Policy Paper 37

Trade and Investment Policy for Overseas Acquisition of Fertilizers and Raw Materials

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Trade and Investment Policy for Overseas Acquisition of Fertilizers and Raw Materials
Role of the Government

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Foreword

International market operations have been an integral part of the Indian fertilizers policy. Major focus on this policy came during the liberalization of P and K fertilizers and allowing overseas investment for N, P and K fertilizers. Since the markets of P and K fertilizers are not very competitive and India continues to depend on imports, there is a need for ensuring availability of P and K fertilizers, including their raw material, at a competitive price. This is more so when policy environment is quite uncertain or hostile in the countries with P and K reserves. Therefore, it was necessary to examine the international scenario of P and K fertilizers for evolving a sound trade and investment policy.

The study has used available evidence on domestic and international scenario of P and K fertilizers and their raw material. Trends in international prices were also examined in the context of the emerging supply scenario. The perspective of fertilizer industry and experiences of joint ventures were also studied. Great efforts were made to study the international operations of other sectors, particularly, petroleum products, minerals, steel and coal, to learn from their experiences. The study also drew inferences from the experiences of Indian foreign policy in such matters and other international experiences and policies for overseas investment and trade.

The study has made several useful recommendations on importing P and K fertilizers, establishing joint ventures and role of the government in ensuring fertilizer supply. The basic premise is that the current international fertilizer scenario is quite positive in terms of both availability of the material and prices, and therefore, market forces shall ensure the supply of fertilizers in India. The Government should play a facilitating role in terms of establishing joint ventures and contracts and this role should be non-discriminatory and preferably non-financial, except in cases of high risk and exigencies. Comments of the readers shall be helpful in developing a long-term fertilizer policy of the Government.

Chhabilendra Roul
Secretary
Department of Fertilizers

October 2020
New Delhi

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The study has come into this form due to the sincere efforts of many individuals, and we acknowledge with all humility the help and support provided by them. First, we would like to thank Shri Chhabilendra Roul, Secretary, Department of Fertilizers, who initiated the study and provided guidance. We thank Shri Dharam Pal, Additional Secretary for his thoroughly discussed inputs. We would like to especially thank Shri Partha Sarthi Sen Sharma, Joint Secretary for guiding us, and providing us a one-on discussion regarding the expectations from the study. These discussions and comments during the review process were instrumental in shaping policy perspective of the study. We acknowledge and thank support of Shri Vinay Kumar Pandey, Director, other staffs of the Department of Fertilizers, Ministry of Chemicals and Fertilizer, for providing the necessary information.

The study was built on information and insights particularly from the Ministry of Petroleum and Natural Gas, Ministry of Agriculture and Farmers Welfare, Fertilizer Association of India (FAI), fertilizer companies such as RCFL, NFL, IFFCO, IPL, KRIBHCO, GSFC, SFC, Chambal Fertilizers, IndoRama, and academia. We would like to thank the heads of these Ministries and organizations, who were supportive during the course of the study. We would like to thank Shri Manish Prabhat, Joint Secretary (Eurasia Division) and Dr T.V. Nagendra Prasad, Joint Secretary (Gulf) for providing us insights on foreign policies and support for Indian enterprises. We are grateful to Shri Satish Chander, Director General, Fertilizer Association of India (FAI) and his colleagues for the insights and information. We would like to thank Mr Rakesh Kapur, Joint Managing Director, IFFCO, Dr P.S. Gahlaut, Managing Director, Indian Potash Limited and Mr Sanjeev Varma, Sr. Vice President (Finance & Projects), Gujarat State Fertilizers & Chemicals Ltd. for sparing their valuable time for personal interaction and providing the acumens on their experience with overseas acquisitions and expectations regarding the role of the government.

We would like to thank Ms. S. Pavithra for compiling data on fertilizer trade. We are thankful to all the participants who attended and provided their inputs during the brainstorming session on `Securing Supply of

Fertilizer and Feedstock for Fertilizer Industry in India' organized on 29 August 2019. The discussions and learning from the session were stepping-stone for developing this policy paper. We are grateful to our fellow colleagues of ICAR-NIAP for providing all logistics and technical help for completion of the study.

Authors

Executive Summary

Fertilizers play a critical role in enhancing crop productivity, farmer's income and sustainability of production systems. Consumption of fertilizers has been increasing over time and currently, India stands second in nitrogen (N) and phosphorus (P) and fourth in potash (K) consumption. India also stands third in per hectare consumption (144 kg/ha) of N, P_2O_5 and K_2O next to Egypt and Bangladesh. The demand projections showed that, at the current rates, we would need an additional 2.57 to 2.97 million tonnes of fertilizer by 2023-24. However, the major concern has been imbalanced use of N, P and K fertilizers, which has been arising mainly because of limited purchasing power of farmers, and using more of urea because of its comparatively low prices. The nutrient-based subsidy has addressed this problem to an extent, but more efforts are needed not only for promoting balanced use of fertilizers but also organic and inorganic sources of fertilizers, which have more impact on crop productivity besides the positive impact on microbiome and environment.

India is producing 79 per cent of its nitrogen requirement and 70 per cent of its phosphorus requirement, whereas the remaining requirement and whole of potash are imported. The overall indigenous production capacity of P&K is underutilized due to viability issues and differences in price of raw materials and intermediaries by suppliers. The raw materials for production of fertilizers are concentrated in few countries. This has also led to a limited number of countries from which both raw materials and finished products are imported. The dependence on imports has resulted in greater exposure to international markets. The major problems faced are price fluctuations, policy uncertainty in the exporting country, and viability of the overseas investment. These problems directly impact the availability and amount of subsidies paid for fertilizers from the central exchequer.

The acquisition policy of fertilizers and their feedstock should depend upon the global outlook of these products. The available evidence indicated that global outlook of fertilizer looks optimistic in terms of the increasing availability of all fertilizers. The estimates of the International Fertilizers Association indicated that there is already a surplus production of N, P & K fertilizers globally and it is likely to increase in the future with the creation of additional production capacity. In 2023, the availability

of N would be 1 per cent in excess to the demand and of K 8 per cent . Domestically also, the current policies of Government of India with respect to support for fertilizer production have resulted in positive development in urea production and availability. The New Urea Policy has promoted the use of natural gas as a feedstock for efficient urea production. The dependence of imported Re-gasified Liquefied Natural Gas as the major feedstock has improved production efficiency but exposed the industry to the global availability of natural gas. Currently, these effects are neutralized by the pooled gas scheme of the Ministry of Petroleum and Natural Gas (MoPNG). The policy complementarity between them ensures long term availability of the gas at reasonable prices. With the commissioning of new nitrogen facilities facilitated under the New Investment Policies in India, the dependence on import for urea as nitrogen fertilizer would come down.

The Joint Ventures for the global acquisition of fertilizers are playing a critical role in ensuring fertilizer availability at reasonable prices. Joint Ventures were able to cope with price volatility during the price spikes and saved money through long-term price contracts. These overseas investments are risky and do face political and economic risks. Though efforts have been made to promote such investments through MoUs, these efforts are driven by individual companies. Other efforts such as creating SPVs (Urvarak Videsh Limited) for foreign investment were not successful and there is little interest in the industry for such ventures. The discussions with fertilizer companies revealed that they seek (a) diplomatic solutions to overcome the political risk, and (b) government support in the form of sovereign funds for credit guarantee for financing high-cost acquisitions. Such mechanisms already exist; the Ministry of External Affairs (MEA) through its embassies has a mechanism (Joint Commission Meetings) to support all Indian entities (public or private). The Government support also exists for selective countries. International Co-operation Division of MoPNG uses diplomacy and the consortium approach for bargaining and risk-sharing. However, MoPNG has an advantage of increasing availability of surplus of natural gas in the international market at a competitive rate. They do it for public enterprises. But at MEA level the policies are non-discriminatory (supports both public and private firms). The Government has facilitated the negotiations through such a mechanism even for the private entities.

In view of the non-availability of raw material in the country, imports of P & K fertilizers are inevitable. These operations are better done by the business sector, both public and private, and therefore, operations of fertilizer companies should be facilitated by the Government. There is some capacity for domestic production of phosphorus fertilizers in the

country which are largely dependent on raw material (rock phosphate) or intermediate product (phosphoric acid). This capacity should be sustained by balancing the imports of P fertilizers and phosphoric acid. It is quite likely that given the international scenario, imported fertilizers may be cheaper than that produced in India and therefore the Government may protect these plants to ensure competitiveness. Similar support should also be provided for the upcoming urea plants. In the existing policy of channelized import of urea, the quantity imported should be restricted to the demand-supply gap. In the long-run uncompetitive plants should be phased out.

Imports of potassic fertilizers are currently working well, but supply is dependent on a few players. There are some joint ventures like in Morocco, Senegal, Tunisia, Jordan, and Oman, and few are yet to take off. Such joint ventures should be encouraged in those countries where investment risk is low and policy environment is predictable. Russia, few MENA countries, and Canada are in this category. The business sector can make a choice for investment based on the landed cost of fertilizers in India. A significant proportion of domestic demand can be met through open market imports under Open General Licence (OGL) through long-term price agreements with reliable suppliers. Such an agreement will be between the fertilizer companies (public or private), but the Government could facilitate the importer companies to re-negotiate the contract through the existing mechanism of Joint Commission Meetings.

The present environment is not enthusiastic about the revival of UVL for market operations (import etc). Support for SPVs could be made if the company comes forward showing any interest and there are no major private initiatives. However, SPVs or some division of the Department of Fertilizers could facilitate, handhold and support the companies in the exploration and negotiations. This could be done by ensuring the presence of the Department while the deal is signed and exerting soft power when there are issues of political risk. Such support should be non-discriminatory for the public and private sectors. It would be desirable that these entities or any other joint ventures in public-private partnership become commercially viable.

The policy of imports of natural gas should continue for the cost competitiveness of fertilizer plants and the availability of natural gas in abundance globally. The success of the urea plant in Oman may be replicated by other companies for the creation of additional capacity abroad; though it seems to be a less likely scenario. There are some good examples of the acquisition of natural gas by MoPNG which should continue in the future

also and the supply of natural gas should be ensured to fertilizer plants in the country. These acquisitions are now tactical for the urea sector in India.

Finally, the role of the Government is critical in ensuring the international acquisition of P&K fertilizers and their distribution domestically. The Department of Fertilizers should play a facilitator role for both public and private entities (non-discriminatory) and it should be non-financial (no financial support for such approach). Participation of the government in equity should be the last resort when market is highly risky and not competitive, and private imports are inadequate. The facilitator support of the government could be (i) handholding the interested firms for establishing joint ventures and signing long-term contracts through the embassy in target countries, (ii) support for re-negotiations of the contracts through the existing provisions of the MEA, (iv) liaison with Indian mission abroad and foreign mission in New Delhi for the companies, (v) signing agreements like MoU with potential investment countries. For financial support/investment, the Department could facilitate both public and private companies to access credits from existing mechanisms such as the line of credit (EXIM bank) and sovereign funds under bilateral agreements. This may need strengthening of the international cooperation (IC) division of the Department of Fertilizers. The strategy of the IC division could be built in similar lines with IC Division of MoPNG, but for both public and private companies.

Another policy support for the sustainability of domestic producers is, ensuring differential import duty/taxes on fertilizers and raw material. For fertilizers under OGL, a differential rate of import duty on raw material can protect the domestic industry from the imports. Outright exposure of the industry to the international market may not be the right decision as some investment is made to make the market competitive. It was evident from the discussions and analysis that the suppliers are benchmarking the price of raw material against the price of finished products to undermine the economic feasibility of Indian manufacturers. Considering the strategic importance of this sector such a protection is necessary. However, the decontrol of imports and price of P&K fertilizers have been beneficial in terms of improving availability and passing on price discounts to farmers, and this policy should continue.

1. Introduction

1.1 Fertilizer Use in Indian Agriculture

Meeting the food demand of the people would be a big challenge with the burgeoning population of India and limited land and water resources. The only option to confront this rise in demand is by increasing the productivity of agriculture in a sustainable and cost-effective manner. Fertilizers play a critical role in enhancing productivity of crops along with other inputs. Foodgrains meet the basic food demand of the majority population in the country; therefore, it is important to examine foodgrains production behaviour and the relationship between the production of foodgrains and consumption of fertilizers. The foodgrains production of the country has increased nearly 5.5 times from 51.99 million tonnes in the year 1951-52 to 285.21 million tonnes in the year 2018-19. During green revolution fertilizer responsive high yielding varieties were introduced along with assured irrigation facilities, which immensely increased production of foodgrains.

The consumption of total nutrients (N, P_2O_5 and K_2O) in India was 0.07 million tonnes in 1951-52. There was a major thrust in consumption of total nutrients in agriculture (Table 1) during the green revolution period as it increased to 2.67 million tonnes during 1971-72, Moreover, in recent times it further increased to 27.23 million tonnes in the year 2018-19. The consumption of N, P_2O_5 and K_2O was 17.64, 6.91 and 2.68 million tonnes, respectively, during 2018-19. The use of fertilizers along with high yielding varieties and assured irrigation increased the foodgrains production thus achieving food security in the country.

Consumption of nutrients per unit of the cropped area pattern (Figure 1) revealed an increasing trend of per hectare consumption of N, P_2O_5 and K_2O in India. Consumption of plant nutrients per unit of gross cropped area in India, increased enormously from 0.49 kg/ha in 1951-52 to 134.20 kg/ha in 2017-18. This increase was mainly because of the introduction of fertilizer-responsive high yielding varieties in Indian agriculture. Among the major fertilizer products, the consumption of urea was 29.89 million tonnes, DAP 9.29 million tonnes, NP/NPK complex fertilizers 8.60 million tonnes, SSP 3.44 million tonnes and MOP 3.16 million tonnes during 2017-18.

Table 1. All India Consumption of N, P_2O_5 and K_2O (million tonnes)

Year	N	P_2O_5	K_2O	Total
1951-52	0.06	0.01	-	0.07
1961-62	0.25	0.06	0.03	0.34
1971-72	1.80	0.56	0.30	2.67
1981-82	4.07	1.32	0.68	6.07
1991-92	8.05	3.32	1.36	12.73
2001-02	11.31	4.38	1.67	17.36
2010-11	16.56	8.05	3.51	28.12
2011-12	17.30	7.91	2.57	27.79
2012-13	16.82	6.65	2.06	25.54
2013-14	16.75	5.63	2.10	24.82
2014-15	16.95	6.10	2.53	25.58
2015-16	17.37	6.98	2.40	26.75
2016-17	16.74	6.71	2.51	25.95
2017-18	16.96	6.85	2.78	26.59
2018-19 (P)	17.64	6.91	2.68	27.23

Source: Fertiliser Statistics (2018-19)

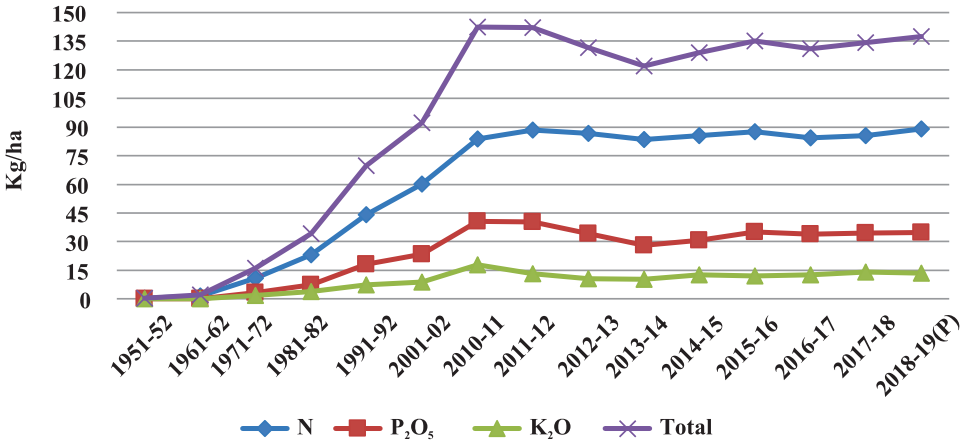

Figure 1. Consumption of N, P_2O_5 and K_2O per unit of gross cropped area

Source: Fertilizer Statistics (2018-19)

The share of the major states in total consumption of N, P_2O_5 and K_2O in the country during 2017-18 is shown in Figure 2. The consumption of N, P_2O_5 and K_2O in Uttar Pradesh was about 18 per cent followed by Maharashtra (11 per cent) and Madhya Pradesh (8 per cent) during 2017-18. State-wise per hectare (N+P_2O_5+K_2O) consumption to the gross cropped area is depicted in Figure 3. The highest per hectare consumption of N, P_2O_5 and K_2O was in the state of Telangana (284 kg/ha) followed by Bihar

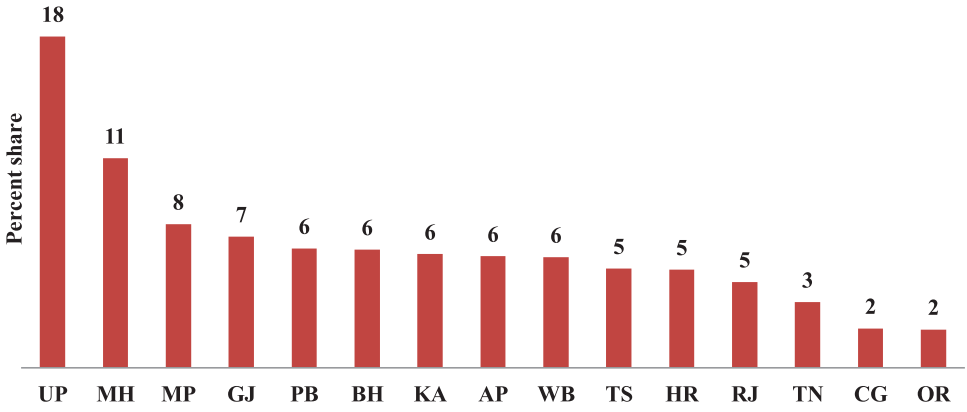

Figure 2. Per cent share (%) of major states in the consumption of total plant nutrients ($N+P_2O_5+K_2O$), 2017-18.

Source: Fertilizer Statistics (2018-19)

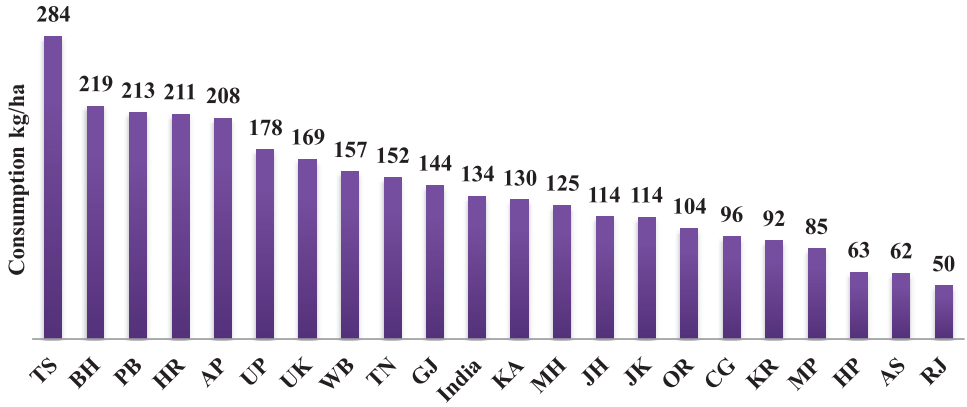

Figure 3. State-wise per hectare ($N+P_2O_5+K_2O$) consumption to gross cropped area, 2017-18 (kg/ha)

Source: Fertilizer Statistics (2018-19)

(219 kg/ha) and Punjab (213 kg/ha) in the year 2017-18. During the same period, in 120 districts of India per hectare consumption of fertilizers was more than 200 kg. The top five high fertilizer consuming districts were Guntur and Kurnool in Andhra Pradesh; Jalgaon and Ahmednagar in Maharashtra, and West Godavari in Andhra Pradesh.

The balanced use of nutrients is crucial to maintain soil health, soil fertility and productivity. The NPK consumption ratio shows the proportion in which N, P_2O_5 and K_2O nutrients are being used. For higher productivity and to maintain fertility of the soil, the recommended NPK consumption ratio is 4:2:1. During the year 2017-18, NPK consumption ratio (Table 2) was found 6.1:2.5:1, which is deviated from the recommended ratio. If we look at NPK use ratio in the country for the last decade, it was very much closer to the recommended ratio during the year 2009-10. The P and

K consumption ratio has been found closer to the recommendation but N ratio was very high; the most relevant explanation for this is may be due to disparity in the prices of N and P&K fertilizers.

Table 2. All India consumption ratio of N and P_2O_5 in relation to K_2O

Year	$N : P_2O_5 : K_2O$		
	N	P_2O_5	K_2O
1991-92	5.9	2.4	1.0
2001-02	6.8	2.6	1.0
2009-10	4.3	2.0	1.0
2010-11	4.7	2.3	1.0
2011-12	6.7	3.1	1.0
2012-13	8.2	3.2	1.0
2013-14	8.0	2.7	1.0
2014-15	6.7	2.4	1.0
2015-16	7.2	2.9	1.0
2016-17	6.7	2.7	1.0
2017-18	6.1	2.5	1.0
2018-19 (P)	6.6	2.6	1.0

Source: Fertiliser Statistics (2018-19)

On the other hand, the per cent consumption of N, P, and K fertilizers (Figure 4) varied across the states. In Punjab, Haryana and Rajasthan more

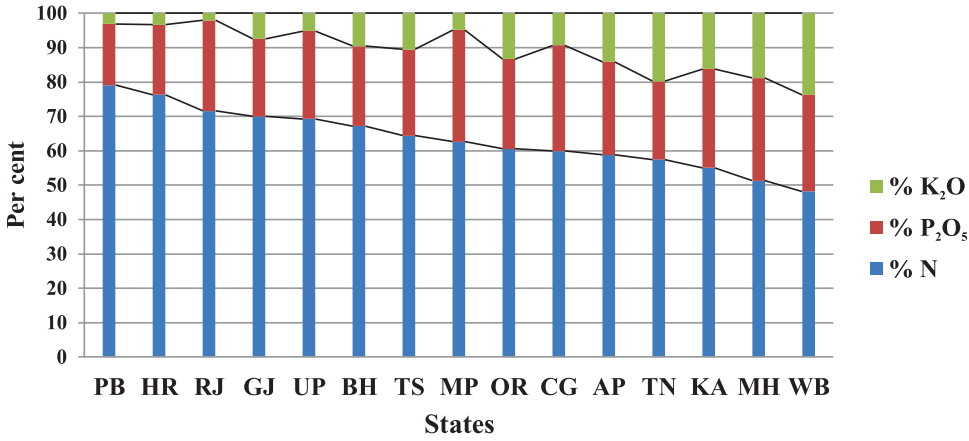

Figure 4. Per cent consumption of N, P and K fertilizers, 2017-18

Source: Fertilizer Statistics (2018-19)

of N fertilizers was used as compared to P and K fertilizers whereas in Karnataka, Maharashtra and West Bengal there was a more equitable use of N, P and K fertilizers. These variations in the use of fertilizers can be due

to types of crops, fertility status of the soils and price disparity in the prices of N and P&K fertilizers.

The consumption of fertilizers also varies according to the size of land holding. The pattern of fertilizers consumption by different sizes of farms (Table 3) revealed that 67 per cent of cultivator households have a farm size of less than 1 ha and they together cultivate 25 per cent agricultural area in the country. This category of farm size (<1 ha) applied the fertilizers to the 78 per cent area of their farm size and used fertilizers at the rate of 243 kg/ha. On the other hand, 5 per cent of cultivator households have farm size of more than 4 ha and they together cultivate 29 per cent agricultural area in the country. They (>4 ha) used fertilizers at the rate of 134 kg/ha. A wide variation in the use of fertilizers vis-à-vis sizes of the farm was observed; with the increase in the size of the farm, per hectare consumption of fertilizer declines.

Table 3. Pattern of fertilizers consumption by size of farms, 2011-12

Item	Size of farm (ha)					
	Less than 1	1 to 1.99	2 to 3.99	4 to 9.99	10 and above	All
Distribution of cultivator households (per cent)	67	18	10	4	1	100
Area cultivated (per cent)	25	22	24	21	8	100
Proportion of fertilized area to gross cropped area (per cent)	78	78	78	74	63	76
Fertilizer consumption per hectare of fertilized area (NPK) (Kg/ha)	243	167	146	134	134	172

Source: Input Survey (2011-12)

So we can deduce that use of fertilizer in Indian agriculture has wide spatial and temporal variation due to introduction of high yielding varieties, commercialization of agriculture, variation in agro-climatic condition and variation in fertility status of soils in different regions of the country. Fertilizers have contributed significantly to the increase in foodgrains production thus making the country self-sufficient in food production, but judicious and balanced use of fertilizers is very important to maintain fertility of soils and to prevent degradation of soils and environment.

1.2 Fertilizer Use in Major Countries

Global consumption of the fertilizers across the countries varies due to soil type, crops, climatic conditions and fertility status of the soils. India is world's third largest per hectare consumer of fertilizers. The annual per hectare consumption of fertilizers in India is 144 kg/ha. The highest per hectare consumption of the fertilizers (Figure 5) is in Egypt (422 kg/ha per

annum) followed by Bangladesh (251 kg/ha per annum). The proportion of NPK in the total fertilizers consumption also varied across the countries. Countries like Egypt, France, Pakistan and India are consuming more of the nitrogenous fertilizers whereas Brazil, Indonesia and Bangladesh are consuming more balanced distribution of N, P and K fertilizers (Figure 6).

India holds an important place in the world market for fertilizers. During the year 2016, India was the second-largest consumer of the

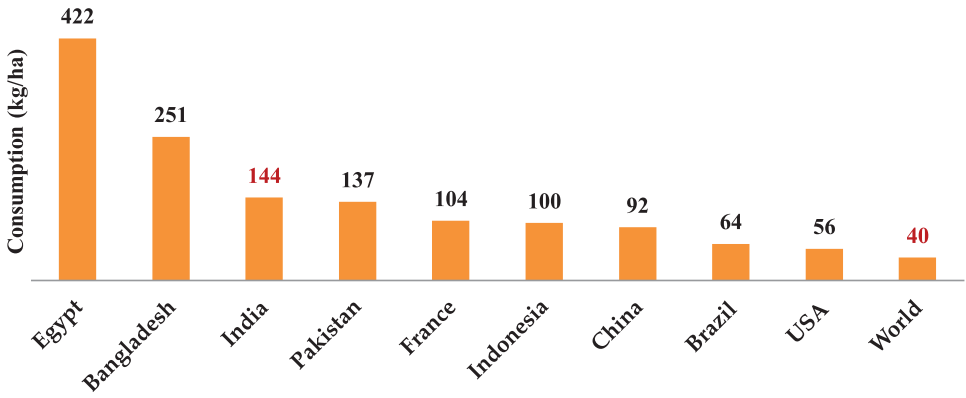

Figure 5: Global consumption of N, P_2O_5 and K_2O (kg/ha) in 2016

Source: Fertilizer Statistics (2018-19)

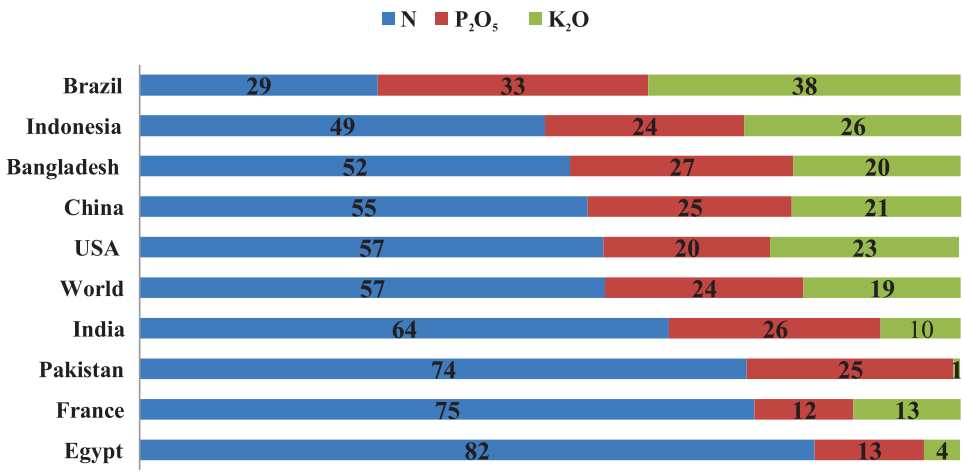

Figure 6: Per cent share of N, P_2O5 and K_2O (Kg/ha) consumption in 2016

Source: Fertilizer Statistics (2018-19)

nitrogenous fertilizers after China (Table 4). During the year 2016, the annual global consumption of the nitrogenous fertilizers was recorded to be 108.38 million tonnes of that India consumed 16.74 million tonnes which was 15 per cent of the total global consumption of the nitrogenous fertilizers. Among the nitrogenous fertilizers, urea is the most important as

it has a share of 48 per cent in the global consumption of the nitrogenous fertilizers in 2016 (Figure 7).

Table 4. Share of major nitrogen consuming countries in 2016

Countries	Consumption (million tonnes)	Per cent share
China	26.52	24
India	16.74	15
USA	12.81	12
Brazil	4.37	4
others	47.94	44
Total	108.38	100

Source: Fertiliser Statistics (2018-19)

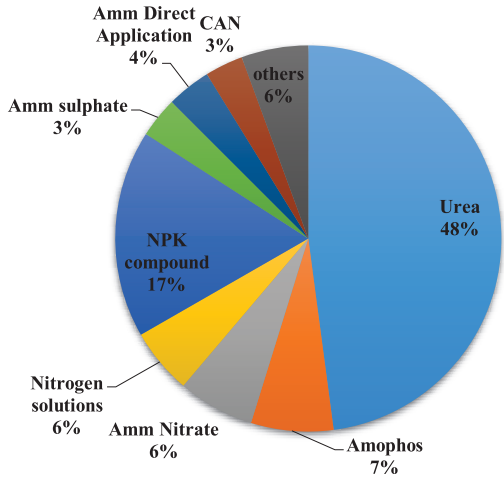

Figure 7. Product-wise percentage share to world consumption of N in 2016

Source: Fertiliser Statistics (2017-18)

Table 5: Share of major phosphate consuming countries in 2016

Countries	Consumption (million tonnes)	Per cent share
China	12.68	28
India	6.71	15
Brazil	4.97	11
USA	4.49	10
Others	17.13	37
Total	45.98	100

Source: Fertiliser Statistics (2018-19)

India is the second largest consumer of phosphate in the world after China (Table 5). In 2016, the phosphate consumption of China was 12.68 million tonnes, (28 per cent of the global consumption) and of India 6.71 million tonnes (15 per cent of the global consumption).

Among the major phosphatic fertilizers, the largest consumed (48 per cent) fertilizer was ammonium phosphate in 2016 (Figure 8). The high consumption of nitrogenous and phosphatic fertilizers by India reflects its prominence in the international market.

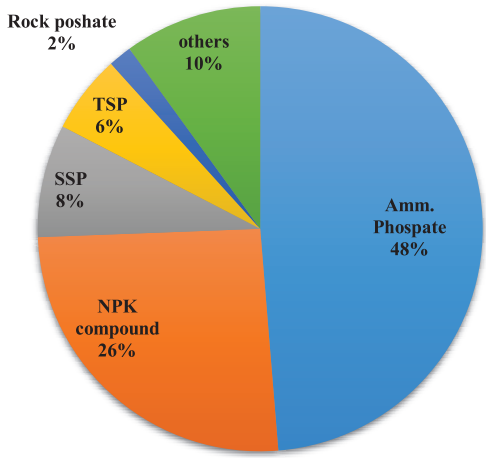

Figure 8. Product-wise percentage share to world consumption of P_2O_5 in 2016

Source: Fertilizer Statistics (2017-18)

It is important to note that India does not have commercially viable sources of potash and its whole consumption requirement is being met through import. India is fourth-largest consumer of potash in the world after China, Brazil and USA (Table 6). India's consumption accounted for 7 per cent of the global consumption of potash in 2016.

Table 6. Share of major potash consuming countries in 2016

Countries	Consumption (million tonnes)	Per cent share
China	9.57	26
Brazil	5.73	16
USA	5.24	14
India	2.51	7
Indonasia	1.60	4
others	11.82	32
Total	36.47	100

Source: Fertiliser Statistics (2018-19)

India being the second largest consumer of nitrogen and phosphate, as well as the fourth largest consumer of potash in the world heavily relies on the international market to meet its potash requirement and to some extent for phosphate and nitrogen requirements. India has very high stakes in the international markets. Any volatility in the international market affects India and vice-versa. Therefore, it is important to ensure the uninterrupted supply of fertilizers at reasonable prices to farmers.

1.3 Demand Projection of Fertilizers in India

The demand projection of fertilizers is important to know its future requirement just to ensure its availability to farmers at reasonable prices, and also to maintain or increase productivity of crops to ensure profitability of agriculture as well as food security of the nation. India is an agriculture dominant country and its large proportion is directly or indirectly dependent on it. It is very important that all the inputs required in agriculture should be given their due importance. The fertilizer is one of the most important inputs in agriculture. Decision on a vital national fertilizer strategy requires knowledge on the likely scenario of the near future. The Fertilizers Association of India (FAI) has made mid-term demand projection of fertilizer nutrients in India. The actual demand of the N, P_2O_5 and K_2O was 16.96 million tonnes, 6.85 million tonnes and 2.78 million tonnes, respectively, in 2017-18 (Table 7). The estimated demand of N, P_2O_5 and K_2O would be around 19.20 million tonnes, 7.09 million tonnes and 2.87 million tonnes, respectively, for the year 2023-24. So, there would be additional requirements of 2.24 million tonnes of N, 0.24 million tonnes of P_2O_5 and 0.09 million tonnes of K_2O in the year 2023-24 as compared to the year 2017-18.

Table 7. Demand projections of fertilizer nutrients by FAI (million tonnes)

Year	N	P_2O_5	K_2O	Total
2017-18 (actual)	16.96	6.85	2.78	26.59
2018-19 (estimated)	17.95	6.87	2.54	27.36
Forecast				
2019-20	18.03	6.94	2.61	27.58
2020-21	18.32	6.98	2.67	27.97
2021-22	18.61	7.02	2.74	28.36
2022-23	18.91	7.05	2.80	28.76
2023-24	19.20	7.09	2.87	29.16
Additional requirement in 2023-24 from 2017-18	2.24	0.24	0.09	2.57

Source: Fertiliser Association of India

Table 8. Demand projections of fertilizer nutrients by ICAR-NIAP (million tonnes)

Year	N	P_2O_5	K_2O	Total
2017-18	16.96	6.85	2.78	26.59
2018-19 (P)	17.95	6.87	2.54	27.36
Forecast				
2019-20	17.94	7.03	2.69	27.66
2020-21	18.25	7.15	2.73	28.14
2021-22	18.56	7.27	2.78	28.61
2022-23	18.87	7.39	2.83	29.08
2023-24	19.17	7.51	2.88	29.56
Additional requirement in 2023-24 from 2017-18	2.21	0.66	0.10	2.97

Source: Authors Estimations

The mid-term demand projection of fertilizers in India were estimated at ICAR-National Institute of Agricultural Economics and Policy Research (NIAP) by utilizing time series forecasting technique (best fitted model) based on historical data of fertilizer consumption in India for the time period from 1952-53 to 2018-19. According to NIAP estimates, there would be additional requirements of 2.21 million tonnes of N, 0.66 million tonnes of P_2O_5 and 0.10 million tonnes of K_2O in the year 2023-24 as compared to 2017-18 (Table 8).

Based on the demand projection by FAI and NIAP, it can be rationally inferenced that in the near future no drastic change in the demands of NPK nutrients is expected. Therefore, major focus should be on to ensure the uninterrupted supply of nutrients at lower prices to farmers. There is also a need to give attention and create awareness among farmers for the balanced and judicial use of NPK in Indian agriculture.

1.4 National Fertilizer Production Scenario

The domestic production of N and P_2O_5 was 10.69 million tonnes and 3.84 million tonnes in 2001-02 (Table 9), which increased to 13.42 million tonnes of N and 4.72 million tonnes of P_2O_5 by 2017-18. Over a time-span of seventeen years, the domestic production of these nutrients increased by 25.54 per cent of N (2.73 million tonnes) and 22.92 per cent of P_2O_5 (0.88 million tonnes) in 2017-18. During the same period, the import of N increased from 0.28 to 3.62 million tonnes (nearly 13 times) and of P_2O_5 from 0.49 to 2.04 million tonnes (nearly 4 times). There is no domestic production of K_2O, our whole requirement is being met by the import. The import of K_2O was 1.70 million tonnes in 2001-02, which has increased to

2.93 million tonnes (nearly 1.7 times) in 2017-18. India is producing 79 per cent of its N requirement and 70 per cent of its P_2O_5 requirement whereas the remaining requirement of N & P_2O_5 and the whole of K_2O are imported (Figure 9).

Table 9. Domestic production and import of N, P_2O_5 and K_2O in 2017-18

Nutrient	2001-02		2017-18	
	Domestic Production (million tonnes)	Import (million tonnes)	Domestic Production (million tonnes)	Import (million tonnes)
N	10.69	0.28	13.42	3.62
P_2O_5	3.84	0.49	4.72	2.04
K_2O	-	1.70	-	2.93

Source: Fertiliser Statistics (2018-19)

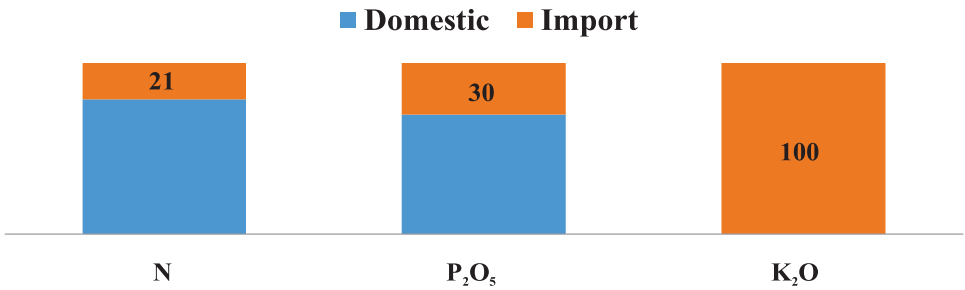

Figure 9. Share of domestic production and import of N, P_2O_5 and K_2O in 2017-18

Source: Fertilizer Statistics (2018-19)

The indigenous fertilizer production in India is being contributed by public, private and cooperative sectors (Table 10). The N production capacity in the country is 14.92 million tonnes out of which 3.64 million tonnes (24 per cent) is in public sector, 7.64 million tonnes (51 per cent) private sector and 3.64 million tonnes (24 per cent) cooperative sector. All the three sectors contribute to the production of nitrogenous fertilizers in the country in proportion to their established capacity. The capacity utilization is highest by cooperative sector (102 per cent) followed by public sector (95 per cent) and private sector (81 per cent). The indigenous production of nitrogenous fertilizers in the country is 13.34 million tonnes from the capacity of 14.92 million tonnes so the capacity utilization is 89 per cent.

The indigenous production capacity of phosphatic fertilizers in the country is 7.35 million tonnes comprising 5.39 million tonnes of NP/NPKs and

Table 10. Sector-wise production of fertilizers and capacity utilization in 2018-19 (million tonnes)

Sector	N			P_2O_5								
				Capacity			Production			Capacity utilization (%)		
	Capacity	Production	Utilization (%)	NP/NPKs	SSP	Total	NP/NPKs	SSP	Total	NP/NPKs	SSP	Total
Public	3.64	3.45	95	0.39	-	0.39	0.21	-	0.21	55	-	55
%	24	26	-	7	-	5	5	-	5	-	-	-
Private	7.64	6.16	81	3.30	1.96	5.25	2.50	0.65	3.15	76	33	60
%	51	46	-	61	100	71	63	100	69	-	-	-
Co-operative	3.64	3.73	102	1.71	-	1.71	1.23	-	1.23	81	-	72
%	24	28	-	32	-	23	31	-	27	-	-	-
Total	14.92	13.34	89	5.39	1.96	7.35	3.94	0.65	4.59	73	33	62

Source: Fertiliser Statistics (2018-19)

1.96 million tonnes of SSP. The NP/NPKs capacity of 5.39 million tonnes comprised 3.30 million tonnes (61 per cent) under private sector, 1.71 million tonnes (32 per cent) under cooperative sector and 0.39 million tonnes (7 per cent) under public sector. The NP/NPKs capacity utilization is 76 per cent in private sector, 81 per cent in cooperative sector and 55 per cent in public sector. The average capacity utilization in NP/NPKs sector is 73 per cent. The SSP domestic production capacity in the country is 1.96 million tonnes and all the plants are in private sector but the capacity utilization here is only 33 per cent. The overall indigenous production capacity of nitrogenous and phosphatic fertilizers in the country is 22.3 million tonnes and of which 17.9 million tonnes is being produced presently with 80.5 per cent capacity utilization.

1.5 Global Fertilizer Production Scenario

The fertilizer data clearly revealed that India is an important player in the international markets for fertilizers. The world production of nitrogen was 120.36 million tonnes in 2016 (Table 11) where India was the second largest producer (13.38 million tonnes, 11 per cent of the world's total production) of the nitrogenous fertilizers in the world after China. Among all the nitrogenous fertilizers produced during the 2015, urea was the most important fertilizer as its contribution was 57 per cent in the total production of nitrogenous fertilizers (Figure 10).

Table 11. Share of major nitrogen producing countries in 2016

Countries	Production (million tonnes)	Per cent share
China	37.51	31
India	13.38	11
USA	9.97	8
Russia	9.47	8
others	50.03	42
Total	120.36	100

Source: Fertiliser Statistics (2018-19)

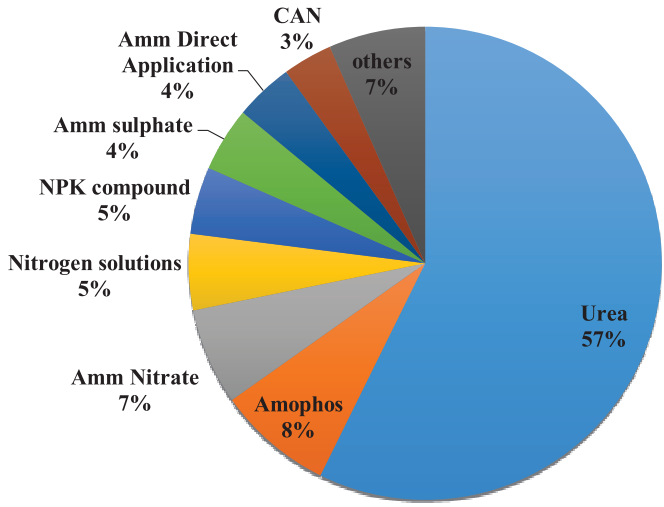

Figure 10. Product-wise percentage share to world production of 'N' in 2015

Source: Fertilizer Statistics (2017-18)

The global production of phosphate was 54.96 million tonnes in 2016 (Table 12), where India was the third largest producer after China and USA.

Table 12. Share of major phosphate producing countries in 2016

Countries	Production (million tonnes)	Per cent share
China	17.43	32
USA	12.11	22
India	4.56	8
Russia	3.58	7
others	17.28	31
Total	54.96	100

Source: Fertiliser Statistics (2018-19)

India produced 4.56 million tonnes of phosphate in 2016 which was 8 per cent of the global supply of phosphate. Ammonium phosphate was the most important fertilizer among the phosphatic fertilizers in 2015 as its contribution was 64 per cent to the phosphate global supply (Figure 11).

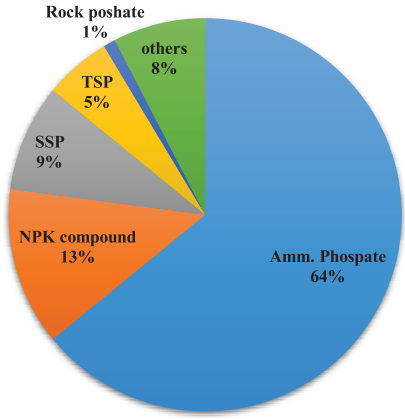

Figure 11. Product-wise percentage share to world production of 'P_2O_5' in 2015

Source: Fertilizer Statistics (2017-18)

India is the second biggest producer of nitrogenous fertilizers and third largest producer of the phosphatic fertilizers in the world. This shows the significant position of India in the global fertilizer production. Still all our production goes for domestic consumption besides we also import fertilizers from international markets to meet the gap in our domestic requirement and supply. As we depend on the international market, there is always a fear of volatility in the prices which are prone to international fluctuation. Fertilizers are crucial inputs for agriculture so there should be some mechanism to ensure long-term uninterrupted supply of fertilizers at reasonable prices.

1.6 Trend in Domestic Prices of Fertilizers

The domestic price of the nitrogen through urea remained the same after the year 2010-11(Figure 12). The prices of P_2O_5 and K_2O through DAP and MOP have increased after the implementation of nutrient-based subsidy scheme. The average prices of P_2O_5 & K_2O were Rs 17.98/kg and Rs 7.93/kg in the year 2010-11. The price of P_2O_5 has increased by nearly 2.7 times from Rs 17.98 to 48.70/kg in 2015-16 due to higher international prices. During the same period, the price of K_2O increased by 3.4 times from Rs 7.93 to 26.67/kg.

During 2016-17 and 2017-18, prices of P_2O_5 & K_2O came down due to a fall in the international prices. Again a surge in the prices of P_2O_5 & K_2O

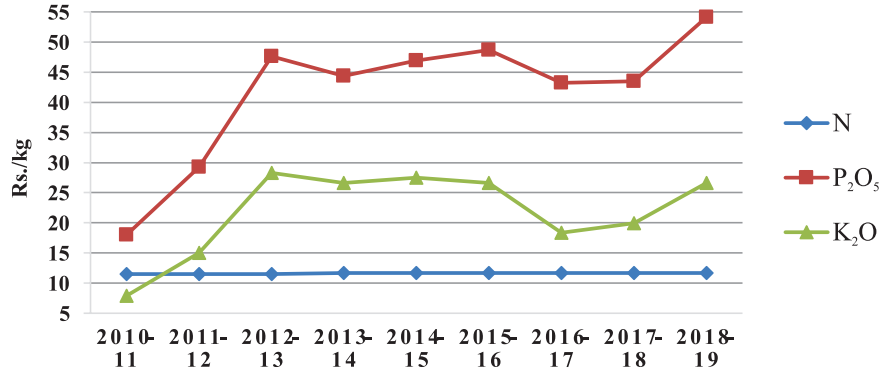

Figure 12: Domestic price trend of N, P_2O_5 and K_2O (Rs/kg of nutrient)

Source: Fertilizer Statistics (2018-19)

was observed in 2018-19. The average prices of DAP and MOP increased by around 24 per cent and 34 per cent, respectively, as compared to that in 2017-18. The prices of K_2O were lower than the N before the implementation of nutrient-based subsidy (NBS) policy. The NBS policy was implemented with the twin objectives of increasing the balanced use of nutrients and lowering the burden of subsidy. After NBS, prices of P_2O_5 and K_2O became much higher as compared to the urea prices leading to a further imbalance in the use of nutrients.

1.7 Central Subsidy on Fertilizers

Fertilizer subsidy is the second largest central government-sponsored subsidy scheme after food subsidy with an annual outlay of Rs 80,000 crore. The fertilizer subsidy in India increased continuously from 1992-93 to 2018-19 (Figure 13). The NBS policy was introduced in 2010, since then the extent of subsidy for P & K has declined. On the other hand, the share

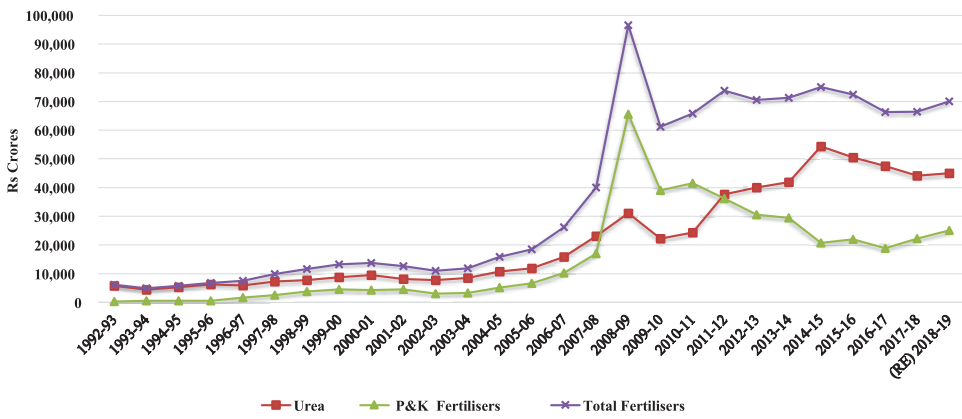

Figure 13: Central subsidies on fertilizers (Rs crore)

Source: Fertiliser Statistics (2018-19)

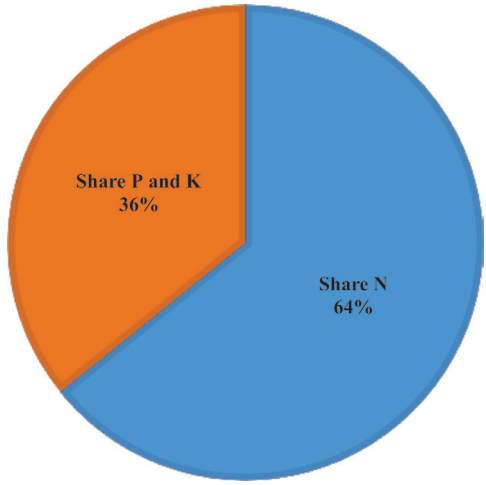

Figure 14. Relative share of subsidies on N and P&K fertilizers, 2018

Source: Fertiliser Statistics (2018-19)

of N subsidy has increased compared to that of P&K fertilizers. Presently, the relative share of N subsidy is 64 per cent whereas the share of P&K subsidy in the total fertilizer subsidy is 36 per cent (Figure 14).

The fertilizer subsidy in India positively affected total consumption of fertilizers leading to increased production of foodgrains and other crops. However, it could not boost the domestic production of the fertilizers. Over the period, there has been an increased dependence on imports to meet the requirement. This might have also lead to imbalanced use of nutrients by the farmers owing to huge differences in prices of N and P&K fertilizers. To address these issues strategies are to be formulated to reduce import dependency and conserve the soil from degradation due to imbalanced use of nutrients. This will also save the public exchequer to a great extent.

2. Availability of Natural Gas, Feedstock, Raw Material and Intermediaries

2.1 Global Raw Material Availability

Natural Gas

The top five countries in natural gas production are USA (21%), Russia (18%), Iran (5%), Qatar (5%) and Canada (5%), which attributes 54% of the total production (Figure 15). USA is emerging as a key natural gas supplier and newer potential capacities are being identified in African and EECA countries.

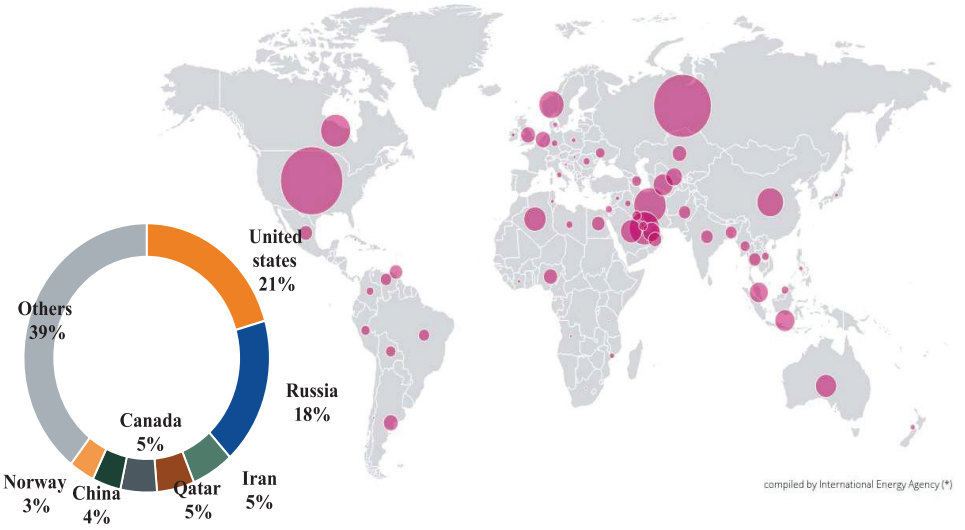

Figure 15. Natural gas production from major countries (2016)

Note: The circles in the map denote the size of the natural gas production. The doughnut chart shows their relative share.

Source: http://energyatlas.iea.org/#!/tellmap/-1165808390

Rock Phosphate

About 74% of global rock phosphate reserves are with Western

Saharan countries, viz. Morocco, Algeria and Tunisia (Figure 16). The top three producers of phosphoric acid are China, USA and Morocco, which account for 63% of the global production capacity.

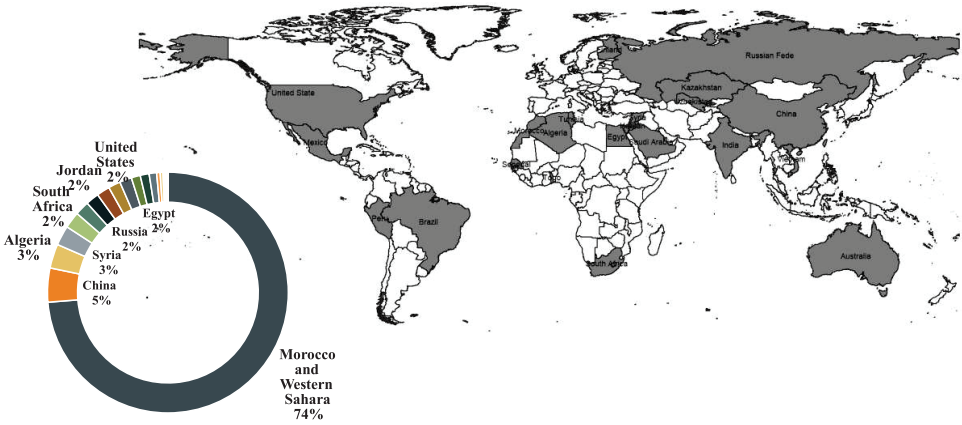

Figure 16. Rock phosphate reserves in major countries

Notes: The rock phosphate reserves exist in shaded countries. The doughnut chart shows their relative share.

Source: United States Geological Survey (USGS)

Potash

About 67% of potash reserves are concentrated in the top three countries viz, Russia (35%), Canada (20%) and Belarus (13%) (Figure 17). Most of the countries with potash reserves are in the northern hemisphere.

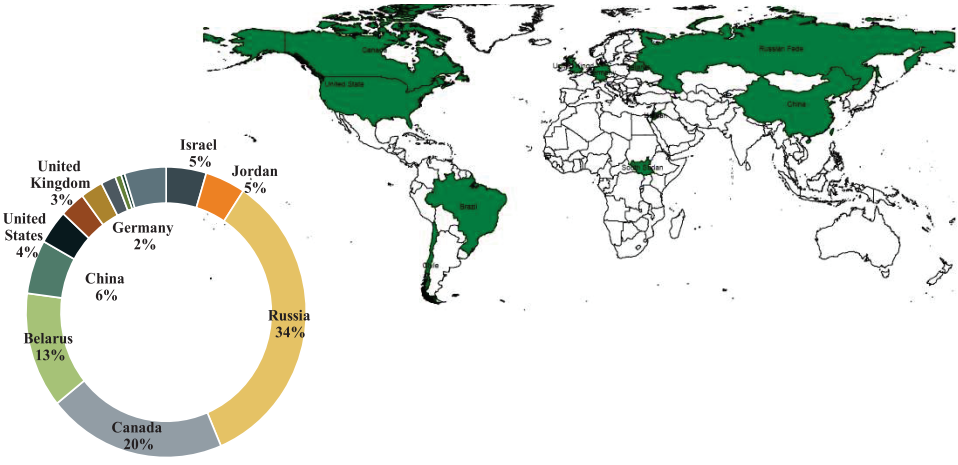

Figure 17. Potash reserves in major countries

Notes: The potash reserves exist in the shaded countries. The doughnut chart shows their relative share.

Source: USGS

2.2 Domestic Raw Material Availability

The supply of gas from existing gas fields in India has been declining over the last eight years. Domestic gas supply declined from 52,219 million cubic meters in 2010-11 to 32,649 million cubic meters in 2018-19 (Figure 18). During the same time, the consumption of natural gas for fertilizer purposes increased from 11,464 to 14,676 million cubic meters. The shortfall

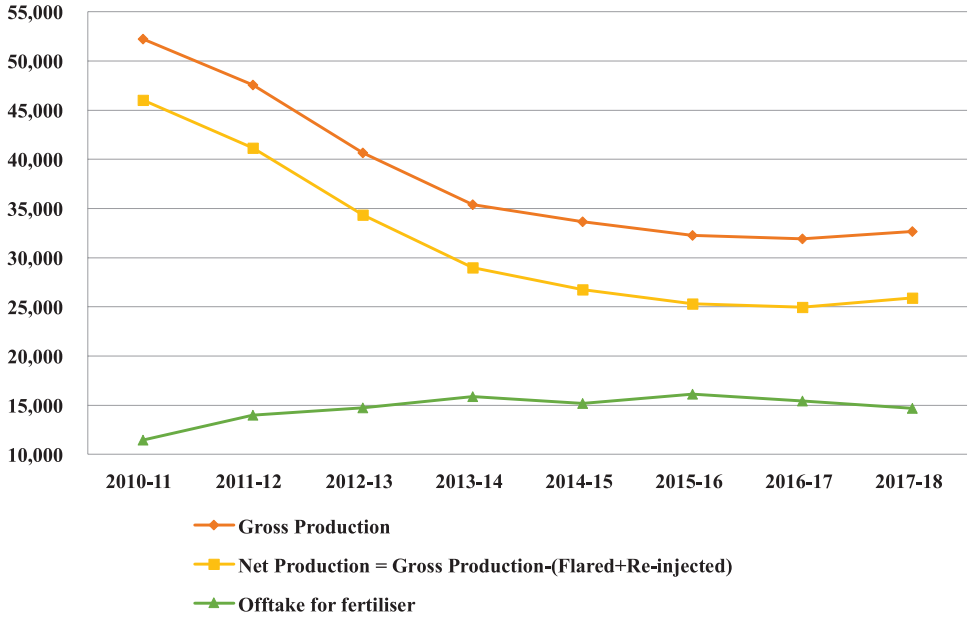

Figure 18. Production of natural gas and off-take by fertilizers (million cubic meters)

Source: Fertiliser Statistics (2018-19)

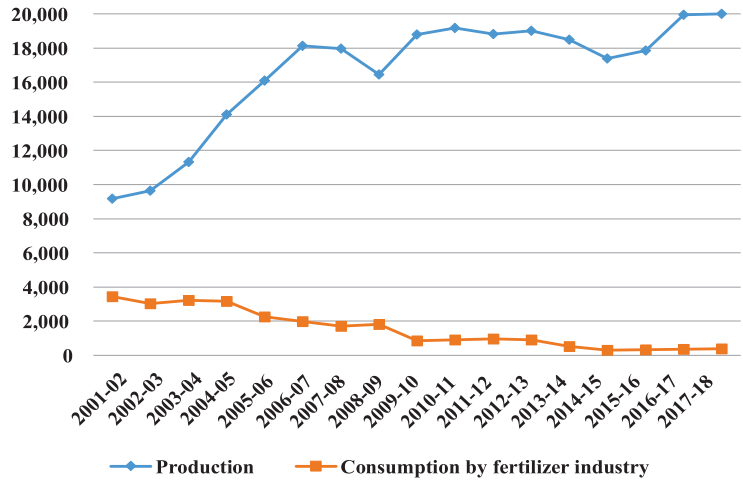

Figure 19. Production and consumption of naphtha by fertilizer industry ('000 tonnes)

Source: Fertiliser Statistics (2018-19)

in the availability of gas from domestic sources is being fulfilled through high cost imported LNG. Imported gas is more expensive than domestic gas, hence cost of production of urea has been increasing over the years.

The production of naphtha in the country was 9,180 thousand tonnes in 2001-02 which has increased by more than two folds to 20,006 thousand tonnes in 2017-18. During the same time, the consumption of naphtha by the fertilizer industry has declined nearly ten folds from 3,426 to 364 thousand tonnes owing to the policy of the government to convert naphtha based plants to gas-based plants (Figure 19).

The indigenous capacity of ammonia production was 15.39 million tonnes as of November 2018. The production of ammonia in the fertilizer industry is increasing constantly; it was 12.15 million tonnes during 2001-02 which increased to 14,66 million tonnes during 2017-18 (Figure 20).

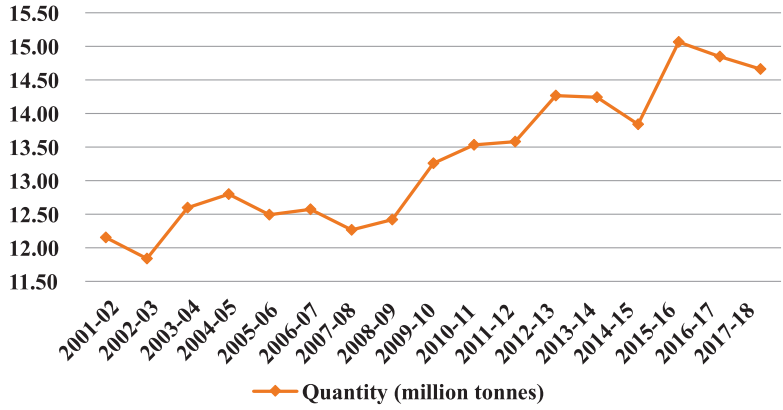

Figure 20. Production of ammonia

Source: Fertiliser Statistics (2018-19)

The indigenous capacity of phosphoric acid was 1.93 million tonnes as of November 2018. The distribution of this capacity between the public, private and cooperative sectors was 0.18, 0.88 and 0.87 million tonnes, respectively. Most of the indigenous production of phosphoric acid comes from private and cooperative sectors in India. The production of phosphoric acid was 1.13 million tonnes in 2001-02 which increased to 1.66 million tonnes during 2017-18 (Figure 21). Over this period, indigenous production of phosphoric acid is mostly varying between 1.00 and 1.50 million tonnes.

The domestic production of sulphuric acid was 5.18 million tonnes in 2001-02 which increased slightly to 5.73 million tonnes in 2012-13 (Figure 22). The production of sulphuric acid was hovering around 5 to 7 million tonnes in India during this period.

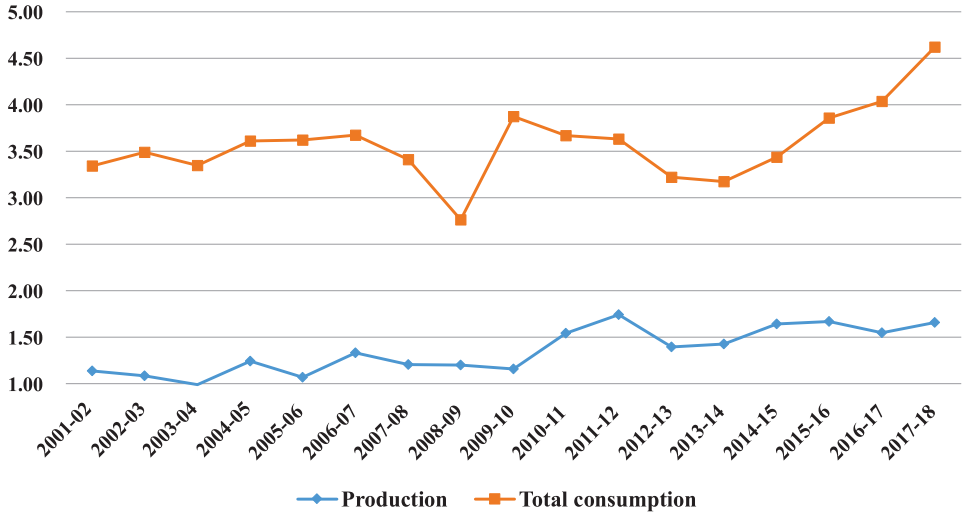

Figure 21. Production and consumption of phosphoric acid (million tonnes of P_2O_5)

Source: Fertiliser Statistics (2018-19)

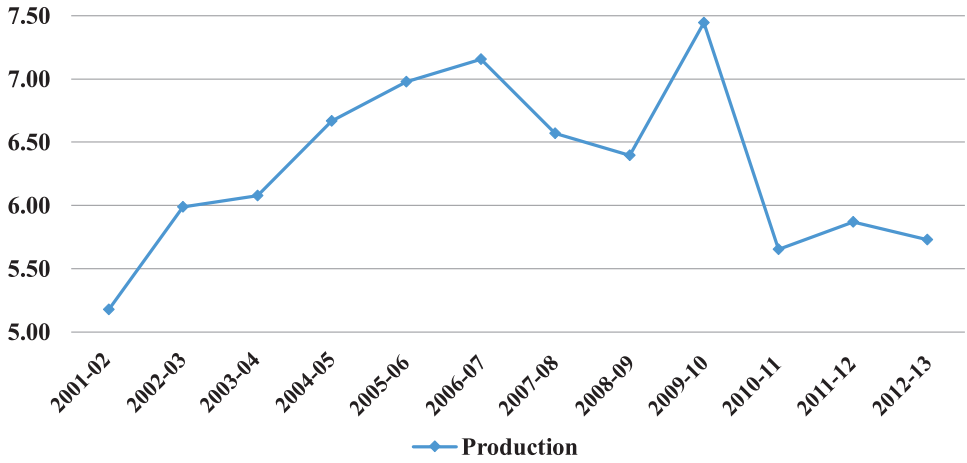

Figure 22. Production of sulphuric acid ('000 tonnes)

Source: Fertiliser Statistics (2018-19)

India is having rock phosphate reserves of 312.68 million tonnes. The distribution of reserves of rock phosphate is widespread across the states. The major reserves are in Jharkhand (107.37 million tonnes), Rajasthan (95.68 million tonnes), Madhya Pradesh (58.05 million tonnes), Uttar Pradesh (25.77 million tonnes) and Uttarakhand (24.18 million tonnes). The quality of Indian rock phosphate is not up to the mark as required for manufacturing the fertilizers. Out of total reserves of 312.68 million tonnes, only 25.98 million tonnes (8 per cent) are of chemical fertilizer grade.

Total production of indigenous rock phosphate was 0.95 million tonnes in 2001-02 which increased to 1.26 million tonnes during 2017-18

(Figure 23). During this period indigenous production of rock phosphate is mostly fluctuating between 1 and 2 million tonnes.

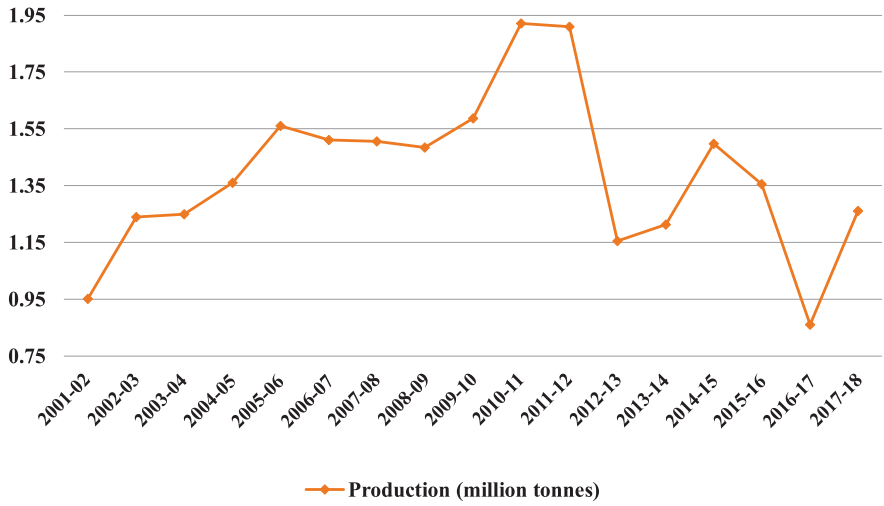

Figure 23. Production of rock phosphate in India (million tonnes)

Source: Fertiliser Statistics (2018-19)

3. Import of Raw Materials and Finished Products

3.1 Import of Raw Materials

The quality of domestic rock phosphate is poor for commercial production. The fertilizer companies mainly rely on imported rock phosphate for manufacturing phosphatic fertilizers. The import of rock phosphate was 8.27 million tonnes in 2014-15 which slightly declined to 7.70 million tonnes in 2017-18 (Table 13).

Table 13. Import of rock phosphate from 2011-12 to 2018-19 (million tonnes)

Country	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 (P)
Jordan	3.53	3.03	2.66	3.21	3.16	2.78	3.11	2.64
Morocco	1.11	1.32	0.96	1.28	1.40	1.11	1.58	2.08
Egypt	0.99	1.27	1.46	1.79	1.76	2.18	1.84	1.27
Togo	0.54	0.66	0.73	0.81	0.46	0.51	0.45	0.83
Algeria	0.07	0.09	0.04	0.06	0.22	0.05	0.16	0.24
others	1.28	0.94	1.32	1.13	1.05	0.88	0.57	0.46
Total	7.52	7.32	7.16	8.27	8.02	7.51	7.70	7.52

Source: Fertiliser Statistics (2018-19)

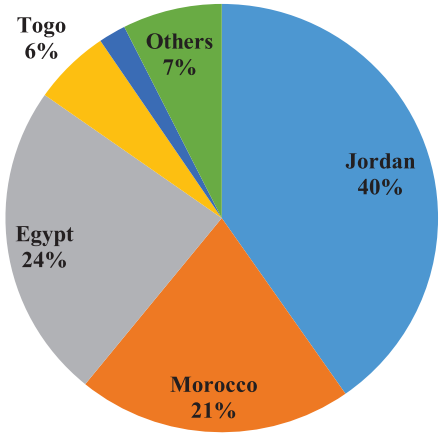

Figure 24. Import of rock phosphate from major countries during 2017-18

Source: Fertiliser Statistics (2018-19)

The annual import of rock phosphate in India is around 7 to 8 million tonnes. India mainly imports rock phosphate (Figure 24) from Jordan (40 per cent), Egypt (24 per cent), Morocco (21 per cent) and from Togo (6 per cent).

The import of phosphoric acid was 1.80 million tonnes in 2014-15 which increased to 2.96 million tonnes in 2017-18 (Table 14). India annually imports 2 to 3 million tonnes of phosphoric acid (Figure 25) mainly from Morocco (29 per cent), Senegal (26 per cent), Jordan (23 per cent), USA (6 per cent), Tunisia (6 per cent) and from Vietnam (4 per cent).

Table 14. Import of phosphoric acid from 2011-12 to 2018-19 (million tonnes)

Country	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19 (P)
Morocco	0.88	0.76	1.02	0.94	1.03	0.90	0.87	0.94
Senegal	0.32	0.00	0.17	0.15	0.25	0.38	0.78	0.73
Jordan	0.00	0.01	0.00	0.15	0.32	0.53	0.67	0.55
USA	0.31	0.30	0.29	0.24	0.18	0.20	0.19	0.21
Tunisia	0.10	0.21	0.05	0.19	0.13	0.14	0.17	0.14
South Africa	0.21	0.08	0.10	0.03	0.06	0.09	0.11	0.09
Vietnam	0.00	0.00	0.00	0.02	0.11	0.12	0.11	0.07
Others	0.09	0.47	0.12	0.07	0.11	0.13	0.05	0.04
Total	1.91	1.83	1.75	1.80	2.19	2.49	2.96	2.77

Source: Fertiliser Statistics (2018-19)

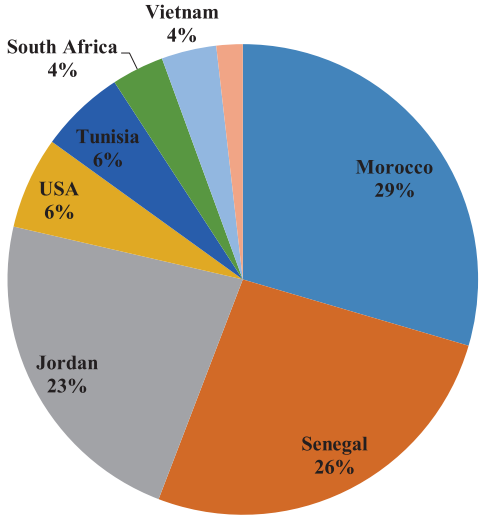

Figure 25. Import of phosphoric acid from major countries during 2017-18

Source: Fertiliser Statistics (2018-19)

3.2 Import of Finished Products

The consumption of fertilizers in India has increased over the decades, much of the increased demand is being met by imports. India does not have a commercially viable source of potash and even in the phosphate sector; there is a limited availability of raw material. Therefore, India imports various grades of fertilizers to overcome the shortage of fertilizers in the country. Urea import in India is canalized. There are canalizing agencies that procure and import as per the requirements and guidelines of the government. The P&K fertilizers (DAP, MOP and NPKs) are under open general license (OGL) as per fertilizer trade policy.

Among the major fertilizers, import of urea was 0.22 million tonnes in 2001-02 which increased to 5.98 million tonnes in 2017-18 (Table 15). During the same period, the import of DAP and MOP increased from 1.06 and 2.81 million tonnes to 4.22 and 4.74 million tonnes, respectively. India also imported 0.14 million tonnes of ammonium sulphate, 0.50 million tonnes of NPKs and 0.07 million tonnes of SOP in 2017-18.

Table 15. Import of fertilizer products from 2001-02 to 2018-19 (million tonnes)

Year	Ammonium sulphate (20.6%N)	Urea (46%N)	DAP (18-46-0)	NP/NPKs (TSP:0-46-0)	MOP (60% K_2O)	SOP (50% K_2O)
2001-02	-	0.22	1.06	-	2.81	0.02
2002-03	-	0.12	0.48	-	2.60	0.01
2003-04	-	0.14	0.80	-	2.58	0.01
2004-05	-	0.64	0.67	-	3.41	0.03
2005-06	-	2.06	2.48	-	4.58	0.04
2006-07	0.02	4.72	2.97	-	3.45	0.01
2007-08	-	6.93	2.99	-	4.42	0.03
2008-09	0.02	5.67	6.46	0.17	5.67	0.03
2009-10	0.04	5.21	6.08	0.09	5.29	0.04
2010-11	0.03	6.61	7.60	1.08	6.36	0.04
2011-12	0.04	7.83	7.40	3.83	3.99	0.05
2012-13	-	8.04	5.86	0.40	2.50	0.03
2013-14	-	7.09	3.30	0.36	3.18	0.06
2014-15	0.16	8.75	3.99	0.29	4.20	0.08
2015-16	0.05	8.47	6.03	0.63	3.24	0.05
2016-17	0.11	5.48	4.39	0.52	3.74	0.05
2017-18	0.14	5.98	4.22	0.50	4.74	0.07
2018-19 (P)	0.08	7.48	6.60	0.55	4.21	0.04

Source: Fertiliser Statistics (2018-19)

The import of fertilizers from major countries during the year 2017-18 was studied (Figures 26 to 30). India imports urea mainly from Oman (41 per cent), Iran (33 per cent), China (12 per cent) and other countries (14 per cent). The import of DAP is from China (45 per cent), Saudi Arabia (31 per cent), USA (13 per cent) and the remaining 11 per cent from other countries. The import partners for MOP are CIS countries (31 per cent), Canada (19 per cent), Russia (18 per cent), Israel (12 per cent), Jordan (9 per cent) and from other countries (11 per cent). Ammonium sulphate is mainly imported from South Korea (95 per cent) and China (5 per cent). The SOP is import from Germany (50 per cent), Taiwan (13 per cent), China (12 per cent), Belgium (9 per cent), Indonesia (7 per cent) and from other countries (9 per cent).

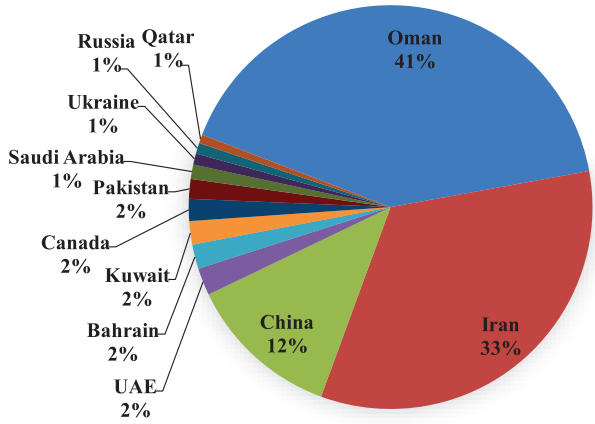

Figure 26. Import of urea from major countries during 2017-18

Source: Fertiliser Statistics (2018-19)

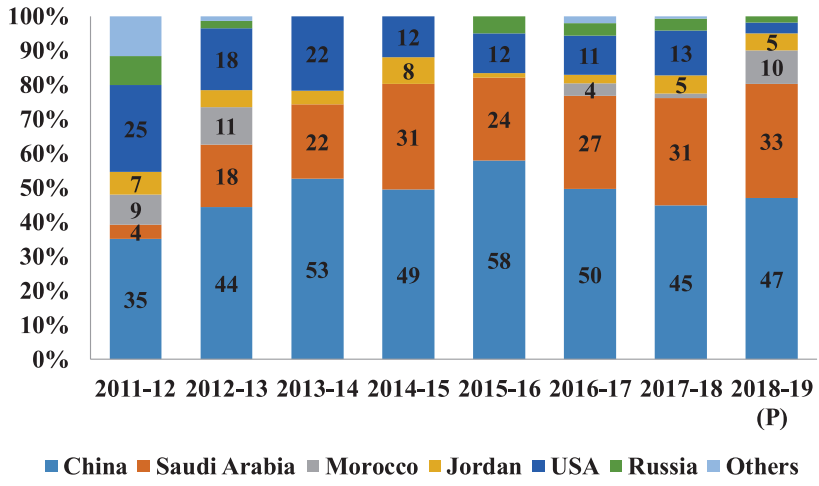

Figure 27. Import of di-ammonium sulphate (DAP) from major countries (% Share)

Source: Fertiliser Statistics (2018-19)

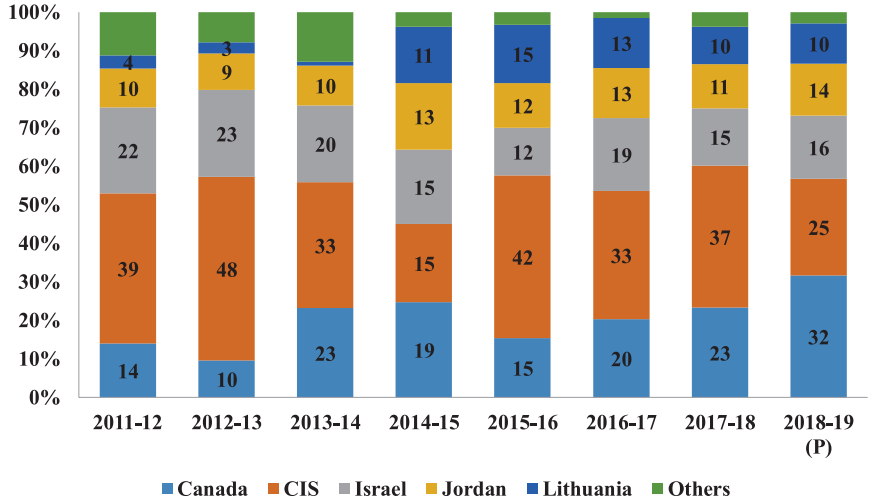

Figure 28. Import of muriate of potash from major countries (% Share)

Source: Fertiliser Statistics 2018-19

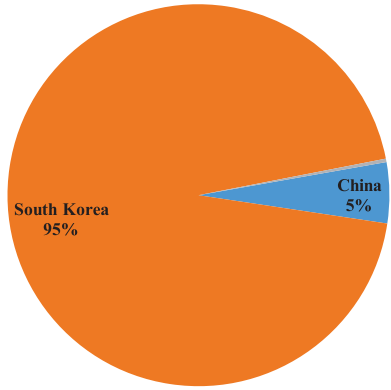

Figure 29. Import of ammonium sulphate from major countries during 2017-18

Source: Fertiliser Statistics (2018-19)

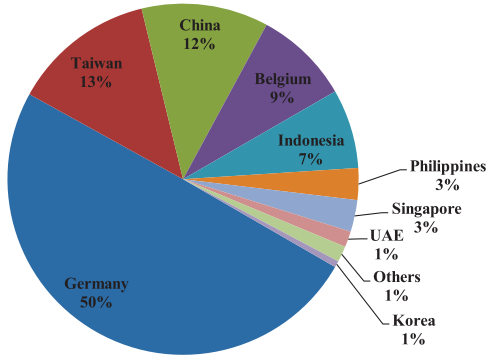

Figure 30. Import of sulphate of potash from major countries during 2017-18

Source: Fertiliser Statistics (2018-19)

3.3 Fertilizer and Raw Material Import Prices

The average CFR (Cost & Freight Rate) prices of urea, DAP and MOP are from the period 1970-71 to 2016-17 (Figure 31). Time series analysis of import prices of fertilizer imported by India revealed that there was a huge spike in the prices after 2006-07. The price of all the imported fertilizers reached its peak in 2008-09 following the global financial crisis. It came down but further increased in 2011-12 and remained historically high. Such prices were not observed in urea imported by the Joint Venture channels. They remained moderately low compared to direct import urea as well as DAP and MOP.

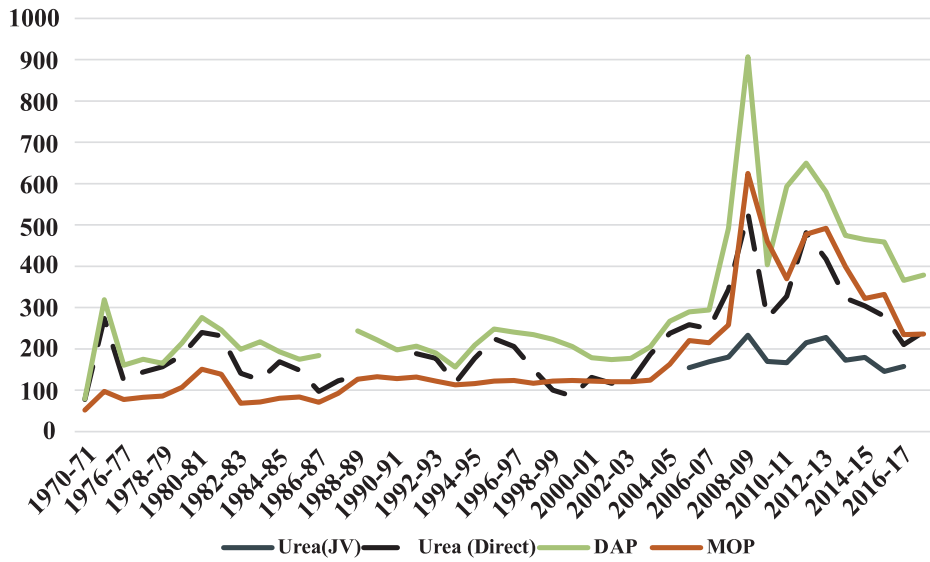

Figure 31. Average CFR (India) prices of urea, DAP and MOP

Note: CFR = Cost & Freight Rate. JV: Joint ventures.
Source: FAI Fertilizer statistics

The volatility of import prices of fertilizers was measured by estimating co-efficient of variation by dividing the time series data into four periods (Table 16).

Table 16. Price volatility (co-efficient of variation)

Period	Urea (JV)	Urea (Direct)	DAP	MOP
1970-1990	-	34.29	27.33	29.31
1991-2001	-	29.73	13.78	4.31
2001 -2011	15.44	45.28	60.63	62.86
2011 -2019	17.57	29.90	21.22	29.44

Source: Estimated by authors.

High volatility (CV>40) was observed during the period 2001-11 for urea (direct import), DAP and MOP. The volatility was higher for DAP (60.63) and MOP (62.36) compared to urea (45.28 direct). This could be attributed to the 2008-09 global financial crisis as discussed before. During the same period, the volatility was lower for urea imported through Joint Ventures (15.44). In the succeeding period, the volatility came down to the previous levels.

3.4 Co-integration of Finished Product and Raw Material Prices

During the discussion with different industries, one of the concerns raised was the benchmarking of the prices of the raw materials with the prices of finished products of DAP by North African countries (Morocco, Algeria). As these countries produce both raw material and finished products, the pricing of raw material based on their finished products makes the produce competitive (lesser price) compared to importing them and producing in India. This resulted in a poor economic viability of domestic industries. There is an increasing divergence between imported DAP and domestic DAP price since 2013 (Figure 32) owing to imports at discriminatory pricing of intermediates by suppliers

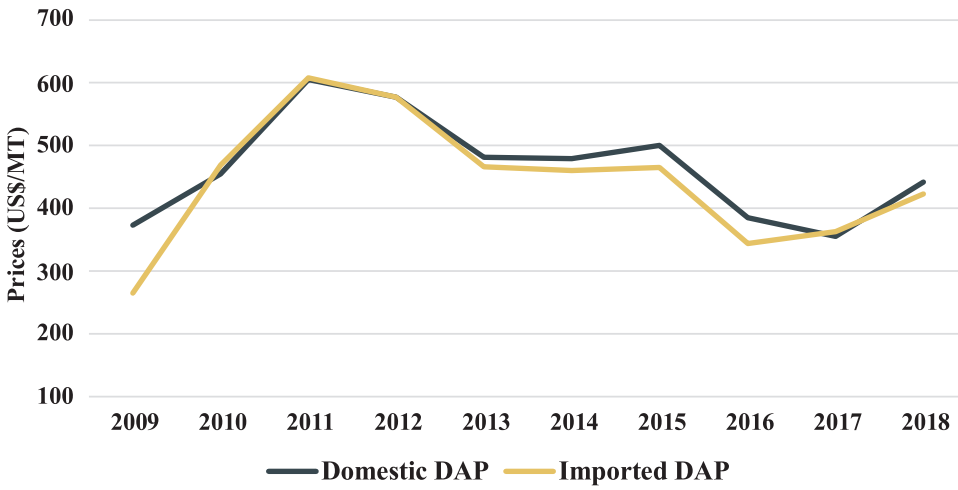

Figure 32. Price gap between manufactured and imported DAP

Source: Coromandel International Ltd

The comparison of the import prices (CFR) of both raw materials (rock phosphate and phosphoric acid) prices with the international prices of finished products imported from North Africa (maximum and minimum prices) showed that raw material price is benchmarked against the finished products (Figure 33).

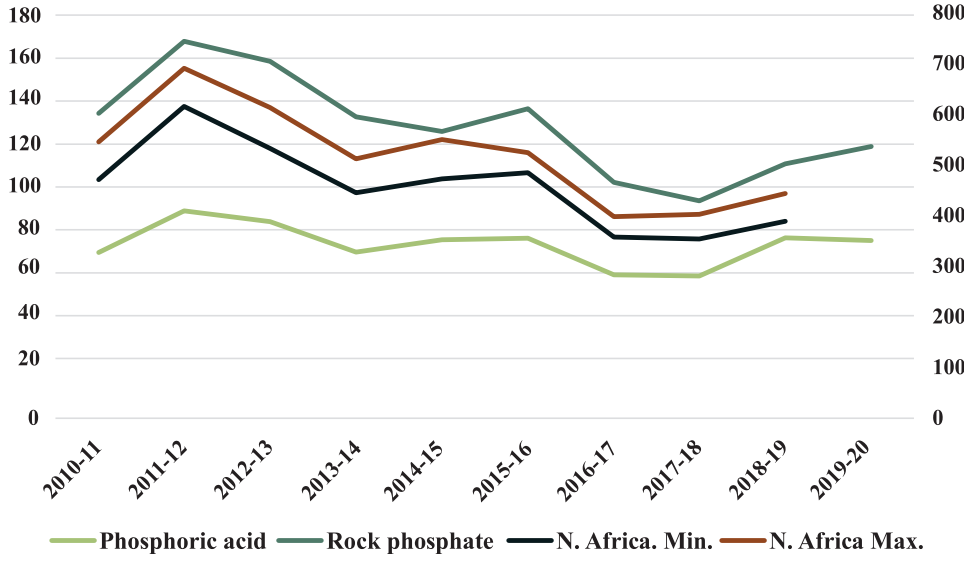

Figure 33. DAP, phosphoric acid and rock phosphate CFR prices

Source: DGCIS, Fertilizer Statistics

Analysis on the seasonality of prices of fertilizer products by plotting monthly prices (Figure 34) revealed no seasonal patterns, but there was some spike in ammonia price trends. The co-integration analysis of FOB price among China, US Gulf and Northern Africa showed, China as a price leader in international DAP markets. With the increasing share of Northern Africa, they would emerge as a price leader in the near future.

India is dependent on a few countries for finished as well as raw material and is vulnerable to international price volatility. There is little scope to diversify the import destinations as the raw materials are concentrated in those countries. This limits the policy options to relying on direct purchase from markets, long term supply agreements or establishing Joint Ventures in those countries to ensure uninterrupted supplies of raw as well as finished products.

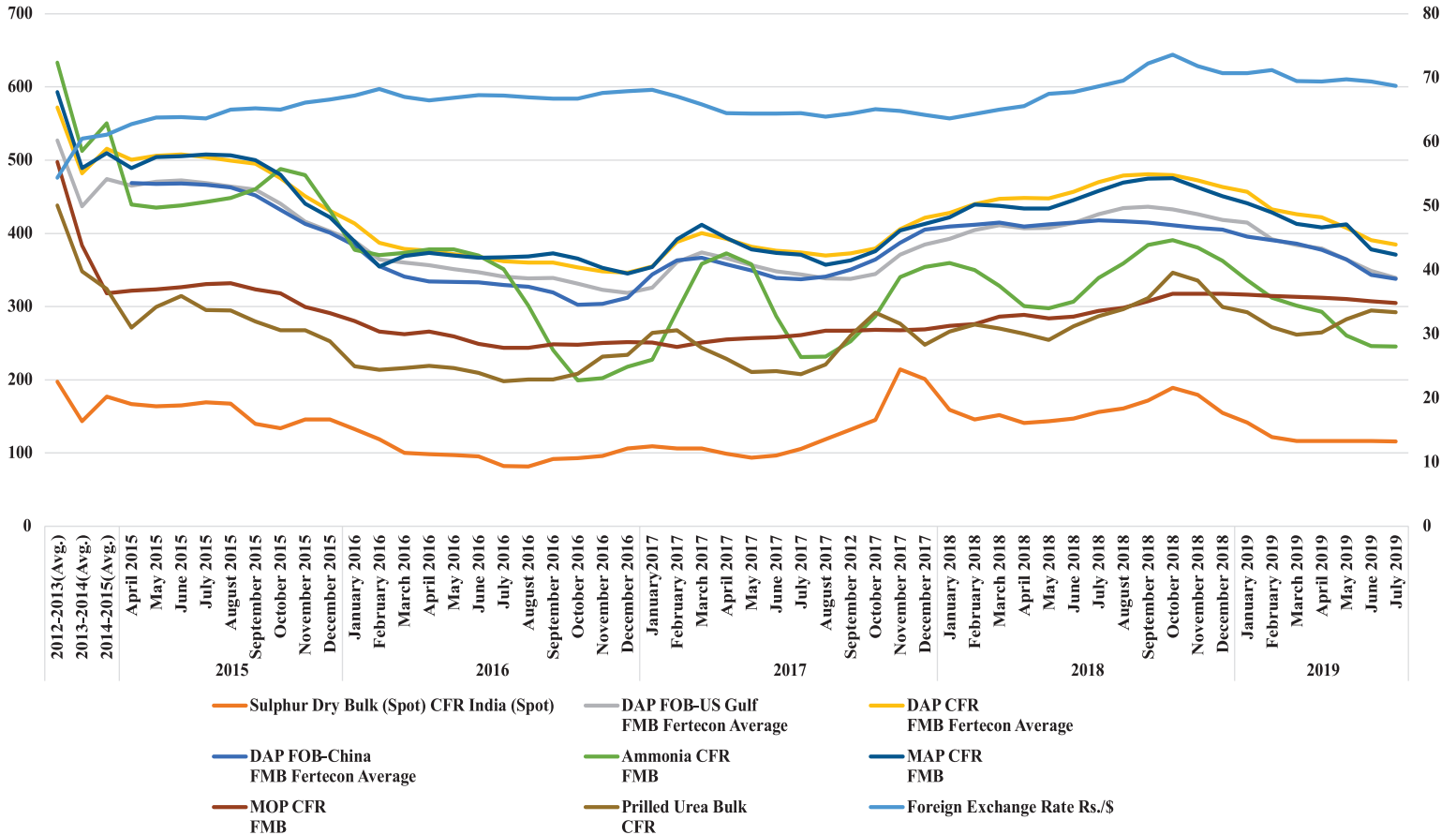

Figure 34. Monthly price of Fertilizer products

Source: IFFCO

4. Global Fertilizer Outlook

Prud'homme and Simonova (2019) on the basis of a short term outlook of fertilizer, showed that global demand for fertilizer would be growing at a rate of 1.3% per annum for the period 2019-23 (in period 2015-18 the growth was 1.2% per annum) . The estimates showed that the increase in urea and potash capacity and supply would be more than its increase in demand (Table 17). While an increase in capacity and supply of phosphoric acid would be less than the demand. An estimate on medium-term outlook showed that the N demand would increase by 1.3% per year by 2030, while P and K would increase by 1.9% and 3.3% respectively (Heffer and Prud'homm 2016). Drescher et al (2011) estimated that the total fertilizer demand would increase to an extent of 347.8 million tonnes by 2050.

Table 17. Fertilizer short term outlook (2019-2013)

	Urea	Phosphoric acid	Potash
Capacity	+8% (226 MT)	+7% (64 MT)	+13% (68 MT)
Supply	+9% (200 MT)	+7% (53 MT)	+13% (55 MT)
Demand	+7% (184 MT)	+8% (50 MT)	+7% (46 MT)

Note: Figure in parenthesis are production capacity in million tonnes.
Source: Prud'homme and Simonova (2019)

Several developments are taking place with respect to the global supply and demand of fertilizer (Figure 35). There are positive developments with respect to capacity development in United States of America, Canada, Bolivia, Brazil, European Union, Middle East, India and Australia. In the next five years (2018-2023), countries like India (33%), Nigeria (200%) would increase their ammonia production capacity. Other countries like Russia, Saudi Arabia, Ethiopia and Mexico are expanding their existing production capacity of ammonia. The world ammonia capacity would increase from 220 million tonnes in 2018 to 228 million tonnes in 2023. At regional level, global urea production capacity would increase by 46% in Africa, 27% in South Asia and 21% in EECA Countries[1]. On the other side, majority of the Sub Saharan African countries would be import dependent, and Nigeria had banned the import of fertilizer due to

[1]See the list of EECA countries https://eeca-ict.eu/countries. Last accessed on 17-09-2019.

its fiscal deficits. There would be a decrease in the ammonia production capacity in China (6.2 million tonnes decrease in 2023 compared to levels in 2018). The share of China in global capacity declined from 35% in 2014 to 30% in 2018 and is predicted to decline further to 16% in 2023. This would also result in a decrease in urea capacity by 4 million tonnes. This change in the production capacity is owing to restructuring of industries for ensuring higher environmental performance, closure of ineffective and unsafe units. On the other hand, these off-set in production capacity is balanced by newer production capacity in India. Seven new urea plants (Annexure Table A1) are currently under construction, which could add 9 million tonnes of capacity leading to total production capacity of 33.7 million tonnes by 2023. This could increase the domestic supply to 90% of the total demand for urea in the country.

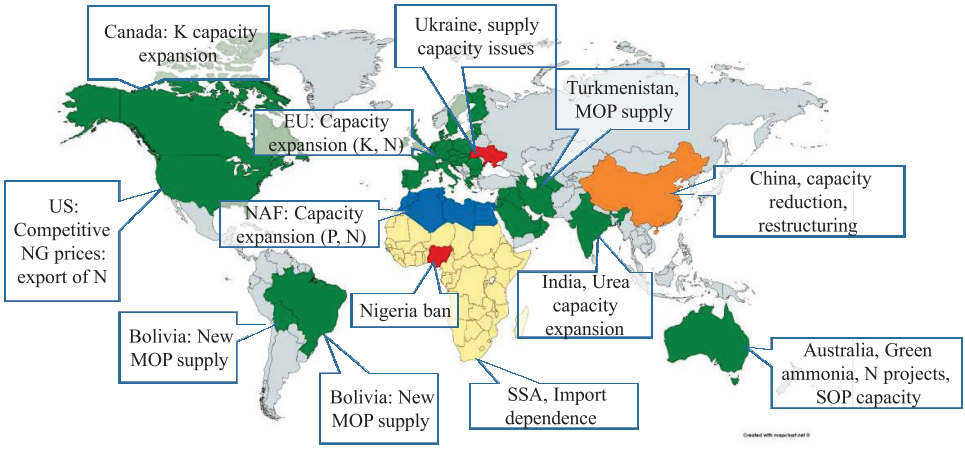

Figure 35. Global supply developments

Note. Countries which are highlighted in green colour are those with positive developments, yellow are the ones with increasing import dependence, orange and red are the one facing issues.

Source. Prud'homme and Simonova (2019)

The growth in phosphoric acid in 2018-23 would be driven by Morocco, Russia, Algeria and Saudi Arabia. New potential production capacities are also identified in Egypt, Brazil, Australia, South Africa and Kazakhstan. Regionally higher growth of production capacity would be witnessed in Africa (27%), followed by EECA countries (12%). In Africa, 80% of the increase in production capacity could be attributed to increased rock phosphate supply from Morocco, Egypt, Tunisia and South Africa. China under the new regulation for 50% of mandatory recycling of phosphogypsum would see a major capacity restructuring. By 2018, the production capacity in Western African and North African countries would overtake China.

Globally new capacity of about 7 million tonnes potash is expected to

be added by 2021. Increase in the production capacity of potasic fertilizer in 2018-23 would be mainly driven by increase in MOP capacity in Russia (5.9 million tonnes additional capacity), followed by Bealrus (3.6 million tonnes additional capacity). Newer sources of potash supply were also discovered in Bolivia, Turkmenistan and Australia. Plants in Europe are restructuring in the same period and it would lead to a reduction of 0.9 million tonnes of MOP production. Nevertheless, there would be a potential surplus of 15% of the supply of potash.

5. Current Policies for Supporting Fertilizer Production

There are several policies implemented by Department of Fertilizer, Ministry of Chemicals and Fertilizer, Government of India for supporting fertilizer production. We reviewed policies such as Urea pricing policies, New Urea Policy 2015, New Investment policy 2012, Joint Ventures and Special Purpose Vehicle (Uarvark Videsh Limited).

5.1 Urea Pricing Policies

In 1977, the Government of India based on the Marathe Committee, designed Retention Pricing Scheme (RPS) for fertilizer industry to ensure a reasonable return on investment. Under RPS a firm-specific normative cost-plus approach was followed. The RPS faced the issue of 'moral hazard' as there was no fair post-return tax and no mechanism to incentivize production efficiency. Subsequently, in 2003, the Government came with the New Pricing Scheme (NPS) which proposed a four-phased pricing reform plan culminating at the decontrolling of urea industry. The major lacuna of the NPS was that it did not ensure uniform price of natural gas for the industry.

5.2 New Urea Policy 2015

On 25th May 2015, the Government of India notified New Urea Policy (DoF Annual Report 2017-18 Annexure IX). Under this policy two provisions were made: firstly, a uniform price (pooled price) of natural gas for 25 gas-based units through a 'gas pooling'; secondly, 25 gas-based units were divided into three groups based on actual energy consumption and pre-set energy norms for three years (2018-19). The objectives of the policy were to (i) maximize indigenous urea production, (ii) promoting energy efficiency in urea production, and (iii) rationalizing subsidy burden on the government. The policy aimed at driving the manufacturing units to select better technology and reduce energy consumption. The policy focused on converting all the units into natural gas feedstock based units. Units using natural gas as feedstock are more energy efficient than the Naphtha based units.

Under this policy 25 gas-based agencies, for production up to 100% of their re-accessed capacity (RAC), they are entitled to get their total cost of production of urea (fixed and variable cost). Beyond 100% RAC, the units would get variable cost and uniform incentive calculated using a formula (DoF Annual Report 2017-18; page 163). Five units were not covered in the scheme because they were not connected to gas pipelines. Of these two units (Namrup II and III) were closed for the installation of higher efficiency units. Under the recommendation of Cabinet Committee on Economic Affairs (CCEA), on 17 June 2015, an amendment was made in the policy, which allowed three naphtha based units (Madras Fertilizer Limited, Manali, Mangalore Chemicals and fertilizer Limited, Mangalore and Southern Petrochemicals Industries Corporation Ltd, Tuticorin) to use naphtha as feedstock till the gas connections are made available for those units.

In 2015, the Ministry of Petroleum and Natural Gas (MoPNG) notified the pooled gas scheme, under which the domestic gas would be pooled with imported Re-gasified Liquefied Natural Gas (RLNG), and natural gas will be delivered at a uniform price to urea manufacturing units connected to Natural Gas grid. This was to ensure that RLNG is supplied to the urea units at competitive prices and to give incentive to them to produce more urea beyond the RAC. The share of RLNG and domestic gas for a different purpose is shown in Figure 36. The imported RLNG contributes roughly 50% of the total natural gas for the fertilizer industry.

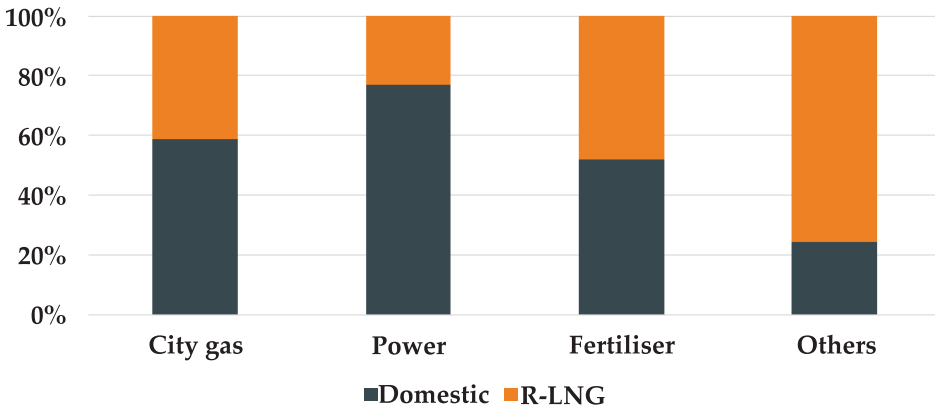

Figure 36. Share of domestic and imported natural gas

Note: (i) Domestic Natural Gas and (ii) Imported Re-gasified Liquefied Natural Gas (R-LNG)

Source: Ministry of Petroleum & Natural Gas Govt. of India (2018-19)

Currently, Out of 30 urea manufacturing units in India (10 public sector, 6 co-operatives and 14 private sector), 28 are using Natural Gas (domestic gas/LNG/CBM) as a feedstock and fuel and three units are using Naphtha as feedstock and fuel. These units are at various phases of connecting it to

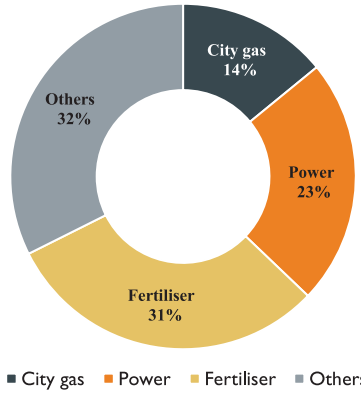

Figure 37. Allocation and Supply of Natural Gas

Note : Others – Sponge Iron/ Petrochemical/Refineries/Internal Consumption/LPG Shrinkage/ Miscellaneous

Source: http://petroleum.nic.in/natural-gas/about-natural-gas

the gas grid. Fertilizer units use about 31% of the total natural gas allocated by the MoPNG (Figure 37). The relative share of Natural Gas is higher for fertilizer use and its reliance on R-LNG also exposes the fertilizer industry into international price risk.

We looked into the encouraging effect of natural gas as a feedstock for urea production units in India. We plotted time series data of prices of naphtha and natural gas in both international and domestic markets. After 2013-14, there is a sharp decline in the domestic wholesale price of naphtha (Figure 38). Prices of naphtha decreased with the decline in its use in fertilizer industry.

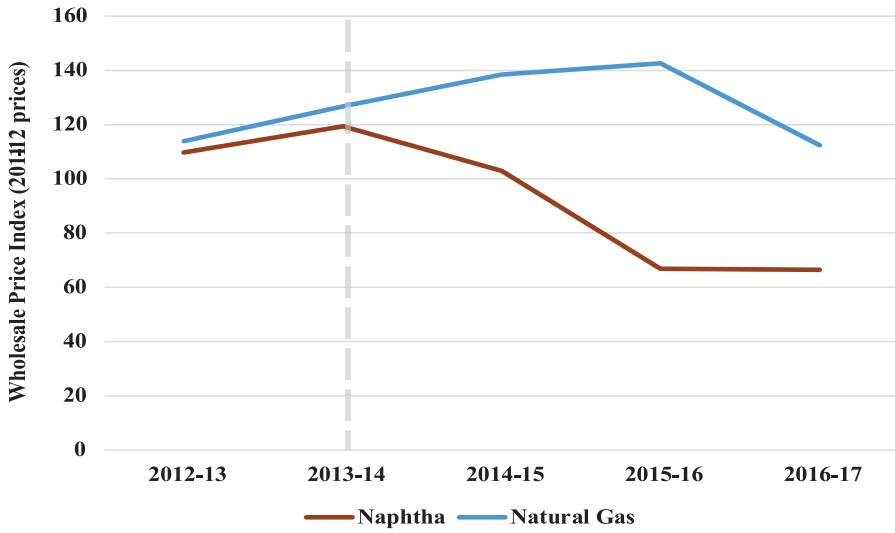

Figure 38. Domestic prices of natural gas and Naphtha in India

Source: MoPNG Annual Report (2018-19)

On the other hand, the international price of LPG more or less moved in the same direction (Figure 39). A sharp decline in the international prices was noticed after 2012-13, which slightly recovered after 2016-17.

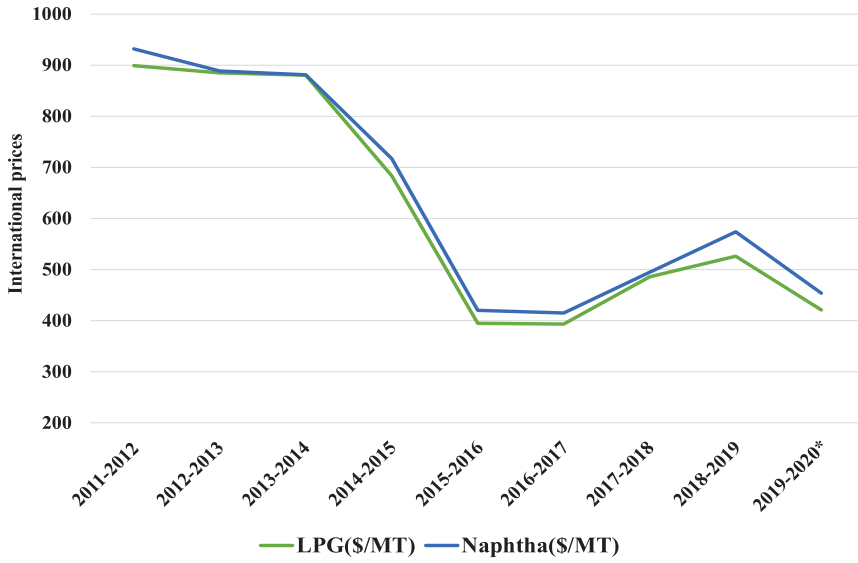

Figure 39. International Prices of LPG and Naphtha

Source: MoPNG, Annual Report (2018-19)

5.3 New Investment Policy 2012

The government of India announced New Investment Policy 2012 on 2 January 2013 and amended it again on 7 October 2014. The policy aimed at facilitating fresh investment in urea industry to ensure self-sufficiency in urea sector. Under this policy, a floor and ceiling price on the amount payable to the urea units is calculated based on the delivered gas price (Table 18).

Table 18. Pricing under new investment policy 2012

Type project	Gas price	Floor price urea	Ceiling price of urea
Greenfield/revival/ closed	USD 6.5 per mmbu	USD 305 per MT	USD 305 per MT
Brownfield projects	USD 6.5 per mmbu	USD 285 per MT	USD 310 per MT
Revamp	USD 7.5 per mmbu	USD 245 per MT	USD 255 per MT

Source: DoF Annual Report (2017-18)

The plants were classified under three categories: (i) Greenfield/ revival of closed projects, (ii) brownfield projects and (iii) revamp projects. Please refer to the details in page 156 Annexure XIII DoF Annual Report 2017-18. Under this scheme, three closed units of Hindustan Fertilizer

Corporation Ltd (HFCL) and five closed units of Fertilizer Corporation of India are proposed for revival under the revival project. Private players such as Matrix fertilizer and chemicals limited had set up Ammonia plant under the Greenfield project in West Bengal and Chambal Fertilizer and Chemical Limited have also proposed a brownfield project in Rajasthan.

5.4 Joint Ventures

Joint Venture is a key strategy used by Indian companies to access raw materials and to produce them with long term buy-back agreements to ensure the supply of fertilizers and inputs. There are five overseas joint ventures in production (Figure 40). Four of these projects are producing phosphoric acid (Senegal, Morocco, Tunisia, and Jordan) and one manufacturing urea (Oman). All these projects are made with 100% buy-back agreement at market prices. Two more projects are proposed (Algeria and Malaysia) and one is on hold (Iran). A brief detail on each of these joint ventures is provided below.

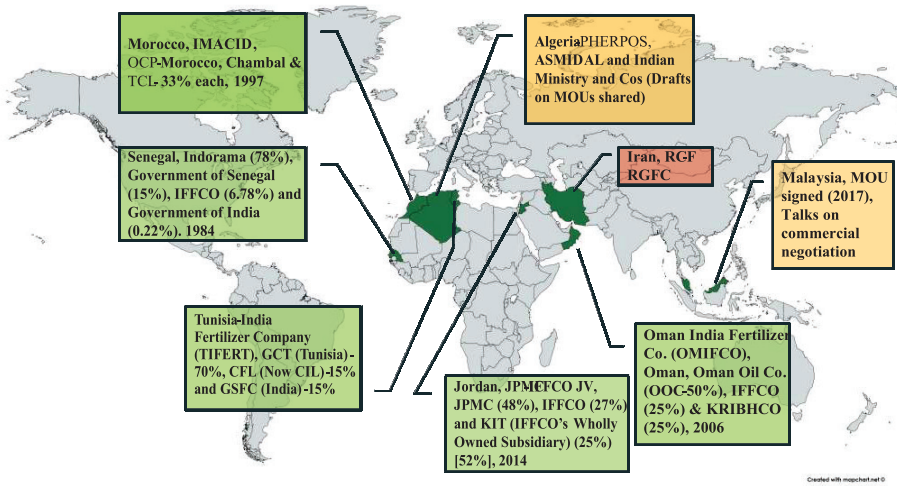

Figure 40. Joint ventures

Source: Compiled by authors. Details provided in Annexure Table A2.

5.4.1 OMIFCO, Oman

Oman India Fertilizer Company (OMIFCO), an India-Oman joint venture company, is a result of the initiative by the Governments of Oman and India. The commercial production of the company was started in 2005. OMIFCO is owned 50% by Oman Oil Company SAOC (OOC), 25% by Indian Farmers Fertilizer Cooperative Limited (IFFCO) and 25% by Krishak Bharati Cooperative Limited (KRIBHCO). The rated capacity of OMIFCO plant is 1.652 million tonnes granular urea per annum and is currently producing 2 million tonnes. Based on the available data, as on

January 2015, 25 % of the urea is imported from OMIFCO through a Long Term Urea Off Take Agreement (UOTA) between GOI and OMIFCO (GoI 2015) (Figure 41). Based on the agreement the production up to the rated capacity is being imported at the Long Term Price (LTP) of granular urea and the excess production (rated capacity) is imported at international prices with 5% discount. The urea imported through JV is much cheaper in comparison of the prevailing prices in the international market. In 2016-17, the CFR price of urea imported through JV was is US$157.65 per million tonnes compared to direct urea import costing US$ 210 per million tonnes. The imports from OMIFCO are resulting in saving US $ 300-500 Million per year to the Government exchequer (Table 19). Since the UOTA with OMIFCO is valid up to July 2020, currently talks were going on with respect to the extension of UOTA beyond 2020 and agreement beyond 2025.

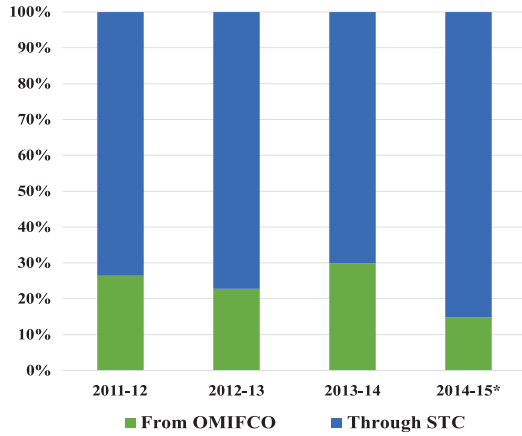

Figure 41. Share of urea imports from OMIFCO and State Trading Corporation

Note: *Up to January, 2015.

Source: Ministry of Chemicals and Fertilizers, GoI.

Table 19. Urea import through Joint Ventures

Year	Quantity of urea (Lakh tonnes)					Estimated savings
	From OMIFCO	Average price per ton	Through STC	Average price per ton	Total	(Million US $)
2011-12	20.69	215.00	57.65	481.74	78.34	551.89
2012-13	18.33	227.63	62.11	417.40	80.44	347.85
2013-14	21.21	172.41	49.68	322.66	70.89	318.68
2014-15*	10.8	179.66	62.22	303.94	73.02	134.22

Note: *Up to January, 2015. STC; State Trading Corporation. OMIFCO: Oman India Fertilizer Company. Average prices are CFR.

Source: Ministry of Chemicals and Fertilizers, GoI.

The Joint Venture model is hailed as a successful one but it is not devoid of challenges. There were issues and concerns with pricing of gas and quantity supplied to the plant by Oman. According to the agreement the prices of gas were supposed to remain stable for 10 years (till 2015). In 2012, the government of Oman demanded a revision of gas prices and India agreed on the revised rates after conducting an impact assessment. Further, there was a reduction in gas supplied by the Government of Oman from 4.5 mmscmd to 2.5 mmscmd in 2014 citing technical reasons resulting in a reduction in production and import of urea. These issues were taken up and often resolved as per mutually agreed terms.

5.4.2 ICS, Senegal[2]

Industries Chimiques du Senegal (ICS) is the largest producer of phosphate fertilizer products in Sub-Saharan Africa. The founding company Compagnie Sénégalaise des Phosphates de TAÏBA (CSPT) began mining of phosphate rock in 1960 and production of phosphoric acid in 1984 as a JV with IFFCO. In 2014, under financial restructuring Indorama Holdings B.V. Netherlands became the majority shareholder with equity shareholding of 78 per cent and the equity shareholding of Government of Senegal, IFFCO and Government of India became 15, 6.78 and 0.22 per cent respectively. ICS has the capacity to produce 6.6 lakh tonnes of phosphoric acid (P_2O_5) per year. In 2018, ICS exported 2 lakh tonnes of phosphoric acid to IFFCO.

5.4.3 JIFCO, Jordan[3]

Jordan India Fertilizer Company (JIFCO) is a Limited Liability Joint Venture Company formed by IFFCO and Jordan Phosphate Mines (JPMC). IFFCO (27 per cent) and KIT (IFFCO's Wholly Owned Subsidiary) (25 per cent) together hold 52 per cent equity, and JPMC holds 48 per cent equity in JIFCO. In 2014, JIFCO started regular operations. The project was funded by International Finance Corporation (IFC) and European Investment Bank (EIB). The annual capacity of phosphoric Acid Plant is 4.75 lakh tonnes P_2O_5 and of Sulphuric Acid plant 14.25 lakh tonnes. Under the long term Rock Supply Agreement, JPMC supplies the Rock Phosphate for the Project and KIT is purchasing the majority of phosphoric acid (minimum 70%) produced under a long term Phosphoric Acid Off-Take Agreement. In 2018, JIFCO achieved capacity utilization of 100.3% and produced 4.76 lakh tonnes of phosphoric acid (P_2O_5).

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[2]http://www.indorama.com/affiliated-companies/industries-chimiques%20du-senegal

[3]http://www.iffco.in/initiatives/initiative_detail/overseas/jifco

[4]Based on presentation made by Coromandal in brainstorming session on `Securing Supply of Fertilizer and Feedstock for Fertilizer Industry in India', organized on 29 August 2019 at ICAR Lecture Hall, NASC Complex, New Delhi.

5.4.4 Tunisia India fertilizer company, Tunisia[4]

Tunisia India Fertilizer Company (TIFERT), was started as a Joint Venture in 2009 for manufacturing phosphoric acid (Figure 42). Tunisian state owned GCT and CPG owns70% of its shares, while Coromandal and GSFC own 15% each. It has a capacity of producing 3.6 lakh tonnes of phosphoric acid. The manufactured acid is exported in equal share by both GSFC and Coromandal. The investment was considered as an ideal one due to Tunisia's experience in phosphate mining and processing, low production cost due to open cast mining and a stable political environment. In 2011, political uprising (Arab Spring) lead to a delay in the commissioning of the plant (commissioned in 2013). This political instability led to the drainage of technical manpower, blockage of rock phosphate supply, pressure for large scale recruitment of non-technical manpower, and strike by non-management staff resulting in low capacity utilization over the years (20-40 per cent).

Figure 42. TIFERT plant in Tunisia

Source: https://fanack.com/tunisia/economy/

5.4.5 IMACID, Morocco[5]

Indo Maroc Phosphore SA (IMACID) was setup as a joint venture between Chambal Fertilizer and Chemical Limited and Office Cherifien Des

[5]http://chambalfertilisers.com/index4a1a.html?option=com_content&view=article&id=33&Itemid=142

Phosphates (OCP), Morocco in 1997. In 2005, both the stakeholder diluted the shares and Tata Chemicals Limited acquired 33% of the share resulting in equal shareholding among the three entities. IMACID produces 3800 MTPD of sulphuric acid and 1400 MTPD of phosphoric acid.

5.4.6 Foskor, South Africa[6]

Foskor was founded by Industrial Development Corporation (IDC) in 1951, focused on producing phosphate for South Africa. It has a capacity of producing 7.2 lakh tonnes of phosphoric acid and 2 lakh tonnes of MAP/DAP per annum. In 2003, Coromandal acquired 2.5% of equity for accessing phosphoric acid. The shareholding further increased to 14% through business assistance agreement as sweat equity. Supplies to Coromandal had declined over period ailing to high input cost, lack of skilled staff, technological issues leading to cost-effectiveness. South Africa also has a higher mining cost compared to other North African countries (Algeria and Morocco).

5.4.7 Karnalyte, Canada[7]

In 2013, Gujarat State Fertilizer & Chemicals Limited (GSFC) acquired 19.98% of the Karnalyte resources, a Canada based potash manufacturer. From an investment perspective, the investment was sound as the country and company qualify different parameters. The lower share of holding in the company created governance and control risk, so GSFC increased its holding to 38.73% and rest is held as public shareholders. Currently, it holds 66% of the board assets of the company and this solved the governance risk. The period 2007-2013 coinciding with the global financial crisis saw higher prices of MOP due to the cartelization of potash. But in 2013, when the potash cartel collapsed (as a result of breakup of Belarusian Potash Company[8]), the prices of potash fell. With the cheaper international market prices GSFC faces issues with financial closure.

5.4.8 Other ventures in pipeline

Based on the details provided in the Annual report, a delegation from Algerian and Malaysia visited India and showed interested in

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[6]Based on the presentation made by Coromandal in the brainstorming session on `Securing Supply of Fertilizer and Feedstock for Fertilizer Industry in India', organized on 29 August 2019 at ICAR Lecture Hall, NASC Complex, New Delhi.

[7]Based on the presentation made by GSFC in brainstorming session on `Securing Supply of Fertilizer and Feedstock for Fertilizer Industry in India', organized on 29 August 2019 at ICAR Lecture Hall, NASC Complex, New Delhi.

[8]https://www.wsj.com/articles/how-the-belarusian-potash-company-re-gained-its-footing-1450098821
https://www.reuters.com/article/us-russia-uralkali/potash-sector-rocked-as-russias-uralkali-quits-cartel-idUSBRE96T0S220130730

collaboration. Algerian delegation led by Director General-Mines and officials from PHERPOS (Algerian owned government company) and other mining companies like ASMIDAL visited India and a draft MoU was signed between two countries, which is under examination.

Rashtriya Chemicals and Fertilizers Ltd (RCF) along with Gujarat State Fertilizer & Chemicals Limited (GSFC) visited Tehran, Iran to discuss setting up a urea-ammonia plant in Chabahar on November 2016. The proposal is on hold due to sanctions imposed by the United States. According to the annual report, talks are being held with other countries like Iraq, Belarus, Saudi Arabia, Qatar, for Joint Venture possibilities and Long Term Off-take Agreements.

5.5 Urvarak Videsh Limited

Public Sector companies in fertilizer in India, formed joined venture in 2009, Joint venture- National Fertilizer Limited (NFL), Krishak Bharti Cooperative Ltd (KRIBHCO), Rashtriya Chemicals & Fertilizer Ltd (RCF) with a shared equity capital of Rs 500 lakh. The objectives of the joint venture were (i) to explore possibilities of investment in nitrogenous, phosphate and potassic in resource-rich countries, (ii) setting up of joint ventures of manufacturing, mining, long term tie-up, (iii) rendering consultancy services for setting up of projects. Since 2015, it is under dormant status and agreed to be revived if any future opportunity arises.

5.6 Current Memoranda of Understanding (MoUs) with other countries

India has signed MoUs with about 25 countries. Eight of these agreements were for urea, 11 for phosphate and three for potash, rest were

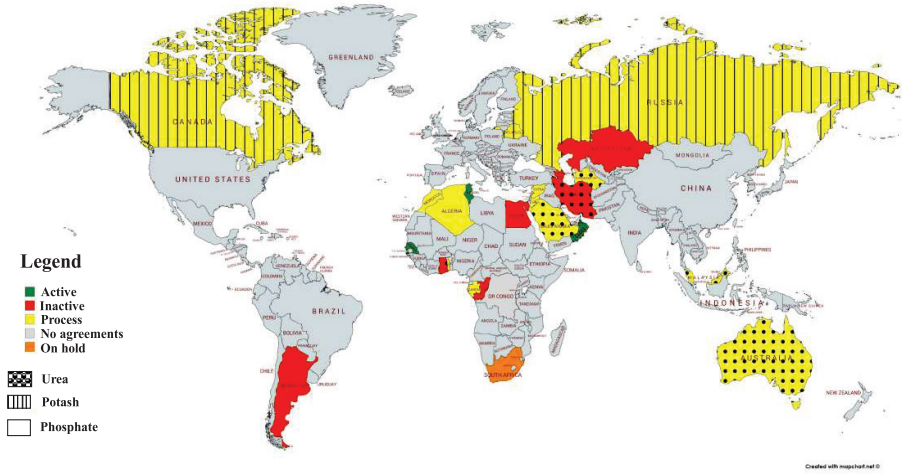

Figure 43. Memorandum of Understanding with other countries

general agreements. Out of which only three are active (Oman, Tunisia, and Senegal), twelve of them are under various process, and rest are either dormant or inactive. Please refer to Figure 43 to understand the status and product combinations. The MoUs were signed for exploring Joint Venture and long term off-take agreement. The process of talks with these countries was initiated through various channels; delegation visit, jointly submits, referred from other ministry and other diplomatic channels. Out of these agreements, only two of them were initiated by the Department of Fertilizer. This emphasises the need for revamping the international co-operation (IC) division similar to that of the Ministry of Petroleum and Natural Gas. IC could liaison between government and public, private players and try to frame strategies for exploring raw materials and products from other countries.

5.7 Challenges in Overseas Investment

Though JVs seem a lucrative option, there are several challenges and risks involved in overseas investment. We conducted in-depth interviews with representatives of industries who have invested abroad, and they were also invited for a brainstorming session. Key challenges highlighted by them are discussed below. The challenges are grouped as those associated with the project location, financial support and human resources.

The success of overseas investment for fertilizer production depends on various factors. Location and logistics is a key factor in project set-up. These projects require huge land acquisition cost and environmental regulatory norms (gypsum in phosphorus). Companies have faced several restrictions under local laws on mining and exploration of raw materials. Joint Ventures may not have any control over mining output. On the other hand acquiring these mines is costly and most countries are reluctant to give up their mining rights. All the current JVs depend on mining companies from the host countries. They are either partners or providers of those inputs, and they keep a hold on reserves and control over prices. The commercial viability of the project also depends on the input prices. JVs which have a lesser share on the holding also face issues with control on the governance of the company. For example, in TIFERT, Tunisia, the Indian companies have only 30% of the total stake over the company. Besides these internal issues, political risks such as expropriation and political instability due to war, terrorism and civil disturbance (Arab spring) also cause problems. Most of the raw material reserves are in countries that are highly politically volatile.

The investment for JV projects is capital intensive and has a long gestation period. Companies find it challenging to find financial institutions for financing such a project. The prices of products in the international

market could also cause financial closure of the project. This leads to long negotiations posing challenges for confidentiality and swiftness of action in acquiring those assets. Lenders also insist on long term take/ supply or pay agreements for the supply of inputs and marketing of finished products. The successful JVs were those ones that were able to satisfy these requirements.

Another major challenge the JVs faced was with human resources. Under the local laws, the companies are required to hire local manpower but there is a severe limitation on skilled manpower availability. There are several embargos on bringing manpower from India. There are several immigration and visa issues (cap on the number of month expatriates can work in host countries), getting work permits for the employees to work in those projects.

Based on these discussions, companies seek, (a) diplomatic solutions for the issues regarding the political risk, and (b) government support in the form of a sovereign fund or credit guarantee for financing such high-cost acquisitions.

5.8 Trade policy

To ensure parity in domestic production and import of fertilizer, the government has enforced differential custom duties on raw material and finished products. This strategy was enforced to ensure the sustainability of domestic production, as it was observed that the exporters are both selling finished products and raw materials. A similar level of customs duty for finished and raw materials has adversely affected the domestic company. As India agreed to a bound duty of 5% on import on DAP under WTO agreement, so the import duty of raw materials was reduced (Table 20).

Table 20. Custom duty on fertilizer product

Product	Custom duty
Raw/Intermediate material	
Phosphoric acid	5.0%
Rock phosphate	2.5%
Ammonia	5.0%
Sulphuric acid	7.5%
Sulphur	2.5%
Potash	5.0%
Finished product	
Urea	5.0%
DAP	5.0%
NP/NPK	5.0%

6. Policies of other Departments and Ministries in India

We explored polices of other departments and Ministries under the Government of India. We reviewed the Ministry of Petroleum and Natural Gas, Ministry of Coal, Ministry of Mines, Ministry of Steel and Ministry of Food Processing. Several secondary sources such as annual reports of the Ministry, press documents and newspaper reports were used in this review. Additional discussion in this respect was made based on presentations made by the International Co-operation division of Ministry of Petroleum and Natural Gas in the brainstorming session.

6.1 Ministry of External Affairs (MEA)

We interacted with joint secretaries of Eurasia Division and Gulf with respect to policies of MEA for supporting Indian firms overseas. MEA through its embassy in those countries supports in getting visa, counsellor access, connection with the authority, clearance from local law agencies and in providing basic profile information for business interest. Such supports are provided to any entity (public or private) of Indian origin. MEA has a Division on Developing Partnership and Agreements (I, II, III), Multilateral Economic Relationship which explores developing partnerships and relationships between India and other countries. MEA also facilitated negotiation through its soft power during the JCM meeting. Before each JCM meetings, MEA circulates inputs for the division from other Ministry. The inputs received from each Ministry are made as an agenda/talking points for the JCM meetings. There are several investment funds existing such as Sovereign wealth funds, and funds as part of the bilateral trade-agreements (eg: Russia Direct Investment Funds), and Line of Credit through EXIM Banks. Again these investment credits are open for any entity (private or public),which are assessed based on the proposals by EXIM banks (for the line of Credit) or other concerned Ministries or Departments for other investments.

6.2 Ministry of Petroleum & Natural Gas

The major areas of work performed by the Ministry[9] involves, Exploration and exploitation of petroleum resources, including natural

gas, Production, supply distribution, marketing and Pricing of petroleum including natural gas and petroleum products, Oil refineries, including Lube plants, Additives for petroleum and petroleum products, Lube blending and greases, Planning, development and control of, and assistance to all industries dealt with by the Ministry, Planning, development and regulation of oilfield services and other related functions. Ministry is involved in various MoUs[10] with countries such as Iraq, Turkmenistan, Syria, Sudan, Qatar, Paris, Iran, Indonesia, Japan, Columbia, Liberia, Canada, Mozambique (Figure 44a).

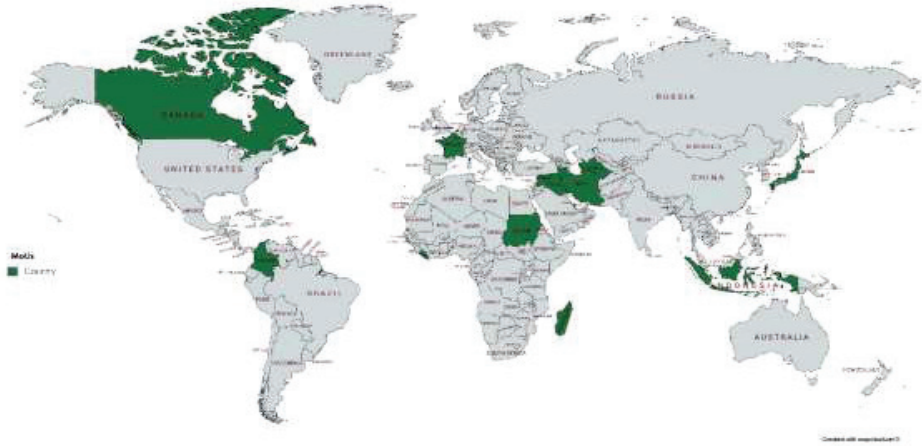

Figure 44a. MoUs and projects in different countries

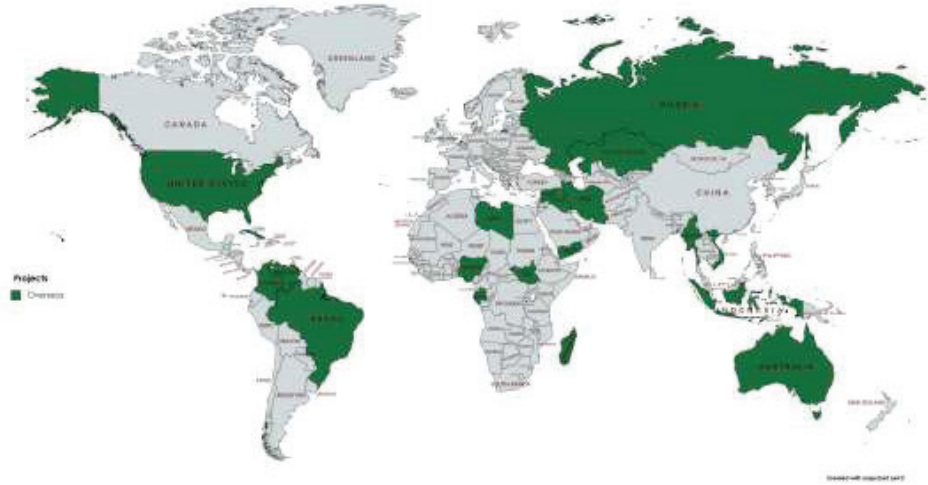

Figure 44b. Overseas projects/assets of PSUs

Notes: details of MoUs and projects provided in Annexure Table A3.
Source: Details of MoUs, http://petroleum.nic.in/about-us/international-co-opration.
Assets: http://petroleum.nic.in/sites/default/files/assetsabroad.pdf.
Pipeline projects: http://petroleum.nic.in/sites/default/files/pipelineprojects.pdf.

Ministry of Petroleum and Natural Gas also signed MoUs with different countries on co-operation in the field of energy. The agreements are on exploration, investment and exchanges and with other countries co-operation and exchanges in energy and fertilizer industry are agreed upon (Figure 44b). Comparing the figures 44a and 44b, it could be inferred that the MoU from the Ministry is not a necessary condition for projects.

India opened up its reserves for exploration, and 100 per cent FDI is allowed for exploration and production in hydrocarbons[11]. To supplement the domestic availability of crude oil and natural gas, the government encourages acquisitions of assets abroad. Indian companies had invested in more than 27 countries (nearly $ 33 billion). Subsidiaries of the PSUs are established for investment in assets abroad (Table 21). The PSUs under the ministry have projects and assets with more than 24 countries.

Table 21. PSUs and its subsidiaries under Ministry

S. No.	Parent Company	Subsidiary	Countries of operation
1.	Oil and Natural Gas Corporation Limited (ONGC)	ONGC Videsh Limited (OVL)	39 E&P projects in 18 countries.
2.	Bharat Petroleum Corporation Ltd. (BPCL)	Bharat Petro Resources Limited (BPRL)	10 overseas blocks in 5 countries
3.	Indian Oil Corporation Limited (IOCL)	NA	8 overseas blocks in 7 countries
4.	Hindustan Petroleum Corporation Limited (HPCL)	Prize Petroleum International Pte Ltd (PPIPL)	Australia
5.	Oil India Limited (OIL)	NA	11 countries

Note: Detailed on overseas projects and assets is provided in Table 2. Appendix (http://petroleum.nic.in/sites/default/files/assetsabroad.pdf). NA: companies have directly invested in the assets.

Source: Ministry of Petroleum and Natural Gas Annual Report 2017-18

6.2.1 International Co-operation Division of MoPNG[12]

The international co-operation division acts as a think tank of Ministry of Petroleum and Natural Gas. The division co-chaired by Minister P&NG, Secretary P&NG, JS (IC), has forums for raising bilateral issues with foreign counterparts in the hydrocarbon sector, and explores

[9]http://petroleum.nic.in/about-us/about-ministry dated 01-04-2019.
[10]http://petroleum.nic.in/about-us/international-co-opration dated 01-04-2019
[11]http://petroleum.nic.in/sites/default/files/exp.investmentopportunity2015.pdf Accessed on 01-04-2019.
[12]Based on the presentation made by Director (International Co-operation), MoPNG at the brainstorming session.

potential investment opportunities and the supply of hydrocarbons. The major activities of the division are to deal with bilateral and multi-lateral cooperation with other countries in the oil and gas sector. It undertakes liaison with Indian Missions and institutional Arrangements - JCM, JWG, IGC, Energy Dialogues, engagements with International Organizations like IEA, IEF, OPEC, International Committee like Energy Cooperation Committee (ECC), acquisition of E&P assets abroad and review of overseas investments by oil and gas PSUs. The division also ensures Indian participation in transnational oil and gas pipelines and diversification of oil and LNG imports for ensuring energy security. IC division also engages on re-negotiations of LNG contracts, signing of important agreements like MoU, MoC with foreign counterparts, raises issues confronting overseas investments with its foreign counterparts.

IC division has revamped its strategies for global asset ownership of petroleum and natural gas for ensuring energy security. IC uses a consortium approach, for better bargaining and risk-sharing. Currently, the investment is focused on productive assets rather than for exploration in politically and economically stable economies. Two way of investment is encouraged for the security of investment.

6.3 Ministry of Mines

The Ministry of Mines is responsible for survey, exploration and mining of all minerals other than natural gas, petroleum, atomic minerals and coal (Annual Report MoM 2017-18). There are also three Public Sector Undertakings (PSUs) under the Ministry [National Aluminum Company Limited, (NALCO), Bhubaneswar,; Hindustan Copper Limited (HCL), Kolkata; Mineral Exploration Corporation Limited (MECL), Nagpur]. India is self-sufficient in most of the minerals except fluorite, manganese ore, rock phosphate, and metals such as aluminum, and lead (Table 2.5 Annual Report MoM 2017-18). With the grouping demand of raw materials and to ensure supply of critical minerals MECL had entered an MoU with NALCO and HCL in September 2017 and formed Khanij Bidesh India Ltd. (KABIL) a joint venture company for exploration and mining of strategic minerals overseas (Annual Report MoM 2017-18, pp-99).

6.4 Ministry of Steel

The Ministry of Steel[13] is engaged in Co-ordination and planning of the growth and development of iron and steel industry in the country. They formulated policies on production, pricing, distribution, import and

[13]https://steel.gov.in/major-activities-ministry Accessed on 02-04-2019
[14]https://steel.gov.in/public-sector-units Accessed on 02-04-2019.
[15]http://icvl.in/aboutus.php?tag=company-aboutus Accessed on 02-04-2019

export of iron and steel, ferro alloys and refractories. It is also responsible for the development of input industries required for the steel industry. It has nine public sector units [Bird Group of Companies, Ferro Scrap Nigam Ltd. (FSNL), Steel Authority of India Ltd (SAIL), Rashtriya Ispat Nigam Ltd (RINL), NMDC Ltd, KIOCL Limited, MECON Ltd, MOIL Ltd, MSTC Limited] and other organizations under its purview[14].

Table 22. Shareholding pattern of ICVL (as on 31 March 2016)

S. No.	Promoters	Per cent
1	Steel Authority of India Limited (SAIL)	46.63
2	Rashtriya Ispat Nigam Limited (RINL)	26.49
3	NMDC Limited	26.49
4	Coal India Limited (CIL)	0.26
5	NTPC Limited	0.13

Ministry was planning to set-up special Purpose Vehicle (SPVs) for mineral rich states such as Odisha, Chhattisgarh, Jharkhand, and Karnataka. For securing metallurgical coal and thermal coal assets in overseas territories, Ministry of Steel, Government of India set up International Coal Ventures Private Limited (ICVL)[15] a joint venture company formed in 2009 with SAIL, CIL, RINL, NMDC and NTPC as promoter (Table 22). The objective of ICVL is to ensure 10% of supply of imported met coal of SAIL and RINL. To own about 500 million tonnes of met coal reserves by 2019-20. ICVL is an autonomy company similar to that of Navratna companies without formal Navratna status. It acquired Rio Tinto coal mine in Mozambique (65% stake including Bega).

6.5 Ministry of Coal

The Ministry of Coal is responsible for policies and strategies with respect to exploration and development of coal and lignite reserves[16]. It has public sector undertakings such as Coal India Ltd (CIL), Neyveli Lignite Corporation Limited, Singareni Collieries Company Limited (Joint venture with Government of Andhra Pradesh). Ministry has signed MoUs with several countries (US, Australia, Poland, Mozambique, South Africa). In 2006, an MoU was signed between the Ministry of Coal and Ministry of Mineral resources and Energy, Government of Mozambique. In 2009, CIL won a bid for Prospecting License of two coal blocks located in Tete Province of Mozambique but later relinquished after doing feasibility analysis (MoC Annual report 2017-18).

[16]https://coal.nic.in/content/about-ministry Accessed on 02-04-2019

7. Review of Policies of Other Countries

We reviewed fertilizer production policies of top three importing countries; Brazil (1st in potash, 2nd in MAP/DAP and 3rd in urea import), USA (2nd in potash, 3rd in DAP/MAP and 2nd in urea import), China (3rd in potash import). India stands first in urea and MAP/DAP imports and forth in potash imports. We explored policies of South Asian and southeast Asian countries like Thailand (6th in urea import), Indonesia, Malaysia and Bangladesh. We also reviewed Russia, which has policies for supporting the domestic industries. For these countries, we briefly summarized the fertilizer demand (import), industry structure and government policies for promoting the industries.

7.1 Brazil

Brazil is the 4th largest consumer of nutrients for fertilizer formulations in the world, next to China, India and the United States. Until 1960s, fertilizer consumed were low grade and mixtures produced at ports from the imported raw materials (FAO 2019). After 1960s, the industries were relocated closer to the production regions. From 1976 to 1981, state-owned companies were involved in the distribution of fertilizers. In 1982, the government transferred the mixture and distribution of fertilizer to private companies. State-owned sectors restricted itself to the production of raw materials and straight fertilizer. Later in 1992, these companies were privatized. During the same period, several efforts such as the provision of services for soil sampling and analysis, advisory for use of fertilizer were carried out by private companies and government agencies (FAO-ANDA-ABCAR Project). This led to an increase in demand for fertilizer from 3.6 lakh tonnes in 1960s to 70.29 lakh tonnes in 2002 (FAO 2019). Brazil is a net importer of fertilizer. In 2016, it imported 4,978 thousand tonnes of urea, 4,413 thousand tonnes of MAP/DAP and 5,465 thousand tonnes of potash[17].

With the increasing demand for fertilizer, Brazilian Government plans to reduce its import dependence by 2020. To guard against the price volatility in the international market, the Brazilian Government is looking towards its state-owned company for production. Brazil may still need to

[17]https://www.nutrien.com/sites/default/files/uploads/2018-01/Nutrien%20Fact%20Book%202018_1.pdf

import potassium as it does not have any reserves, the aim is to become self-sufficient in nitrogen and phosphates (Murphy 2013). In 2009, the Brazilian Government came up with National Plan for Fertilizer sector, which plans to invest for the identification of mineral deposits. The arguments were beyond national security, rather on the competitiveness of production systems. The Brazilian farmers are losing it with its competitors like USA as transportation of nutrients to islands is time consuming and expensive. To address the issue, Brazil plans to invest in its government mining company Vale, and Petrobas, a hydrocarbon company. The planned investment by both companies is predicted to reduce the overall dependence on imported fertilizer from 72 to 28 per cent (Reuters 2010).

7.2 United States of America (USA)

The USA fertilizer industry is one of the world's largest. The USA is the fourth-largest producer of nitrogen-based fertilizers in the world and the second largest producer of phosphate fertilizer. Though it ranks in production, the domestic production is inadequate to supply the domestic demand, therefore it is also a major importing country (Roberts and Dibb n.d.). It imports N, P and K from other countries; urea from Qatar, Canada and Saudi Arabia, MAP/DAP from Morocco, Russia and China, and potash from Russia, Canada and Belarus[18].

There has been a structural change in the size, location and concentration of the nitrogen fertilizer industry in USA[19]. The number of firms had come down from 58 firms in 1976 to 27 firms in 2000, while the production capacity increased from 16.8 million tonnes to 21.4 million tonnes in the same period. There has been a shift in the location of these industries from Midwest to delta and southern plains. The industry is oligopolistic in nature with increasing concentration. Increasing concentration led to higher prices and lesser supply.

The USA follows an open market policy, relies on supply-side economics, with no specific industry policy[20]. Despite these, USA government has been promoting its industries though policies such as direct subsidies, trade policy, export support, venture capital, preferential tax policy, and access to finance[21]. In 2009, the American Recovery and Reinvestment Act (ARRA) provided $ 787 trillion as a stimulus for the industry after the global financial crisis. Other strategic industries such as steel, oil and gas companies are major receivers of subsidies. Under the federal system of the USA, states have separate policies for promoting

[18]https://www.ers.usda.gov/data-products/fertilizer-importsexports/
[19]https://pdfs.semanticscholar.org/4065/345dfc7a1b4e932cb789904fde0d238b53f6.pdf
[20]https://hbr.org/1982/01/why-the-us-needs-an-industrial-policy
[21]https://www.civitas.org.uk/content/files/IndustrialpolicyintheUnitedStates.pdf

industries. Policies such as strategic and investment programme (SIP) 1993 provides property tax exemptions for industries. USA also uses non-tariff measures such as government procurement, export support, multilateral and bilateral trade agreements as a strategic tool to support its domestic industries. There are no separate policies for industries in fertilizer sector but as they belong to the strategic sector they enjoy the benefits of the above-mentioned policies.

7.3 China[22]

China is the largest producer and consumer of fertilizer in the world. The total consumption of fertilizer is roughly 30% of the total fertilizer use. It is self-sufficient in nitrogen and phosphorus, but imports potash. Increasing productivity in agricultural sector in China has been driven by the growth of Chinese fertilizer industry.

Chinese nitrogen companies are owned by major national energy companies, provisionally owned companies and listed companies. Nitrogen industry in China is driven by hydrocarbon resources (coal) unlike natural gas plants in other Middle East countries. Though gas is efficient China has a limited resource, so only 25% of the urea is produced from natural gas. On the other hand, relative abundance of coal leads to the construction of coal-based nitrogen industry. But as the demand for coal for petrochemical industries grew up, China invested in nitrogen plants, which can utilize the lower grade coal resources; and shifted the plants from central eastern province to northern and north western provinces.

With respect to phosphate the industries are located adjacent to the resources in the south and southwest provinces. The ore grades vary substantially and are unsuitable for higher grade DAP. This issue was overcome by technological innovation for developing a large volume of lower grade MAP. The industry structure is unique; unlike other industries, they are not vertically integrated. The industry buys ores and intermediaries (phosphoric acid) from open markets. The companies are also highly concentrated, three largest companies producing 40% of the total production.

China depends on import for potash fertilizer, but the country is developing its own domestic resources. China has developed its own innovative technologies which help them to be a global leader irrespective of the availability of resources. These technological innovations also made them globally competitive as they could produce products at a lower rate (10-40% less than other countries). Other than these technological

[22]China Fertilizer Industry outlook: https://gpca.org.ae/wp-content/uploads/2018/07/China-Fertilizer-Industry-Outlook.pdf

innovations, the fiscal stimulus provided by the government to these industries is promoting new fertilizer projects. The current policies are driven towards ensuring domestic self-reliance and remove inefficient industries.

7.4 Thailand

Thailand has a limited supply of raw materials and therefore depends on the import of raw materials and finished products. Chitibut et al (2014) gave a brief review of changes in the fertilizer policy of Thailand. In 1960, Thailand government established a Chemical Fertilizer plant, which produced 50% of the total demand of urea and ammonium sulphate. The domestic framework followed a protectionist policy by banning imports and single-nutrient nitrogen fertilizer, and later import duty of 20%. The liberalization policy of 1990s led to open trade policy and the abolition of value added-taxes. In 1982, the government established National Fertilizer Corporation (NFC) based on the oil discovery in the Gulf of Thailand to reduce imports. The NFC plant was shut down due to the price competition and depreciation of the currency. Currently, the government has a limited intervention in the fertilizer markets. It continues to monitor the prices and occasionally intervenes when the prices are higher. Producers, importers, wholesalers and retailers are required to report their prices, stock, locations, condition of storage, brand, nutrient, quantity sold, and other information to the government. The government follows a price control mechanism and imposes price ceiling if the prices are higher (eg. Fertilizer crisis during 2008). The cumbersome procedure in the formal fertilizer market had also led to a large quantity of fertilizer trade through informal markets.

7.5 Bangladesh

In Bangladesh, the fertilizer market was a regulated one in 1980s but in 1992 restriction on imports was removed[23]. This led to the fertilizer crisis in 2005, 2007 and 2008. In 2009, the Government of Bangladesh came up with a dealership policy under which the fertilizer distribution network is regulated. The new agricultural policy recommends public sector intervention in import if there is a shortage of fertilizer[24].

7.6 Other major Asian importing countries

We also reviewed fertilizer production and support policies of other major importing countries like the Philippines, Indonesia and Malaysia. Fertilizer production in the Philippines is met from domestic production as well as import. Since the country has no domestic reserves mineral-

[23]http://fpmu.gov.bd/agridrupal/sites/default/files/Barkat.pdf

[24]http://dae.portal.gov.bd/sites/default/files/files/dae.portal.gov.bd/page/dd7d2be1_aeef_452f_9774_8c23462ab73a/NAP.pdf

rich even domestic production it depends on imported raw materials. Though the fertilizer sector is deregulated, incentives such as import duty exception, and VAT exemption for entities (farmer co-operatives) are provided (Briones 2016)[25]. The government regulates the marketing and sale of fertilizer using different legislations (Ani and Abeleda 2018)[26]. Malaysia and Indonesia are promoting joint ventures for production of fertilizers through the liberalization of foreign direct investments.

7.7 Russia

Russian fertilizer industry is one of the largest industries in the world. Fertilizer industry is highly subsidised in Russia. In 1999, the Russian government started a policy to subsidise the domestic production of fertilizer by providing natural gas and electricity. It has oil and natural gas reserves and its dominance in international markets is led by subsidy policies. The domestic producers are also subsidised to an extent of 30% on price of fertilizer. About 80% of the nitrogen fertilizer produced by the firms in Russia is exported[27]. The current fertilizer industry development plan is to increase the total production by 5.5 million tonnes by 2025. The government has outlined a roadmap that showed the main approaches and priority tasks for the development of the mineral fertilizer industry for the period up to 2025. The set of measures stipulated in the document provides for the development of domestic demand and support of export supplies of mineral fertilizers, stimulation of investment activities of manufacturers, contributions to infrastructure development and the improvement of technical and environmental regulation[28].

[25]https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspjd2016-1_fertilizer.pdf
[26]http://ap.fftc.agnet.org/ap_db.php?id=895
[27]http://www.firt.org/sites/default/files/Simonova_Russian_Nitrogen_Fert_Market_presentation.pdf
[28]https://www.uralchem.com/press/news/SPIEF2017/?SECT=corporate_events

8. Summary and Policy Implications

The foregoing discussion made it clear that the international fertilizer scenario is likely to be optimistic in terms of the availability of NPK fertilizers. There would be an increase in the supply of NPK fertilizer. There may be excess production because of the expansion of the production capacity and modernization of the industry in some countries. In 2018, the production of N, P and K fertilizers was 154, 49 and 49 million tonnes against a total consumption of 145, 47 and 43 million tonnes and thus, there was an excess production of 15 million tonnes. As far as India is concerned, there is an expansion of the capacity for urea production to the order of nine million tonnes, therefore the country shall become self-sufficient in the domestic production of urea. However, a large proportion of domestic production of urea shall be based on imported natural gas. In case of phosphorus and potassic fertilizers, the country shall continue to depend on imports, almost entirely for potassic and largely for phosphorus, either intermediate or final products.

In order to ensure the long-term availability of P and K fertilizers, a strategy has to be worked out. This strategy should be based on the international investment trends and likely production scenario, changes in global demand of fertilizers, import requirement and changing the balance of N, P & K, and price and subsidy policy of fertilizers in India. The second important consideration is the nature of imports—whether to import intermediate or finished product. This decision, in turn, will depend upon the policy of the exporting country; some may be liberal allowing in export in any form, while some may insist on the export of finished products because of investment and employment benefits in the economy. For India, the decision shall be based on the comparative cost of the intermediate product, and finished product. As of now, the international prices are such that the landed cost of P&K fertilizers is lower than the cost of production in the country. As a result, there is an underutilization of the production capacity of P fertilizers, particularly for SSP (67 per cent).

International investment decisions are equally challenging, particularly when resource needs are significant and the raw material is available in few countries. In a scenario of a tight international market,

monopoly of a few producers or volatile international prices, it would be useful to invest in the production capacity abroad. In the last few years, there is not much volatility in international prices, but the dominance of a few players in the future is not to be ruled out. The problem may be further complicated with an uncertain policy environment of the exporting countries, leaving the market to the dominance of one or two countries or producers. Therefore, private sector may be encouraged to invest in the countries with availability of raw material and comparatively reliable policy and trade environment.

Investment decisions are also influenced by the business environment and bilateral relations between the two countries. India has good relations with all the countries having mines of the raw material of P&K fertilizers, but the policy environment is a major concern in some of the Middle-East and North-African (MENA) countries. In this region, the security of the investment is of paramount importance. The second uncertainty of the investment is about prices, and there is a need for working out an acceptable price, which is stable in the long-term and also relates to the prevailing international prices.

In view of the above, there are two policy questions to be addressed: (i) is P&K fertilizers to be imported at market prices? (ii) how much to import the finished product and how much to import the intermediate product? Since there is no domestic capacity of K fertilizers, importing finished products shall be rational. But in the case of phosphoric fertilizers, comparative prices of domestic and international prices shall determine the import of intermediate or finished products. Since there is some domestic production capacity of phosphoric fertilizers, its protection is an important issue.

8.1 Lessons from the international operations

There are a few examples of international operations for strategic investment overseas. Most of these are joint ventures in case of fertilizers. For urea production, there is a joint venture (JV) in Oman for the production of urea, which is working well, primarily because of the lower cost of production due to cheaper natural gas and stable policy environment. There are some examples of JVs for P&K fertilizers, but performance is rather mixed. The JV in Oman, Morocco and Algeria are doing well but faces challenges in Tunisia and could not pick up in Morocco and Canada. It is also believed that in some JVs, the production cannot be competitive because of higher freight charges, and it would be cheaper to import from the market under OGL.

The examples of other sectors are rather limited. Boric acid is imported in the country as pesticide and plant nutrient at the market

price, which is competitive. There are many international operations for acquisitions of petroleum products mainly natural gas. All the JVs have been successful because of the assured supply of natural gas at a lower price. Since natural gas is said to be a buyer's market, there is no unfavorable condition for establishing JV when natural gas is the main feedstock. There is a provision of re-negotiation of the contract in most of the JVs and the increasing availability of natural gas has further made the investment more remunerative. There is no significant expenditure on the exploration of gas and entering into the contract with a national government. The situation is just the opposite in case of P&K fertilizers. It costs a significant amount to explore the availability of raw material and install a plant. There are issues of labour, finance, and import of machinery. Negotiations are needed for each aspect to keep the cost competitive and get assurance from the national government for the management of the plant.

8.2 Market operations

In international trade, trading at competitive prices is the best option. This is possible when there is adequate availability of the material and the market is stable. The trends so far for P&K fertilizers showed that there is an opportunity for imports at the international prices which have fallen recently because of excess production capacity in some countries like the USA and China. Given the present production capacity and trends in the international prices, it is recommended that dependence on imports of P&K fertilizers should be a component of the strategy to assure fertilizer supply to farmers. The policy of import of P&K under OGL should continue and the government should monitor the availability of the fertilizers and release subsidy to the companies. Also, the import duty on intermediate products of phosphorus fertilizers should be in line with the finished products. Another strategy could be encouraging private companies to enter into long-term supply agreements with the international companies. Such a contract shall be between the companies, but a facilitating role by the Department of Fertilizer or the Ministry of External Affairs could be helpful.

8.3 Revival of Urvarak Videsh Limited (UVL)

UVL was established to manage the international operations of the fertilizer industry in the public sector. Such entities can be revived to import the fertilizers, but their operations may not be competitive with private companies. This is because there are now a number of private companies in the trade of fertilizers and their responsiveness to the market conditions is higher because of decentralized operations. Moreover, private companies can easily enter into an MoU with the international companies and take market decisions, whereas public sector units will depend upon

the board and the government for critical financial decisions. Moreover, capital needs to revive these entities shall be significant and at present, mobilizing resources in the situation of rising subsidy could be difficult. It is therefore suggested that UVL can be revived in case the response of private companies and traders is not adequate to assure the supply of P&K fertilizers.

8.4 Strategic overseas investment

Strategic overseas investment is needed to ensure the availability of any product at a reasonable price, especially when there are not many suppliers or the cost of production in other countries is lower than the domestic cost. This investment could be done by any business entity (public or private) provided the landed cost of the product is likely to be lower than the domestic cost, or the product in concern shall be available at a reasonable price despite market uncertainty. There are several overseas investments for urea and phosphoric acid which are working reasonably well. First, there is low cost natural gas, reducing the cost of production, and therefore, the plant for urea in Oman is working well. For phosphoric acid also there are JVs for nearly 15 lakh tonnes, which can meet roughly 50 per cent of the domestic requirement. These JVs are in public, cooperative and private sectors. The reasons for success are limited availability of rock phosphate in the country, a better investment climate in the investment countries and low risk in the investment. It is quite likely that these conditions shall not change in the near future and therefore these projects shall be competitive. Expansion of the capacity shall be governed by future demand, both domestic and international demand, and their likely effect on the domestic industry. To make these JVs economically sound, all options including international operations should be considered to sell the excess product in the international markets, or to make the company financially viable.

Most of the potassic fertilizers have been imported through purchases from international markets under OGL. Some of this could be through price agreements for a specific period. Given the current scenario of availability of potassic fertilizers, purchase through the open market should continue. The examples of overseas investment through JVs for potassium fertilizers are few. The discussion with the industry indicated that there is some investment in Canada by Indian fertilizer companies in the public and private sectors. These companies are yet to become operational because of technical and economic difficulties. The landed cost from Canada is higher than the cost of fertilizers imported from the Russian or MENA region. This situation if continues in the future, these JVs may become unviable and to avoid this, these JVs should sell the product in the international market.

Since there are few suppliers of potassic fertilizers in the international market and the availability of raw material is confined to a few countries, the possibility of imperfections in the market cannot be ruled out. Overseas investment and long term contracts to ensure regular supply of potassic fertilizers should be a part of the strategy of international operations. The investment shall be guided by the availability of the raw material, investment climate, and proximity to the Indian ports. Another consideration could be bilateral relations of the investment country with India. The Russian region has an advantage in this context.

8.5 Role of the Government

The Union Government has a major role in facilitating investment. Currently, the Department of Fertilizer does such support for the public companies, but in case of P and K, private companies are active and public enterprises do not have enough capital for such investments. In such a case understanding the strategic importance of the sector, the Department should also facilitate and encourage the private companies. The Government could facilitate a non-discriminatory (both public and private) support for the enterprise who are willing to engage in investments overseas. This is more of a governance function and the potential companies have to undertake an independent assessment of the investment opportunities and support needed from the overseas partner. If there is technical and economic feasibility, the Government should facilitate MoU between the contracting partners, including the government of the exporting country, if necessary. Such an MoU can be routed through the Joint Commission (JCM) meetings organised by the Embassy in the respective countries. The MoU should have necessary risk management clause like review of price contracts.

The second important role of the government is to support for investment. In a normal situation, the business company should invest in the acquisition of raw material (asset or product) and the cost of the plant. In case the investment need is higher, the government may facilitate access to credit (domestic or overseas) through existing investment mechanisms such as Sovereign Fund and line of credit. Such provisions exist in many cases and both public and private enterprises should be eligible for such funding. A non-discriminatory approach should be taken for facilitating access to such credits. The Department could forward the project to the EXIM bank or agencies which evaluated the proposal. Such information could be made available in the Department of Fertilizer website.

The third important role of the government is to help JV in the management of risk. The risk could be due to a change in the policy of the country, price volatility, or problem with the enforcement of the contract. Most of these issues could be addressed by JCM meetings. It is advisable that

the Department communicates with business entities on discussion points to be raised in the JCM meetings by the MEA. This will be useful to address the unfavourable financial conditions and adverse price changes. A similar approach could be followed for renegotiating price for both public and private companies. Thus, the Union Government should play a facilitating role in assuring the long-term supply of fertilizers. The fertilizer industry can take care of business operations and mobilization investment capital. The Government has to facilitate the working of JVs, ensure enforcement of the contracts, and manage risk through the existing channels. The JVs should balance their international and buyback supply arrangements for ensuring the financial viability of the project.

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Annexures

Table A1. New urea plants in India

S. No.	Planned year of completion	Company	Location
1	2019	Chemical Fertilizer and Chems	Gadepan III
2	2019	Ramagundam Fert. & Chems.	Ramagundam
3	2021	HURL (Hindustan Urvarak)	Barauni
4	2021	HURL (Hindustan Urvarak)	Gorakhpur
5	2021	HURL (Hindustan Urvarak)	Sindri
6	2022	Rashtriya Chemicals and Ferts.	Talcher
7	2023	Bhramaputra Valley Ferts.	Namrup IV

Table A2. Details of Joint Ventures in fertilizer sector

S. No.	JV project-Country	JV Participants with equity	Product and the status
1	Oman India Fertilizer Co. (OMIFCO), Oman	Oman Oil Co. (OOC-50%), IFFCO (25%) & KRIBHCO (25%)	16.2 lakh MT Urea & 2.48 Lakh MT Ammonia Production started in the year 2006
2	ICS Senegal, Senegal	ICS Senegal and IFFCO consortium	2.2 lakh MT phosphoric acid. Production started in 1984 and off-take agreement valid till 2033
3	JPMC-IFFCO JV, Jordan	JPMC and IFFCO	4.8 lakh MT Phosphoric acid. Commercial production started in Decmeber 2014
4	IMACID, Morocco	OCP-Morocco, Chambal & TCL-33%	4.25 lakh MT phosphoric acid. Production started in 1997-98
5	Tunisia-India Fertilizer Company (TIFERT), Tunisia	GCT (Tunisia), CFL (Now CIL) and GSFC (India)	3.60 lakh MT of Phosphoric acid. Commercial production started in April 2014
6	Algeria	Algeria-PHERPOS, ASMIDAL and Indian Ministry and Cos	Drafts on MoUs shared
7	Malaysia	Malaysia and India	MoU signed (2017), Talks by Commercial Negotiation going on
8	Iran	RCF-RGFC	Talks going on

Source: (DoF Annual Report, Annexure-VII, page 144)

Table A3. MoUs and projects in different countries

S. No.	Country	Year	Details
1.	Iraq	2013	Exlorartion Block-8 awarded to ONGC Videsh Limited Bilateral agreements, proposals for investment, long term supply
2.	Turkmenistan	2008	MoU on exploration, investment, exchanges
3.	Syria	2009	MoU on exploration, investment, exchanges
4.	Sudan	2009	MoU on exploration, investment, exchanges
5.	Qatar	2012	MoU on exploration, investment, exchanges
6.	Paris	2011	MoU on Participation in IEA, Emergency response Team, Monthly exchange of Data, exchange of assessment and information oil and gas supply disruptions
7.	Iran	2012	Trade, MoUs review
8.	Indonesia	2011	Co-operation in areas of up-stream and downstream activities, investment technology transfer
9.	Japan	2014	Joint research group
10.	Columbia	2008	Information exchange, training etc.
11.	Liberia	2013	Co-operation in areas of up-stream and downstream activities, information sharing, investment technology transfer
12.	Canada	2013	Bi-lateral trade investment, energy diversification, balanced regulatory framework
13.	Mozambique	2014	Co-operation in areas of up-stream and downstream activities, information sharing, investment technology transfer

Source: Details of MoUs, http://petroleum.nic.in/about-us/international-co-opration

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