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Indian Policies in the Phosphate and Fertiliser Sectors: International and domestic aspects

Isabelle SAINT-MÉZARD

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Executive Summary

India is now a major player in the international fertiliser market, regardless of the nutrients considered. Whether it is a question of imports, domestic production, or consumption, India ranks among the top three global players in the sector. At the same time, an internal analysis of the situation in India shows many constraints. Some constraints are structural, including the scarcity of raw material resources in the country, while others are strictly political and refer to the difficulties that Indian leaders are experiencing in reforming a politically sensitive sector.

In this respect, Narendra Modi's government may prove as cautious as its predecessors, at least in the short term. Despite his pro-reform image, Narendra Modi has been more guarded than expected on a number of issues. The prospects for reform in the urea sector - the largest and most problematic of fertilizers in India - are therefore proving uncertain. Nevertheless, the Prime Minister's aim of launching a new "Green Revolution" must attract attention, particularly because it underscores the seriousness of excesses related to the overuse of urea and intends to give Indian farmers better ways to use fertilisers in order to maintain the health of their soil.

Due to a lack of decisive reforms, India's production capacities are not progressing as quickly as domestic demand; the country must therefore rely heavily on imports, including for urea, which was once a self-sufficient sector. This dependence on imports is a risk factor insofar as it subjects India to price fluctuations in international commodity markets. In order to avoid these fluctuations, Indian authorities have tried to enter into long-term supply agreements or even to acquire shares in the firms that supply them.

Similarly, authorities have encouraged major players in the sector to form joint ventures abroad. In keeping with this vision, several firms – including the giant IFFCO (Indian Farmers & Fertilizers Cooperation Limited) – have been building a network of joint ventures in North Africa and the Middle East since the early 2000s. In fact, this network enables supplies to be secured at a very early stage of production, since most of the products from these joint ventures are sent to India. This also provides a certain level of protection from the volatility of international markets. Out of the five joint ventures currently in operation, four fall under the phosphate sector and one under the urea sector. However, it is clear that this network of joint ventures is bound to further develop and diversify, as

the major Indian manufacturers in the fertiliser sector have grown anxious to secure their supplies of raw materials and intermediate products.

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Introduction

The fertiliser sector is of major importance for Indian food security. Two figures are sufficient here to summarise the issues: India today must feed 17.5% of humanity with less than 3% of the world's arable land. Admittedly, the country has the fourth largest agricultural area in the world (the proportion of agricultural land compared to the whole country is very high, at 60%). But it still remains important for India to develop high levels of agricultural productivity.

Since the "Green Revolution" in the 1960s and 1970s, the intensive use of fertilisers, irrigated water, and high-yield seeds has helped increase agricultural productivity and achieve food self-sufficiency. In so doing, India became one of the world's largest consumers of fertilisers: with an average use of 157 kg of fertiliser per hectare of cultivable land, the country was second only to China for the period 2011-2015.[1] More specifically, it was the second largest consumer of nitrogen and phosphate fertilisers in the world after China (14.1% and 14.5% respectively of world consumption in 2012). It was also the fourth largest consumer of potash fertilisers after China, Brazil, and the United States (7% of world consumption in 2012).

However, despite advances made due to the "Green Revolution" and the use of fertilisers, Indian agriculture does not, as it is, have sufficiently high levels of productivity to meet the challenges of the future. Indian demand for food products, particularly cereals, will indeed continue to increase under the combined effect of the general increase in population (India should become the most populous nation in the world in 2028) and rising income. While Indian authorities fully understand the need to improve agricultural productivity and sustainability, they nevertheless find it difficult to change the situation on the ground.[2] Hence, in its forecasts for the twelfth Five Year Plan (2012-2017), the Planning Commission

1. The World Bank, Fertilizer consumption (kilogram per hectare of arable land), available at: <http://data.worldbank.org>.
2. India produces 2.4 tonnes of rice and 3.1 tonnes of wheat per hectare. As a comparison, China produces 4.7 tonnes of rice and 4.9 tonnes of wheat per hectare.

estimated that the agricultural sector had to achieve a growth rate of 4% per year. But in fact, this same growth rate does not exceed 2%.[3]

In view of the uncertainties surrounding the country's ability to ensure its future food self-sufficiency, at the end of June 2015 Prime Minister Modi talked about the need for India to launch a second "Green Revolution". This only goes to show that the issue of Indian agricultural productivity will remain central for the coming years, and with it that of the sustainable use of fertilisers. It is in terms of these issues that this study focuses on Indian policies in the fertiliser sector. In order to present a complete analysis of this sector and its major issues, the choice was made to take the three main macronutrients into account – namely nitrogen (N), phosphorus (P), and potassium (K) –, but with a specific emphasis on the phosphate sector.

In its organisation, the study first provides an overview of India's production and resources, by highlighting the main obstacles and constraints that the sector suffers from in this area. It then focuses on the distortions due to subsidy programmes and discusses the possible reforms or policy changes envisaged under the Modi government. Finally, it analyses the international dimensions of the Indian strategy to fertiliser supply.

3. "Economic Survey 2015: Growth In Agriculture Remains a Worry, Says Ashok Gulati", *The Economic Times*, 28 February 2015, available at: <http://articles.economictimes.indiatimes.com.>.

Indian resources and production: obstacles and constraints

India is among the world's leading fertiliser producers. However, its industry also faces many constraints and is unable to meet domestic demand.

Limited resources

According to the Indian Ministry of Chemicals and Fertilizers, in 2014-2015 India had installed capacity equivalent to 13.2 million tonnes (*million metric tons*, hereinafter MMT) for the production of nitrogen and to 7 MMT for phosphate nutrients.[4] Hence, it stood as the third largest fertiliser producer in the world after China and the United States. Even more specifically, during the decade (2001-2012), India supplied:

- 10-11% of world production of nitrogen fertilisers, ranking second in the world in this field after China; and
- 7% of world production of phosphate fertilisers, ranking third after China and the United States.

In terms of production facilities, the fertiliser sector in India has the following profile:

- 30 large plants specialised in urea production;
- 13 production plants for diammonium phosphate (DAP);
- 21 production plants for complex fertilisers;
- 85 production plants for superphosphates (SSP).

4. Ministry of Chemical and Fertilizer, *Toward Sustainable & Shared Prosperity*, Annual Report 2014-2015, available at: <www.fert.nic.in.>.

Distribution of the installed capacity between public sector, private sector and co-operatives

Sector	Capacity (MT)		Percentage	
	N	P	N	P
Public	3,764,000	387,000	28.39	5.48
Co-operatives	3,638,000	1,713,000	27.44	24.26
Private	5,856,000	4,960,000	44.17	70.26
Total	13,258,000	7,060,000	100	100

Source: Ministry of Chemical and Fertilizer, *Toward Sustainable & Shared Prosperity*, Annual Report 2014-2015.

Nevertheless, India has few raw materials to produce its fertilisers. Out of the three main macronutrients necessary for agriculture – nitrogen, phosphorus, and potassium (N, P & K) – it only has substantial raw materials for the manufacture of nitrogen fertilisers. Therefore, the Indian strategy is to promote this type of fertiliser with a view to achieving the greatest self-sufficiency possible from domestic reserves.[5] In fact, urea is the only fertiliser that is still currently produced 80% domestically.

The goal of self-sufficiency nevertheless remains theoretical as production of this fertiliser requires a high consumption of fossil fuels, particularly natural gas, which India does not have in great supply. In other words, India is still very dependent on imports even to manufacture nitrogen fertilisers.[6] Specifically, urea production plants consume around 42 mmscmd (*million metric standard cubic metres*) of gas per day. Out of these 42 mmscmd, 26 are supplied domestically and 16 have to be imported in the form of regasified Liquid Natural Gas (LNG). This type of gas (R-LNG) costs nearly twice as much as gas produced domestically, which sells for 5.18 dollars/mBtu.

In the phosphate fertiliser sector, both the raw materials and the intermediate products have to be widely imported. India has few phosphate rock deposits, the mineral from which phosphate is extracted. Therefore, it is almost 90% dependent on imports to manufacture phosphate fertilisers. Yet, according to the *Geological Survey of India*, the country may have phosphate rock reserves of nearly 250 MMT, 150 MMT of which could be used for fertiliser

5. *Ibid*.
6. Ministry of Chemicals and Fertilizers, *Report of the Working Group on Fertilizer Industry for the Twelfth Plan (2012-2013 - 2016-2017)*, GoI, New Delhi, 2013.

production.[7] The Indian strategy combines three options in order to deal with this constraint:[8]

- domestic production from domestic and/or imported phosphate rocks and imported sulphur and ammonia water;
- domestic production from domestic and/or intermediate products, such as ammonia water and phosphoric acid;
- importing fertiliser as a finished product.

As for potash fertilisers, the country does not have commercially exploitable reserves; therefore it must rely entirely on imports.

Insufficient production capacities

The main issue here is that Indian fertiliser production has not increased quickly enough to meet the growing national demand. By comparison, China, which has successfully increased its nitrogen nutrient production from 21.6 MMT in 2000 to 49.6 MMT in 2012, is now exporting this type of fertiliser. Indian production of the same nutrients has only marginally increased from 10.9 MMT in 2000 to 12.2 MMT in 2012, so that reliance on imports has become increasingly necessary.[9]

Several factors explain this relative stagnation of domestic production. The lack of raw materials for potash and phosphate fertilisers is a structural constraint, as discussed above. Furthermore, in recent decades, the sector has lacked investment to modernise and expand its production capacities. Indeed, India built most of its nitrogen and phosphate fertilizer production plants in the 1970s and 1980s. However, since 1990-2000, the sector has lost appeal and investment has become rarer, so that the production capacities have not increased sufficiently.

Aware of this problem, the Manmohan Singh government created a special committee in 2008 to promote the revival of investment in this sector, albeit without significant results. In a report

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7. The main phosphate rock deposits are at Jharkhand (36%), Rajasthan (30%), Madhya Pradesh (17%), Uttar Pradesh (9%) and Uttarakhand (8%). The bulk of the production comes from Rajasthan (88%) of the total production and from Madhya Pradesh (12%). See Ministry of Mines, India *Minerals Yearbook 2013*, Nagpur, GoI, July 2015, available at: <http://ibm.nic.in>.
8. Ministry of Chemical and Fertilizer, *Annual Report 2014-2015*, *op. cit*.
9. Ashok Gulati, Pritha Banerjee, "Rationalizing Fertilizer Subsidy in India: Key issues and Policy Options", *ICRIER Working Paper Series*, No. 307, July 2015.

submitted to Parliament in spring 2015, the Comptroller and Auditor General, the equivalent of the French Cour des comptes (Court of Accounts), noted that between 2010 and 2014, "no significant investment [had] been made in the fertiliser sector to increase the number of plants or their installed capacity."[10] For example, between 2009 and 2014, the number of diammonium phosphate (DAP) and complex fertiliser production plants did not change: it remained respectively at 13 and 21. Even in the urea sector, the creation of new production capacities has not been very substantial, according to Ashok Gulati and Pritha Banerjee, rather approximately 2.3 MMT per year after 2008.[11]

The policy followed by the Indian states in terms of exploration and exploitation of mines is an additional constraint. The example of Rajasthan, which is the main producer of phosphate rock in India, is most instructive here. Out of an annual demand of 10 MMT for phosphate rock, India only produces 1.5 MMT, 1.2 MMT of which comes from Rajasthan. However, despite its fairly abundant reserves (more than 80 MMT out of 150 MMT distributed throughout the entire country), this state is having difficulty increasing its production capacity. The responsibility for this lies with the state company, Rajasthan State Mining and Minerals Ltd (RSMML), which is responsible for the extraction and production of phosphate rock. Even more so, it lies with the Rajasthan government, which gave RSMML the monopoly for exploiting the state's phosphate rock deposits, even though this state-owned company does not have the necessary financial resources to strengthen its capacities.

Exasperated by RSMML's low productivity, the central government's Ministry of Mining wrote to the Rajasthan authorities in 2012 to request a liberalisation of the sector. However, the state is stalling on this matter.[12] As opposed to Rajasthan, Madhya Pradesh, which provides about 12% of domestic production of phosphate rock, has taken measures to open up the sector to private players. This state has reserves estimated at 51 MMT.

Additionally, the phosphate rock produced in India is of poor quality and hardly exceeds 24-25% of phosphorus pentoxide (P_2O_5). It must be mixed with a better quality phosphate rock to reach the necessary level of 31-32% to manufacture fertiliser. Added to this is the fact that production plants for phosphate fertilisers and phosphoric acid in India are designed to process higher quality phosphate rock, mainly from Morocco and Jordan. As the Indian Ministry of Mines highlights, it would be better in this respect to replace existing

10. "No major investment in fertiliser plants during 2010-2014: CAG", *IndiaTVnews*, 11 March 2015.
11. Ashok Gulati and Pritha Banerjee, *op. cit*.
12. Srikant Tripathy, "Row over rock phosphate", *TNN*, 22 October 2012.

factories with new production plants capable of processing local phosphate rock.[13]

Finally, in the current situation, Indian fertiliser manufacturers are often in poor health.[14] Many complain of suffering from a government policy favouring only the urea sector at the expense of the rest. Their difficulties in accessing natural gas demonstrate this. Supply problems for natural gas – which is essential to the fertiliser manufacturing process – are generally a real obstacle to production in India. In theory, manufacturers have preferential access to natural gas that they can acquire from Indian state-owned companies at a regulated price. However, in reality, only about thirty state-owned companies specialising in the production of urea are benefiting from this preferential access system, leaving out all the others, including those in the private sector and/or producing phosphates or PK or NPK compound fertilisers.

The problems are such that significant private players in the sector have adopted a wait-and-see strategy, or are even considering a gradual withdrawal. Among them, the Tata Chemicals conglomerate may be thinking of selling its businesses in fertiliser production, while the Aditya Birla group, which owns Indo Gulf Fertilisers, is substantially reducing its investments in the sector.[15]

13. Ministry of Mines, *India Minerals Yearbook 2013*, *op. cit*.
14. "Fertilizer Industry's Neglect Leads to Misery", *The Hindu*, 26 July 2015.
15. Harish Damodaran, "Nutrient Self-Sufficiency: Better Make in Iran than in India", *The Indian Express*, 6 August 2015.

A sector in need of reform

For decades, the agricultural sector has been receiving strong support from the Indian government. This support is mainly through a policy of price controls, both at the level of *inputs* as well as *outputs*. Fertiliser subsidies fit precisely into this general policy.

Distortions due to subsidy policies for urea

Historically, the first subsidy programme for fertilisers was set up in 1977 and focused on urea. Barely two years later, the subsidies were extended to phosphate and compound fertilisers. So, the subsidy programmes have become increasingly expensive for the Indian government. From the 1990s, successive governments in New Delhi have tried to limit the spiralling expenditure on fertiliser subsidies, though without much success. The burden of these subsidies has proven to be increasingly hefty, particularly after 2006 (their total amount tripled between 2006 and 2009).[16]

Faced with this situation, in 2010 Prime Minister Manmohan Singh's government launched a new programme known as NBS (*nutrient-based subsidy*). This programme consisted in deregulating the price of phosphate and potash fertilisers, that is to say, fertilisers of which the country is very dependent on imports. On the other hand, urea – a fertiliser that is 80% manufactured in India – continued to be subsidised. More accurately, the government continued to distribute subsidies to urea manufacturers to compensate for the lack of earnings due to the very low sales price maintained for this product.

As the Comptroller and Auditor General's (CAG) report publicly explained, this programme has not produced the expected results, as not only has it not reduced the cost of subsidies for the government, but it has additionally resulted in an imbalance in the use of fertilisers.[17] In fact, it resulted in a sharp increase in the price of phosphate and potash fertilisers (104% for the first and 251% for the latter between 2010-2011 and 2013-2014). Indian farmers have therefore turned away from this type of fertiliser, including compounds

16. Himanshu, "India's Flawed Fertilizer Policy", *The Hindu*, 1st April 2015.
17. Sayantan Bera, "CAG Slams Nutrient-Based Subsidy Policy for Fertilizers", *Livemint*, 9 May 2015.

such as diammonium phosphate (DAP) and potassium chloride (muriate of potash – MOP), in favour of urea, for which the price has only increased by 1% over the same period. Hence, the use of nitrogen fertilisers doubled between 2009 and 2013 according to the CAG report.

Furthermore, the extensive use of urea has resulted in a worsening of the imbalance in the so-called NPK ratio – nitrogen (N), phosphorus (P), potassium (K). Under the effect of the NBS programme, Indian farmers have increasingly moved away from the recommended NPK ratio (4:2:1). In 2012-2013 for example, they used on average a ratio of around 9.9:3.3:1.[18] This worsening of the ratio has proved to be even more marked in highly agricultural states in North India, such as Punjab (61.7:19.2:1) and Haryana (61.4:18.7:1). Even a state like Andhra Pradesh, which practised a ratio close to the recommended standards, started to show severe imbalances from 2011-2012 (the ratio going to 7.1:2.8:1 in 2012-2013).[19] It goes without saying that this unbalanced use of fertilisers accelerates the deterioration of nutritional quality in the soil and slows down its productivity. At the central level, like at the state level, the authorities are now worrying about the environmental damage caused by the misuse of nitrogen fertilisers.

Finally, the NBS programme has indirectly promoted the development of a black market in urea. According to the current Minister of Chemicals and Fertilizers, Ananth Kumar, around 10% of the urea produced in India may be sold on the black market, either to be used for purposes other than agriculture, or is trafficked to Pakistan, Bangladesh, and Nepal, all countries where its official price is much higher.

There is a virtual consensus in India to acknowledge that the NBS programme has not achieved its objectives and that a reform of the urea subsidies is more necessary than ever. This is all the more so, since the fertiliser subsidies continue to impact heavily on Indian public finances. They accounted for $11.6 billion in the 2015 budget and had increased fivefold over the last fifteen years at constant prices.[20] Moreover, they absorbed 27% of the entire subsidies distributed by the central government across all sectors. Only the food and petrol sectors received more subsidies from the central government.

18. Ashok Gulati and Pritha Banerjee, *op. cit*.
19. *Ibid*.
20. *Ibid*.

Transferring subsidies directly to farmers rather than to manufacturers

In the Indian system for urea subsidies, it is the manufacturers and not the farmers who receive the government subsidies. This system, which is designed to support domestic manufacturers, also poses problems for those who are supposed to benefit from it, since the government is often slow in distributing the promised subsidies, thus leaving many firms in a difficult financial position. In response, many players in the sector suggest allocating the subsidies by direct transfer to farmers, rather than the manufacturing companies. In their opinion, such a reform would help the subsidies to be distributed more fairly and they would benefit those who really need them, namely the farmers. Furthermore, most experts believe that this reform would encourage urea manufacturers to increase efficiency and productivity.

Even if most experts and a large part of the government are committed to the cause of a reform in favour of a cash transfer to farmers, serious obstacles remain. They are mainly organisational and logistical. Indeed at the start of 2013, the previous government launched a major programme called Direct benefit transfer (DBT) designed to cover all social welfare sectors, as well as subsidies for oil, food products, and fertilisers. Yet, this programme, which has been implemented for nearly two and half years, can barely manage another programme, that of subsidies for LPG distribution.

Concomitantly, a pilot experiment was conducted to implement the direct transfer of subsidies to farmers in the fertiliser sector. The experiment is proving to be inconclusive, since in practice, the identification of the beneficiary farmers and the assessment of their agricultural land is proving to be very complicated due to the lack of a reliable land registry (the subsidy must be calculated according to the number of cultivated hectares).

What are the prospects for reform under Narendra Modi's government?

Narendra Modi easily won the general elections in spring 2014 with a programme focused on accelerating growth and improving governance. His victory, which was very well received in national and international business circles, raised high expectations in terms of liberalisation reforms and easing of the major subsidy programmes. Indeed, the new government has deregulated the price of diesel and discussed the possibility of introducing reforms in the fertiliser sector.

In his introduction speech on the budget for the year 2014-2015, the Minister of Finances, Arun Jaitley even announced the development of a new policy for urea.[21]

Nevertheless, for now, the government has proven to be cautious and has maintained the traditional policy of strong support for state-owned companies producing urea. In a country where agriculture provides a livelihood in one way or another for nearly 60% of the workforce, deregulating the urea subsidy system is politically risky and Prime Minister Narendra Modi is afraid of antagonising the farming electorate. The problems that he encountered in spring 2015 when he tried to get a draft bill on easing the expropriation conditions passed have scarred him. Indeed, the government was weakened in the face of an opposition that accused it of pushing a bill unfavourable to farmers' interests. The elections in October 2015 in Bihar, an important state politically and furthermore with a large farming electorate, have also made him cautious. This is even more the case since the local government in Bihar has adopted a policy of strongly supporting the farming community, particularly by using subsidy systems.

The fertiliser manufacturers – including Tata Chemicals and Chambal Fertilisers – who have been calling for a deregulation of prices or a direct transfer of subsidies to farmers for a long time, cannot conceal a certain disappointment. As Satish Chander, the Director of the Fertiliser Association of India, an industry group, concedes: "There was a lot of expectation when Modi came to power. We are a bit disillusioned. We do not see any change as far as fertiliser policy, payment of subsidies or ease of doing business are concerned."[22]

In the meantime at the start of 2105, the Modi government introduced the Soil Health Card Programme[23] to stem the excesses in the use of nitrogen fertilisers. The goal is to distribute recommendation sheets to farmers on the use of fertilisers depending on the specific qualities of the soil they cultivate. Moreover, during the summer of 2015, Prime Minister Modi called for Indian farmers to launch a second "Green Revolution". As he conceived it, this new "Green Revolution" has the following characteristics:

- it must provide through the massive incorporation of the latest advances in agricultural science and technology;

21. "Govt to Formulate New Urea Policy, to Check its Imbalance Use", *The Indian Express*, 10 July 2014.
22. Manoj Kumar and Mayank Bhardwaj, "Indian saves $1.8 bln on fertiliser subsidies, but no reform planned", *Reuters*, 4 September 2015.
23. "PM launches Soil Health Card Scheme Targeting 14 crores Farmers", *DNA*, 19 February 2015.

- it must be conducted first and foremost in the eastern part of the country, i.e. in the states whose agricultural productivity is generally below the national average (Orissa, western Bengal, Bihar and Jharkhand).

This call for a second "Green Revolution" has significant implications for the Indian fertiliser sector. Indeed, the Modi government has already launched the following initiatives:

- to reinvigorate the urea industry in the east of the country, firstly by reviving production plants in Sindri (Jharkhand), Gorakhpur (Uttar Pradesh), and Barauni (Bihar), and then by planning to open new ones in western Bengal;

- to promote new practices for fertiliser use to safeguard soil health. This aims to help the farmers achieve the right nutrient ratio depending upon the specific quality of the soil they cultivate. The Soil Health Cards are part of this initiative, but the goal is also to universalise the use of new information technologies (internet, mobile phones) and soil analysis tests, so that Indian farmers learn to maintain the good health of their agricultural land.

The international dimensions

The inability of domestic manufacturers to substantially increase their production to meet a growing domestic demand has led India to increasingly rely on imports. Hence, this country is among the leading world importers of phosphate and potash products.

Reliance on imports

Generally, India is the second leading importer of nutrients in the world after the United States. In 2012, it absorbed 11% of the world's fertiliser imports. In response to this growing dependency on imports, the players in the sector – that is to say the companies, but also the Indian government – are looking to secure their supplies, either by negotiating long-term contracts or by trying to acquire shares in the firms that supply them.[24]

India is the world's third largest importer of potash nutrients after the United States and China. Its imports accounted for nearly 6% of world imports in 2012.[25] Its main suppliers are in North America, Russia, and Belarus.[26] To secure their supplies, in 2011 Indian authorities offered to buy 20% of the shares in Belaruskali, for a total of $6 billion, but the negotiations with Minsk failed. Elsewhere, the firm Gujarat State Fertilizer Company succeeded in gaining control of 20% of the Canadian supplier Karnalyte Resources Inc. for $54 million. This operation enabled the company to secure its potash supplies for the next twenty years.[27]

India was nearly self-sufficient in the urea sector ten years ago. This is no longer the case today, as the annual Indian demand has increased to 30 MMT for a domestic production of 22 MMT. As such, the country has to import nearly 8 MMT of urea. For the year 2014-2015 for example, India imported 8.75 MMT of urea, including

24. Biman Mukherji, "Indian Fertilizer Firms Hunt for Resources", *The Wall Street Journal*, 2 April 2013.
25. *Ibid*.
26. "Indian Farms in Urgent Need of More Phosphate and Potash-based Fertilizers", *Investorintel*, 21 February 2014, available at : <http://investorintel.com>.
27. "Karnalyte Resources Inc and Gujarat State Fertilizers & Chemicals Announce Strategic Investment and Off-Take Agreement", *Karnalyte Press release*, 10 January 2013.

5.4 MMT from China and 1.4 MMT from Oman. It also purchases supplies from Qatar and (again) from Iran. Interestingly, while emphasising the need for the country to regain self-sufficiency in the urea sector, Prime Minister Modi is trying to find new suppliers abroad. During his trip to Turkmenistan in August 2015, he signed a framework agreement with the firm Turkmenhimiya to supply state-owned company Rashtriya Chemicals and Fertilisers (RCF) with urea for the next three years (or up to 2018).[28]

Finally, India is the world's leading importer of phosphate nutrients (7% of world imports in 2012).[29] Each year, it purchases more than five million tonnes of phosphate rock, mainly supplied by Jordan, Morocco, and Egypt. It also imports phosphoric acid in large quantities, by purchasing from Morocco and Senegal, as well as the United States and Tunisia. In the phosphate sector, even more than in the nitrogen and potash sectors, India has sought to promote a joint venture strategy abroad to compensate for its dependence on imports.

Developing a network of joint ventures abroad

The Indian government is encouraging public and private players in the sector to set up joint ventures abroad, particularly in countries that have an abundant supply of natural gas and phosphate rock. The goal is to secure long-term supplies of finished and intermediate products, as well as raw materials further upstream in the fertiliser sector.

The pioneering project in this area took place in Morocco in 1999, with a partnership between the Office Chérifien des Phosphates (OCP), one of the largest phosphate exporters in the world, and Chambal Chemicals & Fertilizers, a company in the Birla conglomerate. The two partners set up a phosphoric acid manufacturing plant at Jorf Lasfar, around 150 km from Casablanca. In 2005, the Tata conglomerate, through its Tata Chemicals division, joined this joint venture known as IMACID. The three partners are now at the head of a major factory producing nearly 430,000 million tonnes of phosphoric acid per year, mainly exported to India. The OCP, in its turn, has undertaken to invest in India to expand its presence in this huge market. In 2002, with its Indian partner, the Chambal group, it acquired 74% of Paradeep Phosphates, a fertiliser production plant in Orissa, in the east of India, with an annual production capacity of one million tonnes (the remaining 26% is held by the Indian government).

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28. "Rashtriya Chemicals and Fertilisers to import urea from Turkmenistan", *The Economic Time*s, 13 July 2015.
29. Ashok Gulati and Pritha Banerjee, *op. cit*.

India has subsequently extended its joint venture network in the phosphate sector to Tunisia (TIFERT), Senegal (ICS), and Jordan (JIFCO).[30]

The joint venture Tunisia-India Fertilizer (TIFERT), which was created in 2006, became operational in spring 2013. The plant has an annual production capacity of 360,000 tonnes of phosphoric acid. This $450 million project is 30% held by Coromandel Fertilizers and Gujarat State Fertilizers for the Indian part, with the remaining 70% controlled by two Tunisian state-owned companies.

In 2008, a consortium led by Indian Farmers & Fertilizers Cooperation Limited (IFFCO) invested $110 million to revitalise the Industrie Chimique du Sénégal's business (ICS). The goal is to produce 660,000 tonnes of phosphoric acid annually. The agreement included a commitment that the new joint venture supply 550,000 tonnes to India. The joint venture was operational in 2014 with the active support of the Indian government.

In 2008, IFFCO partnered with Jordan Phosphate Mines Company (JPMC) in order to set up a phosphoric acid production plant, presented as one of the largest in the world. This company, called JIFCO, which required an investment of $860 million, is 52% held by IFFCO and 48% by JPCM. The plant was officially opened on 10 October 2015 by Indian President Pranab Mukherjee and the Jordanian King Abdullah II.[31] Located in the city of Eshidiya, 325 km from the capital Amman, the plant produces phosphoric acid that is shipped directly to the port of Aqaba, and then to Kandla in Gujarat.

Besides these projects, which are now operational, Indian manufacturers in the phosphate sector are increasing contacts and joint venture proposals with countries in Africa and the Persian Gulf. Among many proposals, the following two projects should be noted:

- In November 2012, Zuari Agro Chemicals and RAK Maritime City concluded a framework agreement to set up an integrated diammonium phosphate (DAP) production plant in the United Arab Emirates. The project even includes the installation of an electric power plant, a desalination plant, and a dock. Its cost is estimated at $800 million.[32]

30. We have not included the joint ventures created in Jordan in 1997 (Indo Jordan Chemicals) and in Egypt in 2007 (Indo-Egyptian Fertilizer Company) in the following list, as the Indian partners subsequently withdrew.
31. "Pranab Mukherjee inaugurates Jordan's Sulphuric Acid Plant with Indian Stake", *The Economic Times*, 10 October 2015.
32. "Zuari Looks to Raise $900 mn to Fund Fertilizer Plant in UAE", *Livemint*, 7 May 2015.

- In July 2012, the Indian government proposed to the Togolese government to set up a joint venture in the country for the production of phosphates and phosphate fertilisers.

In the urea sector, India has turned to Oman. The large joint venture that it set up in this country, the Oman-India Fertilizer Company Project (OMIFCO), provides it with an annual supply of 1.65 MMT. These supplies have helped to protect it from the volatility of international prices in the raw material sector, especially as Oman agreed in 2002 to supply OMIIFCO with gas at a price of 0.77 dollars/mBtu (this price was readjusted to 3 dollars/mBtu in 2012).[33]

India has also renewed negotiations with Iran and Ghana, two countries that it had already approached seriously – respectively in 2010 and 2013 – with a view to establishing urea production plants. With regard to Iran, the project aims to set up a 1.3 MT urea production plant in the Chabahar region. It would involve, on the Indian side, Rashtriya Chemicals & Fertilisers and Gujarat Narmada Valley Fertilisers. The Iranian government, for its part, may have guaranteed a natural gas supply from the plant at a price of 2.9 dollars/mBtu.[34]

33. Harish Damodaran, "Nutrient Self-Sufficiency: Better Make in Iran than in India", *op. cit*.
34. *Ibid*.

Indian joint ventures abroad in the fertiliser sector

Co. Name	*Joint venture Country located*	*Stakeholders* *Shares in the project*	*Production*
1.	OMIFCO (Oman India Fertilizer Co.) Oman	Oman Oil Co. (50%) IFFCO (25%) KRIBHCO (25%)	1,652,000 MT of urea 248,000 MT of ammonia water Production started in 2006
2.	ICS Senegal (Industrie chimique du Sénégal) Senegal	ICS Sénégal IFFCO consortium	550,000 MT of phosphoric acid Production boosted in 2014
3.	JIFCO (Jordan-India Fertilizer company) Jordan	JPMC (48%) IFFCO (52%)	480,000 MT of phosphoric acid Commercial production started in December 2014
4.	IMACID Morocco	OCP-Maroc (33%) Chambal (33%) TCL (33%)	425,000 MT of phosphoric acid Production started in 1997-1998
5.	TIFERT (Tunisia-India Fertilizer Company) Tunisia	GCT (Tunisia) CFL (now CIL) GSFC (India)	360,000 MT of phosphoric acid Commercial production started in April 2014

Sources: table extracted from the Indian Ministry of Chemicals and Fertilizers, "Encouraging Indian Companies to Establish Joint Ventures for Fertilizers", *Press Release*, 17 March 2015 and supplemented with various newspaper articles.

Conclusion

India is now a major player in the international fertiliser market, regardless of the nutrients considered. Whether it is a question of imports, domestic production, or consumption, India ranks among the top three global players in the sector. At the same time, an internal analysis of the situation in India reveals that the sector faces many constraints. Some constraints are structural, especially the scarcity of raw material resources in the country, while others are strictly political and refer to the difficulties that the Indian leaders are experiencing in reforming a politically sensitive sector.

In this respect, Narendra Modi's government may prove to be as cautious as its predecessors, at least in the short-term. Despite his pro-reform image, Modi has been more guarded than expected on a number of issues. The prospects for reform in the urea sector - the largest and most problematic of fertilizers in India - are therefore proving uncertain. Nevertheless, the Prime Minister's aim of launching a new "Green Revolution" must attract attention, particularly because it underscores the seriousness of excesses related to the overuse of urea and it intends to give Indian farmers better ways to use fertilisers in order to maintain the health of their soil.

Due to a lack of decisive reforms, India's production capacities are not progressing as quickly as domestic demand; the country must therefore rely heavily on imports, including for urea, which was once a self-sufficient sector. This dependence on imports is a risk factor insofar as it subjects India to price fluctuations on international commodity markets. In order to avoid these fluctuations, Indian authorities have tried to enter into supply agreements over several years or even to acquire shares in the firms that supply them.

Similarly, authorities have encouraged major players in the sector to form joint ventures abroad. In keeping with this vision, several companies – including the giant IFFCO (Indian Farmers & Fertilizers Cooperation Limited) – have been building a network of joint ventures in North Africa and the Middle East since the early 2000s. In fact, this network enables supplies to be secured at a very early stage of production, since the bulk of the products from

these joint ventures is sent to India. This provides a certain level of protection from the volatility of international markets. Out of the five joint ventures currently in operation, four fall under the phosphate sector and one under the urea sector. However, it is clear that this network of joint ventures is bound to develop and diversify, as major Indian manufacturers in the fertiliser sector have grown anxious to secure their supplies of raw materials and intermediate products.