
  - No soil testing/plant analysis

- Often responsible for:
  - large yield gaps
  - poor fertilizer use efficiency
  - nutrient leakage to the environment
- Best management practices are aimed at improving productivity, profitability, preserve the environment
  → meet the economic, social and environmental goals

Nutrient Stewardship

- Industry takes its responsibility
- Several industry-led initiatives:
  - 4R Nutrient Stewardship adopted by IFA and promoted by IPNI (framework)
    Apply the right product at the right rate, at the right time, in the right place
  - Nutrient Stewardship programme developed by Fertilizers Europe
  - Fertcare programme implemented by Fertilizers Australia and the Australian Fertiliser Services Association (AFSA)
- IFA will define criteria to recognize Nutrient Stewardship approaches → will encourage higher standards

4R nutrient stewardship

Organisation
FERTCARE®

Knowledge Transfer

- Developing countries account for 2/3 of world consumption
- Inefficient ‘conventional’ governmental extension
- Hundreds of million smallholder farmers are not/poorly advised on fertilizer management (poor use efficiency)
- Multiple initiatives by fertilizer industry and retailers
- Develop solutions to supplement extension workers:
  - Develop common knowledge platform to ensure consistent messages
  - Train agri-input dealers to provide agronomic advice
  - Use mobile phone technology for customized, real-time, crop- and site-specific recommendations
- Huge challenge → requires PPPs

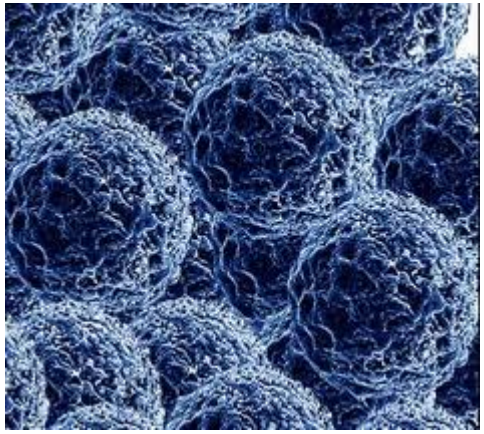
Credit: DSCL

Credit: IFFCO

Research and Innovation

Where Is More Research and Innovation Needed?

- Develop new fertilizer products
  - P fertilizers with specific properties (for fertigation, foliar fertilization, seed coating…)
  - Slow- and controlled-release P fertilizers: DAPR, polymer coating
  - Nanotechnology: what potential?
- Develop new processes
  - Removal of heavy metals (Cd in rock, Pb in sludge…)
  - Recycling (struvites, calcined P…)
- Develop new uses
  - for phosphogypsum



What Is Done? What Is Needed?

- Rising R&D investments by industry
  - Specialty fertilizer segment
  - Engineering firms
  - Mainstream P producers
- IFA Working Group on Innovation and Research
- Virtual Fertilizer Research Center (launched in 2010 by IFDC): Creating the next generation of fertilizers
- Stimulate innovation
  - Shift in culture (investment vs. cost, product differentiation)
  - Develop incentives, enabling regulatory framework

IN CONCLUSION

We Need to…

Better understand the whole P cycle

Stimulate research and innovation

Encourage public-private partnerships

PPP4P

Support nutrient stewardship programmes

Pay more attention to Sub-Saharan Africa

International Fertilizer Industry Association

for questions/comments:

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