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Global K & P Fertilizer Markets and the Implications for Brazil

Presented by Robert B. Winslow
May 26, Ouro Preto, Brazil

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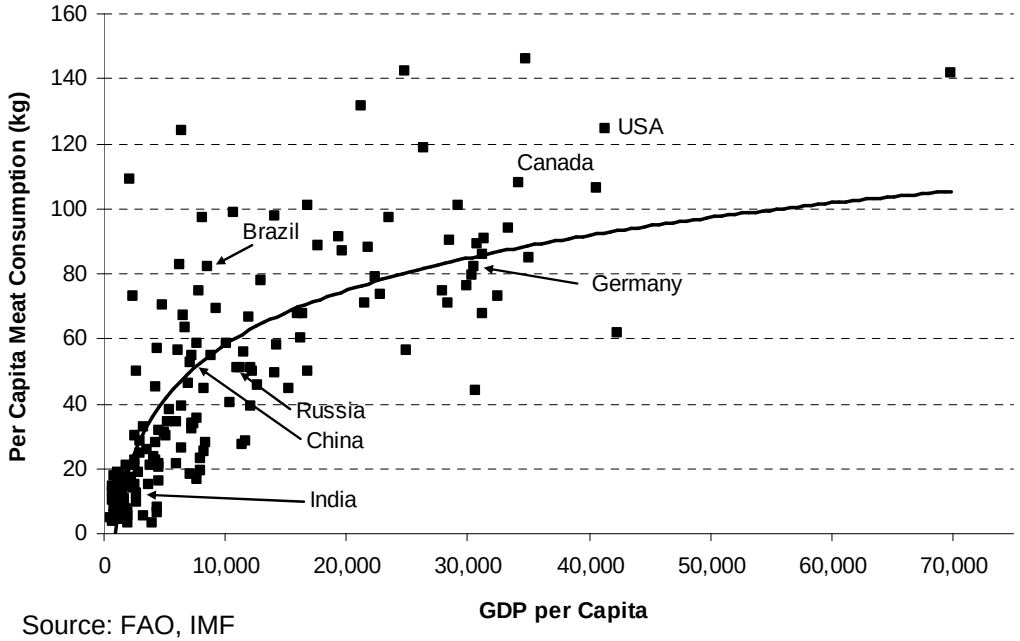
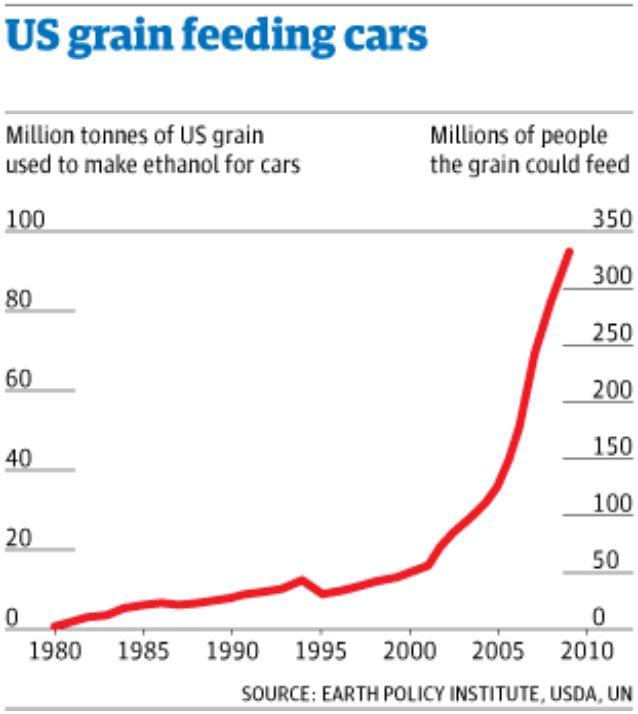
It’s All About Grain Production

No Surprise, Demand for Food (i.e. Grain) Continues to Grow

- The UN (FAO) estimates the world will need 70% more food by 2050 (Aug '09)
- Key grain demand drivers
  - Rising affluence (1+ billion Chinese seeking more protein)
  - Population growth (~0.7% p.a. through 2050, Source: FAO)
  - Biofuels mandates (food for fuel)



Source: FAO, IMF



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But Agricultural Production Growth Faces Constraints

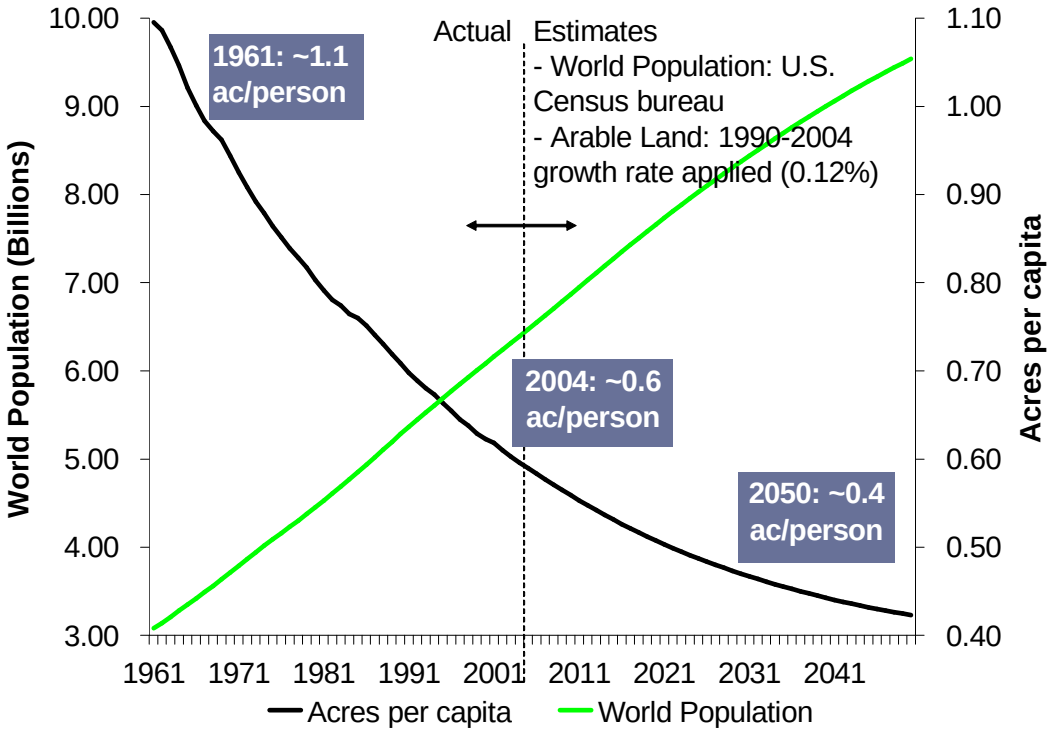
- Slowing rate of yield improvement (requires technology investment)

Period	Average Yield / ha	Yield CAGR (%)
1979-1993	2.19	2.56%
1994-2007	2.65	0.85%
2008-2016	2.99	0.76%

Source: USDA

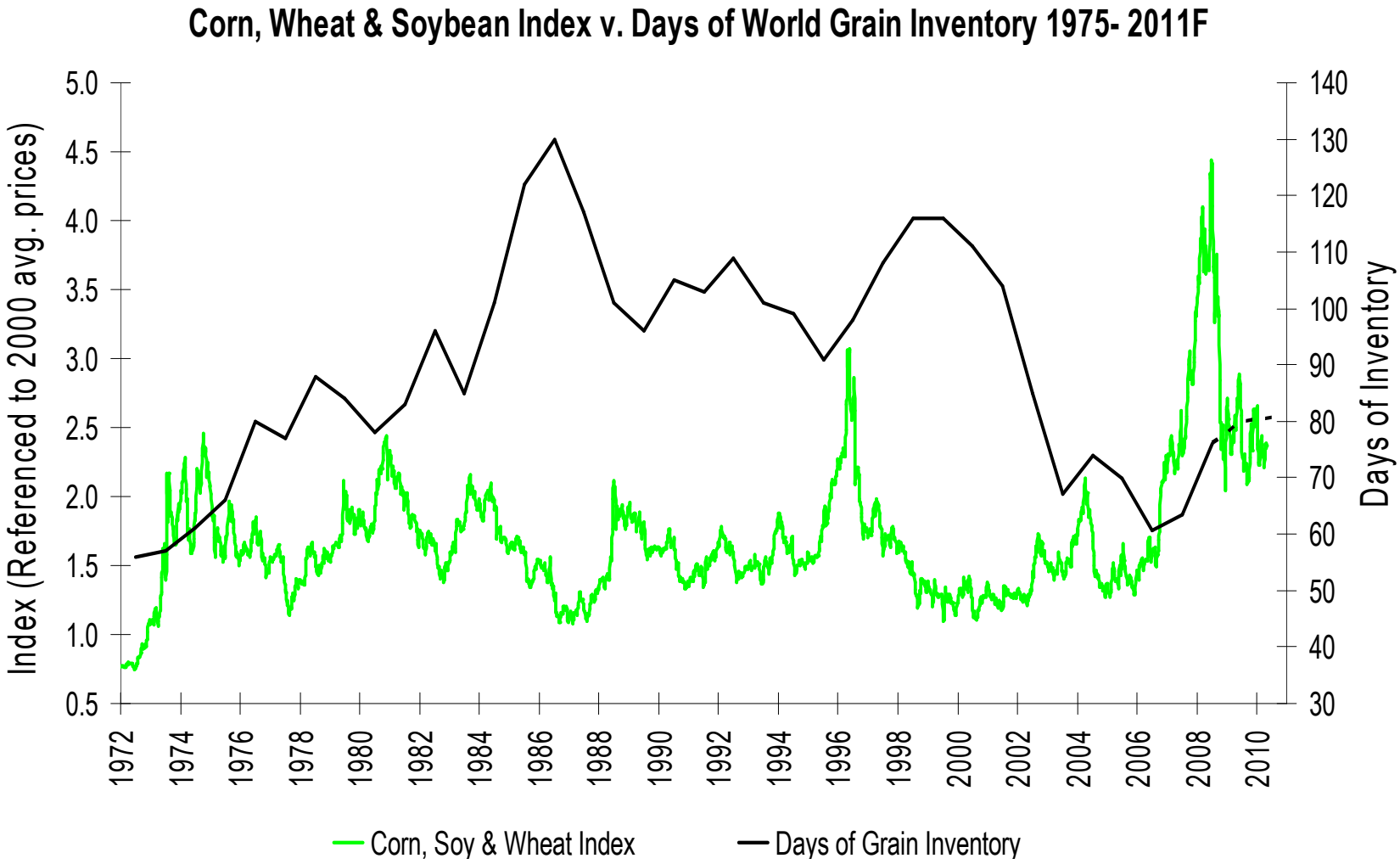
- Declining arable land per capita

- Water – agriculture accounts for ~70% of global fresh water usage (’03)



Source: US Census Bureau, CIA World Factbook, UN FAO

Global Grain Stocks have Climbed to 10-yr Average, but Buffer is Modest



Source: CBOT, USDA, Earth Policy Institute, WWCM

K & P Help Expand Crop Yields, and have No Known Substitutes

Potassium (K)

- Offers resistance to drought, disease; helps with efficient water use
- Sourced from potash (KCl or MOP)
- Measured in % K_2O
- Also Potassium Sulphate (SOP) for plants that need K & sulphur (S) but are sensitive to chlorides

Phosphorous (P)

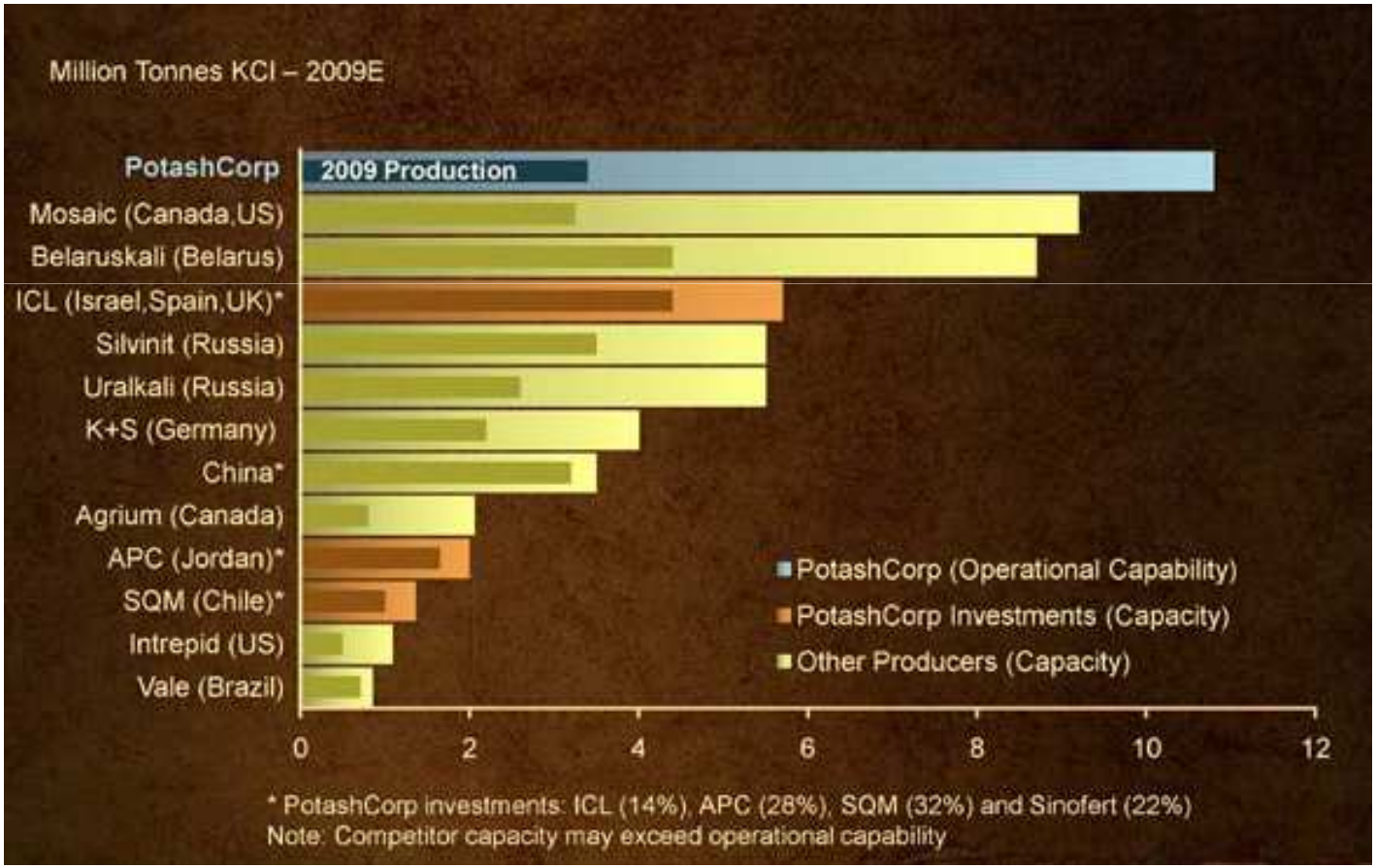
- Helps store & transfer energy in photosynthesis; provides energy during periods of rapid growth
- Sourced from phosphate rock
- Often defined as % P_2O_5
- Acidulate phos rock with sulphuric acid to make phos acid: MAP, DAP, SSP, TSP, etc.

Potash

The Primary Source of Potassium

Global KCl Market is Dominated by a Few Suppliers (i.e. an Oligopoly)

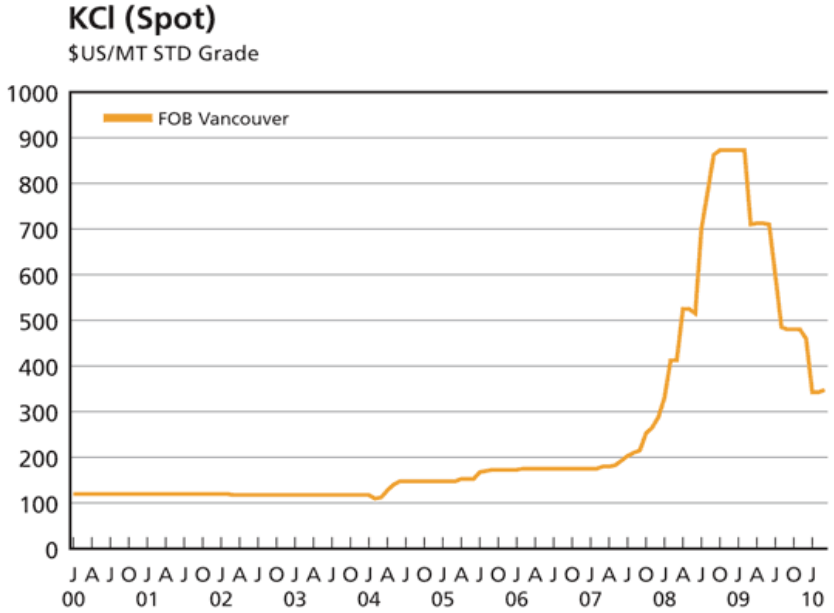
- 12 Producers in 9 countries control 80+% of the world's supply of potash



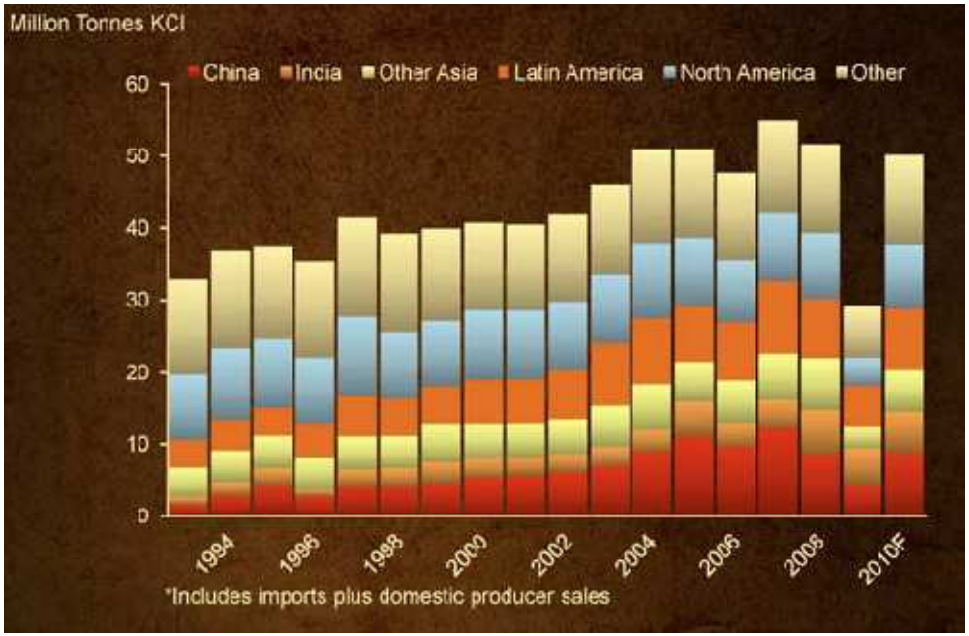
Source: (Fertecon, via PCS)

KCl Demand & Pricing were Affected by Credit Crisis Despite Oligopoly

- Spot prices rose with grain prices, nearing US$1,000/tonne in ’08
- Global KCl demand fell in ‘09, along with prices, as farmers deferred purchases and suppliers curtailed production to keep supply/demand balanced
- Demand is expected to recover to ~50M tonnes in 2010 and prices seem to have stabilized, but at much higher prices than prior range (i.e. pre ‘08)



Source: PCS



Source: PCS

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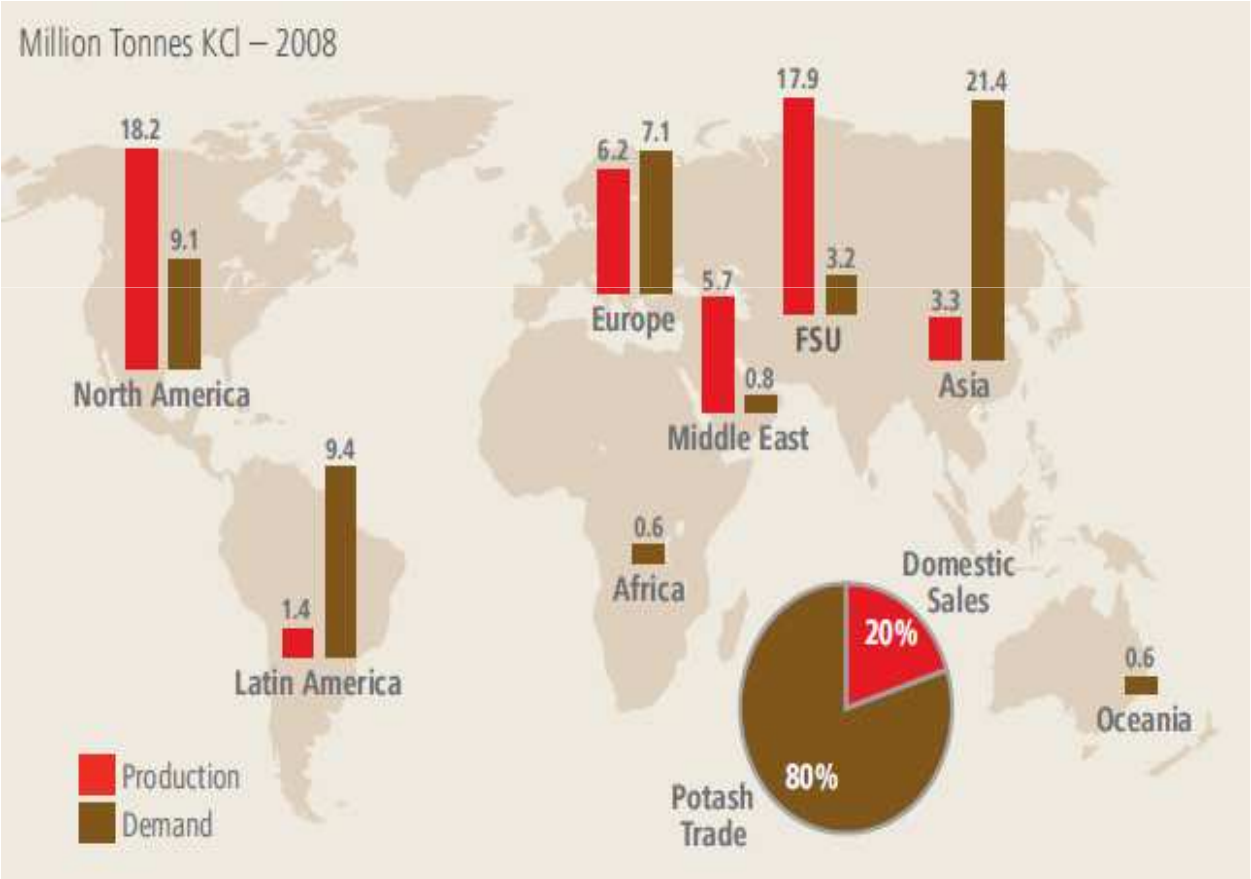
Three of the World's Largest Economies are Major Potash Importers

•Potash imports (tonne): China ~12M ('07), India ~6M ('08) and Brazil ~7M ('08)

	Population Rank	GDP Rank*
China	1st	2nd
India	2nd	4th
Brazil	5th	9th

* European Union not classified as a single economy
Source: CIA World Factbook



Source: PCS

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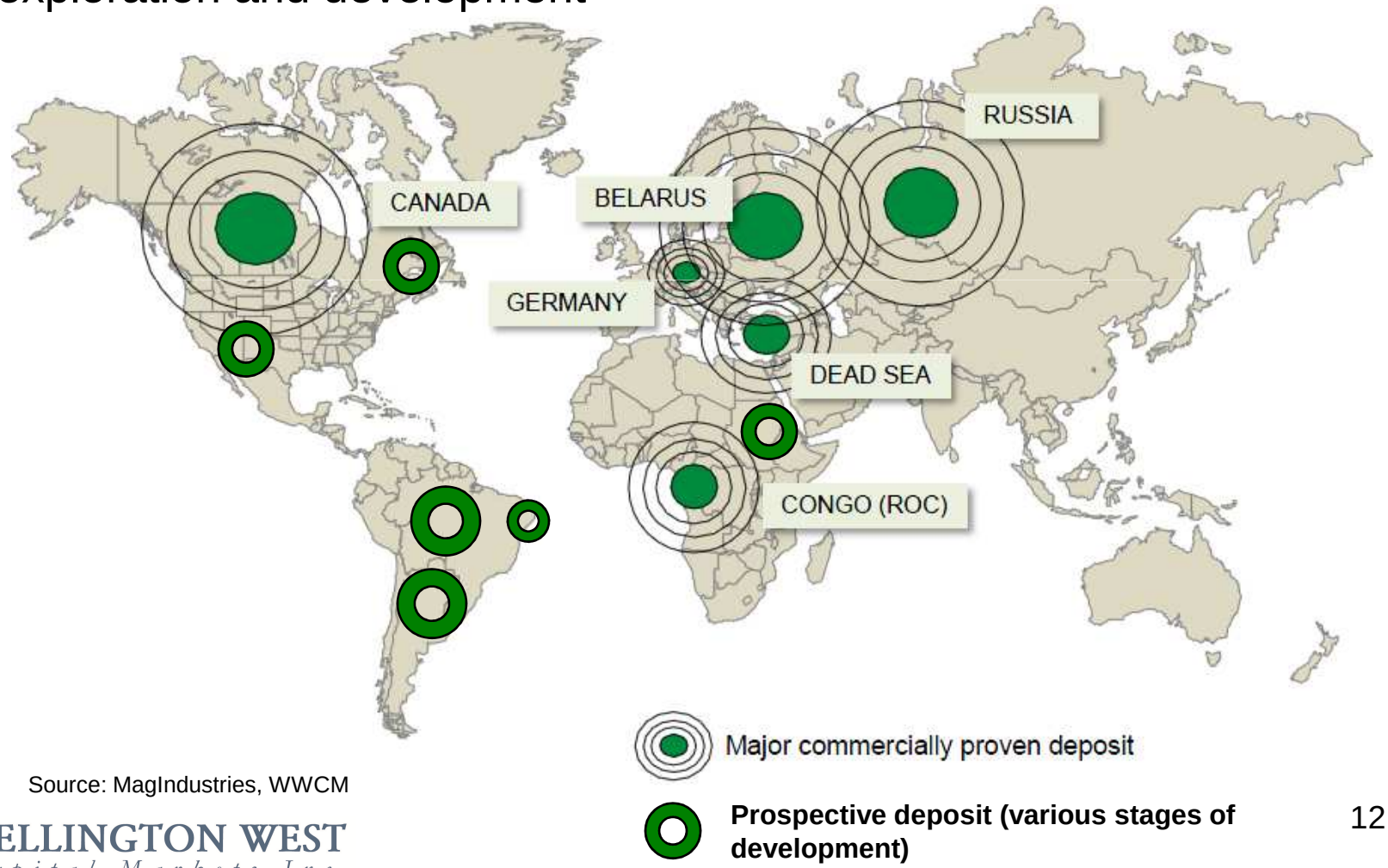
There are Only a Handful of Known Areas with World-class Potash Deposits…

- …though many relatively large scale projects are under various stages of exploration and development



Source: MagIndustries, WWCM

Greenfield Potash Projects are Costly and Take Many Years to Build…

- Three main methods to mine potash

	Underground Room & Pillar	Underground Solution Mining	Salt Lake Brine
Time to production	5-7 years	4-5 years	2-3 years
Capex	$900-$1200/T	$600-$800/T	$400-$600/T
Opex	$80-$100/T	$120-$150/T	$80-$120/T

Note: Capex excludes infrastructure costs

Source: PCS, Grow Max Agri Corp., WWCM

…thus Projects will Need Competitive Advantages to be Developed

- **High ore grade** (e.g. ~24% K_2O in Canadian prairies)
- **Proximity to major importers** (e.g. Saskatchewan to Brazil transport costs ~US$50-US$100/tonne; if eliminated could add US$500+M NPV to project over life of mine)
- **Co-products** could provide credits to offset opex (e.g. Mg from carnallite ores)
- **Shallow deposits** (e.g. open-pit mines could save US$50/tonne opex v. room-and-pillar)
- **Utilizing solar evaporation** versus natural gas/coal with solution mining or salt-rich brine operations

Greenfield Mine Economics are Attractive at US$450/tonne KCl

- We estimate **~20% IRR** for a 2M tpa greenfield, room-and-pillar KCl project in Canada
  - i.e. $2B capex, US$85/tonne opex, US$450/tonne KCl fob Vancouver, excluding infrastructure

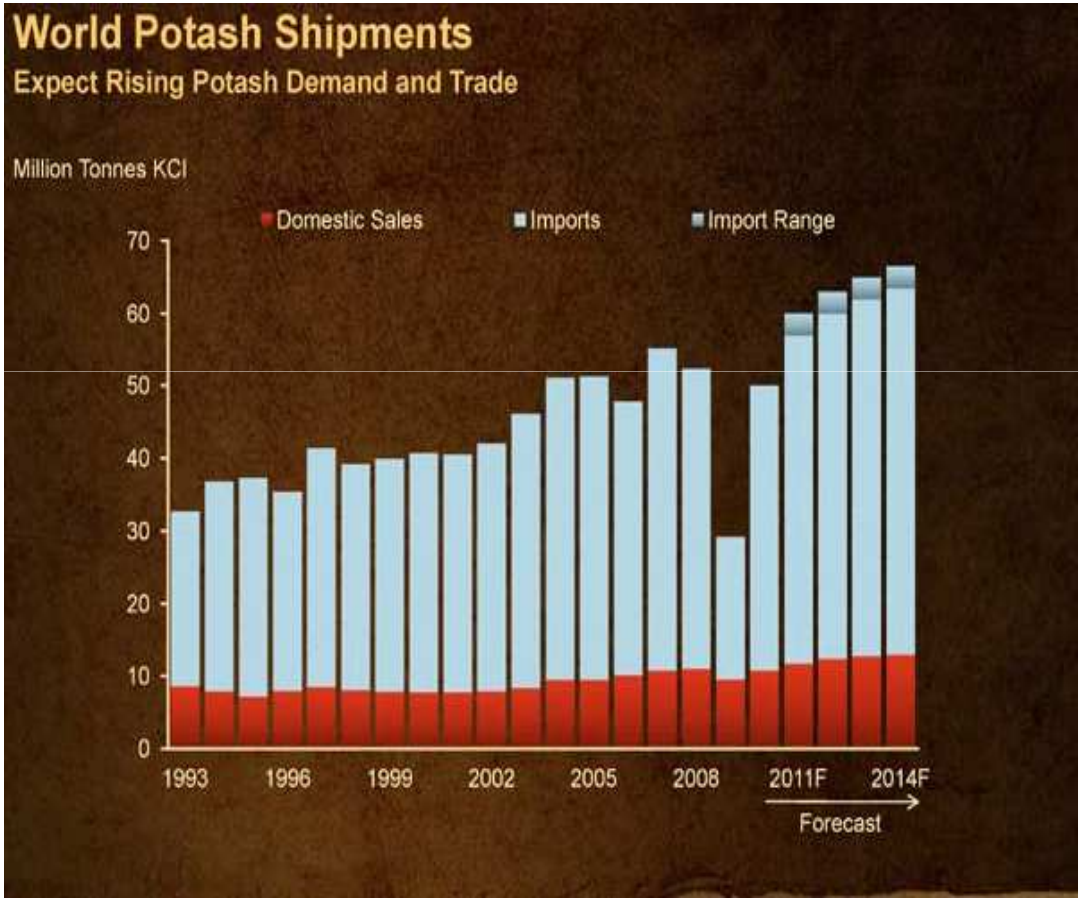
- Alternatively, we estimate ~**US$1.8 billion NPV** at 10% cost of capital

- But at current KCl spot price (~US$350/tonne), IRR is ~15%, which is somewhat challenging to justify investment

Market Apt to Remain Balanced Even with Expected ~3% p.a. KCl Demand Growth

- KCl demand growth supported by grain drivers: population growth, ~1 billion Chinese seeking protein, biofuels

- Brownfield expansions likely have half the capex/tonne of new mines; thus greenfields must have sustainable competitive advantages to be developed



Source: PCS

Phosphate

The Primary Source of Phosphorous

The Global Phosphate Market is More Competitive than Potash

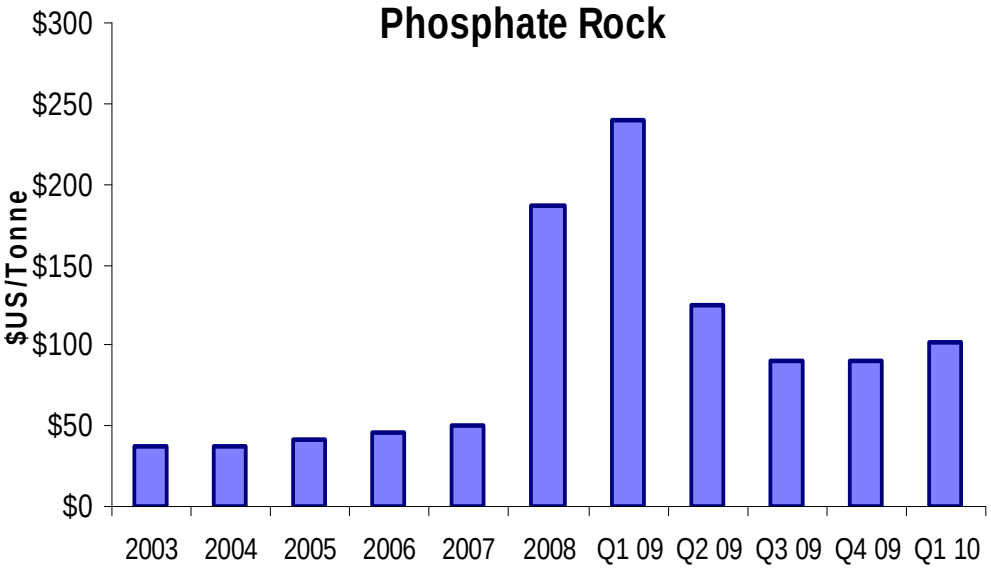
- Large-scale phosphate deposits are found in a number of locations across the globe (Morocco is the largest, with the highest grade ore) but phos acid plants exist in dozens of countries

	Potash	Phosphate
Potash Corp, % World Capacity	**~20%**	**~5%**
The Mosaic Company, % World Capacity	**~13%**	**~13%**
# of Producing Countries	**12**	**~40**
Raw Material Volatility	**Low**	**Moderate-High**
% Gov't Control	**20%**	**50%**

Source: PCS, The Mosaic Co.

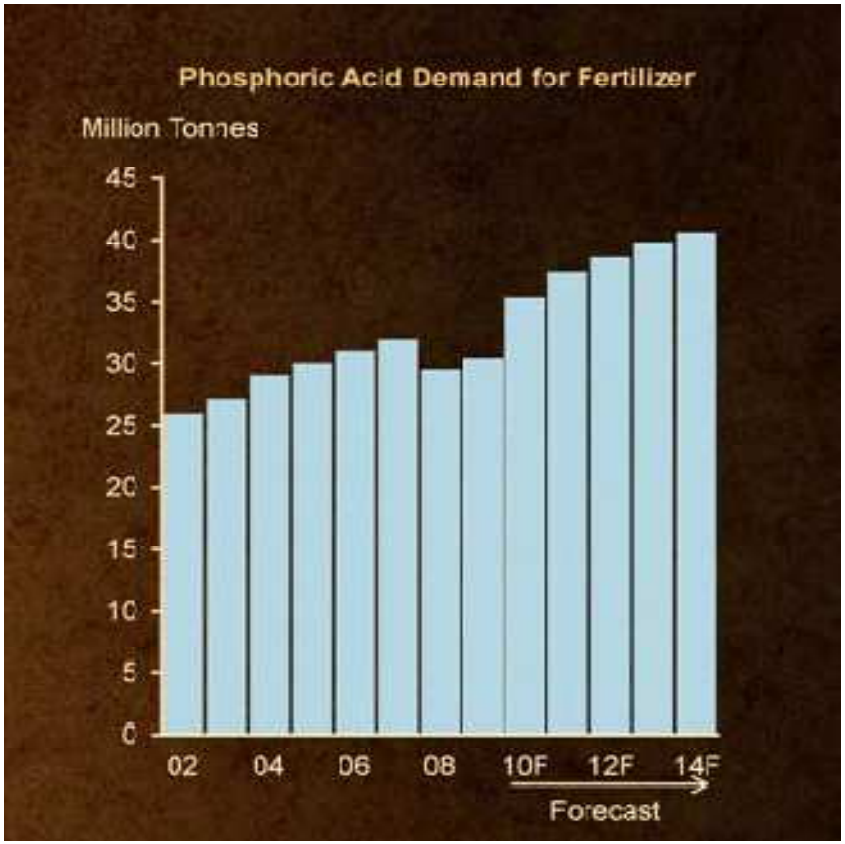
Phosphate Demand & Pricing were also Affected by the Credit Crisis

- Spot phos rock prices rose with grain prices, eclipsing US$400/tonne in some markets in '08, before retreating in '09; demand was less sensitive
- Demand is expected to recover in '10 and prices seem to have stabilized, but at a higher level than pre-'08 prices



***US/Tonne FOB Casablanca 70-72% BPL

Source: PCS, The World Bank



Source: PCS

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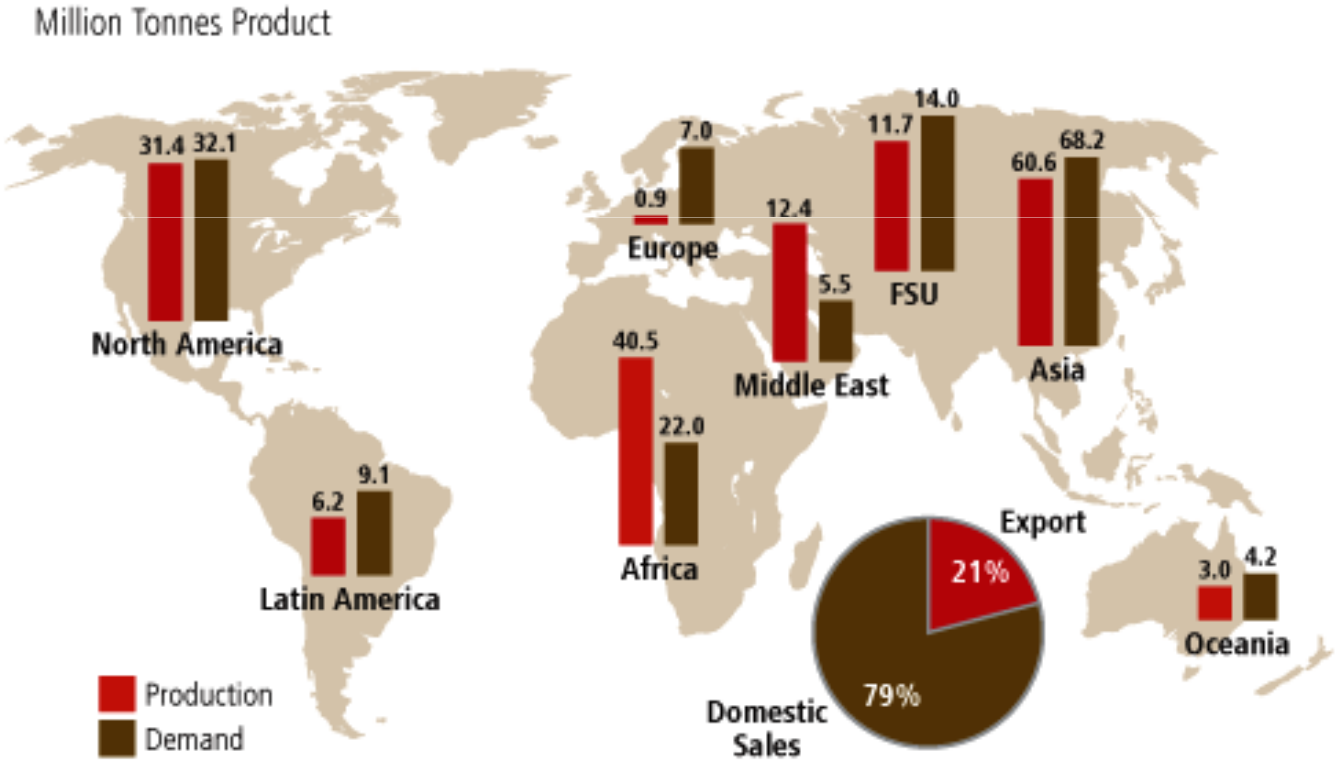
Two of the World's Largest Economies are Major Phosphate Importers

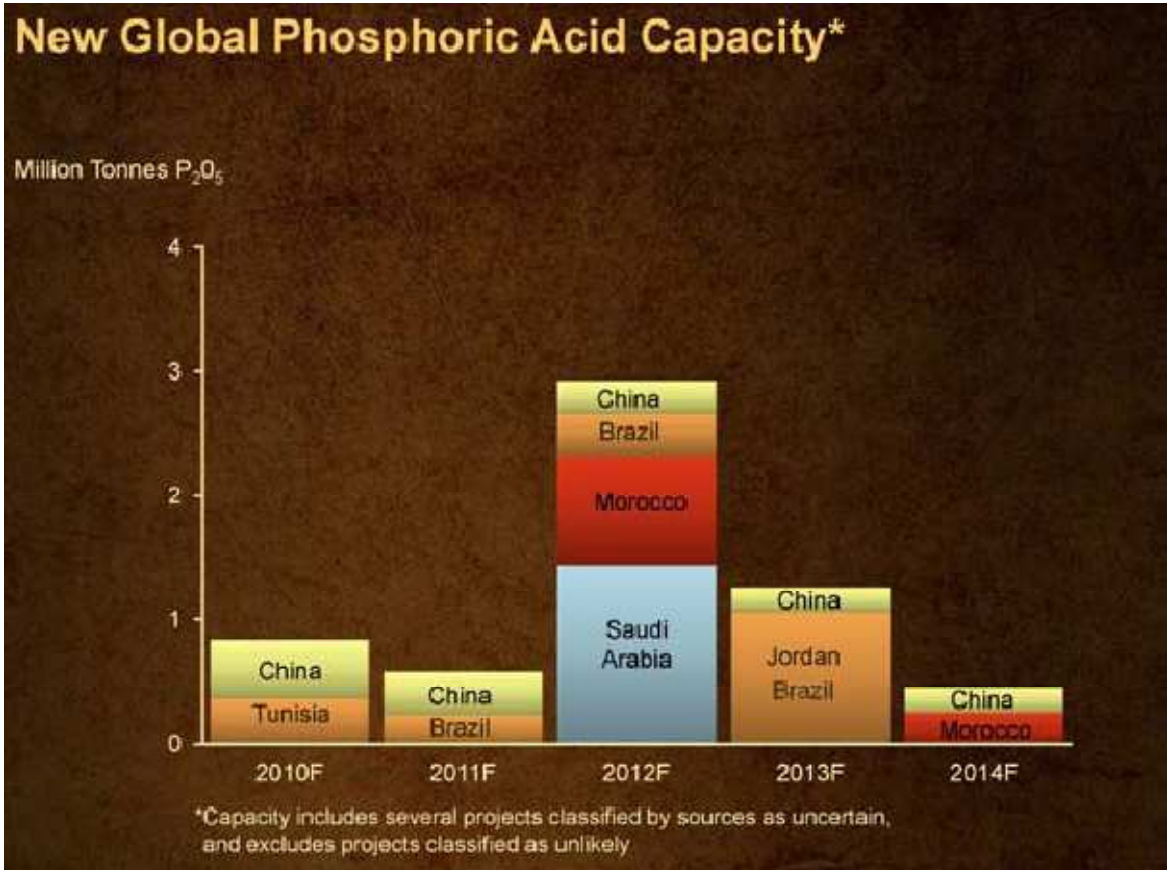
- Phosphate imports (tonne): India ~6.1M DAP in '09 (comprising ~40% of global DAP imports) and Brazil ~2.5M MAP & DAP in '07



Source: PCS

Global Phos Acid Supply Expected to Climb with New Saudi Arabia Project

- Growing phos rock supply, primarily from Saudi Arabia's Ma'aden project (3M tpa DAP capacity by '12) plus new China mines, expected near term

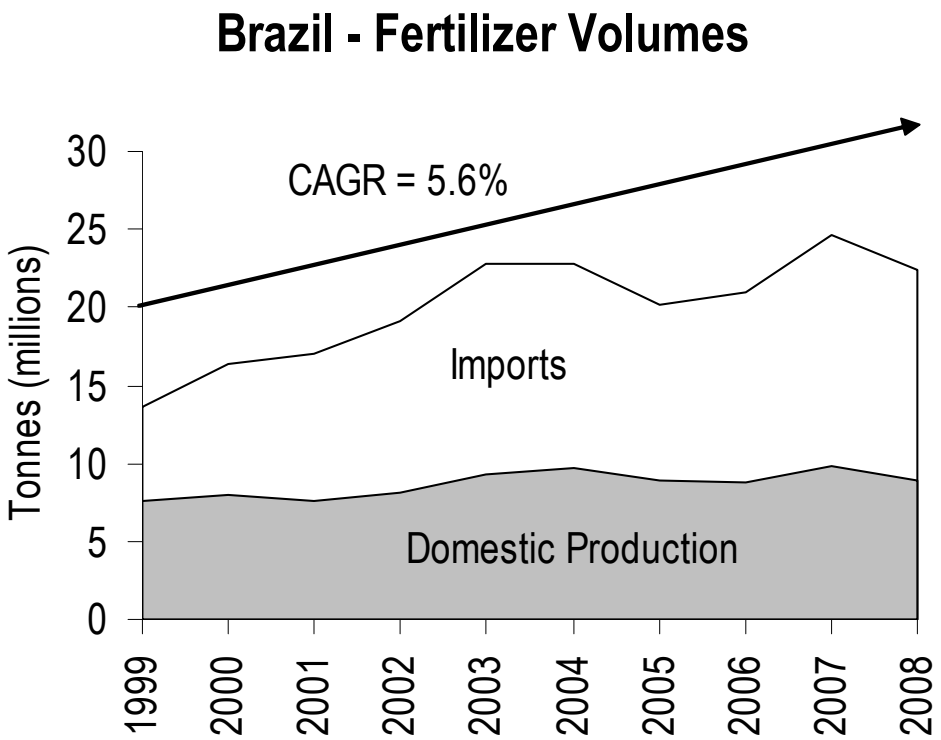


Source: PCS

K & P and the Implications for Brazil

Brazil – A Leading Agri-nation Reliant on Fertilizer Imports…

- Import 70% of fertilizer needs (~90% potash, ~50% phosphate)
- 25% of GDP is ag-related
  - Leading global producer of soybeans, orange juice, coffee, sugarcane



Source: ANDA, WWCM

…but Aspires to Build a World-class Fertilizer Industry within 10 Years

- Goal to become self-sufficient in K, P and N-based raw-materials by 2020 (Agriculture Minister Stephanes, Feb ‘10)
- Vale becoming major P producer through M&A – buying Bunge & Fosfertil assets for US$4B+ in ‘10
- Self-sufficiency implies 3-4 two million tpa KCl mines and 3-4 500k tpa phos-acid facilities (at 2010E demand)…
- …implies US$7 billion to US$10 billion investment in K & P operations (at zero demand growth), excluding supporting infrastructure

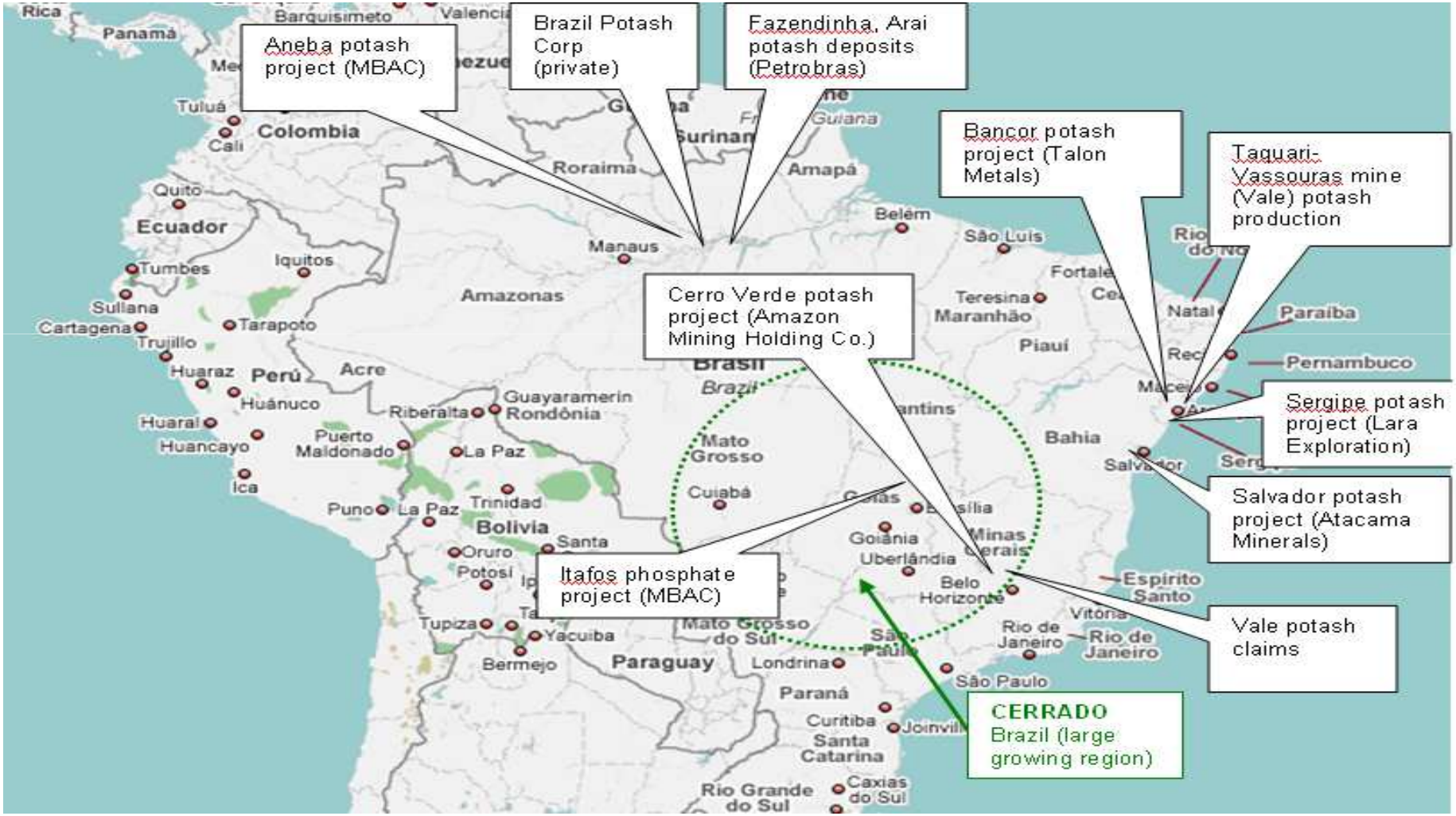
Brazil Appears to have the Resources to Become Fertilizer Self-sufficient

- Potash
  - Evidence suggests a potential world-class KCl deposit in the Amazons (Brazil Potash Corp investigating)
  - Off-shore and carnallite potash, near Sergipe basin, also a possibility (MBAC Fertilizer Corp and Vale investigating)

Source: Brazil Potash Corp.

- Phosphate
  - MBAC developing 500+k tpy SSP operation in the Cerrado
  - Fosfertil (Vale) and Copebras also indicated aspirations to expand existing phosphate operations, though Vale may face anti-competition constraints

And Many Large & Small Companies Aim to Help Meet Brazil's Needs



Source: Googlemaps.com, Company reports, WWCM

But there are Many Constraints to Consider

- **Billions in capital** – hard to finance in today's environment, though arguably this is short-term
- **Environmental concerns**, especially in Amazon region
- **Resource risk** is largely unknown – development is underway, but no guarantee deposits will be economic
- **Lacking infrastructure** – today's port/rail/road capacity can't meet potential demand (though first steps to address this through Growth Acceleration Plan ("PAC")
- **Government** reluctance for foreign capital to invest given strategic importance of fertilizer – e.g. blocked Petrobras sale of KCl deposit to Falcon Mines in '08

Thank you