

GLOBAL PHOSPHATE ROCK PRODUCTION TRENDS FROM 1961 TO 2010

Reasons for the temporary set-back in 1988-1994

In 2007, Patrick Déry and Bart Anderson published a paper in *Energy Bulletin* entitled “Peak Phosphorus” which proposed to apply the technique of *Hubbert Linearization* to phosphorus production¹. The paper concluded that a definite production peak had occurred in 1988. This argument has since been adopted by a number of researchers, who have gone on to argue the “peak phosphate” theory. However, the International Fertilizer Industry Association (IFA), which represents the largest phosphate producers worldwide, does not support this argument.

IFA has been collecting and compiling first-hand production and consumption data since 1937. A review of available statistics clearly indicates that the decrease in production between 1988 and 1994 was a consequence of a dramatic drop in use, which was directly related to the collapse of the former Soviet Union. The assertion that phosphate rock production peaked in 1988 totally contradicts available production and consumption data and is based on a misinterpretation of prevailing market conditions.

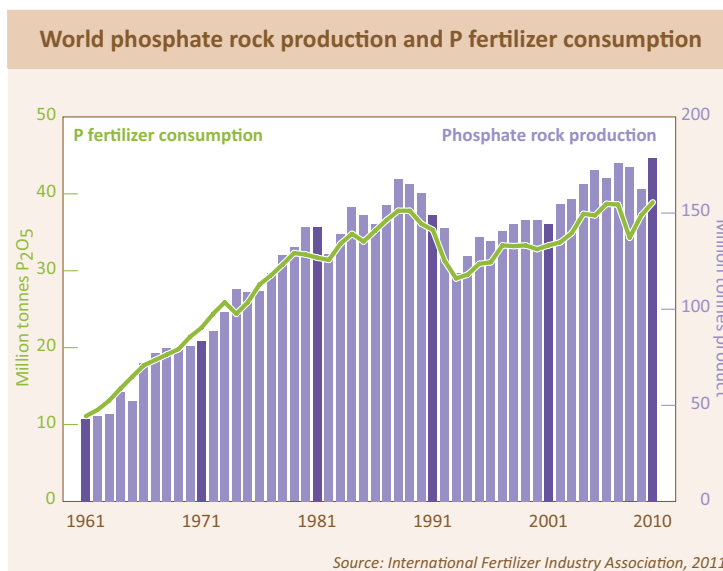
World production data on phosphate rock clearly indicate an upward trend between 1961 and 2010, with a contextual decline in the period 1988 to 1994. Over the past five decades, world phosphate rock production rose from 42.2 Mt in 1961 to 178.5 Mt in 2010. Considering that 80 to 85 per cent of world phosphate rock output is used in the fertilizer sector, trends in world fertilizer consumption, especially consumption of phosphate fertilizers, clearly explain the variations in global phosphate rock output during this period.

World phosphate fertilizer consumption

World phosphate fertilizer consumption increased from 11 Mt P₂O₅ in 1961 to 39 Mt in 2010, with a contextual drop between 1988 and 1994. Three main periods have characterized the variations in P fertilizer consumption since 1961:

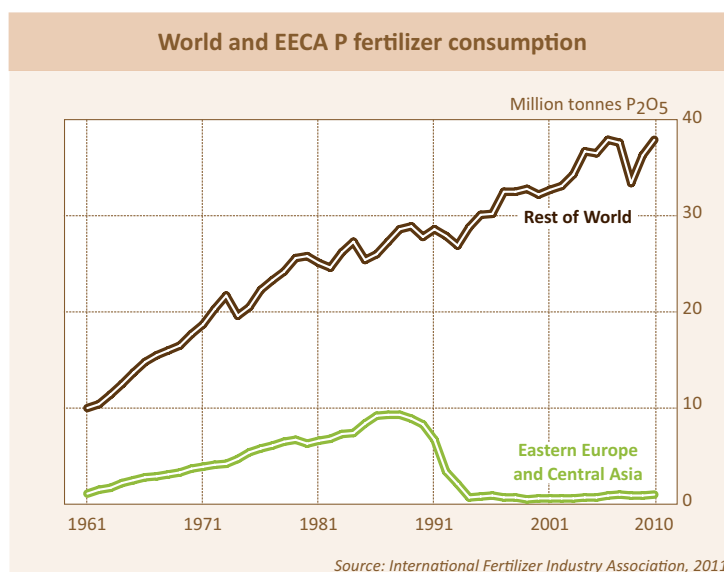
- Between 1961 and 1988, the compound annual growth rate (CAGR) of world P fertilizer consumption averaged 4.6 percent.

¹ www.energybulletin.net/nofr/33164



Between 1988 and 1994, world consumption declined at an annual rate of 4 per cent. Between 1994 and 2010, world P fertilizer consumption recovered and grew at a CAGR of 1.8 per cent.

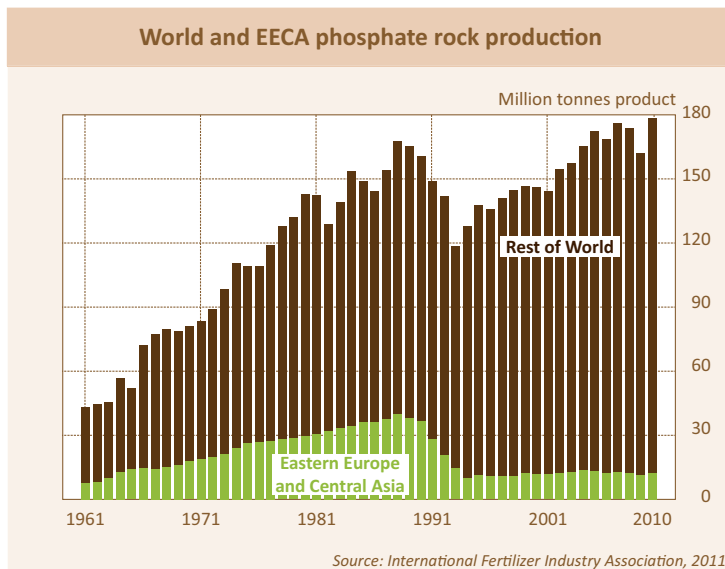
- Consumption of P fertilizer in Eastern Europe and Central Asia (EECA) rose by 8 per cent per annum between 1961 and 1988, and then decelerated at a rate of 35 per cent per annum up to 1994. P fertilizer consumption reached a low of 714 Kt P_2O_5 in 1994, with a 92 per cent drop compared with the level of consumption in 1988. Since 1994, P fertilizer consumption has been recovering gradually, at a CAGR of 2.3 per cent per annum.
- Between 1988 and 1994, global P fertilizer consumption dropped from 37.8 Mt P_2O_5 to 29 Mt. The decline in EECA accounted for 83 per cent of this 8.8 Mt decrease. A large share of the remaining 17 per cent drop occurred in Central Europe.



World phosphate rock production

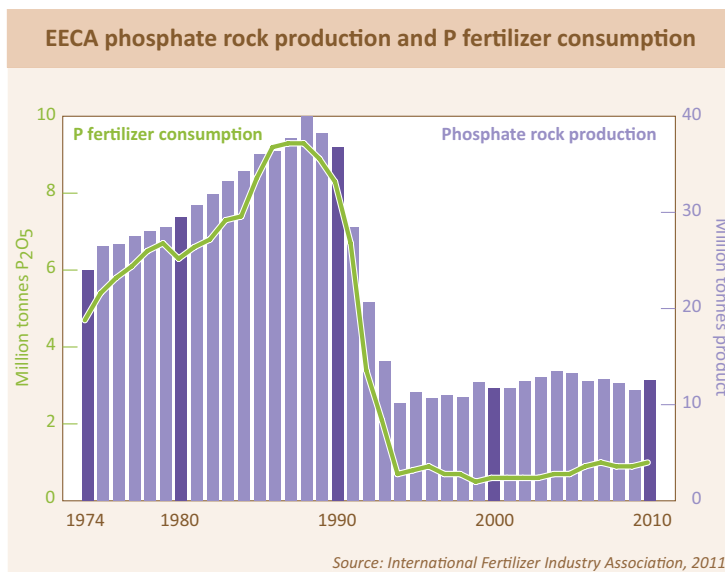
The variations in global phosphate rock production were parallel to those of consumption, as producers reacted to fluctuations in demand.

- On the basis of detailed production data available since 1974, the CAGR of world phosphate rock production was 3 per cent between 1974 and 1988. Between 1988 and 1994, world production declined at an average rate of 4.4 per cent per annum. Between 1994 and 2010, world phosphate rock production recovered, in response to growing demand, and expanded at a CAGR of 2.1%.
- The production of phosphate rock in EECA rose by 3.7% per annum between 1974 and 1988. It decelerated at a rate of 21 per cent per annum up to 1994. Since then, production of phosphate rock in EECA has remained fairly stable at 12-13 Mt per annum.
- Between 1988 and 1994, EECA contributed three-quarters of the 40 Mt decline in world phosphate rock output.
- The market share of EECA production dropped from 18% of the world total in 1961 to 8% in 1994, but has remained fairly stable since then.



This series of graphs demonstrates the predominant effect of the collapse of P fertilizer consumption in EECA on regional production and on world output from 1988 to 1994. Since then, consumption of P fertilizers has marginally recovered in EECA while increasing moderately in the rest of the world.

There is a strong and obvious correlation between consumption of P fertilizers in EECA and the level of production, which then impacted world output levels between 1988 and 1994.



Looking at the period 1961-2010, it therefore cannot be concluded that world production of phosphate rock reached a definite peak in 1988. A more likely conclusion is that global production of phosphate rock has been closely related to P fertilizer consumption at the regional and national levels.

	P Fertilizer Consumption			Phosphate Rock production			
	EECA	Rest of World million tonnes P ₂ O ₅	World	EECA	Rest of World million tonnes rock	World	
1961	1.1	10.0	11.1	1961	7.7	35.3	43.0
1962	1.5	10.4	11.9	1962	8.0	36.5	44.5
1963	1.7	11.4	13.1	1963	10.0	35.5	45.5
1964	2.2	12.5	14.7	1964	13.0	43.9	56.9
1965	2.5	13.7	16.2	1965	14.0	38.2	52.2
1966	2.8	14.8	17.7	1966	14.8	57.2	72.0
1967	2.9	15.5	18.4	1967	14.2	63.2	77.4
1968	3.1	16.0	19.1	1968	15.3	64.4	79.7
1969	3.3	16.5	19.8	1969	16.2	62.4	78.6
1970	3.7	17.7	21.4	1970	17.7	63.3	81.1
1971	3.9	18.7	22.6	1971	19.0	64.2	83.2
1972	4.1	20.3	24.4	1972	19.7	69.2	88.9
1973	4.2	21.7	25.9	1973	21.3	77.2	98.5
1974	4.7	19.6	24.4	1974	24.0	86.4	110.4
1975	5.4	20.5	25.9	1975	26.5	82.5	109.0
1976	5.8	22.3	28.2	1976	26.7	82.6	109.3
1977	6.1	23.3	29.4	1977	27.5	91.4	118.9
1978	6.5	24.2	30.8	1978	28.0	100.0	128.0
1979	6.7	25.6	32.3	1979	28.5	103.6	132.1
1980	6.3	25.8	32.1	1980	29.5	113.4	142.9
1981	6.6	25.1	31.7	1981	30.7	111.8	142.5
1982	6.8	24.6	31.4	1982	31.9	96.9	128.8
1983	7.3	26.2	33.5	1983	33.2	105.8	139.0
1984	7.4	27.3	34.8	1984	34.3	119.0	153.3
1985	8.4	25.4	33.8	1985	36.0	113.0	149.0
1986	9.2	26.0	35.2	1986	36.4	108.0	144.4
1987	9.3	27.3	36.6	1987	37.7	116.3	154.0
1988	9.3	28.6	37.8	1988	40.0	127.6	167.6
1989	8.9	28.9	37.8	1989	38.2	127.1	165.3
1990	8.3	27.8	36.1	1990	36.8	123.8	160.6
1991	6.7	28.6	35.3	1991	28.4	120.4	148.8
1992	3.4	27.9	31.3	1992	20.6	121.4	142.1
1993	2.1	26.9	29.0	1993	14.5	104.1	118.6
1994	0.7	28.8	29.5	1994	10.1	117.7	127.8
1995	0.8	30.1	30.9	1995	11.3	126.4	137.6
1996	0.9	30.2	31.1	1996	10.7	125.0	135.7
1997	0.7	32.5	33.3	1997	11.0	129.8	140.8
1998	0.7	32.5	33.2	1998	10.8	133.8	144.5
1999	0.5	32.8	33.3	1999	12.3	134.0	146.3
2000	0.6	32.2	32.8	2000	11.7	134.7	146.4
2001	0.6	32.7	33.3	2001	11.7	132.4	144.1
2002	0.6	33.1	33.7	2002	12.4	142.1	154.5
2003	0.6	34.3	34.9	2003	12.8	144.3	157.1
2004	0.7	36.7	37.4	2004	13.5	151.8	165.3
2005	0.7	36.5	37.2	2005	13.3	158.9	172.2
2006	0.9	37.9	38.7	2006	12.4	155.9	168.4
2007	1.0	37.6	38.6	2007	12.6	163.6	176.2
2008	0.9	33.4	34.3	2008	12.2	161.5	173.7
2009	0.9	36.3	37.2	2009	11.5	150.7	162.3
2010	1.0	37.9	38.9	2010	12.5	166.0	178.5

International Fertilizer Industry Association, 2011.

Feeding the Earth represents a series of issue briefs produced by the International Fertilizer Industry Association to provide current information on the role of fertilizers in sustainable agriculture and food production.