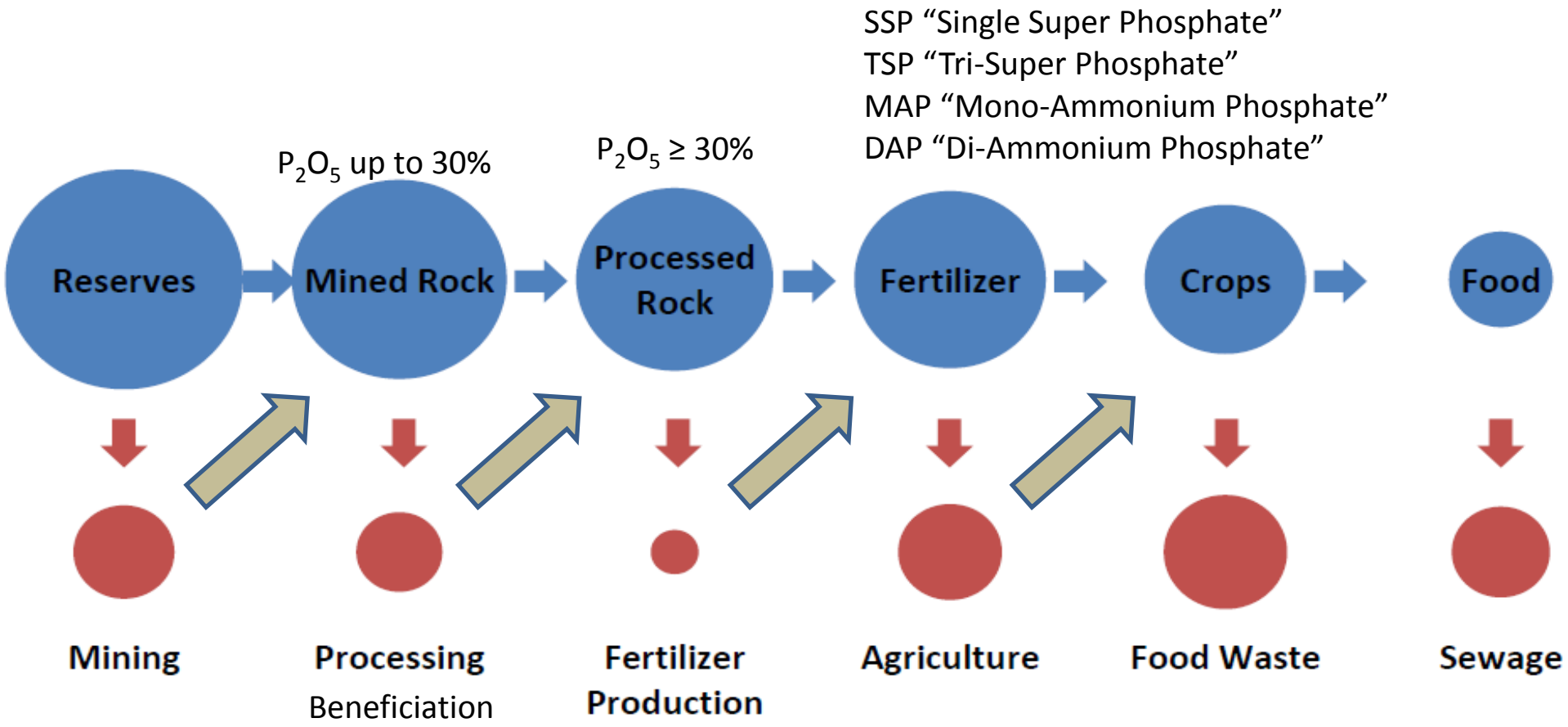
Phosphate Industry Economics

(May 10, 2014)

Phosphate Industry Flow Sheet



Egypt Production of Phosphate Rock

Egypt: Production of Phosphate Rock **(Thousand metric tons)**

Industrial Mineral	2006	2007	2008	2009	2010	2011	2012	2013
Phosphate Rock	2,177	3,890	5,523	6,227	4,622	3,500	6,240	6,000
30% P_2O_5 Content	653	1,167	1,657	1,868	1,400	1,050	1,872	1,800

Source: U.S. Geological Survey, Mineral Commodity Summaries, February 2014

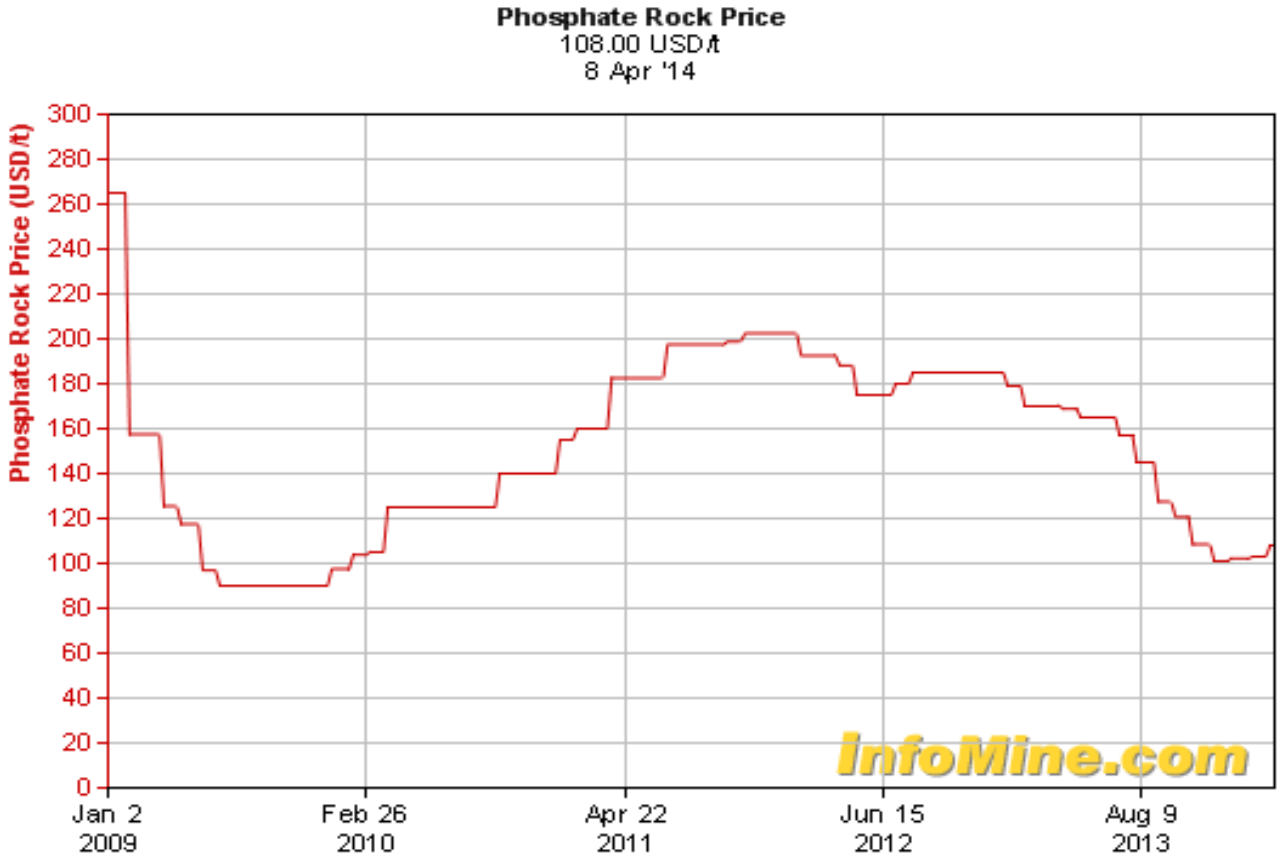
Egypt: Phosphate Rock Companies in 2010 & 2011
(Thousand metric tons)

Company	Location of Main Facilities	Design Annual Capacity	Annual Production (2010)	Annual Production (2011)	Annual Export (2010)
El Nasr Mining Co. (شركة النصر للتعدين)	East Sabaiya, west Sabaiya and Qusier	**4,500**	**2,900**	**4,200**	**2,300**
Misr Phosphate Co. (شركة فوسفات مصر)	Abu Tartur	**1,750**	**270**	**346**	**64**
National Co. for Mining & Quarries (El Wataneya) (شركة الوطنية)	Aswan	**600**	**252**	**205**	**67**

Source: Arab Fertilizers Association, 2011, p. 30 and 2012, p.33

Phosphate Value Added due to Downstream Processing

1. Phosphate Rock Price WW



- Rock Phosphate from **<u>Egypt</u>** - P_2O_5 24 to 30% 65-95 USD/Metric Ton (FOB Price on **2014**)

2. Phosphate, fertilizers Price ($/t) and Phosphoric acid ($/t P_2O_5)

Forecast phosphate prices - 2013/2014						
	Mar	Apr	May	Q3-2013	Q4-2013	Q1-2014
DAP fob						
Morocco	500 - 510	510 - 530	520 - 540	540 - 560	520 - 547	520 - 540
US Gulf	480 - 490	490 - 510	500 - 520	520 - 540	500 - 527	500 - 520
MAP						
Baltic fob	495 - 520	500 - 520	540 - 560	538 - 558	515 - 535	515 - 535
Brazil cfr	515 - 520	530 - 550	570 - 590	568 - 588	545 - 565	545 - 565
Phos Acid						
India cfr	770 - 770	760 - 785	760 - 785	785 - 850	775 - 800	750 - 780
Phos Rock						
N Africa fob	150 - 170	150 - 170	150 - 170	200 - 210	180 - 200	150 - 180

3. SSP fertilizer forecast WW ($/T)

SSP Prices (US$/tonne)

2012	2013	2014	2015	2016	2017	2018
$ 349.0	$ 356.0	$ 363.1	$ 370.4	$ 377.8	$ 385.3	$ 393.0

2019	2020	2021	2022	2023	2024	2025
$ 400.9	$ 408.9	$ 417.1	$ 425.4	$ 433.9	$ 442.6	$ 451.5

2026	2027	2028	2029	2030	2031	2032
$ 460.5	$ 469.7	$ 479.1	$ 488.7	$ 498.5	$ 508.4	$ 518.6

2033	2034	2035	2036	2037	2038	2039
$ 529.0	$ 539.5	$ 550.3	$ 561.3	$ 572.6	$ 584.0	$ 595.7

2040	2041	2042	2043	2044
$ 607.6	$ 619.8	$ 632.2	$ 644.8	$ 657.7

Destination Markets for Phosphate Fertilizers **(Kton)** (Q2 on 2013)

Summary of demand for main markets			
	Import requirement 2013 (est 2012)	Estimated purchases YTD	Outlook
India*	5,900-6,000 (6,900)	5,500-5,600	The reported suspension on Fertilizer Control Orders effectively stops further imports in Q1 2013
Brazil	2,300-2,500 (2,350)	400-450	Has a base load booked from Morocco in Q1. Interest also in SSP
Argentina	850-950 (850)	45-65	Quiet so far, but will need to come to the market soon
Australia	800-850 (835)	150-200	MAP cargo booked from US - more to follow
Pakistan	500-600 (510)	150-200	Rabi covered, but showing interest in imports
Turkey	350-400 (390)	40-60	Will be quiet until June; some DAP exports
France	350-400 (400)	60-80	Large volume of Moroccan DAP sourced; Q1 DAP nearly covered
Thailand	300-350 (325)	30-40	Will probably source another couple of DAP cargoes for Q1

WW
Reserves and Production

Phosphate Reserves 2011

MAP OF COUNTRIES BY PHOSPHATE ROCK RESERVES

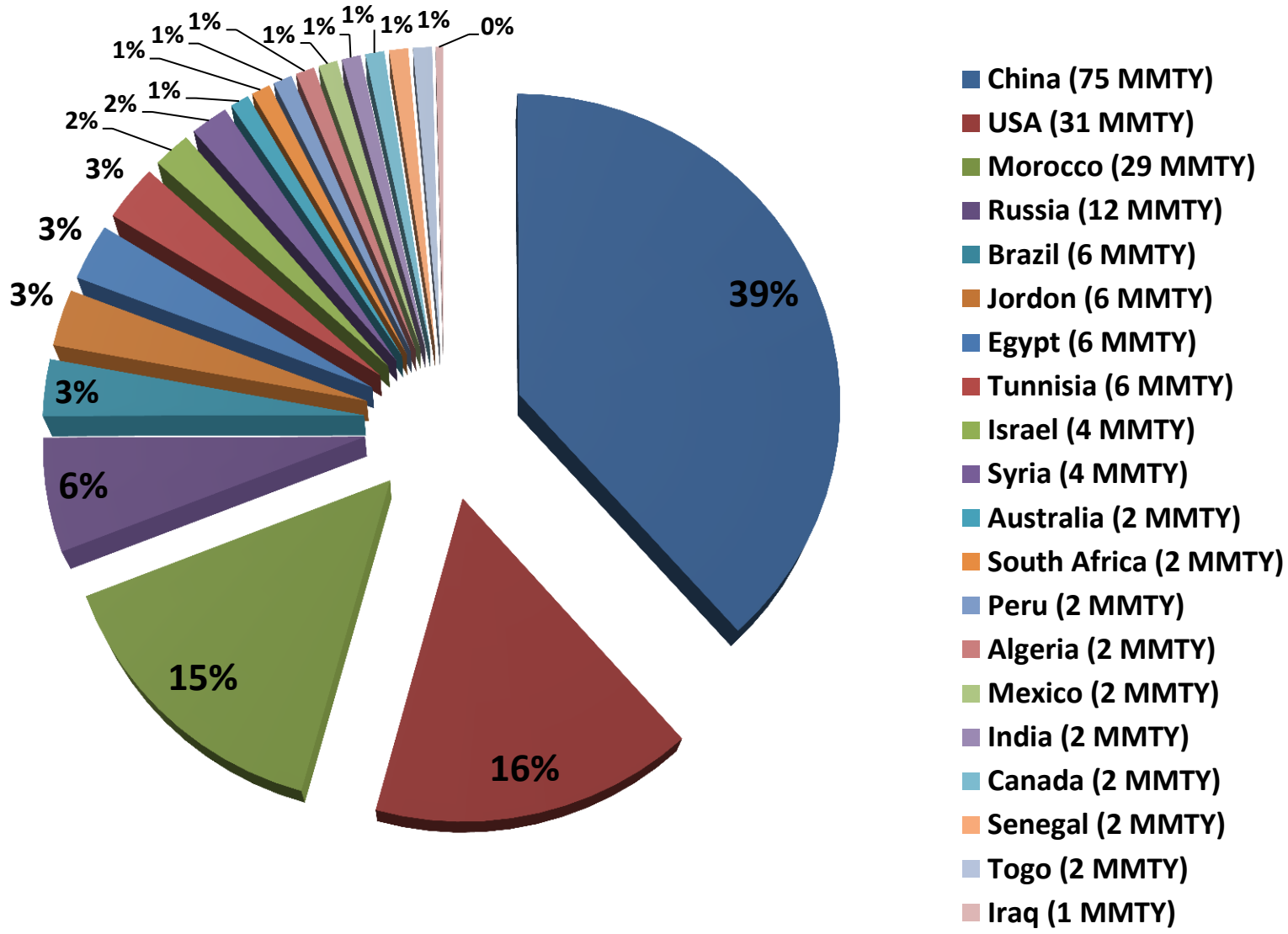
Egypt reserve: Over 100 MMT

World Main Producers by Country (2011)

MAP OF COUNTRIES BY PHOSPHATE PRODUCTION IN 2011

World Main Producers (2013)

World Production: 215 MMTY **Arab Production: 43.35 MMTY**



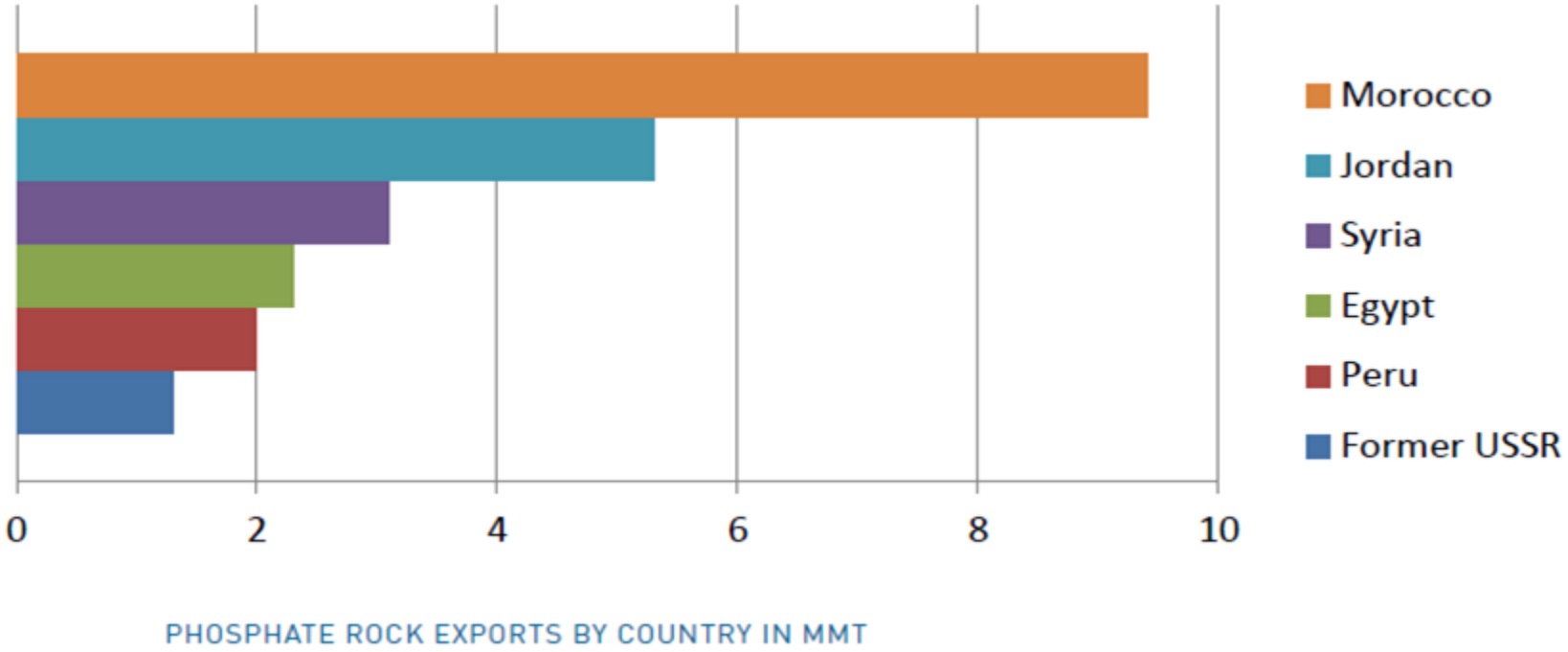
Main Producing Companies (2013/2014)

New Capacity 2013/2014					
Product	Company	Location	Date Ex-pected	Additional Capacity	Notes
Rock	Vale	Peru	2013	1.1	Bayovar mine scheduled to reach capacity of 3.9 million mt/year in 2012. Later expansion planned to 5.8 million mt/y
New export rock supply (ex China) in 2012/2013				1.1	
Rock	Acron	Russia	2012	1	Production to start in July. Prodn rising to 2.0 million mt/y apatite by 2017.
Rock	Rio Verde	Brazil	2013	1.2	Based on mine life of 8 years. Re-named the Bonito Phosphate Project, to reflect location in municipality of Bonito, in the state of Pará (see project section below)
Rock	Agrium	Canada	2013/14	-1	Having announced last year that reserves at its Kapuskasing
mine in Ontario were exhausted, production is scheduled to end 2013/14					
Rock	Paradise Phosphate	Australia	2017	7	Located north-west of Mount Isa
Phosacid	Tifert	Tunisia	2014	0.36 P2O5	Expected in 2012 but considering internal problems in Tunisia, it seems unlikely to appear before 2014. Tifert is a JV between GCT/GSFC/CFL. This should provide new P2O5 available to Indian market
Phosacid	JIFCO	Jordan	2013	0.5 P2O5	Previously scheduled end-2012, but now set for a 2013 start. JV with India's IFFCO
New export phosacid supply in 2012/2013				0.86	
Phosacid	PotashCorp	USA	2012/2013	?	Might increase phosacid production at Geismar given the re-start of the 495kt/y ammonia plant scheduled to come on-stream in 2012. Current phosacid capacity:
0.2 million mt. PCS currently imports ammonia to plant					
Phosacid	Toros	Turkey	tbc	0.2 P2O5	Captive use only. This revamp is part of Toros's plan to secure raw material supply

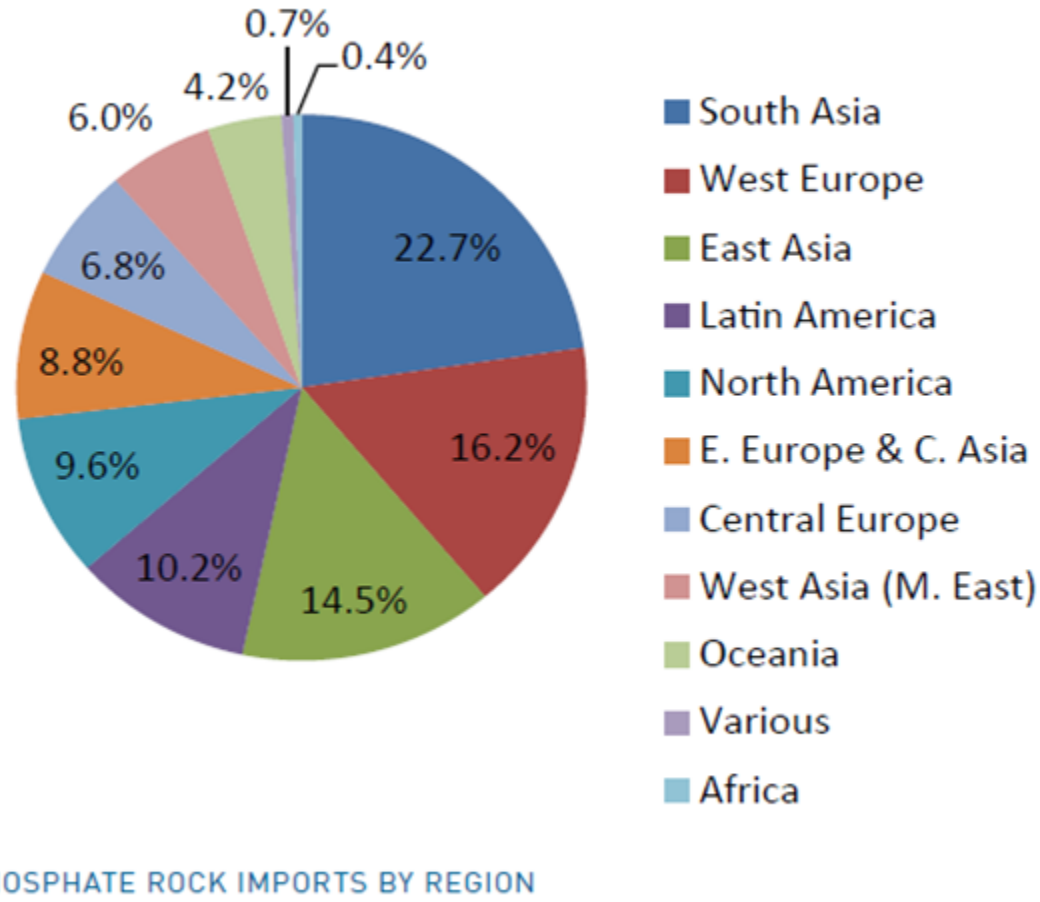
Main Producing Companies (cont'd)

New Capacity 2013/2014					
Product	Company	Location	Date Expected	Additional Capacity	Notes
DAP/MAP	OCP	Morocco	2013	2	Two new granulation units, previously expected 2012.
DAP	JPMC	Jordan	2013	0.3	DAP capacity has been increased to 1 million mt, although exported quantities still average around 60-70kt/month. Estimate additional 300kt/y of DAP export potential for 2013.
DAP	Ma'aden/				
Sabic	Saudi Arabia		2013	0.5-0.7	Ramping up production to 200kt mt/month during 2013
New export DAP/MAP capacity in 2012/2013 (ex China)				3	
DAP/MAP	OCP	Morocco	2013-2015	4	4 units of integrated production
DAP	Vinachem	Vietnam	2012	0.375	The second plant has been constructed and domestic capacity for both Vinachem's plants is 660kt/y. Production not believed to have reached that level, so will still import around 600kt/y DAP.
DAP/MAP		China	2011/2012	5.2	
TSP	GCT	Tunisia	2013/14		GCT is continuing construction to build the new facility in M'dhilla, according to latest reports (see below). Unlikely to start-up in 2013.
SSP	Itafos	Brazil	2012	0.33	MBAC Fertilizer Corp plans to increase mining capacity at Itafós Arraias SSP plant for an additional 330kt rock concentrate

Phosphate Rock Exporters MMTY (2011)

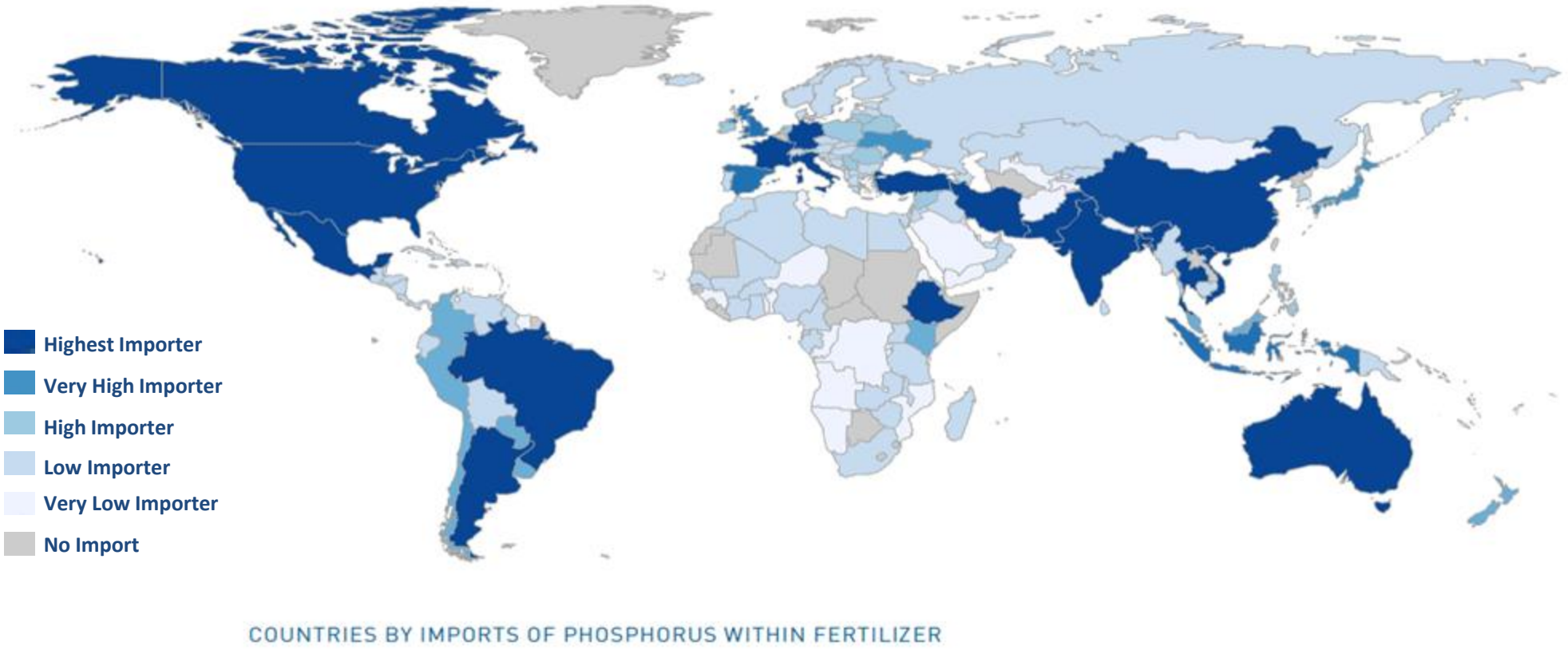


Phosphate Rock Importers (2011)



PHOSPHATE ROCK IMPORTS BY REGION

Phosphate Fertilizers Importers (2011)



Phosphate Rock Balance **(Kton)** (2013/2014)

Phosrock Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
EXPORT TOTAL	2,285	2,280	2,280	6,840	6,845	6,840	6,845
Morocco	790	790	790	2,370	2,370	2,370	2,370
Tunisia	40	40	40	120	120	120	120
Jordan	400	400	400	1,200	1,200	1,200	1,200
Russia	90	90	90	270	270	270	270
Syria	40	40	40	120	120	120	120
Algeria	100	100	100	300	300	300	300
Peru	310	310	310	930	930	930	930
Egypt	300	300	300	900	900	900	900
Togo	60	60	60	180	180	180	180
China	60	60	60	180	180	180	180
Christmas Island	35	30	30	90	95	90	95
Israel	40	40	40	120	120	120	120
Other	20	20	20	60	60	60	60

Phosrock Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
IMPORT TOTAL	2,178	2,133	1,918	6,409	6,785	6,740	6,354
West Europe	533	543	543	1,629	1,635	1,635	1,599
E Europe C Asia	120	145	145	435	425	435	365
Africa	15	15	15	45	45	30	45
North America	200	320	120	780	745	765	600
Latin America	235	235	235	705	705	705	705
Mexico	75	75	75	225	225	225	225
Brazil	110	110	110	330	330	330	330
Middle East	70	70	70	210	210	210	210
South Asia	740	470	460	1,610	2,190	2,080	2,010
India	730	430	420	1,490	2,070	1,960	1,940
South East Asia	110	155	150	455	420	415	355
East Asia	95	95	95	285	155	210	285
Oceania	60	85	85	255	255	255	180
BALANCE	107	147	362	431	60	100	491

Phosphoric Acid Balance **(Kton)** (2013/2014)

Phosacid Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
EXPORT TOTAL	341	340	315	1,000	1,085	1,035	1,163
Morocco	120	120	120	360	360	360	360
Tunisia	30	30	30	90	90	90	180
Jordan	15	15	15	45	120	120	120
South Africa	40	40	40	120	120	120	120
Senegal	30	30	30	90	90	60	90
Other	106	105	80	295	305	285	293

Phosacid Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
IMPORT TOTAL	264	248	164	666	957	822	870
West Europe	53	58	58	174	184	179	159
E Europe C Asia	20	20	20	65	80	90	54
Africa	3	3	3	9	9	9	16
North America	0	0	6	6	6	6	6
Latin America	23	23	13	59	59	59	54
Middle East	0	0	0	0	30	30	0
South Asia	**155**	**125**	**45**	**305**	**545**	**405**	**545**
India	130	100	20	230	470	330	470
South East Asia	0	4	4	8	4	4	3
East Asia	10	15	15	40	40	40	33
Oceania	0	0	0	0	0	0	0
BALANCE	77	92	151	334	128	213	293

MAP Balance **(Kton)** (2013/2014)

MAP Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
EXPORT TOTAL	495	540	510	1650	1845	1530	1648
West Europe	0	0	0	0	0	0	0
EECA	160	160	160	480	480	480	500
Russia	160	160	160	480	480	480	480
Africa	125	150	150	450	500	450	375
Morocco	125	150	150	450	500	450	375
S Africa	0	0	0	0	0	0	0
US	160	180	200	580	550	360	543
L. America	50	50	0	50	35	60	200
Middle East	0	0	0	0	0	0	0
Asia	0	0	0	90	280	180	30
China	0	0	0	90	280	180	30
Oceania	0	0	0	0	0	0	0

MAP Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
IMPORT TOTAL	687	534	394	1478	1796	1366	1819
West Europe	45	15	20	45	30	145	100
E. Europe C. Asia	50	40	45	135	130	120	135
Africa	10	0	0	30	40	40	15
North America	80	85	60	185	210	160	267
Central America	15	20	20	60	30	150	45
South America	312	149	189	718	1146	486	664
Brazil	250	70	50	380	730	310	477
Argentina	20	20	80	190	290	100	70
Other S. America	42	59	59	148	126	76	117
Middle East	0	0	0	5	5	10	0
South Asia	0	0	0	0	145	95	0
India	0	0	0	0	115	85	0
Other S. Asia	0	0	0	0	30	10	0
East & SE Asia	15	45	60	120	30	50	73
Japan	0	10	10	35	30	30	15
Other	0	0	0	0	0	0	0
Oceania	120	180	0	180	30	110	385
BALANCE	-192	6	116	172	49	164	-171

DAP Balance **(Kton)** (2013/2014)

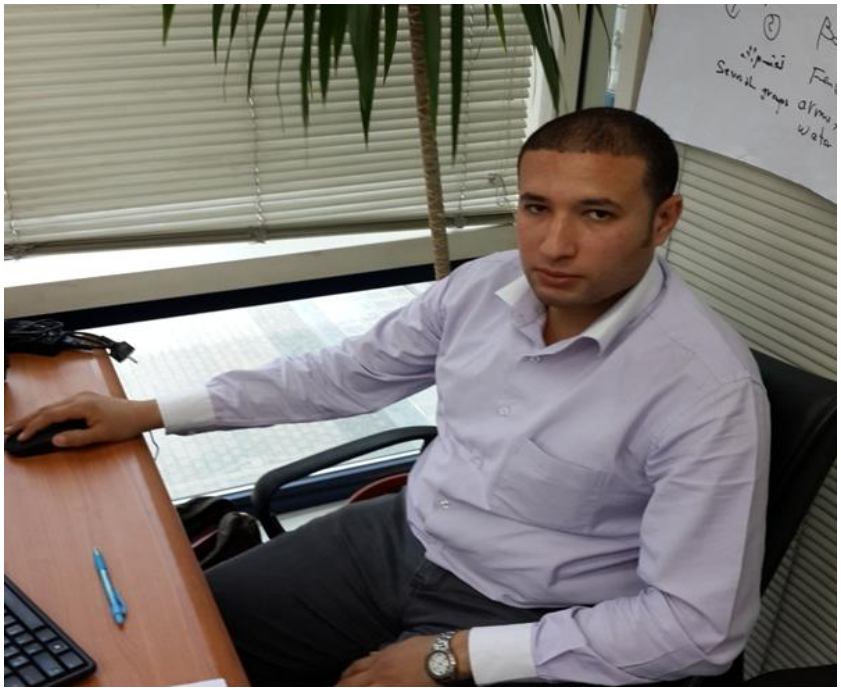
DAP Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
EXPORT TOTAL	950	1095	1475	4160	5550	4235	2855
West Europe	87	87	87	261	261	261	261
Lithuania	75	75	75	225	225	225	225
EECA	163	163	183	529	549	549	489
Russia	155	155	175	505	525	525	465
Turkey	8	8	8	24	24	24	24
Africa	150	150	200	550	540	570	510
Morocco	100	100	150	400	390	420	360
Tunisia	50	50	50	150	150	150	150
N. America	300	370	400	1010	740	700	740
(Mexico	20	20	20	60	60	60	60
Jordan, S. Arabia	200	270	270	810	810	810	600
Asia	30	35	285	830	2350	1205	195
China	20	25	250	775	2300	1150	140
Other Asia	10	10	10	30	30	30	30
Australia	0	0	30	110	240	80	0

DAP Balance	Mar 2013	Apr 2013	May 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
IMPORT TOTAL	820	989	1272	3715	5330	3475	2719
West Europe	163	120	91	246	355	427	428
E. Europe C. Asia	20	25	45	220	190	40	50
Turkey	5	15	40	195	170	10	5
Other EECA	15	10	5	25	20	30	45
Africa	131	140	50	284	209	286	301
North America	30	18	10	28	45	100	122
Central America	50	85	65	230	170	30	150
Mexico	30	45	45	140	75	10	70
Other C. America	20	40	20	90	95	20	80
South America	156	171	171	522	431	332	348
Brazil	80	40	30	150	200	110	133
Argentina	30	10	50	110	80	50	70
Other S. America	46	121	91	262	151	172	145
Middle East	30	0	0	30	65	160	90
Iran	30	0	0	30	50	90	90
Other M. East	0	0	0	0	15	70	0
South Asia	150	270	660	1660	3485	1740	900
Bangladesh	50	90	0	130	255	20	150
India	50	150	600	1350	3100	1600	600
Pakistan	50	30	60	180	130	120	150
East & SE Asia	45	115	170	420	380	320	210
Vietnam	25	75	25	160	150	80	75
Thailand	0	20	40	100	80	60	65
China	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Oceania	45	45	10	75	0	40	120
BALANCE	130	106	203	445	220	760	136

Recovery of Uranium from Phosphate Rock by Dual Process

- **Why extraction of Uranium from Phosphoric acid?**
  - The rapid increase in (U3O8) prices.
  - The changing fundamentals in the world's supply/demand balance.
- **Dual Process**: Phosphoric acid purification and Uranium extraction.
  - **1st step:** Dissolution of P2O5 phosphate and total passage of Uranium phosphate in the acid phase.
  - **2nd step:** Purification of the phosphoric acid from the first step by liquid-liquid extraction.
  - **3rd step:** The rich Uranium extraction raffinate is treated in a mixer settler using PRAYON process. (to get the yellow cake illustrating the recovery of Uranium element)
- With the price of the industrial phosphoric acid, purified acid, and yellow cake, an economic calculation amply justifies this operation.

Thank You



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