CRITICAL ANALYSIS OF NEW UREA POLICY-2015, WAY FORWARD

A Dissertation submitted to the Panjab University, Chandigarh for the award of Master of Philosophy in Social Sciences, in Partial Fulfilment of the requirement for the 45th Advanced Professional Programme in Public Administration

By

Shri Vijay Ranjan Singh, IFS

(Roll No. 4539)

Under the guidance of

Professor Geethanjali Nataraj

45th Advanced Professional Programme in Public Administration

(2019-20)

Indian Institute of Public Administration

I. P. Estate, Ring Road,

New Delhi-110002

Certificate

I have the pleasure to certify that **Shri Vijay Ranjan Singh** has pursued his research work and prepared the present dissertation titled

"Critical Analysis of New Urea Policy-2015, Way Forward"

under my guidance and supervision. The dissertation is the result of his own research and to the best of my knowledge, no part of it has earlier comprised any other monograph, dissertation or book. This is being submitted to the Panjab University, Chandigarh, for the purpose of Master of Philosophy in Social Sciences in Partial fulfilment of the requirement for the Advanced Professional Programme in Public Administration of Indian Institute of Public Administration (IIPA), New Delhi.

I recommend that the dissertation of **Shri Vijay Ranjan Singh** is worthy of consideration for the award of M.Phil degree of Panjab University, Chandigarh.

(Geethanjali Nataraj)
Indian Institute of Public Administration
Indraprastha Estate, Ring Road,
New Delhi-110002.

Acknowledgement

I consider myself as a lucky individual, as I was provided with an opportunity to be part of 45th APPPA, a great chance of learning, professional development and meeting so many wonderful people from different field. I perceive this opportunity as a big milestone in my carrier development. It would not have been possible without permission of Shri D.V. Sadanand Gowda, Hon'ble Minister of Chemicals and Fertilizer, Government of India, I wish to express my gratefulness and deep regards to him for providing with this opportunity.

I owe my deepest gratitude to Shri Mansukh Laxmanbhai Mandaviya, Union Minister of State for Shipping (India) (Independent Charge) and Union Minister of State for Chemicals and Fertilizers for his continuous support and guidance.

I am using this opportunity to express my deepest gratitude and a special thanks to my supervisor Prof. Geethanjali Nataraj who is in spite of being extraordinarily busy with her hectic duties took out time to hear, guide and kept me on correct path and allowing me to carry out my project and complete dissertation on time. Without her thoughtful encouragement and careful supervision this dissertation would have never been taken its final shape.

I am grateful to acknowledge the support and guidance Shri S.N. Tripathi, Director IIPA and all faculty members of IIPA for giving necessary advice and guidance for the dissertation. I place on record my sincere gratitude to Prof. Govind Bhattacharjee for his support and advice.

My deep gratitude and heartfelt thanks go to Mrs Neetu Jain for her unwavering enthusiasm for well being of all participants of 45th APPPA during last nine months. Her personal generosity and mentoring made my time at IIPA enjoyable. I particularly indebted to her words of encouragement and support.

I am also grateful for having chance to meet so many wonderful people and professionals at FAI. It is my radiant sentiment to place on record my deepest sense of gratitude to Mr. Satish Chander DG, FAI, Dr. S Nand, and Dr. P.C. Chanda and their team for unconditional support and guidance which were extremely valuable to my study.

I'm also grateful to Mr Rajan Choudhry MD, KRIBHCO and his entire team for their contribution to this dissertation.

My appreciation and gratitude also extend to my library colleagues Mrs. Sunita Gulati, Mrs Surabhi Anand, Mrs Shakti Chouhan and Mrs Taruna Rani for

extending help and encouragement to use online resources, which have been especially valuable at early stage of dissertation writing,

This Dissertation would not have been possible without contribution of Mr. Prabhas Kumar, Mrs, Sunita Bansal and Mr.Sachin Kumar. Thanks you all for more timely help.

I wish to express my gratefulness to Mohit, Rupesh, Aashish, Navneet, Shubham, Ankur and Sameer who volunteered and participated in this research by giving generously their wisdom and time. Thank you so much for always being there when I needed you.

I express my deep sense of gratitude to Jatin who helped and encouraged me at all stage of my work with great patience and immense care.

It is with immense gratitude, I acknowledge the support and help of Mr.Anil Kumar Sharma, Mr. Manish Rawat and Mr. Rajesh Kumar for their patience while addressing my endless queries and addressed myriad problems with smile.

I choose this moment to acknowledge the contributions of Gurcharan, Dharaballabh Joshi, and Manish Kumar for greeting me every day with smile and arranging all facilities to make my life easier in APPPA lounge.

The co-operation and assistance of all experienced representatives of FICC, and PDIL were essential for the completion of the dissertation. I feel indebted for their valuable suggestions.

The completion of this work could not have been possible without the participation and assistance of so many people whose name may not be possible to innumerate. But their contributions are sincerely appreciated and gratefully acknowledged.

I take this opportunity extend my deepest thanks to my wife Vineeta and daughters Nistula and Pragalbha for their unceasing encouragement, support and care during odd hours.

Finally deepest gratitude to

Almighty, the author of knowledge and wisdom for countless love.

Contents

List of Table

List of Figure

List of Abbreviations

APM	Administrative Price Mechanism
CC	Conversion Cost
CCEA	Cabinet Committee On Economic Affairs
CGD	City Gas Distribution
CRC	Capital Related Cost
DBT	Direct Benefit Transfer
DOE	Department Of Expenditure
DOF	Department Of Fertilizers
ECA	Essential Commodities Act
EGOM	Empowered Group Of Ministers
EPMC	Empowered Pool Management Committee
ERC	Expenditure Reform Commission
FPO	Farmers Producers Organizations
FAI	Fertilizers Association Of India
FC	Fixed Cost
FCO	Fertilizer Control Order
FICC	Fertilizer Industry Coordination Committee
FOR	Free On Road
G.CAL	Giga Calories
GHG	Green House Gases
GOI	Government Of India
GST	Goods And Services Tax
HSD	High Speed Diesel
ICRA	Investment Information And Credit Rating Agency
i-FMS	Integrated Fertilizer Monitoring System
IPP	Import Parity Price
K	Potassium
KG-D-6	Krishna Godavari Basin D-6 Block

LMT	Lakhs Metric Tonnes
LNG	Liquefied Natural Gas
m-FMS	Mobile Fertilizer Monitoring System
m-NPS	Modified New Pricing Scheme
MMBTU	Million Metric British Thermal Unit
MMSCMD	Million Metric Standard Cubic Meter Per Day
MOP	Muriate Of Potash
MRP	Maximum Retail Price
N	Nitrogen
NAS	New Agriculture Strategy
NBS	Nutrient Based Subsidy
NELP	New Exploration Licensing Policy
NG	Natural Gas
NPK	Nitrogen Phosphorus Potassium
NPS	New Pricing Scheme
NUE	Nitrogen Use Efficiency
NUP	New Urea Policy
OMC	Oil Marketing Companies
P	Phosphorus
PFA	Pool Fund Account
PMT	Per Metric Tonnes
PSC	Production Sharing Contracts
PTPK	Per Kilometre Per Tonnes
RAC	Re-assessed Capacity
RLNG	Regasified Liquefied Natural Gas
RPS	Retention Price Scheme
VAT	Value Added Tax
VC	Variable Cost

Abstract

The New Urea Policy (NUP) - 2015 is a pricing policy for calculation of the cost of production of urea from twenty five indigenous gas based urea units subject to adherence of certain norms and parameters defined by the policy. The policy was implemented effectively from 1st June 2015 to 31st March 2019. Based on a qualitative and quantitative analysis of energy consumption norm, additional production beyond Reassessed Capacity (RAC), cost of production of urea from different units in response to the provisions of NUP-2015, it can be concluded that Government of India has implemented this policy effectively with verifiable outcomes. It is basically sound, forward looking policy and has fared well in achieving its stated objectives. Due to implementation of NUP-2015, the urea industry has become more energy efficient with noticeable fall in average energy consumption norms, more than twenty Lakh MT (LMT) of extra production beyond RAC and more homogeneity in cost of production of urea among heterogeneous urea units. In recent years, externalities like Direct Benefit Transfer (DBT) in fertilizer sector, short supply of domestic natural gas, implementation issue in gas pooling; low price of urea in international market and devaluation of Indian Rupee, have affected the additional production adversely. Therefore, the government needs to accommodate the concerns of industry arising due to implementation of DBT and Gas Pooling and timely payment of subsidy to industry.

The massive rise in urea subsidy is effect of rising cost of input like Natural Gas (NG) and Re-gasified Liquefied Natural Gas (RLNG) and stagnant Maximum Retail Price (MRP) since last one decade. The government has tried to control subsidy outgo by tightening the energy norms and non-revision of fixed cost of urea industry only. There is little scope for more energy efficiency and additional production among the domestic urea units because of techno-economic reasons. The allocation of domestic gas to urea sector, rationalization of tax on natural gas and RLNG, adequate budgetary allocation and timely release of subsidy can address many concerns of indigenous urea industry.

The low MRP has resulted in diversion and smuggling, and excess use of urea, and resulting in soil, air and water pollution. Revision of MRP of urea linked with input cost, dual pricing either based on region wise or size of land holding merit serious attention to bring down subsidy bill. The upward move in MRP depends on political consideration. Total decontrol of MRP and roll out of DBT across the

country is feasible when master data base of farmers, landholding, soil health cards and Aadhaar need to be linked for seamless implementation of DBT.

Region specific extension programme has gained little attention from policy makers. The collaboration of myriad agencies involved in agriculture extension and education programme can be used as tool to influence the famers' decision to use fertilizers and choice of crop can result in balanced use of fertilizers. The promotion of crop specific composite and mixture fertilizers, simplification of procedure to include new fertilizers in Fertilizers Control Order (FCO), extension of subsidy to organic and bio-fertilizers need active consideration.

The coordination between law enforcing agencies, state agriculture department and border forces is urgently needed to curb diversion of urea to non agriculture sector and smuggling to neighbouring countries. Agriculture extension, increased nitrogen use efficiency and strict measures to control diversions and smuggling can reduce demand of urea considerably.

Any future policy must take lessons from second generation subsidy programme of other developing countries. In democratic country like India, Any policy is successful and viable policy it must be socially desirable, economically feasible and politically acceptable.

Chapter 1

1. Introduction

Agriculture plays a pivotal role in the service to mankind in meeting food requirements for the ever increasing world population. The continuous crop production which is necessary for food security and livelihood depends on increased agricultural productivity. Agricultural productivity primarily depends on several factors viz., land, seed, water, fertilizers and also influenced by access to agricultural credit, crop insurance, and assurance of remunerative prices for agricultural produce, and storage and marketing infrastructure. Adequate and judicious use of fertilizers becomes very important in maintaining agricultural productivity because continual removal of nutrients from soil in the form of crop removal without adequate replenishment results in loss of soil fertility.

In India, application of chemical fertilizers was part of an overall strategy for increasing food grain production during green revolution and thereafter. The Government of India (GOI) regulates production, distribution and sale of various types of chemical fertilizers under FCO which promulgated under Section 3 of Essential Commodities Act (EC Act), 1955, with an objective to ensure timely availability to farmers across the country. There are three major types of nutrients used as fertilizers: Nitrogen (N), Phosphatic (P), and Potassic (K). Of these, the MRP of urea (containing N fertilizer) is controlled by the GOI, and difference in cost of production of urea by thirty-one indigenous urea manufacturing units is paid by the GOI in the form of subsidy to the urea units under pricing policy announced by the GOI.

The requirement of fertilizers in the country is much higher than the indigenous production. It is evident from above from Table:1 that the indigenous production does not commensurate the domestic consumption/sale of fertilizers in the country. The gap has to be met through import.During 2018-19, the annual requirement of urea in the country is about 320 Lakhs Metric Tonnes (LMT) while the annual indigenous production is stagnated at around 240 LMT. The gap has to be met through import on government account. These imports are imperative for ensuring smooth and timely supply of urea to the farmers in the country.

All non-urea fertilizers are covered under Open General License regime and are imported by the fertilizer companies on commercially viable terms. In so far as

P&K fertilizers are concerned, there is no other option available but to import these fertilizers to meet the domestic demand. India is fully dependent on imports for its requirement of Muriate of Potash (MoP) which can be used as finished fertilizers as well as raw material for other complex fertilizers. India is also dependent on imports for the raw materials of phosphatic fertilizers such as natural gas, ammonia, rock phosphate, phosphoric acid, sulphur, sulphuric acid etc. due to non-availability/scarce availability of resources.

Table 1: Consumption of Fertilizers In Last Four Years

Year	Production	Consumption/Sales	Import
2015-16	413.14	534.07	183.54
2016-17	414.41	499.10	141.23
2017-18	413.61	515.85	154.27
2018-19	414.85	537.90	188.43

The prices P and K fertilizers were decontrolled under Nutrient based Subsidy (NBS) policy implemented in 2010 wherein the fix subsidy is being paid on different grades of P & K fertilizers announced on 1st April of every year MRP is fixed by the companies reasonably. Urea is the only fertilizer, subject to aMRP set by the Government and also under movement and distribution control. The current MRP of urea is Rs.5377/MT (approximately US$77). The installed capacity of urea in India has reached a level more than 244 LMT making India the 3rd largest Urea producer in the world. The rapid build-up of fertilizer production capacity in the country has been achieved as a result of a favourable policy environment facilitating large investments in the public, co-operative and private sectors. Presently, 31 urea producing units are eligible to get subsidy under the urea pricing policy, of which 29 units are gas based and three units are naphtha based *viz*., Madras Fertilizers Limited (MFL), Southern Petrochemical Industries Corporation (SPIC) and Mangalore Chemicals and fertilizers Limited (MCFL).

Urea industry is continuous process; low value addition and high energy consuming industry with low direct employment generation potential. The domestic urea industry is heterogeneous and riddled with distortions and cost of production varies from unit to unit due to several reasons such as varying vintage, installed capacity of plants, energy consumption norms, feed stock /fuel used etc.The pre-set energy norms vary from lowest of 5.417 G.Cal/MT of urea to 12.688 G.Cal/MT of urea whereas actual consumption during 2017-18 varied from lowest of 5.155

G.Cal/MT (Yara Fertilizer India Private Limited (YFIL) of urea to highest of 18.917 G.Cal/MT (Brahmaputra Valley Fertilizers Corporation Limited (BVFCL)-II of urea. The plant vintage varies from year 1965 to year 1999. The urea plant reassessed capacity of urea units varies from 2.40 LMT per annum to 17.30 LMT per annum. It reflects in the cost of production which varies widely from the lowest of Rs. 22,610/MT of urea to highest of Rs. 39,157/MT of urea during the year 2018-19 (provisional third quarter). The annual sale of urea during 2018-19 was 317.19 LMT. With almost static production of around 240 LMT (2018-19), the country had imported 74.81 LMT of urea from joint venture and international market to meet demand supply gap. The urea pricing policy plays a very important role in incentivizing urea units to maximise indigenous production and thereby saving in foreign exchange.

1.1 Evolution of Urea Subsidy Policy in India

The beginnings of the nitrogenous fertilizer industry in India can be traced to 1933, when ammonium sulphate was produced as a by-product in the steel plant of the Tata Iron and Steel Company at Jamshedpur. The production of nitrogenous fertilizers based on synthetic ammonia began in 1941, when Mysore Chemicals and Fertilizers set up a plant. This plant used the electrolysis of water to obtain hydrogen for ammonia synthesis. The first major public sector unit manufacturing N fertilizer was the Fertilizer Corporation of India's ammonium sulphate plant at Sindri, established in 1951. The fertilizer industry was recognised as a core sector for public sector investment in the industrial policy of (Venkateshwarlu and Sen, 2002).

Post independence, the Government of India has considered various methods to ensure availability of fertilizers at affordable price. In the year 1943, the government fixed the fertilizer prices on a no-profit-no-loss basis, which is considered as the first major fertilizer policy. After independence, the Government of India had been regulating sale, price and quality of fertilizers in the country to ensure adequate and timely availability of fertilizers at affordable prices to farmers for maximizing agricultural production in the country and also food security for the people. Keeping this objective in mind, the government notified and implemented the FCO under EC Act in the year 1957 and to regulate the distribution of fertilizer, the Movement Control Order was passed in 1973. At present, the Department of Agriculture and Cooperation and farmers Welfare is dealing with FCO and the movement of fertilizers

is being controlled by Department of Fertilizers (DoF) in consultation and inputs from the Department of Agriculture and CO-operation (DAC) and the State Governments.

1.2 History for Fertilizer Subsidy in India

In May 1964, India faced perilous situation because of war, drought, and major food crisis and to handle the situation C. Subramaniam, who had successful stint as Union Minister of Steel and Mines, took charge of the crisis-ridden food and agriculture ministry. He decided that food crisis can be handled quickly by increasing agricultural production by using technology into farming. His new food policy, which was soon popularized as the "New Agricultural Strategy" (NAS), was defined by a national commitment to capital-intensive technological resources, price incentives to farmers, and organizational reforms. The core of his technocratic approach was use of fertilizers and better seeds which is evident from his statement

“To produce more food with less fertilizer is as impossible a task as to produce more food with less fertilizer is as impossible a task as to produce more steel with less iron ore.... Better seeds for agriculture are as crucial as better machine tools for industry." (C. Subramaniam as cited in Saha, 2013 on page 303).

Subramaniam's plans for the modernization of Indian agriculture received additional endorsement from the Fertilizer Committee Report of 1964. Headed by B. S. Sivaraman, who was a member of the Indian Civil Service, it urged the removal of all obstacles in the production and distribution of chemical fertilizers to ensure rapid increases in agricultural production (C. Subramaniam as cited in Saha, 2013 on page 303).

It was only in the new policies Subramaniam that state leaders found a chance to realize their long-held demands for price supports to farmers and subsidies for expensive agricultural inputs like fertilizers. In further justification of the uses of chemical fertilizers, the minister expressed his concern that applying huge amounts of organic fertilizers would "literally drown" the crops during tilling and their grain-formation stages (C. Subramaniam as cited in Saha, 2013 on page 304).

At the International Center for Maize and Wheat Improvement, agronomist Norman Borlaug bred wheat varieties (dwarf wheat) that respond to heavy applications of chemical fertilizers; the resulting yield increases are known as the Green Revolution. Borlaug was awarded the Nobel Peace Prize in 1970. These yield increases are not only the result of plant breeding, but also of increasing applications

of fertilizers and pesticides, expansion of the irrigated area and the rising atmospheric carbon dioxide concentration (Gillind, 2015).

At advent of Green Revolution, increased fertilizer consumption, devaluation of rupee in 1966 and the oil price shock in the 1973 resulted in increase in the price of fertilizers and less investment in fertilizer sector. In order to protect and promote the urea industry and ensure low farm gate prices for fertilizers, the central government implemented Retention Price Scheme in 1977.

1.2.1. Retention Price Scheme (RPS) (1977 -2003)

The RPS was introduced on recommendations of committee under the chairmanship of Shri S.S. Marathe, constituted by Ministry of Chemicals and Fertilizers, Government of India in 1976. The committee reviewed the pricing policy at that time and suggested cost plus pricing scheme to compute the cost of production with assured return of 12% on the net worth for indigenous urea units. The RPS recognized two types of cost viz., Variable cost and fixed cost for pricing of urea of a particular unit. The variable cost consists of cost of energy (NG, RLNG, Naphtha, etc.), Cost of bag and Water.

The fixed cost consists of Conversion Cost (CC) and Capital related Cost (CRC). The CC includes Salaries and wages, contract labour, chemicals and consumables including catalyst, repair and maintenance, administrative, Social, and Factory overheads, insurance of plant and miscellaneous income. The CRC includes depreciation, interests on borrowing (short terms as well as long term loan) interest on cash credit and 12 percent post tax return on net worth i.e. equity and reserves.

The implementation of RPS witnessed high growth in fertilizer industry in terms of new capacity addition and higher plant capacity utilization. It also helped in import substitution when the foreign exchange was under tremendous pressure. The RPS as a pricing mechanism failed to accelerate the incentives either for promoting internal efficiencies or cost cutting measures. The resulting outcomes are largely interpreted in terms of losses to the national economy, the burden of which is to be borne by the taxpayer and Indian farmers.

1.2.2. New Pricing Scheme (NPS)

During RPS regime the cost of domestic production was higher than the import price and due to high consumption fertilizer subsidy was rising. It was debated that fertilizer subsidy which is meant for farmers was going to industry. The Government of India set up various committees and study group viz., Expenditure

Reform Commission (ERC) headed by Shri K. P. Geethakrishan, in 2000, Expert Committee on Reassessment of Production Capacity (Alagh Committee, 2001), Committee on energy efficiency levels etc. for urea Units (Gokak Committee 2003).

1.2.2.1 NPS-I and NPS-II (2003 to 2006)

Based on the recommendations of aforesaid committees and study groups during RPS period, the unit based retention price system RPS was replaced with group based subsidy system. Under NPS-I for the first time six groups were decided on the basis of vintage and feed stock used for production of urea with goal to ensure competitiveness and transparency. It was decided to implement for one year (1-4-2003 to 31-3-2004). The stage II of NPS was implemented for two years from 1-4-2004 to 31-3- 2006 (extended up to 30-9-2006). During this period pre energy norms were notified and enforced and concession rate was tightened on account of CRC for three units of pre 92 gas based group and for all post 92 gas and naphtha units.

1.2.2.2 NPS-III (2007-2014)

It was decided that after taking in to account of concerns of industry, farmers and interest groups and performance evaluation of Stage I and II of NPS, stage III of NPS would be implemented. Therefore, in 2004, a working group under Dr. Y. K. Alagh was constituted to review the effectiveness of Stage I and II of NPS and to formulate a policy for urea units for future. Accordingly stage III of NPS was notified in 2006 and its provision were implemented up to March 2010 and it was further extended up to March 2014. The comparative account of three stages of NPS has been summarized in the following table.

During NPS period out of 30 indigenous urea units, 27 urea units except from MFL, MCFL and SPIC, started using gas as feedstock for production of urea. Recently, MFL has also converted to gas based and commenced urea production as a gas based unit. Presently there are only two Naphtha based urea units viz. MCFL and SPIC. These three units are producing urea using naphtha in the absence of gas allocation and pipeline connectivity. However, with the pipeline work likely to be finished in the next one year, these units also will also start production as gas based unit in the next one year.

Analysis of Cost data of fertilizer companies in terms of energy norms, operating stream days and capacity utilisation suggest that main thrust of NPS had been successful. The capacity utilisation had gone up and energy efficiency had improved during NPS period. In spite of enforcing pre-set energy norm, based on

stringent criteria, many of the urea units were operating below pre-set energy norm, by making necessary technological adjustments and investments. In trend of increasing energy prices, the industry had substantially saved in national energy cost / energy import bill. The production of urea during 2002-03 was 186 LMT, which crossed to 218 LMT in 2010-11 which ultimately resulted in lower import of urea.

1.2.2.3 Modified NPS (2014-2015)

In 2011, for formulation of policy beyond NPS-III for existing urea units, Group of Ministers (GOM) was constituted who recommended that a Committee under chairmanship of Shri Saumitra Chaudhuri, Member, Planning Commission comprising Secretaries of Department of Fertilizers, Department of Expenditure, Department of Agriculture and Cooperation and Ministry of Petroleum and Natural Gas would examine the proposal for introduction of Nutrient Based Subsidy (NBS) in urea, including various options thereof, and making suitable recommendations.

The committee evaluated various alternatives on NBS based subsidy regime in urea sector and submitted its report in April 2011. However, the proposal of NBS in urea sector was not accepted by the government because of group based subsidy, heterogeneity among the urea units in terms of feedstock used, fear of windfall gains to some units, decontrol of MRP of urea and taxation related issues of inputs etc. are few among many.

In April 2014, after prolonged deliberations among the various stakeholders and to stem declining profitability of urea industry on account of under recovery of fixed cost, rising cost of working capital and increased maintenance in old plant, Modified NPS was announced for one year. The Modified NPS had the provisions to compensate the provision to address under recoveries due to fixed cost, minimum fixed cost and vintage allowance for gas based urea units which were more than thirty year old. Apart from these all remaining provisions of NPS-III continued with some minor changes.

1.2.3 New Urea Policy (NUP) -2015 (2015-till date)

It is evident from the above section that there had been no major change in the urea subsidy policy after NPS-III. The Government of India in the budget for financial year 2014-15 had set an agenda for reform in urea pricing scheme as follows:

"What is urgently required are certain pricing reforms in the urea sector with an immediate price correction for urea, new Nutrient based Urea Policy. This is not

only essential from viewpoint of the size of the subsidy bill but also from the viewpoint of balanced use of N, P & K nutrients."

With the approval of Cabinet Committee of Economic Affairs (CCEA), the government of India announced NUP-2015 in June 2015 with following objectives:-

i. To maximize indigenous urea production
ii. To promote energy efficiency in indigenous urea production and
iii. To rationalize subsidy burden on the government

For the first time, it was decided to implement the price pooling of domestic gas and RLNG for urea sector as announced earlier by the Ministry of Petroleum & Natural gas. The energy norms were tightened, provisions for production above reassessed capacity was simplified and units were incentivized to get subsidy comparable with Import Parity Price which includes other incidental charges which government bears on import of urea from international market. However, it may be noted that NUP-2015 has continued many provisions of Modified NPS and also stage III of NPS while calculating the cost of production for subsidy calculation of urea unit.

During the implementation of this policy the government announced amendments to maximise production beyond reassessed capacity and extended the timeline to achieve energy norm target for two more years with minor penalties. The amendment of 2018 further stated that target energy norms would continue till 31st March, 2025.

The NUP-2015 was initially intended to be replaced by new policy after 31st March 2019 but in absence of new policy, for time being its provisions has been extended till further order in April 2019.

1.3. Statement of the Problem

At present, the urea pricing of domestic units is governed by NUP-2015. This dissertation is an attempt to critically analyse the implementation of NUP-2015 during June 2015 to April 2019. Although the NUP-2015 has allowed many provisions of Modified NPS-III to continue, but I focus specifically on the three objectives of NUP-2015 para (1.1.4 above) and challenges and issues faced during implementation and future suggestions for future.

1.4. Objectives

- To assess the implementation of NUP-2015 Policy from June 2015 to April 2019 period and identify issues and challenges
- To evaluate key parameters of NUP-2015 during implementation of this policy.
- To identify the barriers and challenges that had crept into this policy regime.
- To provide feasible alternative solutions for future.

1.5. Research Design

The research design of the study is largely descriptive in nature. It will be a desk based research based on secondary sources of information (Both national and international). Secondary data will be compiled from various sources including the websites of the Ministry of Agriculture, Ministry of Chemicals and Fertilizers, Food and Agriculture Organization, World Bank and other reputed journals and studies carried out in the area by private agencies and consultancy firms, Research journals, working papers etc. from various think tanks. A short questionnaire will be prepared for the purpose of interview with key experts and stakeholders in the Urea sector.

1.6. Rationale

- There has been no review of NUP-2105 after April 2019.
- The NUP-2015 was supposed to replaced with new policy but the same policy has been extended beyond April 2019 till further order
- The policy was amended twice to accommodate the grievances of urea units during the implementation period.
- Provisions of this policy decide the subsidy out go in the tune of Rs. 32,189 cr. per annum (2018-19).
- During last two financial years, the urea industry is facing liquidity crisis and as a whole is having negative return. It may be noted that more than 50% of units are having losses on urea production.
- The provisions of NUP-2015 has important and has direct bearing on the import of urea from international spot market.

1.7. Research Questions/Hypothesis

- Has NUP-2015 been implemented effectively?
- Has it achieved its three objectives viz., improved energy efficiency, rationalization of subsidy and maximising indigenous production?

- What were the various issues and challenges faced during implementation?
- What are the actionable points for future?

1.8. Limitations of the Study

The study is fairly comprehensive and will provide an in depth analysis of implementation of NUP of 2015 during last four years and issues and challenges thereof. It will also strive to suggest the changes which can be incorporated to address these issues and challenges only.

The study will not deal with issues related to introduction of Nutrient Based Subsidy in urea, consumption of urea, movement of urea across the country, freight related issues and method of transfer of fertilizer subsidy to farmers, fiscal implications of ballooning subsidy and also de- canalisation of urea import and its impact on urea industry. However, the study is partly limited in scope as it is restricted to Urea policy only and has no chapters pertaining to Agriculture policies of India.

Chapter 2

2. Literature Review

Chand, R. and Pavithra, S. (2015). Fertiliser use imbalance in India Analysis of States. *Economic and Political Weekly*, *L*, (44), 98-104.

Chand and Pavithra (2015) strongly suggests that the common and strongly-held view in India is that balanced fertiliser use requires three major plant nutrients, namely, nitrogen, phosphorous and potassium, to be used in the ratio of 4:2:1 and any deviation in fertiliser use from this norm would constrain growth in crop productivity. This officially-accepted perception, a product of 1950s experiments, has led to wrong policies on fertilisers. Excess use of 'N' in six states, namely, Andhra Pradesh, Assam, Punjab, Bihar, Haryana and Jharkhand is enough to meet the deficiency in the remaining 12 states. The paper concurs that it will be wrong to discourage use of N in the country, but it certainly needs to be curtailed in some states and promoted in most other states.

Bhushan, C., Arora, S., Trivedi, V., Srivastava, S., Subramanian, K. & Verma, S. (2019). *Grain by grain, Green rating of Fertilizer sector.*Centre for Science and Environment, New Delhi.

Under the green rating project, the authors have concluded that Urea industry has to manage Kafkaesque bureaucracy micro managing marketing, logistics and subsidy payment, which has seriously vitiated the business environment in the sector. Thus, for the fertilizer industry to take required steps the government needs to bring a measure of decontrol in the industry. Decontrol will also make the industry more competitive. Competiveness and innovation will be vital for survival and growth of the industry in 21st century.

Anju Agnihotri Chaba | Jalandhar | Published: December 26, 2019 11:54:42 am The Indian Express

Chaba (2019) found that the usage of Urea could be curtailed not because farmers wanted it, but because of the changed packing of Urea bags. Earlier, one Urea bag mostly used to contain 50 kg and now the packing of 45 kg bag was introduced to curtail its usage because our farmers go for by number of bags not by kgs and when they are using two to three bags per acre, the usage of urea is decreases 10 to 15 kg per acre because of the small packing," said a senior officer in the Agriculture

Department. Farmers can save a huge amount by following the instructions given on their Soil Health Card and from Soil Health Maps provided in the model villages rather than using fertilisers blindly as excess of anything is bad.

Chander, S. & Nand, S. (2017).*Impact of Fertilizer Policies on Farmers and Industry.* Pre-print of Annual seminar papers. Fertilizers Association India, New Delhi. Session 4, 1-8.

Chamder and Nand (2017) added that there is need to address the immediate problems of industry to save the efficient industry from sickness. For urea industry the immediate issue of payment of increased fixed beyond 2002-03 and maintaining the present energy consumption norm will go a long way to maintain the operations.

Deshpande, R. M. (2019).DBT *issues and Remedies. Indian Journal of Fertilizers, 15*(9), 124-138.

Deshpande (2019) has observed that 25 urea units are having negative returns in last two years on urea operations. The present pricing system, heterogeneity among urea units are major hurdle in implementation of DBT. The increasing carryover liabilities and financial stress in urea industry can be addressed with additional credit period facilities and working capital are prerequisite

Gulati, A. and Banerjee, P. (2020). Goal Setting for Indian Agriculture. *Economic & Political Weekly LV*, (9), 34-37.

Gulati & Banerjee (2020) suggests that given the existing subsidy system to fertilizer sector where urea is being subsidized more heavily as compared to other fertilizers, it will take time correct farmers behaviour pattern for the application of fertilizers through proper awareness creation. This something that India cannot achieve overnight. The balanced application of fertilizers is key to sustainability to production and policy should be directed to create more awareness in this aspect.

Gupta, U. (2019, October 7). India's fertilizer policy flawed, policymakers still stuck to the 1970s/80s. Financial Express. Retrieved from https://www.financialexpress.com

Gupta (2019) opined that the root cause of these anomalies is that our policymakers remain glued to the antiquated framework of the 1970s and 1980s, which was designed solely to increase the production and consumption of fertilisers. In contrast, today, it is issues such as fertiliser use efficiency, balanced fertilisation, increase in crop yield, improvement in soil health, efficiency and cost optimisation in the supply chain, and reduction in subsidy that need greater attention.

Huang, J., Gulati, A. and Gregory, I. (2017). Fertilizers *Subsidy- Which Way Forward*. IFDC/FAI report. Retrieved from https://ifdc.org/2017/01/23/new-publication.

Across the world including India, the fertilizer subsidy policies are implemented for demand and supply creation to ensure food security. In India, these policies have resulted in under pricing of urea, imbalance in fertilizer usage and limited incentive for expansion of domestic urea capacity. They suggested that one option is to gradually increase the price of urea and reduce the balance that has crept in the pricing of NPK and consequently their imbalance use in the country. It would be major challenge for policy makers and especially as past experience suggests action are unlikely. They also cautioned that the option of maintaining status quo is not sustainable. It will lead to ballooning subsidies, lower investments, greater inefficiency in the use of fertilizers and deceleration in grain productivity, which India can ill afford. Therefore, the best options seem to be marching ahead with bolder reforms and with the due consideration to the interests of the interested industry (through capital subsidy) and of farmers (through cash transfer).

Mohapatra, J.K. (2019). New Urea Policy-2015 - Has it incentivized Energy efficiency of the Domestic Urea Industry. *Indian Journal of Fertilizers, 15* (3), 218-224.

Mohapatra (2019) concluded that on the basis of the available empirical evidence that though the new policy intervention nudged the domestic urea industry to improve their energy efficiency during the year 2015-18, the extent of efficiency improvement achieved by the industry fell short of the targets envisaged under the policy for switching over to the group specific urea pricing and subsidy regime with effect from 2018-19. He opined that this policy stance substantially deviates from original intent of the NUP-2015 to upgrade the efficiency of the domestic urea to be globally competitive by 2018-19 paving the way for the next stage of reform in the sector either by way of replacement of cost plus pricing by NBS regime or by switching over to DBT.

Ravinutala, S. (2016). *Redesigning India's Urea Policy* (Doctoral dissertation). John F. Kennedy School of Government, Harvard University.

Ravinutala (2016) concluded that "Urea policy is politically sensitive. Solutions like reducing rate of subsidy or deregulating prices will not gain political support in the absence of a crisis. Therefore, we must look for second-best solutions

like the ones presented to gradually transition to the desired end state". He recommended a second-best approach of limiting the amount of subsidized fertilizer available per Aadhaar card. The deregulation must begin with import decanalization. By switching to an open general license (OGL) policy, we allow importers to respond to unmet demand and increase supply.

Mukundan, R. (2013).*Issues relating to Implementation of Pricing Policies and Industry*. Pre print of Annual seminar papers. Fertilizers Association India, New Delhi. Session 4, 1-5.

Mukundan (2013) concluded that pricing policies have given us some major benefits- creating domestic urea capacity, ensuring round the year availability of fertilisers, achieving self sufficiency in food production. The areas of concern include sustainable soil productivity, affordable prices to the farmer (in synchronisation with crop prices), increasing subsidy bill and the sub- productive investments. These are some areas where the stakeholders have to jointly evolve some solutions.

Sharma, V.P. & Thaker, H. (2010). Fertilizer Subsidy in India: Who are the Beneficiaries?*Economic & Political Weekly*, *xlv* (12), 68-76.

Sharma and Thaker (2010) suggested that reductions in the fertilizer subsidies would have an adverse impact on the farm production and incomes of the people as farmers are always not impacted by higher output prices but are certainly helped by lower input prices.Deregulation of the sector should be started with first decontrolling the phosphatic and potassic fertilizer sectors since they are already more or less deregulated, and the subsidy on these fertilizers should be directly transferred to farmers' accounts as cash. After that, the urea sector should be decontrolled gradually. He also concludes that our policies should be reformulated in the light of recent technological advances to achieve not only efficiency but also equity and sustainability.

Smith, L. G., Kirk, G. J. D., Jones, P. J. and Williams, A. G. (2019). The greenhouse gas impacts of converting food production in England and Wales to organic methods. Nature Communications. doi.org/10.1038/s41467-019-12622-7.

Smith *et al*. (2019) found that the results show that widespread adoption of organic farming practices would lead to net increases in Green House Gases (GHG) emissions as a result of lower crop and livestock yields and hence the need for additional production and associated land use changes overseas. Given that land resources are finite, this implies more competition for land, and more-intensive food

production per unit land area where as current organic systems are inherently less intensive.

Chapter 3

3. Data Source and Research Methodology

The research work started with specific observation that NUP-2015 was implemented by the DoF for four years for urea units and with certain targets to each urea unit. But during course of implementation, two amendments were announced and it was extended for two years after expiry of four years. On literature survey, it was found that there is no similar method of fertilizer subsidy scheme available in other countries across the world which is based on cost based and normative pricing principle. Therefore, there is paucity of published peer reviewed articles on thissubject. The proposed research therefore, has strived to look in to issues and challenges surfaced during implementation period, perception of various stakeholders viz., Urea industry, Department of Fertilizers, Department of Expenditure, Ministry of Agriculture and Farmer Welfare, Ministry of Petroleum and Natural Gas, NITI Aayog etc.

3.1. Secondary Data Sources

The data on energy consumption norms and annual production of urea by urea units, notifications under NUP-2015, subsidies paid to the units have been compiled from websites and publications of Department of Fertilizers, Ministry of Chemicals and Fertilizers. Other information will be collected from website of Ministry of Petroleum and Natural Gas, Ministry of Agriculture and Farmer Welfare and Parliament questions answered from the website of Lok Sabha and Rajya Sabha. The relevant data has also been collected from annual seminar paper of Fertilizers Association of India (FAI) and Fertilizer Statistics, published by FAI, research papers, newspaper reports, annual reports of companies, etc. was referred as secondary data source to collect necessary information.

3.2. Primary Data Sources

In order to satisfy the objectives of the dissertation, a qualitative research was held. A simple and open ended questionnaire was designed to gather information in line with my research objectives. Also to have first-hand opinion and discussion about NUP -2015, a semi-structured in depth interviews were conducted. The questions were prepared to guide the interview towards the satisfaction of research objectives enumerated in previous paragraph. In the current study, the participants who are

selected has special relationship with the urea industry, sufficient and relevant work experience in the running and maintaining a urea plant, active involvement in policy formulation at Government of India, are part of either of consultant organizations or industry associations, as well as proven background and understanding of technical and economic issues concerning the urea industry. Within this context, the participants of this study are from

- Executives of urea companies from public, private and co-operative sectors of all the three groups of urea plants.
- Experts dealing with fertilizer industry in NITI Aayog.
- Officials of Department of Fertilizers, Government of India.
- Project Development India Limited (PDIL), one of the leading consultants in fertilizers industry in India.
- Domain experts from Fertilizer Association of India (FAI).
- Officials of Retired financial and technical executives of urea companies.

Meetings were held during October/November 2019 and January/February of 2020 with the various respondents as per their convenience at their offices and lasted approximately one hour to two hour. I contacted the participant and asked them to participate in the research after explaining the purpose and the scope of the study. In general terms the respondents were willing to participate in the research. During the interviews some points were noted to gather and analyze data related to implementation of NUP- 2015. Additional questions were also asked which were not directly related to provisions of NUP-2015 but were related to finance of urea industry i.e. Direct Benefit Transfer (DBT). The entire conversations went smoothly and ended pleasantly.

The informal discussion with eminent persons from fertilizer industry and Fertilizer Dealers' Association was held to have deeper understandings of issues and challenges faced during implementation of NUP-2015 and novel implementable ideas for future keeping economic and political reality in consideration. Based on the secondary data available from Department of Fertilizers, industry and various publication, research articles a short questionnaire survey was prepared for the purpose of interview with key experts and stakeholders (representatives of urea units, FAI, Dealers association, Government officials of abovementioned ministries) to

elicit their response about the present policy regime and to meet these challenges to make urea industry viable

Chapter 4

Findings and Discussion

4. Findings

The questionnaire was sent to 25 gas based urea units and three naphtha based urea units belonging to fourteen companies. Three companies out of 18 companies did not reply. Total fifteen interview sessions have been organized.

4.1 Profile of Respondents

Respondents represented the urea companies belonging to RCF, NFL, IFFCO, KRIBHCO, CFCL, INDOGULF, GNVFC, NFCL, YARA, KFCL, and naphtha units MFL and MCFL. I met and discussed with the senior officials of Department of Fertilizers, Department of Agriculture and Farmers Welfare, Government of India, Member of NITI Aayog, Advisor, NITI Aayog, domain experts of FAI, PDIL and officials of Fertilizer Industry Co-ordination Committee (FICC). Moreover, most of the participants interviewed were based in National Capital Region of Delhi. The three objectives of NUP 2015 were supposed to be achieved by following tools with in a time period of four years

i. Increasing energy efficiency among the urea units by re-fixation of energy consumption norms;
ii. By simplification of subsidy calculation for additional production beyond RAC and;
iii. Supply of feedstock to all the units at uniform cost to weed out inefficiency

Therefore, the data gathered from personal interviews were categories in to four themes *viz.*, Energy consumption norm, production beyond RAC, gas pooling and other issues so as to make it more comparable.

4.2 Fixation of New Energy Consumption Norms to Improve Energy Efficiency

It is interesting to note that almost all respondents stressed that government has gone back from its promise to not to mop off the saving/benefits accruing to the units on account of lower actual energy consumption norms than target energy consumption norm. In the same length, the efficient units which have been running either below the target energy norms or achieved energy norms by target date of April 2018 complained that they are denied benefits of energy saving and are punished

because they are efficient and met the government deadline by regularly investing and maintaining their units to world class level. Many old units demanded that it is techno economically difficult to implement the energy saving project because of financial stress and need government support in form of subsidy as was done for Fuel Oil (FO)/Low Sulpher High Sulpher (LSHS) units in 2012-13. The issues raised by the respondents have been collated below

Chambal Fertilizers and Chemical Limited (CFCL)

The company commented that because of re-fixing of energy consumption norms, the company incurred a loss of almost Rs 100.00 per MT. Over a period of June-2015 to April-2018 the revision of energy norms has resulted in loss of Rs.49.55 Croress (up to 100% production).. Further, from 2018 our energy was converged to a norm of 5.50 G. Cal/MT which was a further mop up, and unfair, because some of the other units that were non-compliant with their respective energy norms, were let off for a further period of two years with minor penalties, thereby creating a two speed convergence. This was a case of rewarding the inefficient over efficient units.

KRIBHCO Shyam fertilizers Limited (KSFL)

The company complained that the energy norm under NUP-2015 has drastically reduced from 5.643 to 5.5G.Cal which has affected the unit adversely. The approximate loss on account of energy norms considering energy cost of Rs. 3100/- per G. cal is Rs. 44 Crores per annum.

Indo Gulf Fertilizers Limited (IGF)

The company has no complain and they stated that the management has implemented various energy saving schemes to achieve revised energy norms under NUP 2015.

Yara Fertilizers India Private Limited (YFIL)

The company replied that Yara (formerly Tata Chemicals Limited) has been one of the most energy efficient. NUP-15 enabled the unit to harness the benefit of investment made for energy efficiency. The unit has achieved actual energy consumption norm of 5.12 G. Cal/MT consistently since the time NUP-15 is implemented. The company confirmed that the investment to achieve energy efficiency was made by Tata Chemicals at the time of executing the green field project in December 1994 at total capital cost of Rs 1532 cr. Therefore, the unit

achieved its target much before NUP-15 is implemented, no fresh investments made for this and company incurred no loss.

Indian farmers Fertilizers Cooperatives (IFFCO

The company opined that it was the understanding between the DOF and the urea units from NPS –III policy that any future investment to reduce energy level and / or increase in urea production may be recovered from the saving in energy consumption and pre-set energy norms of the urea units shall not be mopped up. In the NUP-15 policy govt., has mopped up the pre-set norms of urea industry. Accordingly, saving in energy consumption is also reduced to the urea industry. The amount of investment to reduce the energy level in urea units are to be recovered from the energy savings achieved. Therefore, because of change in government policy the payback period of the investment in urea industry has increased considerably because of reduction in energy norms. Under NUP-15 policy, w.e.f. 01.04.2018 GOI has selectively mopped up energy norms which is disincentive for energy efficient units. The company replied that all the urea units of IFFCO have achieved the energy target applicable under NUP-2015. IFFCO has invested following amount to achieve the target energy level:

Table 2: InvestmentMade by the IFFCO for energy saving project[1]

Sr. No.	Name of the Unit	Amount of investment incurred Rs/Cr
1	Kalol Unit	157.00
2	Phulpur Unit –I	560.00
3	Phulpur Unit – II	370.00
4	Aonla Unit – I	385.00
5	Aonla Unit – I	309.00

Krishak Bharati Cooperative Ltd (KRIBHCO)

In declared provisions in NPS-2008 Policy, KRIBHCO completed a comprehensive revamp of the plant in 2012-13 by spending about Rs.1620 Crores. Due to the revamp, the production capacity increased from 17.29 LMT to 21.95 LMT per year with improvement in energy level. Even before KRIBHCO could recover the capital investment made on revamp, NUP-2015 was announced under which KRIBHCO is required to further bring down the energy level to 5.5 G.Cal /MT by the now extended date of 31.03.2020. This stipulation of reduction in energy level to 5.5 G.Cal /MT in NUP-2015 will mop up the benefits in energy saving accruing to KRIBHCO with effect from April 1, 2020 without any provision of compensating KRIBHCO for the unrecovered capital cost of revamp and is clear deviation of the

[1]Personal discussion with representatives of companies

above mentioned provision of NPS and unfair to KRIBHCO which has been a consistent supplier of least cost urea to the nation. However, as the norms will be revised to 5.5 G. Cal PMT with effect from 1.4.2020 under provisions of NUP- 2015, the scenario that has emerged for KRIBHCO is as under:

- Investment already made for revamp of the plant amounting to Rs. 1620 Crores will largely remain unrecovered.
- No scope that the additional investment cost of more than Rs 500 Crores(to reduce the norms to 5.5 G.Cal/MT will be recovered.

Further the grouping of Units under NUP-2015 based on pre-set energy norms has certain basic anomalies as follows:

- The fixation of single Target norms to units in a particular Group does not take into consideration their actual energy norm or their capacity to achieve the target energy norm.
- The Expert Committee which finalized the pre-set energy norms under NPS did not find it appropriate to fix the same pre-set energy norm for two identical plants which came up at different point of time at the same location for technical reasons. As per the technical study for NPS, two identical plants installed at two different point of time at the same location and managed by the same set of people had different pre-set energy norms. These companies have the scope of achieving the Target norms since the second unit which was set up later is efficient and is either running below or capable of running below the Target energy norm. These units have to bring the energy norms to 5.5 G.cal/MT only in one unit, which was set up earlier. Now under the NUP-2015 when same Energy Target Norm of 5.5 G.Cal/MT is fixed for all these units, it is unfair and discriminatory to vintage KRIBHCO Unit in comparison.
- Conversion of 6 groups under NPS to 3 Groups under NUP-2015 has created anomaly among units such as KRIBHCO - Hazira and RCF Thal which are of similar vintage, technology and feedstock. For the purpose of re-fixing the energy norms for the NUP-2015 period effective from 1.6.2015, the average of actual energy consumption achieved during 2011-12, 2012-13 and 2013-14 were considered subject to preset norms. In fact the actual average energy consumption of both KRIBHCO and RCF Thal for the said 3 years was more than 6 G.Cal/MT. However since RCF, Thal had a preset energy norm under

NPS-III of more than 6 G.Cal/MT, it found place in Group II and the Target energy norm for it has been fixed at 6.2 G.Cal/MT while it was already operating at less than 6.2 G.Cal/MT level. KRIBHCO whose preset norm was also as good as 6 G.Cal/MT (against 5.952 less by 0.048) is considered under Group I and given target of 5.5 G.Cal/MT. If actual energy consumption of both KRIBHCO and RCF Thal for the said 3 years was considered, both the units should have been placed in the same group viz Group II and given the same target energy norm of i.e. 6.2 G.Cal/MT effective from 1.4.2018. It may be observed that for RCF, Thal there is no target to achieve as they were already operating below 6.2 G.Cal/ MT since 2013-14. We feel that categorization of the units in Group I & II and fixation of targets have been discriminatory as some of the units are required to achieve a target while some others units had already achieved the target by then.

KRIBHCO is vintage plant. Feasible technology options available for upgrading the energy efficiency has been implemented in the year 2012-13 based on the revamp study carried out by the process licensor. In order to reduce the energy consumption further, the technology options available for new generation plants are neither technically feasible to gel with the vintage plants nor it is economically viable because of substantially high capital cost. So in order to achieve the targeted norms KRIBHCO had to adopt the non-conventional measures by way of adopting motor driven CO2 compressor, first time in the country. KRIBHCO has already tied up with M/s KBR/SAIPEM for implementation of energy saving schemes to achieve the target energy norms w.e.f. 1.4.2020 with an estimated investment of Rs 500 Crores. It may not be out of place to mention that KRIBHCO has already made huge investment of Rs.1620 Crores in the year 2012-13 for reduction in energy norms which has so far not been recovered.

Gujarat Narmada Valley Fertilizers Corporation (GNVFC)

The company commented that in NUP-2015 DoF has grouped all urea manufacturing units into three Groups with different target Energy Norms. GNFC were put into Group-II having pre-set energy norms between 6.0 G.Cal/MT to 7 G.Cal/MT and with a target Energy Norms of 6.2 G.Cal/MT. Our unit is more than 35years old. Moreover our unit is using natural gas as feedstock and coal for utilities. The coal is less energy efficient. It is very difficult to achieve targeted norms of 6.200 G.Cal. GNVFChasnot achieved targeted allowable energy norms of 6.300 because it

is difficult for the old Plants with old technology to achieve such targeted norms without making modifications which required Sizeable Capex in various energy saving schemes. This capex are required to be financed by Government.

Nagarjuna Fertilizers and Chemical Limited (NFCL)

Nagarjuna Fertilizers and Chemicals Limited has two Urea manufacturing Units. Unit-I Energy Norm is 5.693 and for Unit-II 5.672 and the target norm is 5.500 G.Cal/MT for both units. Unless substantial investment is made, we are unable to achieve target energy norms. NFCL is undergoing financial stress due to various external factors such as GAIL Pipeline accident, short supply of gas and non-availability of working capital from banks etc and unable to find resources for capital expenditure for energy saving project. NFCL is required to pay penalty of 2% for 2018-19 and 5% for 2019-20 for no fault of the company. The company has taken steps for energy saving project in 2014 itself (prior to GAIL accident) but could not execute project due to financial difficultiesarising out of the incidence.

NFCL has planned investment of Rs.250 Crores on Energy saving project and Rs.140 Crores for Reliability improvement project. Schemes for energy savings were finalized as early as 2015-16. With this investment NFCL will achieve Energy efficiency of 5.4 G.Cal/ MT of Urea. NFCL could not make any investment for achieving the target, due to financial stress as explained above. There is no Technical reason for not achieving the energy target. Therefore, we have not achieved energy target applicable to our both units.

Rashtriya Chemicals and Fertilizers Limited (RCF)

There are two urea units and RCF-Thal has complied and achieved the target energy consumption norms after investing approximately Rs. 1000 Crores, while the RCF-Trombay unit is trying to achieve the energy consumption norm and process is still continuing and may take some time. The investment for RCF-Trombay is around Rs. 500 Crores.

National Fertilizers Limited (NFL)

For the period 1st June, 2015 to 31st March, 2018, the revised energy Norms were the simple average of pre-set Energy norms of NPS III and the average actual energy consumption achieved during the years 2011-12, 2012-13 and 2013-14 or the pre-set energy norms of NPS III whichever is lower. This did not impact the norms for Nangal, Bathinda and Panipat. However, the Norm for Vijaipur-I was reduced from 5.952 to 5.904 G.Cal/MT and the Norm for Vijaipur II was reduced from 5.712

to 5.569 G.Cal/MT. For the period 2018-19, the norms were fixed at 5.50 G.Cal/MT for Vijaipur I and II. For Nangal, Bathinda and Panipat the norms were arbitrarily fixed at 6.50 G.Cal/MT.

Vide notification dated 28th March, 2018, the revised energy norms for Vijaipur II was made effective from 1st April, 2018. For rest of the four units the extension was given for two years with the penalty equivalent to 2% energy of difference between NUP energy norms and target energy for 2018-19 and penalty equivalent to 5% for the year 2019-20.

NFL has taken all the necessary steps for investment of Rs 675 Croress for installation of GTGs in three of its plants which were earlier fuel oil basedi.eNangal,Panipat and Bathinda. It is expected that the actual energy consumption will match the revised norms by 1st April, 2020. However, there is no scope for NFL to service its debt availed for this investment.

Similarly Rs.235 Crores have been invested in various energy saving scheme for reduction of energy consumption in Vajaipur-I &II to match its revised norm of Vijaipur-Iw.e.f. 1st April, 2020.

The drastic reduction of norms for Vijaipur-I to 5.50 G.Cal/MT and for Nangal,Panipat and Bathinda units to 6.50 G.Cal/MT comes as a big blow to the profitability of these units unless a suitable dispensation is granted for recoupment of CAPEX and interest either by way of retention of energy savings by extending the existing energy norms for 5 years or by way of capital subsidy. NFL expects to achieve the energy target by 1st April, 2020 with the investment of Rs.910 Cr.

Kanpur Fertilizers and Fertilizers Limited (KFCL)

For any reduction in energy consumption norms the CAPEX should be borne by the government as the bank will not support unit with projected loss or negligible profitability. The mop off energy saving seriously dented the viability of some of the units. Earlier the urea policy was kept different for feedstock conversion of naphtha and FO/LSHS for no different reasons.

Naphtha Based units

Madras Fertilizers Limited (MFL)

The company is of the view that the energy consumption norm for Naphtha Based units under NUP-2015; simple average of pre-set norm and lowest actual energy consumption during 2011-12, 2012-13 and 2013-14 or pre-set norm, whichever is lower. As against average energy consumption for last 3 years for Gas

based, it is lowest for last 3 years for Naphtha based plants. Based on the above MFL's energy norm was fixed at 7.862 G.Cal/MT as against 7.956 G. Cal/MT based on gas based units. The impact on profitability is Rs 13.05 Croresper annum due to fixation of lower pre-set energy of 7.862 G.Cal/MT instead of 7.956 G.cal/MT. MFL have converted the feed stock to RLNG from 28th July 2019. NUP 2015 allowed units converted to gas feed stock to RLNG to retain the pre-set energy norm for a fixed period of 5 years to recover the investment for conversion.

Mangalore Chemicals and Fertilizers Limited MCFL)

The unit replied that New Urea Policy – 2015 (NUP.2015) does not apply to MCFL as it is applicable only for existing gas based urea manufacturing units.

4.2.1 View of Urea Companies on Energy Norms and Its Amendment

The discussions with the respondents during interview and questionnaire survey revealed that urea units face numerous problems in achieving the target consumption norms. It is related to time period given to achieve the target energy consumption norm, investment required and its payback period, some of the main observations are enumerated below

- The energy norm for the first stage i.e. 2018-19 is competitive and encourages units to invest money and to save more. The units have achieved target energy consumption norms after regular investment and technology up gradation with the expectation to have good return but change in government policy resulted in non-recovery of complete investment by the units.
- Revision in norm is against the spirit of NPS 2002 which very clearly stated that henceforth there would be neither revision of norms nor recognition of capital additions. The revision of norms proposed in NUP-2015 has created a doubt in the minds of lenders and investors as to what is the future of fertilizer industry. If GoI can go back on its words then how would this industry survive for long?
- The decision of the DOF to further mop up energy saving of compliant unit in 2018 was unjust and unfair, because some of the other units that were non-compliant with their respective energy norms, were let off for a further period of two years with minor penalties, thereby creating a two speed convergence. This was a case of rewarding the inefficient over efficient units.

- In the NUP-15 policy govt. has mopped up the pre-set norms of urea industry which resulted in less saving to the urea industry. The amount of investment to reduce the energy consumption norms in urea units are to be recovered from the energy savings achieved. But because of change in government policy the payback period of the investment in urea industry has increased considerably. The government of India has selectively mopped up energy norms which is disincentive for energy efficient units.
- Some old units have complained that they have not achieved targeted allowable energy norms of 6.300 because it is difficult for the old Plants with old technology to achieve such targeted norms without making modifications which required sizeable CAPEX in various energy saving schemes. This CAPEX are required to be financed by Government.
- Some units raised voice of concern and opined that unless substantial investment is made, units are unable to achieve target energy norms. The government policy must allow sufficient time to changeover project and recovery of investment made therein.
- Financial stress among the some of the urea units due to delayed subsidy payment, short supply of natural gas, under recovery on account of fixed cost, and non-availability of working capital from banks etc are some of the reasons for delayed project implementation of energy saving projects.
- Units are required to pay penalty of 2% for 2018-19 and 5% for 2019-20 for non-compliance and it further accentuate the problem as these units are not able to execute project due to financial difficulties.
- The drastic reduction of norms for Vijaipur-I to 5.50 G.Cal/MT and for Nangal, Panipat and Bathinda units of NFL to 6.50 G.Cal/MT comes as a big blow to the profitability of these units unless a suitable dispensation is granted for recoupment of CAPEX and interest either by way of retention of energy savings by extending the existing energy norms for 5 years or by way of capital subsidy.
- For vintage units, feasible technology options were available and have been implemented in recent past (2- 3 years prior to notification of NUP-2015) but due to sudden change in policy the units could not recover the investment and now more stringent targets has been given to the units. In order to reduce the

energy consumption further, the technology options available for new generation plants are neither technically feasible to gel with the vintage plants nor it is economically viable because of substantially high capital cost.

- Conversion of six groups under NPS-III to three groups under NUP-2015 has created anomaly among units and many units with same vintage technology and capacity has been merely on the basis of actual energy consumption levels of three years preceding the publication of NUP-2015 e.g., KRIBHCO - Hazira and RCF Thal which are of similar vintage, technology and feedstock. For the purpose of re-fixing the energy norms for the NUP-2015 period effective from 1.6.2015, the average of actual energy consumption achieved during 2011-12, 2012-13 and 2013-14 were considered subject to preset norms. In fact the actual average energy consumption of both KRIBHCO and RCF Thal for the said 3 years was more than 6 G.Cal/MT. However since RCF, Thal had a preset energy norm under NPS-III of more than 6 G.Cal/MT, it found place in Group II and the Target energy norm for it has been fixed at 6.2 G.Cal/MT while it was already operating at less than 6.2 G.Cal/MT level. KRIBHCO whose preset norm was also as good as 6 G.Cal/MT (against 5.952 less by 0.048) is considered under Group I and given target of 5.5 G.Cal/MT. If actual energy consumption of both KRIBHCO and RCF Thal for the said 3 years was considered, both the units should have been placed in the same group viz Group II and given the same target energy norm of i.e. 6.2 G.Cal/MT effective from 1.4.2018. It may be observed that for RCF, Thal there is no target to achieve as they were already operating below 6.2 G.Cal/ MT since 2013-14. We feel that categorization of the units in Group I & II and fixation of targets have been discriminatory as some of the units are required to achieve a target while some others units had already achieved the target by then.

4.3 Incentivizing Production beyond Re- Assessed Capacity (RAC)

Clause 5 of NUP-2015 provides “For additional production beyond RAC units should be entitled for their respective variable cost and uniform per MT incentive equal to the lowest of the per MT fixed cost of all indigenous Urea units subject to import parity price plus weighted average of other incidental charges which government incurs on the imported Urea”.

Most of the respondents mentioned that in spite of some implementation glitches, the provisions of NUP-2015 for promoting additional production RAC have helped their units and welcome step. But at the same time it should be mentioned that the participants emphasized intensively the non-implementation of Modified NPS-III (notifications issued by the DoF in April, 2014) which mandates increase of Rs. 350/MT for all urea units, a minimum fixed cost of Rs. 2300/MT and additional Rs. 150/MT for gas based plants which are more than 30 year old, all limited to cost of 2012-13. The policy has not been implemented since 2014, even though it has been approved by the CCEA on recommendations of Group of Ministers (GoM). On the basis of this notification most of the units have been booking the entire "Revised Fixed Cost" as income in their account on accrual basis. Some of the observations are listed below

CFCL

The policy never gave the reward expected due to interpretation issues. The minimum fixed cost as it reads today isRs. 1,285/MT which is a full Rs.1,015/MT less than the promised Rs.2,300/MT. Therefore we have suffered a loss on this aspect of about 120.00 Cr.

KSFL

Concession price of production beyond RAC is subject to import parity price plus weighted average of other incidental charges which Govt. incur on the imported urea. Concession price of production beyond RAC has exceeded above cap and in one year this cap was relaxed and included Central Govt. levies however, the same has been not done in subsequent years. Because of this, production beyond RAC is not remunerative.

IGF

Provision under NUP 2015 has been changed for reimbursement towards production beyond RAC from 85% to 100% of IPP which has helped to produce beyond RAC.

YFIL

Production beyond RAC has been consistent since inception of NUP-15 due to transparency it provided. Babrala unit achieved record additional production beyond RAC since June 2015 onwards.

IFFCO

Increasing pool gas price is a big hurdle for high energy norm's units to produce beyond 100% of RAC because of overall cap ofImport Parity Price (IPP). IPP is running at US$ 225-300/MT since last few yearsand the Pooled gas prices have increased significantly. Both of these factors are beyond the control of Indian urea industry.

It is very difficult for high energy norm's units to invest heavy CAPEX to reduce the energy. As the incentive for additional production is not sufficient or even negative due to restriction of IPP of Urea. Thus urea units with high energy norms are not in a position to recover their CAPEX through increase in production beyond 100% because of restriction of IPP for such production.

Central government levies which were added in overall cap of IPP for urea production beyond 100% for the year 2016-17 may be continued. This would help the high energy cost units to produce urea beyond 100%. New urea unit are being reimbursed around US$455/MT of urea on delivered gas price of US$ 15/mmbtu. In view of urea reimbursement rate of new urea units, existing cap of IPP for urea units should be removed.

KRIBHCO

The New Urea Policy - 2015 (NUP) dated 25th May 2015 provided that "for production beyond the RAC, the units will be entitled for their respective variable cost and a uniform per MT incentive equal to the lowest of the per MT fixed cost of all the indigenous urea units subject to import parity price plus weighted average of the other incidental charges which the government incurs on the imported urea".

KRIBHCO is incurring losses under the said policy, as for production beyond RAC our cost of production is much higher than the IPP ceiling as notified in NUP-2015. The problem has been compounded by rising gas prices, uniform gas pooling and lower IPP.

NUP-2015 was modified by Government and notified on 07th April 2017 to add amongst other things that "In event of any fluctuation in IPP that would have adverse impact on the production beyond RAC by urea units, DoF is authorized to take an appropriate decision in consultation with Department of Expenditure (DoE)".

The said provisions were implemented only for the financial year 2016-17 and not beyond. It is suggested that the same provisions should have been continued beyond 2016-17 also.

GNVFC

The Government has already announced minimum Fixed Cost of Rs.2300/MT or actual fixed cost prevailing during 2012-13 for consideration of incentive for subsidy reimbursement on additional production beyond RAC in modified NPS-III. However the escalated fixed cost is not considered while calculating subsidy on production beyond RAC.

KFCL

The production cost beyond the RAC is very high and therefore, production beyond RAC is not viable due to cap of IPP.

NFCL

Clause 5 of NUP 2015 relating to production beyond RAC needs to be deleted for following reasons.

A) The assumption that unit recovers its fixed cost upto RAC is wrong particularly on introduction of New Pricing Scheme (NPS). The units which got weighted average price of the group have lost substantial portion of the fixed cost due to principle of lower of the unit cost or group average. For example, NFCL was losing Rs 40 Crores per annum of fixed cost due to group averaging which continued in modified NPS III and NUP 2015.

B) Lowest of the per MT fixed cost of all indigenous Urea units should not be applied to other Urea units as fixed cost varies from unit to unit. The fixed cost beyond RAC of the respective units should have been considered instead. For example, NFL Vijaypur fixed cost is Rs 1285/MT due to unit specific issues, whereas the fixed cost beyond RAC which consists of Chemicals, catalyst, stores and spares, wear and tare leading to replacement, loading unloading at plant platform and warehouses (contract labour per MT basis, warehousing charges, interest on higher working capital requirement etc which is around Rs 2500 per MT. Hence minimum fixed cost of Rs 2500 should be introduced for all the units beyond RAC in para 5 of NUP 2015 without linking to IPP.

C) Import parity price plus weighted average of other incidental charges which government incurs on the imported Urea should independently considered for production beyond RAC as higher production beyond RAC will result into lower Urea imports and will be Real “Make in India“ case. If B above is not acceptable C should be introduced in para 5 in NUP 2015

RCF

Production beyond RAC has been challenge for both units because of following two reasons

- Realization for production beyond RAC is capped with theIPP and other incidental charges, which is very low compared to past years. The old units like RCF-Thal and RCF- Trombay with high energy norms are facing difficulty in saving.
- The price of pooled gas is high which is applicable for production beyond RAC (which is increasing day by day as compare to our own purchase/sourced gas making our variable cost very high for both units. Removal of cap of IPP can be a viable option for production beyond RAC.

NFL

Major gain of NUP-2015 is that production beyond the re-assessed capacity became viable and production increased from 32.5 LMT to 38 LMT

NUP gave level playing field to all companies including older units and Gas price pooling was good idea in this regard. All units which are efficient in terms of fixed cost and variable cost have started producing beyond RAC.

Naphtha based units

MFL

As MFL was using high cost Naphtha feed stock, the company was not allowed to produce beyond RAC. MFL have converted the feed stock to RLNG from 28th July 2019. Hence the question of production beyond RAC does not arise.

MCFL

The unit does not produce beyond RAC because of high cost of production.

4.3.1. Views of Urea Units on Production beyond RAC

The observations of companies on provisions for production beyond RAC is summarized below

- Additional production beyond RAC under NUP-2015 worked exceedingly well for Urea units by way of generating additional contribution after having recovered fixed cost upto RAC.
- Even custom duty should also be included in the working of imported cost because many of the inputs used in production of urea attracts GST, VAT etc. so tax applicable on imported urea should also be considered.

- All urea units are now able to have in place a visible production planning quarter wise, including production beyond RAC at the start of the Financial year as against the previous regime where, the Urea units were able to revisit the production plan and keep on updating it on monthly basis in the substantial event of fluctuations in the import parity price of Urea.
- The policy never gave the reward expected due to interpretation issues. The minimum fixed cost as it reads today is Rs. 1285/MT which is Rs. 1015/MT less than the promised Rs.2,300/MT. Therefore many units are suffering loss on this aspect.
- There should be uniformity in government decision to avoid loss and proper production planning. e.g. Concession price of production beyond RAC has exceeded above cap and in one year this cap was relaxed and included Central Govt. levies however, the same has been not done in subsequent years although some units have produced beyond RAC expecting the government to do so.
- In view of urea reimbursement rate of new urea units, existing cap of IPP for urea units should be removed.
- Increasing pool gas price is a big hurdle for high energy norm's units to produce beyond 100% of RAC because overall cap of IPP. IPP is running at US$ 225-300/MT since last few years and the Pooled gas prices have increased significantly. Both of these factors are beyond the control of Indian urea industry.
- Removal of cap of IPP can be a viable option for production beyond RAC.

4.4 Subsidy Rationalization through Supply Uniform Cost of Feedstock by Gas Pooling

The reply of interviewees and answers of questions related to gas pooling has been listed below

CFCL

The pooling of gas was an essential step towards converging energy costs and achieves a sort of NBS in Urea, a cherished goal. That was to be welcomed.

KSFL

Pooling of gas mechanism in fertilizer is beneficial to industry in the way of uniform weighted average price for all units. KSFL has been benefitted by this mechanism.

IGF

It provides level playing field to domestic Urea manufacturers in terms of Gas price. However the Gas pool policy is not being implemented in later & sprit.

B) Domestic gas allocation has to be uniform for all domestic Urea manufacturers.

C) Fertilizer Sector should be given priority for domestic gas allocation to reduce overall subsidy burden.

YFIL

NUP -2015 is a progressive policy. However, scope to improve it further exists. Babrala unit affected by delay in payment by other units resulting in lock up of working capital.

IFFCO

Pooling of gas in fertilizer sector was favourable for urea units. It eliminates the uneven distribution of domestic gas among the urea industry. Gas pooling is controlled by Gas Authority (India) Limited (GAIL) by issuing Debit / Credit note to urea units for their higher or lower purchase price of gas in comparison to pool price of gas on monthly basis.Most of the urea units are contributing to pool account on time against debit note issued to them by GAIL on account of their lower purchase price of gas in comparison to pool price. Some of the units are not contribution in time, because of this delay, units which are to be on receiving end for their higher purchase price of gas are suffering from late payment from pool account.

There are penal provision for late contribution to Gas Pool Account and timely payment of credit note to urea units from Gas Pool Account. Fertilizers Industry Coordination Committee (FICC) / Empowered Pool Management Committee (EPMC) may decide the rate of interest to be charged on late payment to gas pool account. Any late payment to gas pool account should strictly monitored and interest should be charges on such late payment.

KRIBHCO

Uniform gas pool price mechanism was introduced by GOI in the year 2015-16. Since then the gas prices have increased considerably and the uniform pool gas price is now around Rs 800/ mmbtu. Due to increase in the pool gas price, KRIBHCO

whose actual gas price is around Rs 500/ mmbtu is regularly contributing on an average Rs 100 Crores per month to the pool account. KRIBHCO and RCF are the only companies contributing major amount to the pool account. However, it takes on an average basis 4 to 6 months period for subsidy to be realized. This increases the working capital requirement of such companies, resulting in increased interest cost. If KRIBHCO actual gas price is considered than there won't be any hit for production beyond RAC and no relaxation from GOI would have been required for production beyond RAC.Uniform gas pooling mechanism is actually benefiting other remaining fertilizer companies at the cost of KRIBHCO.

The amount due from KRIBHCO under uniform gas pooling should be adjusted against our subsidy bills instead of making contribution to the pool fund.
Further, Government should directly make the differential payment to aggregator (GAIL), rather than asking individual companies to contribute their portion to the pool fund.

GNVFC

A critical review of the operation of the gas pooling and its overall impact on urea industry reveals that it has failed to bring the desired level playing field for the urea manufacturers.

- The objectives of the policy was to pool domestic natural gas with RLNG and provide it at uniform delivered price to all urea manufacturers through the pool operator. But in practice, the pool operators have not pooled domestic gas with RLNG and deliver it at uniform price to urea units. The big urea manufacturers operating at 120%-150% of RAC are consuming huge quantity of RLNG at exorbitant rates. Such high quantity of high-cost RLNG is pulling the weighted average actual gas procurement rate, called the pool rate very high. A major share of their high-cost gas purchases is simply passed on to smaller units like ours through debit notes by the pool operator and subsequent payments to the Pool Fund Account of the pool operator.
- The operation of the present form of gas pooling has practically made our working capital management totally unpredictable. Our working capital requirement is not commensurate with our procurement plan but is highly affected by the purchases of other big buyers of RLNG. Their high-volume

gas purchase at high prices simply jeopardizes our working capital management.

KFCL

The price pooling of gas has adversely impacted the company because of high working capital requirement and interest cost on it because the unit is having gas supply agreement for RLNG only. The lock period of fund in pool fund account is adversely affecting the unit financially.

NFCL

NUP 2015 is implemented along with Gas pooling policy. There are many short comings in gas pooling policy.

I. It is not gas pooling, but it is price pooling. The price pooling upto RAC is justified, but beyond RAC is violative of NUP 2015 policy as explained in para IX and X below.

II. It does not ensure adequate supply of gas as envisaged in the policy, units which do not have access to LNG are facing gas shortfall, production shortfall resulting in higher energy consumption and losses.

III. When gas pooling policy was introduced the domestic natural gas was under NELP, the gas policy was changed to HELP making gas pooling policy meaningless and ineffective. Ironically, gas pooling policy NELP and HELP are Ministry of Petroleum and Natural Gas (MoP&NG)policies affecting Urea manufacturers

IV. The gas pooling policy was made on the premise of 31.5 mmscmd of domestic gas to urea sector shall be available as approved by EGOM, whereas this was neither ensured by MoP&NG or DoF.

V. At the time of introduction of gas pooling domestic gas share in total gas consumed by Urea units was 71% which has come down to 43% in 2018-19 due to III and IV above.

VI. Lower share of domestic gas was compensated by high cost LNG resulting in higher subsidy outflow.

VII. Gas pooling policy was introduced to protect the long-term LNG contracts.

VIII. Gas pooling policy should not be sector-wise but for all gas consuming sectors like power, fertilizer, iron & steel etc.

IX. It is well known fact that Urea produced with LNG is costlier than Imported Urea price, gas pooling was introduced to reduce the cost of production of

high cost urea units to bring their production cost below IPP. Allowing these high cost units to produce beyond RAC, NUP 2015 is breached, as their realization has increased over IPP. These units got revenue from three sources (MRP + Subsidy + PFA payment) which is far higher than IPP, thus breaching NUP 2015.

X. The additional subsidy payment to low cost units at pool price has come from the consolidated funds of India and the same has gone to high cost units through PFA (whose production cost beyond RAC would have been higher than IPP otherwise)

XI. Government could have imported Urea directly which would have saved substantial subsidy to the government rather than importing LNG and making Urea of higher cost.

XII) The extra cost incurred due to policy breach of NUP 2015 policy and gas pooling policy has been accounted as fertilizer subsidy to Indian farmers has in fact benefitted foreign LNG suppliers and few high cost urea units.

RCF

Higher working capital as we are procuring/sourcing the gas at much cheaper rate as compared to price of pooled gas. Therefore, every quarter/month we are depositing the difference amount to the pooled account. Thus Pooling of gas has affected our unit adversely as our working capital requirement has gone up substantially and consequently the interest burden. This has also affected the production beyond RAC making it unviable at many times.

NFL

Gas pooling has ensured a level playing field for all the urea manufacturers of the country. The units getting higher proportion of expensive RLNG was were the most affected ones.

MFL

4.4.1 Views of Urea Industry on Gas Pooling

Pooling of Gas in fertilizer sector helps in equalizing the input cost for all units. It will only improve the competitiveness in the fertilizer sector.The views of companies on gas pooling have been collated and presented below

- After pooling of gas, domestic gas allocation has to be uniform for all domestic Urea manufacturers a perfect move towards the NBS in Urea, a cherished goal. That was to be welcomed.
- It provides level playing field to domestic Urea manufacturers in terms of Gas price. However the Gas pool policy is not being implemented in letter and sprit. Fertilizer Sector should be given priority for domestic gas allocation to reduce overall subsidy.
- Pooling of gas mechanism in fertilizer is beneficial to industry in the way of uniform weighted average price for all units.
- Units have benefitted this mechanism as it is getting payment from pool operator towards excess gas cost. Secondly, the value of energy savings has been increased ad the energy saving is being reimbursed on the basis of pooled gas price.
- The big urea manufacturers operating at 120%-150% of RAC are consuming huge quantity of RLNG at exorbitant rates. Such high quantity of high-cost RLNG is pulling the weighted average actual gas procurement rate, called the pool rate very high. A major share of their high-cost gas purchases is simply passed on to smaller units which aere earlier using NG through debit notes by the pool operator and subsequent payments to the Pool Fund Account of the pool operator. This has practically made working capital management totally unpredictable. For few units working capital requirement is not commensurate with our procurement plan but is highly affected by the purchases of other big buyers of RLNG. Their high-volume gas purchase at high prices simply jeopardizes our working capital management.

4.4.2 Some Critics of Gas Pooling

- It is not gas pooling, but it is price pooling. The price pooling upto RAC is justified, but beyond RAC is violative of NUP 2015 policy as explained in para IX and X below.
- It does not ensure adequate supply of gas to units like NFCL-Kakinada, which do not have access to LNG) are facing gas shortfall, production shortfall resulting in higher energy consumption and losses.
- Ironically, gas pooling policy NELP and HELP are MoPNG policies affecting Urea manufacturers

- Domestic gas share in total gas consumed by Urea units has come down to 43% in 2018-19 from 71% in 2015-16.
- Lower share of domestic gas was compensated by high cost LNG resulting in higher subsidy outflow. Gas pooling policy was introduced to protect the long-term LNG contracts.
- Allowing these high cost units to produce beyond RAC, NUP 2015 is breached, as their realisation has increased over IPP. These units got revenue from three sources (MRP + Subsidy + PFA payment) which is far higher than IPP, thus breaching NUP 2015.
- Government could have imported Urea directly which would have saved substantial subsidy to the govt rather than importing LNG and making Urea of higher cost. The extra cost incurred due to policy breach of NUP 2015 policy and gas pooling policy has been accounted as fertilizer subsidy has in fact benefitted foreign LNG suppliers and few high cost urea units.

4.4.3 Coal Based Units

- There are six urea units which uses coal as fuel for generation of steam. Out of six units, three units of NFL at Nangal, Panipat and Bathinda are switching over to generation of steam from Gas by installing Gas based Captive power plant along with steam generation unit. Remaining three units i.e. GNVFC, Baruch, SFC, Kota and KFCL, Kanpur are continuing usage of Coal as cost of energy being lower from usage of coal as compared to usage of gas. With the usage of coal, the physical energy is higher but the cost of energy is low as the price of coal is substantially lowered than the Pooled price of gas.
- As per the Policy, six urea units using coal as fuel for generation of steam and Captive power plant are to achieve target energy norms of 6.5G.Cal/MT of urea except for GNVFC, Baruch for which the target energy norms are 6.2G.Cal/MT urea. These target energy norms cannot be achieved with usage of coal due to high ash content in domestic coal and other inefficiencies associated with usage of coal. Conversion to Gas based Captive power plant and Steam generation unit would reduce the energy consumption to the target levels. However, the cost of energy would increase due difference between pooled gas price and coal price. As a result Subsidy outgo of the Government would increase.

Discussion

4.5 Background of Determination of Pre-Set Energy Consumption Norms

Energy consumption norms of any urea unit is a sign of its efficiency, and is result of various parameters like feedstock used, location, plant capacity and configuration, vintage, operational efficiency, including preventive maintenance. Urea industry is continuous process industry and a typical urea plant can operate for 24 hours a day for several weeks at a stretch. Thus, the Government considers 330 day/ year as normal working day of urea unit for calculation of fixed cost. Any break down or shut down has adverse impact on energy efficiency because start-up energy costs are high. The specific energy consumed for production of one metric tonne (MT) of urea is prime indicator of efficiency of plant as the cost of energy constitutes 60 to 70% of the total cost. It is as high as 85% for some unit in 2019-20. It is possible to increase energy efficiency of urea units by using modern and energy saving technologies. Therefore, the pricing policies had in built incentives for encouraging urea units to make investment for adopting technologies that can reduce their energy consumption per metric tonne of urea production. Such units had been allowed to retain gains arising from such investment. This chapter provides a brief analysis of various pricing policies of the Government with the focus being mainly on the efforts to promote overall energy efficiency in the industry. This analysis is imperative because even after a gap of forty years, the industry is still struggling with some issues which were prevalent in 1970s and 1980s.

4.5.1 Retention Price-cum Subsidy Scheme

Retention Price-cum Subsidy Scheme (RPS) was introduced in 1977 on the recommendation of B.B Marathe Committee in the backdrop of the oil shock of 1970's. The objective was to increase fertiliser consumption and to meet the requirement through domestic production.RPS was a cost based producer pricing system which assured manufacturer 12 per cent post-tax returns on net worth provided prescribed norms are achieved. In addition, the system of freight subsidy was introduced for the first time to ensure timely and farm gate availability of urea across the country. RPS encouraged indigenous production and made it possible for the government to provide urea to the farmers at affordable price.

However in 1997, the Hanumantha Rao Committeewhile noting the positive aspects of the RPS system in providing secure environment for investment and production, found a number of deficiencies in the cost-plus approach and recommended to discontinue of the RPS for urea units because

- The unit-wise RPS concealed inefficiencies which add to the burden of subsidy without benefiting the farmers.
- The cost- plus content of the RPS affected the decision-making process of the government for fixing prices also. Since the cost- plus approach resulted in an ever-increasing subsidy bill with no possibility of a cap, most of the decisions were taken with a view to containing the subsidy in an arbitrary and ad hoc manner. This style of decision-making put industry to undue hardship and resulted in cases of under- recovery.
- RPS did not envisage any exit policy for inefficient units. The emphasis was on production, rather on the cost of production. Unrestricted entry of high cost producers and inability of old or sick units to generate surpluses to modernize themselves led to creation of a heterogeneous urea industry. The committee also felt that "RPS militates against economic efficiency.
- More emphasis of RPS was on production and not on cost of production from a unit
- Absence of an exit policy let high cost units be part of the sector and put a premium on inefficiency.

By late 1990s the Urea industry had some very inefficient plants, although there were also few modern plants which was comparable to any world class production facility. The heterogeneous character of the urea units was result of RPS which has been implemented for more than two decades (1977-2003) which permitted both old as well new urea units to produce urea by using different feedstock and technology. The policy also recognized investment cost and varied financing patterns for subsidy calculation unit wise.

The Hanumantha Rao Committee recommended for either an alternative pricing mechanism and by removing some of the deficiencies of the existing pricing system. The committee submitted its report in April 1998 and recommended for recommended uniform pricing system based on Long range marginal Costing (LRMC) which was not accepted and implemented.

4.5.2 New Pricing Scheme Stage-II (NPS-II)

In May 2003, the DoF appointed Gokak Committee for determining the pre-set energy norms of indigenous urea units. The committee submitted its report, and recommended that the energy consumption level for the unit should be based on weighted average group energy consumption figures of three years, i.e., 1999-2000, 2000-01 and 2001-02, excluding three outliers viz., BVFCL- Namrup- III, RCF-Trombay and FACT-Cochin. In line with the objectives of NPS i.e. to promote energy efficiency, the government adopted even stricter view than the Gokak Committee recommendations. The energy consumption norms for urea units in various groups in NPS-II was decided on the basis of group weighted average (excluding outliers on higher side) of only one year i.e., 2001-02 or eighth pricing period norms (1st April 2000 to 31st March 2003), whichever is lower. Even in pre-1992 Naphtha group, the specific energy consumption norms for NPS-II were worked out by splitting the group into two sub-groups by keeping SFC- Kota, IFFCO- Phulpur-I and KFCL- Kanpur (erstwhile DIL- Kanpur) in one subgroup which uses substantial quantity of coal and ZACL- Goa, MFL- Manali, MCFL-Mangalore, SPIC- Tuticorin and FACT- Cochin in another subgroup. This was done because coal is less efficient but a cheaper fuel as compared to Naphtha/FO/LSHS. In FO/LSHS group, the specific energy consumption norms for stage II of NPS were worked out for all the units in the group by including GNVFC- Bharuch, which was outlier on the lower side in the group. However, the GNVFC- Bharuch was given the same energy consumption norm for the eighth pricing period which was lower than the group average for 2001-02.

4.5.3 New Pricing Scheme Stage-III (NPS-III)

The Para 3 (viii) and (ix) of the NPS-III notification dated 8th March 2007 **(Appendix--)** entitles urea units to get concession rate based on the pre-set energy consumption norms and saving on energy over pre-set energy consumption norms as follows:

> *3 (viii) The respective pre-set energy consumption norm of each urea unit during Stage-II of NPS or the actual energy consumption achieved during the year 2002-03, whichever is lower, will be recognized as the norm for Stage-III of NPS.*
>
> *3 (ix) Saving on energy over the pre-set norms will be paid as per the basic rate of the weighted average of feed/fuel used during Stage-III of NPS.*

From preceding paragraphs, it is apparent that the actual energy consumption level achieved by the most of the urea units has been lesser than the recognized pre-set energy norms of NPS-II (01-04-2004 to 30-09-2006) and NPS-III period (01-10-2006 to 01-04-2014) the NPS-III norm was determined on energy consumption norms of years 2001-02, 2002-03 and even eighth pricing period for some units. In addition, NPS-III also provided for separateenergy norms for the six units which had converted to gas-based units. Under NPS – III, there was loss to companies due to group averaging of concession price of the units in the same group resulting in lower fixed cost to certain units. Urea units were already getting concession rate based on pre-set energy norms during NPS II itself. During NPS-III, energy norms were made stringent for units whose actual energy consumption in 2002-03 was less than the pre-set energy norms prevailed during NPS-II.

The six non gas based units (viz., ZACL-Goa, KFCL- Kanpur, Bhatinda, Nangal and Panipat units of NFL and GNVFC- Bharuch) which have converted to gas from the FO/LSHS/Naphtha have invested in the conversion process. Government has given incentives to these FO/LSHS/Naphtha based units in para 5 of NPS-III as follows

(D) Conversion of non-gas based units to NG/LNG.

5. (i) All functional Naphtha and FO/LSHS based units should get converted within a period of 3 years (of these, Shriram Fertilizers & Chemicals Ltd (SFC) Kota is expected to convert by the end of the current financial year). On the expiry of the aforementioned period, the Government will not subsidize the high cost urea produced by the non-gas based urea units and rate of concession of such units will be restricted to the lower of the prevalent import parity price (IPP) or their own rate. Units not able to tie up gas will have to explore alternative feedstock like Coal Bed Methane (CBM) and coal gas.

(ii) In order to provide incentives for conversion to gas, since there is no recognition of investment made by units for conversion, there will be no mopping up of energy efficiency for a fixed period of 5 years for Naphtha based as well as for FO/LSHS based units. Capital subsidy will be considered for FO/LSHS based units for which DOF will notify a separate scheme in consultation with Department of Expenditure (DOE) Ministry of Finance.

(iii) For conversion of the non-gas based Urea Plants to Natural Gas (NG) / Liquefied Natural Gas (LNG), a Committee headed by Petroleum Secretary, comprising of Secretaries of Planning Commission, Department of Fertilizers and Department of Expenditure has been constituted for facilitating the connectivity and supply of gas to non-gas based units converting to gas and to develop appropriate mechanism for fixing the price of gas in a transparent manner.

The two Naphtha units KFCL-Kanpur and ZACL- Goa which have converted to gas would be allowed to retain their saving of energy over the pre-set energy consumption norms of NPS-III as per para 6 of the Modified NPS-III notified on 02-04-2014 to recover the investment made for conversion from Naphtha to natural gas

Table 3: Details regarding Conversion of Naphtha units to Gas[2]

S. No.	Units	Date of start of production after conversion to gas	Financial Year
1	ZACL- Goa	15-02-2013	2012-13
2	KFCL-Kanpur	27-05-2013	2013-14

The four erstwhile FO/LSHS urea units viz., NFL- Panipat, NFL- Nangal, NFL- Bhatinda and GNVFC- Bharuch have started production after conversion to gas in 2013. These units are eligible for special fixed cost and energy saving over the pre-set energy norm to recover their cost for conversion over a period of five years from the date of conversion or till the time these units get their investment recovered by saving in energy over the pre-set energy consumption norms. After this period, these units will be getting concession rates on the basis of the target energy consumption norms set for the group they belong to.

Table 4: Details regarding Conversion of FO/LSHS units to Gas[3]

S. No.	Units	Start Date of production after conversion to gas	Financial Year
1	NFL- Bhatinda	11-03-2013	2012-13
2	NFL- Panipat	28-03-2013	2012-13
3	NFL- Nangal	18-07-2013	2013-14
4	GNVFC- Bharuch	01-10-2013	2013-14

[2]Personal discussion with representatives of companies
[3]Personal discussion with representatives of companies

4.5.4 New Urea Policy-2015

In May 2015, 25 gas based urea units were divided into three groups on the basis of the energy consumption norms and actual energy consumption norm during the preceding three years (viz. 2011-12, 2012-13 and 2013-14). The new energy consumption norms of each urea unit was re-fixed on the basis of simple average of pre-set energy consumption norms of NPS-III and average actual energy consumption achieved during the years 2011-12, 2012-13 and 2013-14 or the pre-set energy norms of NPS-III, whichever is lower. Further to bring efficiency and competitive in cost of production, each group was given target energy consumption norms to be achieved by 31st March 2018.

i. **Group-I (Target Energy Consumption Norm 5.5 G.Cal/MT)**
   NFL- Vijaipur-I & II, Kribhcho-Hazira, IGF, IFFCO-Aonla-I & II and Phulpur-II, KSFL, CFCL-I & II, TCL, NFCL-I & II (Thirteen Units)

ii. **Group-II (Target Energy Consumption Norm 6.2G.Cal/MT)**
   IFFCO-Kalol, GSFC, RCF-Thal, GNVFC (Four Units)

iii. **Group-III (Target Energy Consumption Norm 6.5 G.Cal/MT)**

NFL-Nangal, NFL-Panipat, Bhatinda, ZACL, SFC, RCF-Trombay-V, IFFCO-Phulpur-I, KFCL (Eight Units).

At the time of notification of NUP-2015, eight urea units*viz.*, TCL-Babrala, NFL-Vijaypur-II, IGF-Jadishpur, CFCL-Gadepan I &II, IFFCO-Aonla-II, RCF-Thal, IFFCO-Kalolwere operating well within the target energy norms prescribed under the policy.These urea units have taken revamp under New Investment Policy-2008 (NIP-2008) notified by DoF on 04th September, 2008 for incentivising Revamp, Expansion, Revival/Brownfield and Greenfield projects. As per NIP-2008, these units were entitled to get 85% of IPP for the production beyond cut off. It is important to mention here that during the regime of NIP-2008, the IPP was quite high while at the same time the cost of delivered gas was relatively low because of larger share of domestic gas in gas supply basket to urea units. As a result of the higher IPP and the low cost of natural gas these units have substantially recovered their investment made for the revamp projects, in addition to energy savings.The details of the revamp year and the investment made are tabulated below:

Table 5: Investment done by the Urea Unit in Revamp under New Investment Policy 2008[4]

Sl. No.	Name of Fertilizer unit	Revamp Month/Year	Investment Cost (Rs/Cr)
1	CFCL Gadepan-I	March 2008	304
2	CFCL-Gadepan-II	March 2008	130
3	IFFCO-Aonla-II	October 2008	70
4	IFFCO-Kalol	April, 2009	30
5	IGF-Jagdishpur	May 2007	141
6	NFL-Vijaipur-II	July 2012	374
7.	RCF-Thal	April, 2012	294
8.	TCL-Babrala	December 2008	204
9	KRIBHCO	May 2012	1625
10	RCF-Thal	2010	550

Immediately after the notification of NUP-2015, many units like, IFFCO engaged PDIL to conduct the study to implement the energy saving project. Many units were in dilemma to implement energy saving project because of techno-economic reasons and financial conditions of companies. The three units; IFFCO-Phulpur-I, IFFCO-Phulpur-II and IFFCO-Aonla-I were given target energy consumption norm of 6.5 G.cal/MT, 5.5 G.Cal/MT and 5.5 G.Cal/MT respectively. The energy saving projects were implemented on time and as a result these three units could achieve the target energy consumption norms by March 2018 as shown below

Table 6: Details of investment made by IFFCO and energy norms achieved under NUP-2015[5]

Sl. No	Name of unit	Investment under NUP'15 till Jan/Feb'18	Energy Efficiency Achieved	Details of investment on ongoing activities	Energy Efficiency likely to be achieved
		Rs./Crores	G.Cal/MT	Rs/Crores	G.Cal/MT
1	IFFCO, Phulpur-I	607	0.754	153	0.111
2	IFFCO-Phulpur-II	347	0.182	74	0.171
3	IFFCO-Aonla-I	346	0.117	168	0.215

It is clear from the above table that these three urea manufacturing units would run their plant at/below the target energy norms under NUP-2015till the completion of project and need sufficient time to recover the investment through energy saving.

Out of twenty five urea units only eleven units could able to achieve prescribed target norms by March 2018.

[4] Personal discussion with representatives of companies
[5] Personal discussion with representatives of companies

4.5.5 Reason of Amendment of NUP-2015 in 2018

After the notification of NUP-2015, some units requested the DoF either to give one-time financial subsidy to achieve the target energy norms, or extend the existing norms for substantial period so that units could recover the investment incurred on energy saving project. The representations were received are companies of public sector undertaking, old unitsand the units which were using coal for steam and power generation. There are seven urea units whose energy norms are high because they use coal for steam and power generation, as given in the table below;

Table 7: Consumption pattern other than Gas and coal in coal using units[6]

Unit	Gas	Coal	Power
GNVFC-Bharuch	80%	20%	0
IFFCO-Phulpur-I	80%	20%	0
SFC-Kota	70%	30%	0
NFL-Nangal	67%	21%	12%
NFL-Panipat	60%	40%	0
NFL-Bhatinda	60%	40%	0
KFCL-Kanpur	70%	30%	0

The concerned raised by these units were as followed

- Considering the vintage and technology used by these units, to meet the target norms for the year 2018-19, huge investment is required. The units have to borrow funds from the financial institutions at interest rate of not less than 8-9% per annum.
- The implementation of target energy norm (w.e.f April, 2018) would result in under recovery resulting in financial loss and units will not be in position to implement energy norm improvement measures in future also.
- The government must either reimburse the investment for achieving target energy norms or to allow the unit to operate on earlier pre set energy consumption norms at least for five years to recover the capital related costs on the investment proposed/already incurred by the unit.
- The urea units using coal must be seen differently. Although the energy consumption norms of coal based units are higher but average cost of energy per MT urea is lower in case of units using coal as compared to other units in the group using Gas/LNG/Naphtha for generation of power and steam; Therefore, the coal based units like SFC-Kota, KFCL- Kanpur

[6] Personal discussion with the representatives of companies

and GNVFC requested that they may be allowed to continue urea production using mixed energy (Coal+NG).

4.5.5.1 Study by PDIL

The DoF requested the PDIL to conduct a detailed study and give techno-economic feasibility report on representations of remaining 14 units and its impact on the subsidy outgo from the Government of India.These units differ in terms of production capacities, technology used, energy efficiency and investment required to achieve target norms. After detailed study on the basis of data provided by these fourteen units, the PDIL submitted its report with following observations

- Target energy consumption norms for some units can be achieved by up-gradation in the main ammonia urea plants, while some of them also required modification in their utilities.
- By March 2018, only 11 units would be able to achieve the target energy norms.
- For the other remaining 14 units, if they do not achieve target energy consumption norms, if the government implement the target energy consumption norms from March 2018, there will be substantial loss to the units
- Implementation of energy saving schemes is viable, if some capital/revenue subsidy is passed on to these units or the existing energy norms is extended for certain period after implementation of recent energy saving schemes.
- To make the energy saving schemes viable for 14 units, different units require different length of extension in existing energy consumption norms.

To make energy saving schemes viable, 14 units required different time periodand these unit may be allowed to continue in existing energy consumption norms, DoF announced for uniform period of extension up to 31st March, 2020, for these fourteen units to avoid legal disputes. The target norms of all twenty five units were not extended eleven units were operating below the target energy normssince implementation of NUP-2015 and even before. During 2015-18, these units, as a result of energy saving, accrued a substantial amount of gains (at the rate of pooled gas price).

Table 8: Energy consumption norms of eight units during FY 2011-12 to FY 2015-16[7]

Sl. No.	Name of Fertilizer unit	Preset Energy norm of NPS-III	Actual energy Consumption					NUP-2015 Energy Norms.
			2011-12	2012-13	2013-14	2014-15	2015-16	Effective from 01st June, 2015)
		G.Cal/ MT	G.Cal/ MT	G.Cal/ MT	G.Cal/ MT	G.Cal/ MT	G.Cal /MT	G.Cal /MT
1	TCL-Babrala	5.417	5.325	5.207	5.218	5.143	5.182	5.333
2	CFCL-Gadepan-II	5.678	5.358	5.398	5.408	5.459	5.340	5.533
3	NFL-Vijaipur-II	5.712	5.378	5.471	5.432	5.347	5.406	5.569
4	GRASIM Industries Ltd Jagdishpur	5.534	5.383	5.488	5.532	5.324	5.227	5.501
5	IFFCO-Aonla-II	5.522	5.597	5.369	5.501	5.381	5.301	5.505
6	CFCL Gadepan-I	5.621	5.494	5.595	5.573	5.524	5.489	5.587
7	IFFCO-Kalol	6.607	5.979	5.787	5.802	5.783	5.593	6.231
8	RCF-Thal	6.938	6.345	6.233	6.317	5.886	5.922	6.598

4.5.5.5.2. Naphtha Based Units

There are three urea manufacturing units viz., MFL, MCFL and SPIC (although not covered under NUP-2015) which are using Naphtha as feedstock for urea production. These three units are governed by the policy notification dated 17th June, 2015, wherein they have been allowed to operate on Naphtha for a period till these plants get assured supply of gas either by gas pipeline or any other means. As per the said policy, these units are eligible for subsidy on the basis of the revised energy norms from the date of notification, which would be the simple average of pre-set energy norms of New Pricing Scheme (NPS) – III and lowest yearly specific energy consumption achieved during the years 2011-12, 2012-13 and 2013-14 or the pre-set energy norms of NPS – III, whichever is lower. Specific energy consumption norms for these 3 units from financial year 2018-19, have been given as 6.5 G.Cal/MT of urea. These units have also been requesting to defer the target energy norms. In this regard, it is mentioned that as per provisions of NPS-III (dated 8th March, 2007) in order to provide incentives for conversion to gas, since there is no recognition of investment made of units of conversion, there will be no mopping up of energy efficiency for a fixed period of 5years from the date on which gas connectivity is achieved for Naphtha based units. Therefore, consequent upon establishing gas

[7] PDIL, New Delhi.

pipeline connectivity and production of urea using natural gas as feedstock, these units will be allowed to retain benefits accruing from saving of energy vis-à-vis preset energy norms of NPS-III for a period of 5 years. It was expected that the naphtha units will be gas pipeline connectivity by 2020, therefore, it was reasonable to allow the existing energy norms for another two years upto 2020 as was allowedin case of gas-based urea units, or till these units get the pipeline connectivity, whichever is earlier. MFL has got pipeline connectivity in July 2019 and remaining two units (MCFL-Mangalore and SPIC-Tuticorin) will be connected to gas pipeline network by June/2020.

In view of difficulties faced by the urea units and recommendations of PDIL, the DoF decided

- To extend the period to achieve the target energy consumption norm from 31st March 2018 to 31st March, 2020, for these fourteen units only.
- to extend present energy norms with token penalties of 2% of difference between NUP-2015energy norms and target energy norms of NUP-2015 for 2018-19 and 5% of difference between NUP energy norms and target energy norms of NUP-2015 for 2019-20 in the case of 14 units that failed to meet the targets.
- Urea manufacturing units were directed to achieve target energy norms during the extended period of 2018-19 to 2019-20 failing which additional penalties may be imposed on defaulting units in consultation with the Department of Expenditure.
- The aforesaid target energy norms may be continued upto 31st March, 2025. Meanwhile, an expert body under NITI Aayog would be engaged to recommend the energy norms to be achieved from 1stApril, 2025.
- The three Naphtha based urea units viz., MFL, MCFL, SPIC are also allowed the existing energy norms under Para (2) of policy notification dated 17th June, 2015 for another two years i.e. till 31st March, 2020 or till these units get the gas pipeline connectivity, whichever is earlier. There will be no mopping up of energy efficiency

for a fix period of 5 years from date of gas pipeline connectivity as per Para 3 (viii) and 5 (ii) of NPS-III policy dated 8th March, 2007.

The idea of implementing energy norms in the fertilizer sector is to make sure that production of the subsidized commodity is carried out at the optimum cost. The extension of present energy norms for a further period of two years will ensure easy availability of urea to farmers throughout the country. It will also help to maximize the indigenous urea production and will lessen the import of urea. The cabinet also decided to allow three naphtha-based units to carry on with existing energy norms for another two years or till they get gas pipeline connectivity.

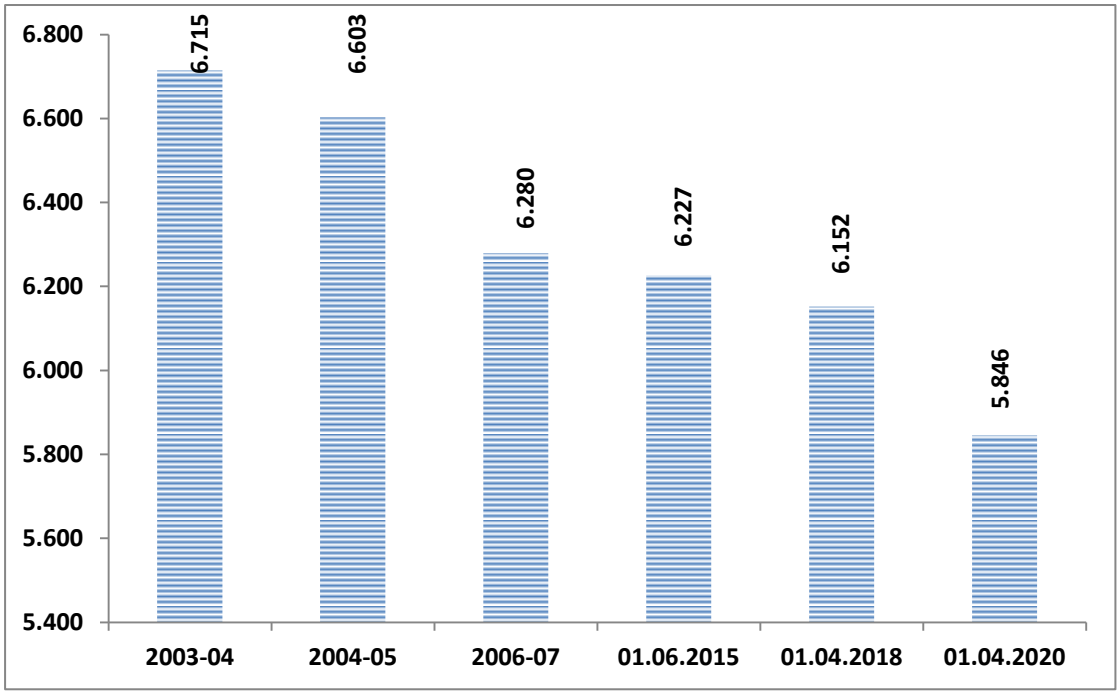


Figure 1: Weighted Average Energy consumption norms over the years (All urea units except BVFCL)[8]

Thus it can be concluded that the NUP-2015 has been successful in achieving its objective to making urea units competitive by making them more energy efficient as the weighted average energy consumption norm came down from 6.227 G.Cal/MT to 5.8446 G.Cal/MT.

Firstly the amendment in NUP-2015 was done to accommodate the concern of urea units which could not implement the target norms due to many genuine reasons. Secondly sudden closure of these plants due to under recovery would have affected the availability of urea in the country as the India is net importer of urea to meet demeand.

[8] Based on data from FAI, New Delhi.

4.6 Production beyond RAC

Urea production from a unit can be divided into two parts, first production up to (RAC) and production beyond RAC. During 2018-19, the RAC of all twenty five urea units which are covered under NUP-2015 (excluding three naphtha units and BVFCL-II & III) is around 187.12 LMT. The government guaranteed subsidy for production up to RAC as per provisions of applicable urea pricing policy at different point of time since RPS.

4.6.1 NPS-III and New Investment Policy 2008

The para 6 of the Modified NPS-III and para 3 of NIP-2008 (deals with production beyond cut-off quantity after revamp) have provisions concerning incentivized production beyond the RAC, which, is linked with the Import Parity Price (IPP) of urea.

The provisions for production beyond RAC under NPS- III are as under

Incentives for additional urea production.

6. The following measures are decided to be implemented to incentivise additional Urea production in the country:-

(i) No permission will be required from the Government for production beyond 100% of re-assessed urea capacity of the unit.

(ii) All production between 100% and 110% of the existing reassessed capacity, if so required by the government as per the approved production plan will be incentivized on the existing net gain sharing formula between the Government and the unit in the ratio of 65:35 respectively with the proviso that the total amount paid to the units, after including the component of variable cost will be capped at the unit's own concession rate.

(iii) Units increasing production beyond 110% may be compensated at their concession rate, subject to the overall cap of IPP.

(iv) While procuring additional urea beyond 100% of the reassessed capacity of urea units, a merit order system of procurement will be followed. In other words, the units which supply urea at the least cost would be given preference in procurement.

(v) The cost of feedstock/fuel allowed will be in the ratio of gas/LNG/Naphtha etc. with reference to actual ratio of consumption of annual actual production of urea up to that portion of the incremental production of urea required by

the Government for sale to agriculturalists. Energy/inputs for non-agricultural sale/exports and surplus ammonia shall be allocated on costlier feed/fuel basis.

(vi) To the extent that the Government does not require any quantities of additional production for direct sale to agriculturalists, the concerned units would be free to dispose of the remaining quantities by way of exports, sale to complex manufacturers etc. without seeking prior permission of DOF.

(vii) Government will not subsidize the additional production, if not required by it for agricultural consumption.

In 2008, to attract New Investments in the Urea sector, a policy for investments in the Urea sector was notified by the Department of Fertilizers for revamp, expansion, revival/Brownfield and Greenfield projects. The subsidy was linked to the Import Parity Price (IPP) benchmark, with fixed floor and ceiling to protect the subsidy from wide fluctuations. The policy notification of 2008 resulted in fructification of manyrevamp with an increase in Urea production of about two million tonnes per annum. During same period the consumption of urea was increasing every year and during the FY 2018-19it has crossed 320 LMT/ annum.

With almost static production of around 227 LMT (2013-14), the country had the option of either augmenting indigenous capacities by conducive policy environment of “Make in India” or resort to imports at the cost of vulnerability and volatility of the international urea market, foreign exchange, local employment, economic development and progress of the country. During the year 2013-14, 70.87 LMT of urea was imported. The urea import purchase tenders are floated according to demand supply dynamics and are intrigued with its own issues like price fluctuation in the international market, timely delivery and transportation from the ports to the hinterland.

The provisions of NPS-III were very complicated and subsidy for production beyond cut-off level in NIP- 2008 only accounted for 85% of IPP. If the units decided to stop production beyond the government has only option to import from the international market. The cost of imported urea includes IPP (CIF price which include cost, insurance and freight) of urea and incidental expenditure done by the government to make it available to the farmers from the ports. Therefore, it was decided to limit the cost of domestic production (beyond the RAC) to the total cost of imported urea.

4.6.2 NUP-2015

In NUP-2015to incentivize production beyond RAC following provisions were included

- For production upto 100% of RAC - The 25 gas based units are entitled to fixed cost and variable cost as per provisions of New Urea Policy -2015, NPS-III and Modified NPS-III.
- For production beyond RAC - The units are entitled for their respective variable cost and a uniform per MT incentive equal to the lowest of the per MT fixed costs of all the indigenous urea units subject to import parity price plus weighted average of other incidental charges which the government incurs on the imported urea.

4.6.3. Amendment in 2017

The devaluation of Indian Rupee against US dollar, increasing price of gas in international market, dwindling NG supply to urea units coupled with low Import Parity Price (IPP) production were reasons to make production beyond the RAC unprofitable to the units.

In 2017, the DoF received many representations from urea units and on wider consultation with line departments, the DoF again notified an amendment in respect of the production beyond RAC to make production beyond RAC viable for the year 2016-17 was amended as:-

"For production beyond Re-Assessed Capacity (RAC) during 2016-17, the units will be entitled for their respective variable cost and a uniform per MT incentive equal to the lowest of the per MT fixed costs of all the indigenous urea units subject to sum to import parity price, other incidental charges which the government incurs on the import of urea and weighted average Central Government levies per MT of urea paid by the urea manufacturing units."

With the said amendment, the ceiling (Import parity price plus other incidental charges) imposed on production beyond RAC during the year 2016-17 was raised by weighted average of Central Government levies.

Further, to address any future fluctuation in IPP that would have adverse impact on the production beyond RAC by urea units, Para 8 was included in amendment to NUP – 2015 which authorized DoF to take appropriate decision in consultation with Department of Expenditure on 25th May, 2015 for existing 25 gas

based urea units with the objective of maximizing indigenous urea production; promoting energy efficiency in urea production; and rationalizing subsidy burden on the Government.

The above provision was made applicable in 2016-17. However, in the last two financial year (2017-18 and 2018-19) it has not been implemented and many units complained that because non-implementation of this amendment they incurred losses.

4.6.3. Impact of NUP-2015 on additional production

NUP-2015 has led to additional production of approximately 20 LMT as compared to 2014-15, from 25 gas based urea units before and after NUP-2015 has been given in the following figure 2.

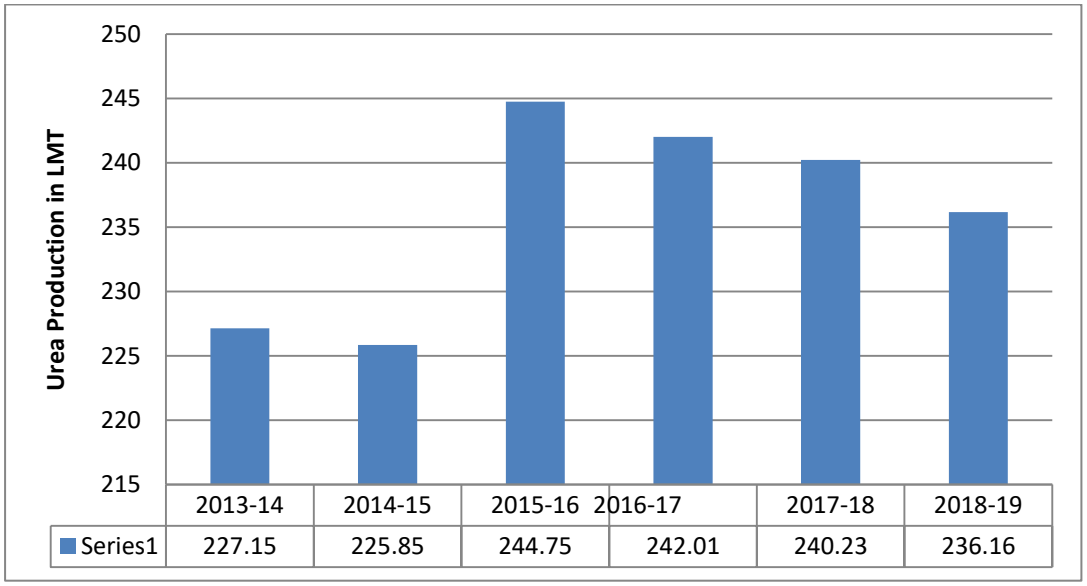


Figure 2: Production of urea during FY 2013-14 to 2018-19[9]

The production beyond RAC has following impact

i. The simplification of procedure for production beyond RAC has resulted in profit which will largely offset the impact of tightening of energy norms for production up to RAC and fixed subsidy for production beyond RAC has contributed to stability in cash flows for efficient urea units only.

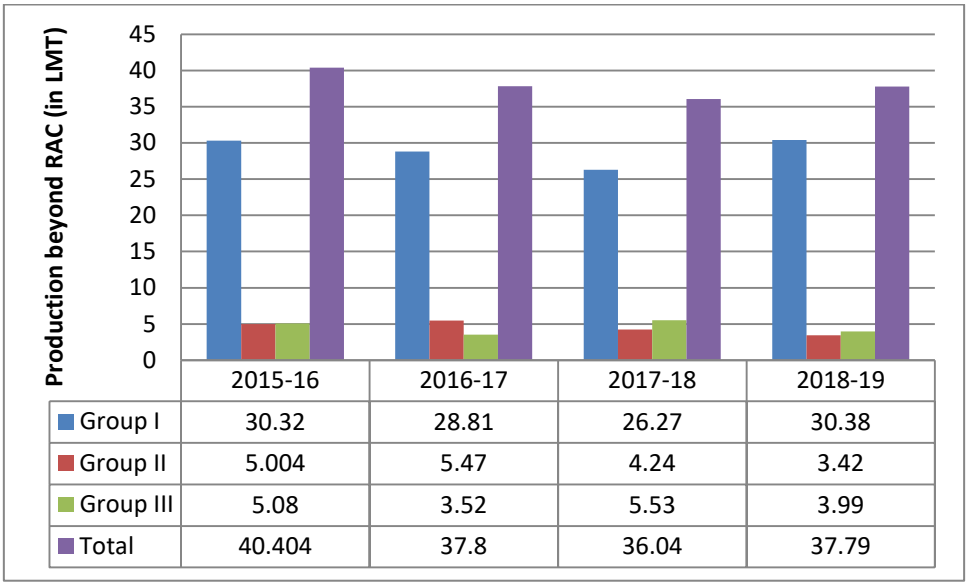
ii. For urea units that haven't revamped their units and do not produce beyond RAC, the policy has been no impact at this end and had negative impact. But the extent of increase in production beyond RAC has been on decreasing trend

[9] Based on the data collected from http://fert.nic.in/

because of increasing cost of delivered feedstock mainly NG/RLNG. And additional production can be ascertained only when it results in positive contribution to the balance of a unit.

The annual re-assessed capacities of twenty five units are 187.12 LMT. There is net increase of production of around 19 LMT to 11 LMT beyond the RAC post implementation of NUP-2015 in comparison with production during 2014-15. But the actual production beyond the RAC of urea under NUP-2015 is around 40 LMT to 36 LMT as evident in the figure-3.It has not reflected in total domestic production because

- Many units took shut down during this period for implementation of energy saving project and could not produce up to reassessed capacity.
- Some of the units like NFCL-II was shut down due to technical/financial reasons and short supply of gas..



	2015-16	2016-17	2017-18	2018-19
Group I	30.32	28.81	26.27	30.38
Group II	5.004	5.47	4.24	3.42
Group III	5.08	3.52	5.53	3.99
Total	40.404	37.8	36.04	37.79

Figure 3: Production of Urea beyond RAC after implementation of NUP-2015[10][11]

On the basis of preceding paragraphs it can be inferred that NUP-2015 has been extremely successful in incentivizing production beyond RAC which is more than capacity of an latest urea plant 12.7 LMT/ per annum) without any investment. The additional production beyond RAC has resulted in urea production below IPP and import substitution which has led to saving in urea subsidy in comparison with IPP as shown in the table below

[10] Based on the data available at [10]http://fert.nic.in/

Table 9:Import substitution due to additional production beyond RAC and saving to GOI[12]

Year	Urea production beyond RAC ('000 MT)	IPP notified for the respective years (Rs.Crores)	At indigenous cost of production = VC+FC Rs.2300/ MT (Rs. Crores)
(1)	(2)	(3)	(4)
2015-16(Pro rata June 15-March 16)	3362.9	6539	5885
2016-17	3779.6	6004	5643
2017-18	3605.9	6120	6011
2018-19 (Est.)	3780.4	8415	8161
Total (June 15 to March 19)	14528.8	27079	25700
Saving to Govt.			1379
			(27079-25700) (Col 3-Col 4)

4.7. Subsidy Rationalization through Uniform and Competitive Price (Gas Pooling)

4.7.1. Feedstock

The cost of feedstock mainly NG//RLNGdetermines the cost of urea produced and therefore, has been under major consideration in formulation of pricing policy. Some units also use coal for power generation and utilities in addition to NG/RLNG. The NG/RLNG is obtained through number of sources each have different price structures. Although the Indian urea manufacturers are at par with the best of the world in terms of low energy consumption and Green House Gas (GHG) emissions, (Bhushan *et al* , 2019).

4.7.2. Price of Feed Gas/ RLNG

There are multiple pricing regimes existing in the country for domestic NG supplies and also, region specific pricing exists in the country with North Eastern states getting NG at relatively cheaper prices as compared to other parts of the country. The fertilizer sector achieved its priority in allocation of NG by Empowered Group of Ministers (EGoM) in 2008 on the premise that the agriculture sector provides a crucial link between the rural, industrial and service sectors of the economy. The urea sector has been receiving NG from various sources at different prices e.g. Administrative Price Mechanism(APM), (NON-APM)/NDP gas, Pre-New Exploration Licensing Policy (NELP), gas from Small & Isolated fields, NELP/Production Sharing Contracts (PSCs) gas and gas from Coal Bed Methane (CBM) blocks, according to the contractual quantity and price regulated by the

[12] Based on the data collected from FAI, New Delhi.

Government of India. Recently, gas from High Pressure-High Temperature (HPHT) Areas (e.g. S1-VA fields of ONGC OIL and Private Parties (BP-RIL)) has become available where operator has marketing and pricing freedom. Apart from domestic NG, the Liquified Natural Gas (LNG) is supplied directly by marketer through Long Term contract, Medium Term Contract and on Spot basis. The price of LNG imported through Long Term contract & Medium Term Contract is mutually decided by buyer and seller and that of Spot varies from cargo to cargo based on international price.

4.7.3. Feedstock supply in India

- The domestic gas in the country is majorly being supplied from the oil & gas fields located at western and south-eastern areas viz. Hazira basin, Mumbai offshore & KG basin. In addition, North East Region (Assam & Tripura) is also producing domestic gas which is being consumed by the localized gas customers.
- Import of LNG is being carried out at terminals located on western and south-western coasts viz. Dahej (GJ), Hazira (GJ), Dabhol (MH) and Kochi (KL). In FY 2018-19, two new LNG import terminals located at Mundra (Gujarat) and Ennore (Tamil Nadu) have been commissioned. At present, total LNG import capacity is 39.2 Million Metric Tonne Per Annum (MMTPA). Efforts are also underway to develop additional LNG import terminals located at Dhamra (Odisha), Jafrabad (Gujarat) and others.

4.7.4. Gas Pooling for Urea sector

Major stumbling block in reforms in urea pricing policy is the differential prices of the delivered cost of energy and different energy efficiency levels of various urea units. The cost of delivered gas of various urea units is different because initially gas based urea plants were set up near the source of gas and after discovery of big gas reserves at Hazira, KG basin and Bombay high. The Hazira- Vijaipur- Jagdishpur (HBJ) pipeline was laid and became operational in year 1997 and many plants were set up along the pipeline much near to urea market. On reduction in gas supply from one source of gas, other sources (Panna, Mukta, Tapti, RIL, etc.) were added with different landed costs. Later on, LNG supply coming from Qatar through Petronet LNG Limited (PLL) was also added in 2005.

This has happened over a period of last 25-30 years and has resulted in supply of mixture of differently priced gas to urea units. As discussed above, the need for

intervention arose because; the price of gas supplied to urea units varies from plant to plant depending upon the combination of domestic gas and RLNG. Further, there is wide variation in the conversion efficiency of plants measured in G. Cal/MT. As the variation in final urea production cost is a result of variation in two factors (gas price and conversion efficiency), it is necessary to separate the two effects.

A uniform gas price at the input stage will achieve this objective and will help in focusing upon improving plant efficiency. This issue of variable gas costs was addressed by Pooling of Gas for production of urea. The Ministry of Petroleum and Natural Gas (MoP&NG) notified a major policy intervention, to supply gas at uniform delivered price to all fertilizer plants on the gas grid for production of urea through a pooling mechanism. The scheme on Pooling of Gas implemented w.e.f. 1st June, 2015 which has following provisions

- Domestic gas pooled with imported R-LNG to provide natural gas at uniform price to all urea units connected to natural gas grid
- An Empowered Pool Management Committee (EPMC) constituted under the chairmanship of Addl. Secretary, MoP&NG to monitor the gas pooling and issue the guidelines to administer the operation of pool.
- The responsibilities of EPMC include ensuring gas supplies to urea plants, approving procurement of R-LNG, monitoring optimum utilization of domestic gas etc.
- GAIL (India) has been appointed as the pool operator to determine the demand and making necessary arrangements for supplies of gas.

GAIL, as Pool Operator, has been carrying out the following major activities:

- Declaration of Uniform Delivered Pool Price at the beginning of each month. It is not being done presently. The same is taking time.
- Invite bids from International and domestic suppliers for delivered supply of RLNG to the Fertilizer Plants.
- Issuing of debit/credit statements to fertilizer units for payment into/payment from Pool Fund Account (PFA).
- Reimbursement of payment to fertilizer plants based on payments received in PFA.

In gas pooling mechanism, two gas based units (BVFCL- I &II) based in North Eastern region of the country were kept out of pooling because they are situated in North-Eastern region and are not connected to gas pipeline network. The three Naphtha based urea units viz., SPIC, MCFL and MFL are not connected with Natural gas pipeline grid and therefore, these units are also kept out of pooling of gas.

The current scenario of Indian Gas supplies and consumption patterns is as under: -

4.7.4.1. Domestic NG allocation and gas consumption in Urea sector:

Government in the past, with a view to develop the gas based industry, had been making allocations to various firms across industries. Domestic gas supply to sectors/plants was made as per the availability of gas. The actual gas supply against the allocation is being made as per the availability of domestic gas. The trend of domestic gas production and consumption of last 7 years are as under. The various committees which were formed over the years, and which allocated gas to various gas customers is tabulated as under

Table 10: Sectoral allocation of gas during FY 2012 to FY 2019[13]

FY	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Gross Production*	111.45	97.00	90.99	88.12	87.39	89.20	90.05
Sectoral consumption(in mmscmd)							
Fertilizer	31.50	30.30	26.70	25.11	21.52	18.83	17.18
Power	37.52	27.26	25.33	22.90	25.00	25.71	25.11
CGD	6.89	7.25	9.16	10.74	11.72	12.77	14.36
Others	18.31	15.21	12.74	9.63	10.90	13.84	14.05
Total	94.22	80.02	73.93	68.38	69.14	71.50	70.70

The sectoral allocation of gas in percentage term of total availability of gas is depicted in figure 4.

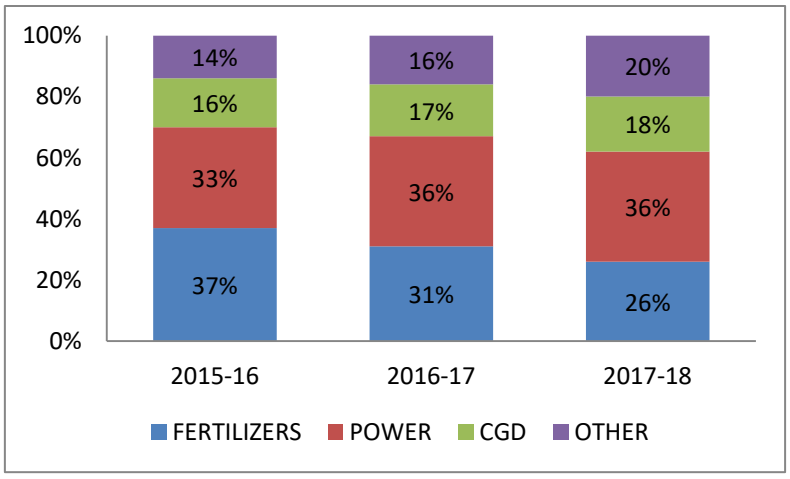


Figure 4: Sectoral allocation of gas in last three years[14].

[13] Based on data collected from https://www.ppac.gov.in/

[14] Based on data collected from https://www.ppac.gov.in/

4.7.4.2. Reduction in domestic gas supply to Urea sector against committed 31.5 MMSCMD (NELP):

- On 23/08/2013, when the EGoM, took decision to maintain the supply of 31.5 mmscmd (Million Metric Standard Cubic Meter per Day) domestic gases to fertilizer sector, it was on the average supply in FY 2012-2013. About 17.07 mmscmd (including BVFCL-Namrup supply of 1.44 MMSCMD) domestic gas was supplied from APM, Non-APM & pre-NELP gas sources and rest 14.43 mmscmd domestic gas was supplied from NELP (KG-D6) source totalling 31.5 mmscmd. After that there is continuous decline in supply of gas from KG D which finally reduced to 1.15 mmscmd and finally supply of gas stopped during February 2020. Considering the fact that domestic production of natural gas is less than the demand, allocation to one particular sector will always be at the cost of another sector. Further, due to ageing gas fields, there is a decline of domestic gas production from the existing nominated gas fields. This has increased the share of RLNG in total gas supply to urea sector as shown in figure 7. There is no voice raised because increase in cost of gas is paid fully in subsidy calculation by the Government to urea units.

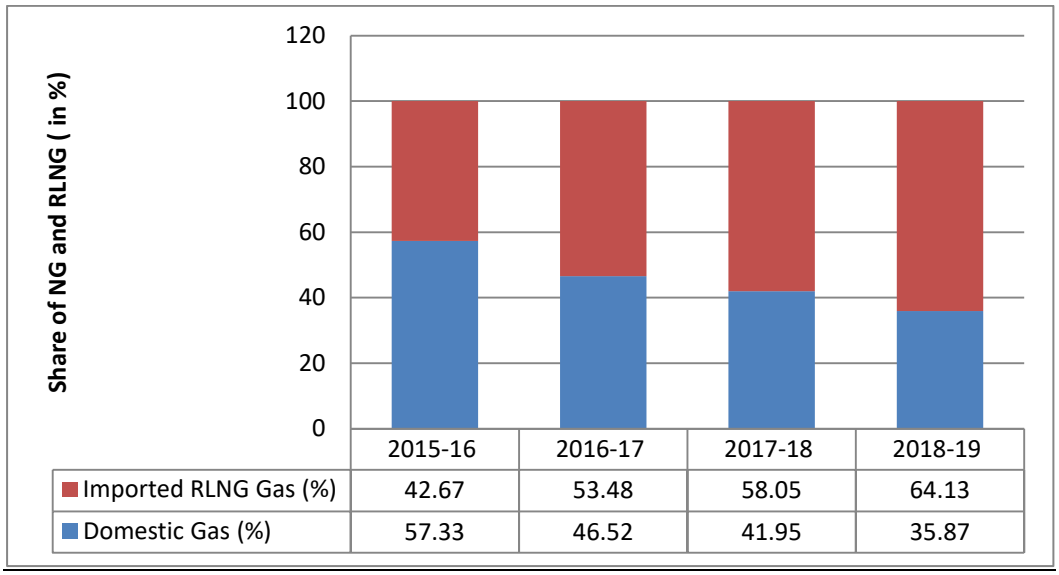


Figure 5: Share of RLNG and NG in total supply to urea sector in last three years[15].

[15] Based on data collected from https://www.ppac.gov.in/

4.7.4.3. Policy changes in 2014 and onward

In order to promote gas sector, MoP&NG has taken various policy initiatives as under:

- On 3rd February 2014, the Government has accorded the highest priority in domestic gas (except NELP) allocation to PNG(Domestic) and CNG (Transport) segments of City Gas Distribution (CGD) sector for securing the un-interrupted supply of cooking and transport fuel to public at large. The use of natural gas in domestic/transport sector helps in combating rising air pollutions and improving public health.
- There is a continuous increase in domestic gas consumption in CGD sector along with the expansion of CGD infrastructure across nation.
- Under the New Domestic Gas pricing Guidelines, 2014, the price of the domestically produced gas have been linked with the global gas markets to move towards creating a liberalized gas market. It is a significant diversion from earlier adopted gas price fixation models of cost-plus basis and now, the domestic gas prices are linked with Henry Hub(HH) (USA), National Balancing Point,((NBP)UK), Alberta(Canada) and Russia gas prices. The domestic gas prices are being revised on half yearly basis in line with global gas market prices.
- In year 2016, the marketing and pricing freedom was given to the gas produced from Deep water, Ultra Deep water and High Pressure-High Temperature Areas (HPHT/Deep water) to incentivize the domestic gas production and reduce the dependency on imported gas. The price discovery of gas produced from difficult fields (HPHT/Deep water) is again a market based pricing model subject to the ceiling price of alternative fuels, including imported coal.
- It can be concluded that the decrease in share of domestic gas and change in priority to urea sector have been the reasons for increased in the pooled gas price to urea industry.

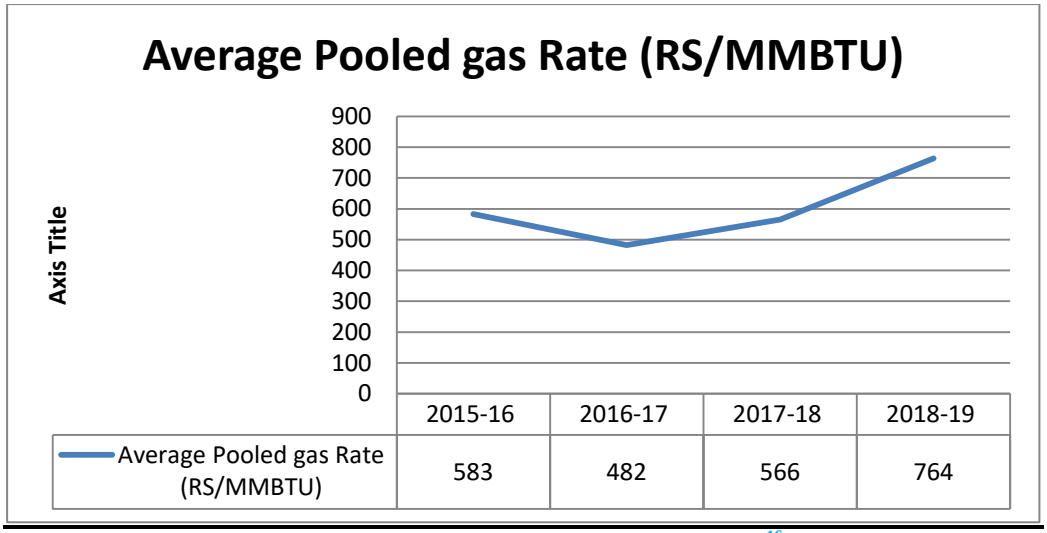


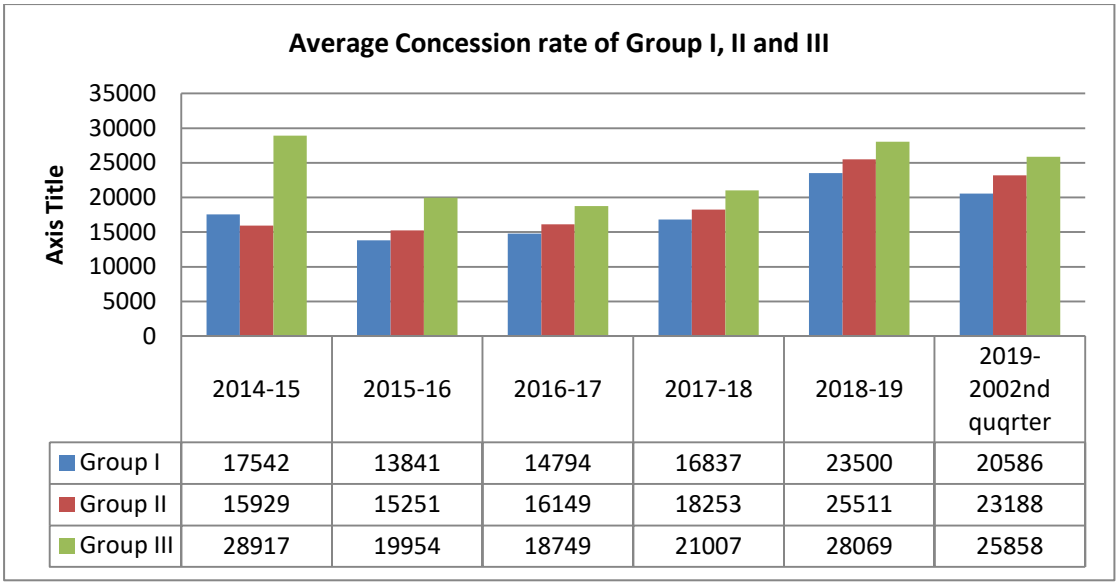
Figure 6: Average pooled price over last three years[16]

4.7.5. Impact of gas pooling on urea units

- All the existing contracts between urea unit and gas producer and transporting companies continued
- The short supply of gas to urea units have been addressed after the implementation of gas pooling mechanism.
- Price settlement at the end of the month
- Level playing field
- Major step forward for reforms
- Implementation issues

As expected, after the implementation of gas pooling the cost of production of urea at pooled price became lesser than the price of imported urea, which encouraged some existing urea units to produce beyond their reassessed capacity. Moreover, the difference in concession rate due to pooled rate reduced the cost of coal based units of the Group III to produce beyond RAC. The overall difference in concession rate decrease as it is evident in figure 7 below.

[16] Based on data collected from https://www.ppac.gov.in/



	2014-15	2015-16	2016-17	2017-18	2018-19	2019-2002nd quqrter
Group I	17542	13841	14794	16837	23500	20586
Group II	15929	15251	16149	18253	25511	23188
Group III	28917	19954	18749	21007	28069	25858

Figure 7: Average Concession rate of urea units group-wise before and after the implementation of NUP-2015[17]

This will reduce import dependency to the extent of production of additional quantity after the gas pooling and NUP-2015. The gas pooling policy has created financial stress on the balance sheet of the units which are paying pooled gas price which is much higher than their actual gas price.

However, it is to be kept in mind that pooling of gas is a short term solution for bring urea units to a level playing field, encouraging efficiency with the ultimate target towards single concession price for all urea units.

4.7.6. Implementation of Gas Pooling

In gas pooling, different units are purchasing gas at different rates which is influenced by the different existing contracts with the gas supplier and transporters, and composition of domestic or imported gas availability at their plant location.

The units which were purchasing gas at lower rates are either those who started after directions of the government on discovery of gas near Bombay High (KRIBHCO, RCF-Thal, GSFC, etc.)to promote utilization of gas.or units which were established in 1980s/90s along HBJ gas pipeline (IFFCO Phulpur-II NFL-Vijaipur, etc.). These units had allocation of APM/Non- APM or NELP gas at cheaper rate as comparable to the RLNG. The units which converted to gas from Naphtha/FO/LSHS under NPS regime hadless allocation of domestic gas and had to meet the feedstock requirement through long term/mid-term contract for RLNG signed in 2005.

[17] Based on data collected from http://fert.nic.in/

All units which converted to gas during NPS-III regime (2007-2014) got no allocation of domestic gas and totally dependent on RLNG (Nangal, Bhatinda and Panipat units of NFL, KFCL, ZACL etc.). From the recent month derived pool rate, it is seen that the weighted average pool rate is Rs 750/ MMBTU (GCV).The units actual Gas rates are given as below

Table 11:Cost of delivered gas to different urea units[18]

Name of the units	Gas Rate MMBTU (GCV)	Name of the units	Gas Rate MMBTU (GCV)
IFFCO, Aonla I & II	818.73	IFFCO-Phulpur I & II	977.92
Indo Gulf-Jagdishpur	931.35	KFCL- Kanpur	983.45
KRIBHCO	604.14	SFC- Kota	845.53
RCF- Trombay	376.41	ZIL-Goa	982.21
NFL -Vijaipur I & II	744.51	GNFC-Bharuch	729.82
NFCL- Kakinada I &II	295.32	NFL- Nangal	903.40
CFCL- Kota I & II	856.18	NFL-Bhatinda	897.79
YFIL- Babrala	893.62	KFL-Shahajahanpur	807.53
NFL-Panipat	889.98	IFFCO- Kalol	745.09
GSFC-Vadodra	429.47	RCF-Thal	517.25
KFL-Shahajahanpur	807.53		

The units which get gas at lower price than pool price have to deposit the difference of delivered price and pool price to the Pool fund account (PFA) and opposite is true for the units which get gas at higher price than the pool price, as they get the difference of delivered price and pool price from PFA.

The process of finalizing the weighted average rate of gas takes around 15 to 20 days and settlement to gas pool fund account takes around 5 to 7 days. The time for this entire transaction increase the working capital requirement of units, receiving pooled gas at higher cost than pooled price.

Generally the units have been depositing into pool fund account timely but it is seen from the past few months that NFCL isnot depositing to the pool fund account timely and huge amount is pending from the unit to PFA, as the unit is facing operational problems and shortage of funds. One of the units of NFCL-II has been closed since July 2019 because of financial issues.

From preceding section it is evident that the NUP-2015 has achieved its three objectives. The amendments were necessary to address the concern of urea industry and maintenance of supply chain of urea in country.

[18]Discussion with representatives of companies and information from FICC

4.8 Answer of Research Questions

From the discussion following research question can be answered

Has NUP-2015 been implemented effectively?

Yes. The NUP-2015 has been successful in meeting all three stated objectives effectively

Has it achieved its three objectives viz., improved energy efficiency, rationalization of subsidy and maximising indigenous production?

Yes.

What were the various issues and challenges faced during implementation?

The concerns issues and challenges have been enumerated in chapter 4.

What are the actionable points for future?

The actionable points for future have been discussed in detail in next chapter 5.

Chapter 5

5. Present Scenario

5.1 Overview

India has achieved a remarkable growth in agriculture through increasing the food grain production from 8.3 Crores MT in 1960-61 to about 28.337 Crores MT (fourth estimate) in 2018-19. Actual fertilizer consumption grew over time as a result of the spread of use on unfertilized land, increase in irrigated areas and increase in rates of application on fertilized land.

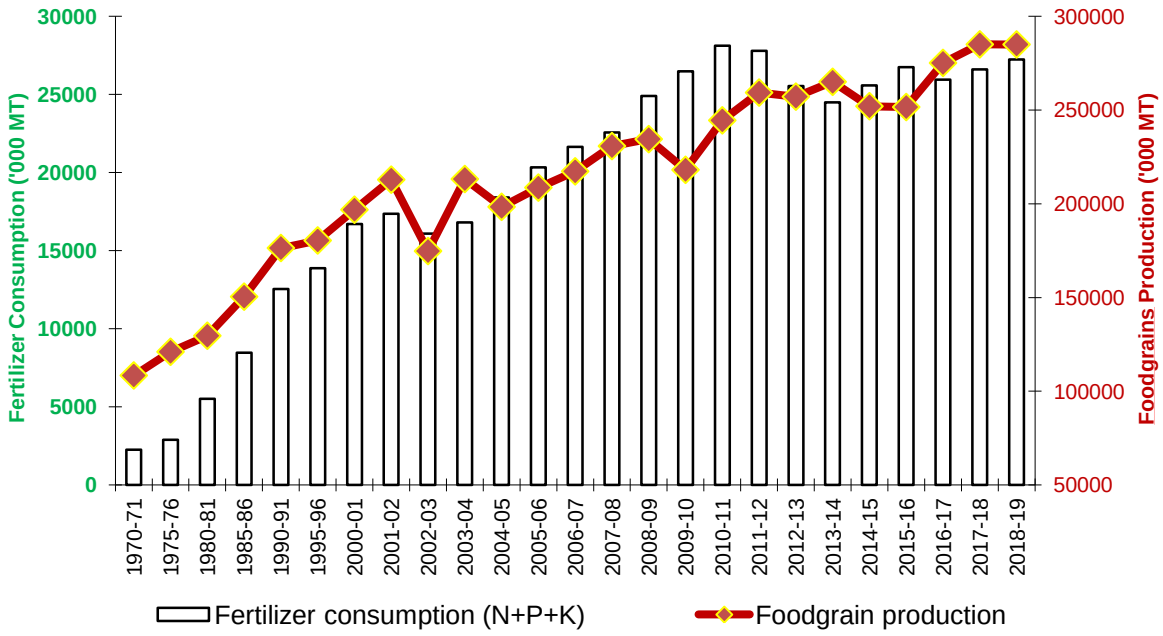


Figure 8: Fertilizer Consumption and Food Production in India[19]

It is no denying fact that *seed-fertilizer-irrigation*, wherein high yielding varieties of seeds were used for enhancing agricultural production and productivity. The generous application of chemical fertilizers and irrigation, were main contributor for this phenomenal growth in agriculture. But now the yield is showing signs of fatigue and decrease in production by over consumption of fertilizers. The slow growth in agriculture sector indicates crisis in agricultural economy.Over the last fifty years the Crop response ratio (kg grain produced/kg NPK applied) has fallen sharply over the decades from 12.1 during 1960-69 to 5 during 2010-17 (Katyal, 2019).

[19] Based on data collected from Fertilizers Statistics 2018-19

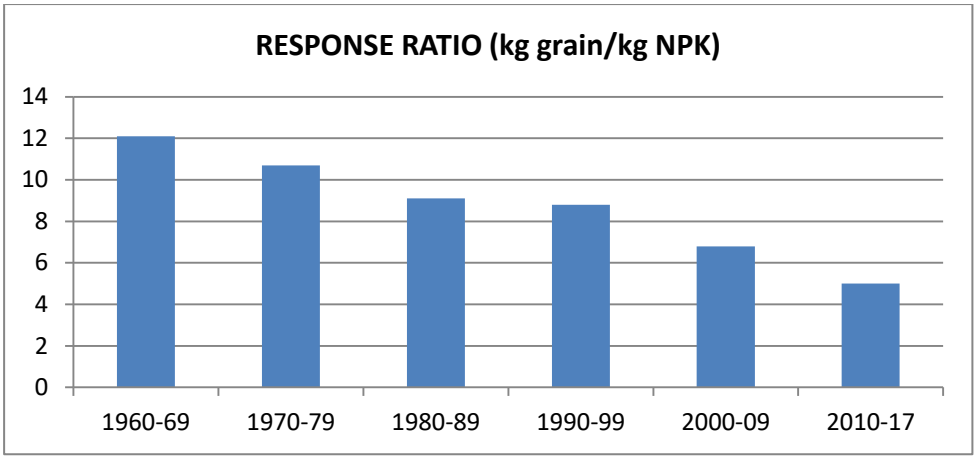


Figure 9: Response of Fertilizers Use In Terms Of Kg Grain/Kg NPK Fertilizers Used (Katyal, 2019).

Since the inception of RPS in 1977 to NUP-2015, the urea subsidy have been discussed and criticized by the economists and at the same time supported by the agriculturist scientists. In last decade, there has been a sudden surge of domestic urea subsidy. It has become unsustainable and thereby its careful handling requires in depth analysis of the factors influencing it.

It is well known fact that various interests group/stakeholders attempt to influence the design and implementation of subsidy policy across the world and urea pricing policy is not an exception. Political consideration and rent seeking behaviour has led the urea subsidy policy to unclear and contradictory objectives as well as implementation failure over time due to competing interests. The potential outcome has been very costly and has resulted in un-intended results like

- Imbalance use of nutrient due to overuse of urea,
- Environmental pollution,
- Declining agriculture yield in response to fertilizer consumption
- Under recovery of many urea units and no private investment in urea sector,
- Burgeoning skewed subsidy bill,
- Diversion of subsidized urea for non- agricultural purposes and
- Smuggling to neighbouring countries e.g. Bangladesh, Nepal and Myanmar.

The present urea pricing policy i.e. NUP-2015 has been successful in achieving its objectives of rationalization of urea subsidy through supply of gas at uniform price, enforcing energy norms, additional production beyond RAC and making indigenous urea units globally competitive.

The urea subsidy is distributed directly or indirectly amongst abovementioned stakeholders and influences them. Therefore, a simplistic solution of price increase of urea is not panacea of all problems of urea subsidy policy.

It is worthwhile to mention here that the urea subsidy not only affects the urea industry; but also other stakeholders *viz*,

i. Government
ii. Urea industry,
iii. Farmers, and
iv. Consumers of agriculture products.

The fertilizer subsidy has mostly been seen in isolation from macroeconomic point of view and there is growing voice of concern that urea subsidy is leading to imbalance in nutrient use, low fertilizer use efficiency in absence of introduction of new generation of fertilizers, crowding out investment from agriculture sector and viability of urea industry.

5.1.1 How urea subsidy has assumed such a huge proportion and underlying causes behind it?

In late 1960s, the reports of devastating drought across the country, short supply of food and violent demonstration across the cities forced the government to adopt policy decisions in order to promote use of new technology and inputs in agriculture. It was done because structural reforms in agriculture were not successful and increase in food grain production was considered as quick option to solve the crisis.. The policy was designed and implemented to enhance domestic production of fertilizers and promote the use of fertilizers to enhance agricultural production to ensure food security of the country.

The policy objectives had no provisions to address many issues like, time frame (long term /short term), specific market failure, subsidy distribution across the country, externalities and its effects, target groups (socio-economic and agro-ecological), its effect on consumers (farmers), producers (industry) and on the government. Political agenda, pressure groups and short term goal ensured the continuity of subsidy policy without any exit strategy.The situation became more complicated in absence of regular monitoring and assessment framework to review the subsidy policy.

The Government subsidy bill for urea has been mounting and is currently about forty-three thousand Croress out of total seventy-one thousand Croress.

Internally, the government is under pressure to keep the fiscal deficit at target level. Thus, it is necessary to be influenced not only by the seer quantum of subsidy arising from the present urea pricing policy but also to examine the underlying causes.

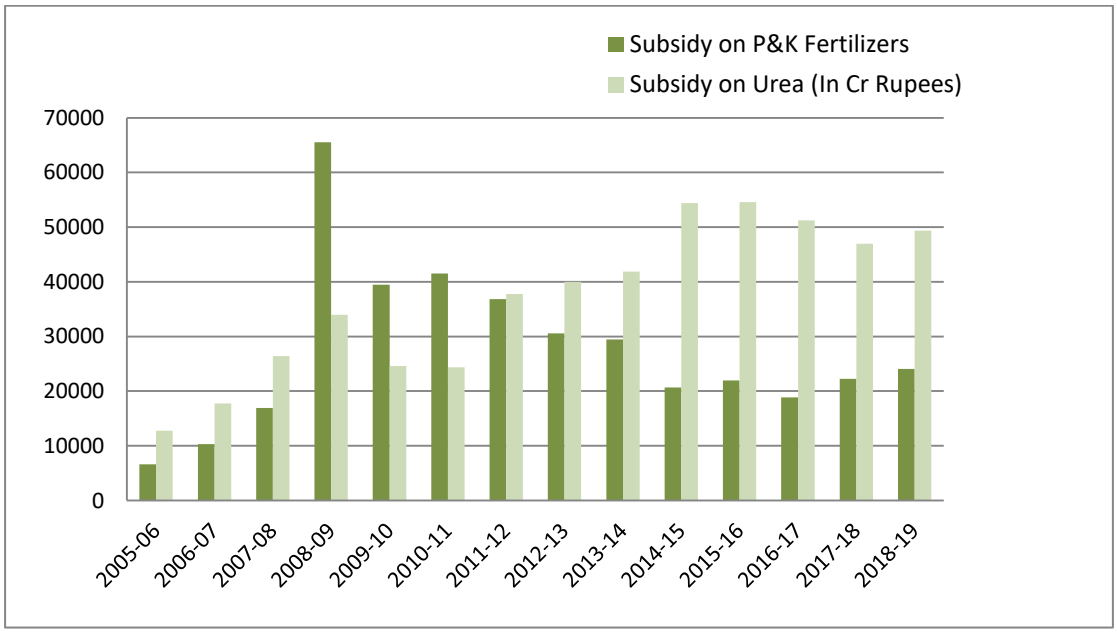


Figure 10: Subsidy on P& K fertilizers and Urea from FY 2005 to 2018[20]

The first cause is sharp increase in consumption of urea over last a decade which is either being met by domestic production or import from international markets. The country's total NPK (nitrogen, phosphorus and potassic) fertiliser consumption was 43 LMT (24.9 kg/Ha) in FY1960-61 which has risen to 273 LMT (137.6 kg/Ha) in FY 2018-19. It may be recalled here that this subsidy is given to industry with a view to ensure that ultimate consumer namely the farmer receives fertilizers at a reasonable price (Fertilizer Statistics- 2018-19).Secondly, in spite of increase in cost of production of urea, there has been no revision in the MRP of urea in last one decade since increase in MRP of urea is a very sensitive matter. Therefore, the market price of urea is decided on political consideration defying logic given by economists, scientist, environmentalist and development agents. The third reason is continuing and sharp increase in the cost of inputs both indigenous as well as imported. During 2018-19, the subsidy on urea was more than 78% of the cost of production. This is also one of the reason why there are use rising subsidy bill. In spite of price pooling of gas in 2015, the delivered cost of gas has increased from Rs. 582.68/ MMBTU in 2015-16 to Rs.764.05/MMBTU in 2018-19.

[20] Based on data collected from http://fert.nic.in/

5.1.2 Why Subsidy is Necessary?

The published literatures indicate that in developing countries and developed countries agriculture activity is very difficult to sustain because of uncertainty involved in it and the government intervention is needed either in price subsidization of inputs or support price for output. It becomes more important in country like India which had witnessed famine and drought in 1950s and 1960s. In this context, fertilizer subsidy is going to stay in years to come to ensure the food for masses at an affordable price.

The substantial reductions in urea/fertilizer subsidy will directly affects consumption of urea and in turn will have a manifold effect on output. Itmay affect the availability of food grains to small and marginal farmers (86.21% of the total land holdings of 14.83 Croress farmers in country) who consume a large part of their produce. On the other hand, they will gain little from a rise in output prices as they have little surplus to sell in the market. The rise in food grain prices will also affect poor consumers including a majority of marginal and small farmers (86% of total farmers) who are net buyers of food grains. A rise in fertilizer prices is also likely to slow down the process of technological change in case of regions and crops where fertilizer use is still low (Rain fed areas). From the consumptions of urea among the different states it is evident that urea is being used by the farmers of irrigated area particularly growing sugarcane, wheat and rice and using new technology.

In the present framework, most of the time while talking about subsidy, consumer is left out which is major beneficiary of the subsidy in term of low MRP of agricultural products. The government has to keep the inflation under check and bring stability to economy. The benefits of fertilizer subsidy have gone not only to small and marginal holdings but also to lower and middle urban as well rural consumers who get food grains from government run Public Distribution System outlets. Thus government has been able to achieve food security and stable economy of the country.

However, today all four stakeholders are facing multiple challenges arising out of this policy. Therefore, all the stakeholders must actively collaborate to aim for desired result to meet the desired aspiration in best possible manner. Any future pricing policy should have following principles

i. From industry point of view must thrive

- To attain sustainable growth in healthy and competitive environment

- To have reasonable return to industry and comfortable liquidity
- To have freedom to do business
- To have incentives to launch new and innovative products

ii. From government perspective the policy must aim

- To ensure timely availability of adequate, affordable and quality fertilizer throughout the country, besides being welfare maximizing.
- To reduce the subsidy burden on government and rationalize subsidy structure
- To ensure food security of country
- To utilize subsidy efficiently and effectively
- To educate and empower farmers for efficient use of new technology

iii. From farmers' perspective policy must ensure

- Timely availability of adequate quantity at affordable price
- Maximum yield and profit for the investment made
- Availability of multiple, efficient and environment friendly products
- Balanced fertilization to maintain healthy soil
- Freedom and capacity to grow crops as per market dynamics

iv. From consumers of agricultural stand point the policy should have objectives

- To guarantee efficient use of taxpayers' money
- To ensure safe and healthy surrounding free of water, air and soil pollutions due to excessive use of urea/fertilizers
- To supply affordable agriculture products for consumption

The new policy which will follow the NUP-2015, must take into account the expectations of industry, in particular and challenges/issues faced by other stakeholders providing the redressal of concerns to maximum possible extent. The issues faced by farmers, urea industry, public and government, the recent budget announcement of Zero Budget Natural Farming (ZBNF) (in budget speech of July, 2019)[21] and incentivization of organic fertilizers use (in budget speech February, 2020) instead of chemical fertilizer[22]s; are discussed in next sections.

[21] Budget speech of Finance Minister, Government of India in July 2019.
[22] Budget speech of Finance Minister, Government of India in February 2020.

5.2 Concerns of Farmers

The farm subsidies (including fertilizer subsidy) has become integral part of their livelihood as it affects farm income. It varies from region to region, farm size and the variation of crops grown on it. Fertilizer subsidy in the form of price intervention is targeted subsidy for the farmers who use subsidized fertilizers as input in agriculture. While India's agricultural output has steadily diversified away from paddy and wheat, government support continues to be largely limited to these two. Lack of support for other crops has meant a squeeze in farmers' incomes across India. The present challenges were not thought of at the time of policy formulations. Some of these challenges/concerns are discussed below

5.2.1 Demand of Urea

The widespread deficiency of nitrogen in Indian soils is well known. The use of fertilizer including urea is determined by many factors like soil quality, climatic conditions, cropping pattern, genetic characteristics of crops, and use of inputs other than fertilizer.

Nutrient Deficient in Indian Soils[23]

Nutrient	% deficient samples
Nitrogen	94
Phosphorous	91
Potassium	51
Sulphur	41
Zinc	37
Boron	23

These factors determine the maximum amount of fertilizer which can be used to increase agricultural production. The fertilizer use also gets influenced by price of fertilizers as well as crops. Thus effective demand of fertilizer is an outcome of aforementioned factors and fulfilment of demand by effective fertilizers supply and distribution systems. There has been increase in consumption of urea over the years and is major reason of increase in urea subsidy.

5.2.3 Overuse of Urea

Globally government policies act as a major trigger for increased chemical fertilizer use practices and India is not an exception. It is necessary to understand the factors which influence farmer's decision to excessively use urea. It assumes utmost

[23] Based on the data available from FAI, New Delhi

importance because it can become an effective way in policy formulation to influence decision-making behaviour of farmer toward this excessive use of urea. Therefore, there is immediate need to find out the reasons of overuse of urea by farmers. According to published literature, newspaper articles and opinion of representative of urea industry, scientist, economists academicians and government officials, the low MRP of urea is major reason for its overuse.

High subsidy has lowered the relative price of urea with respect to the other fertilizers. As a result, the application of fertilizers is heavily skewed towards urea in respect to DAP and MOP). Wide network of fertilizer dealers and retailers of private and public companies and cooperative societies, continuous subsidized movement by road, railways and costal channel coupled with timely import ensure adequate supply of urea throughout the countries. Total nutrient used in the country, and NPK ratio over last ten years has given below in the table 12.

Table 12: NPK consumption in country fertilizers used/ HA and NPK ratio over last ten years[24]

	NPK CONSUMPTION	NPK used	NPK MIX RATIO		
	MMT	Kg/Ha	**N**	**P**	**K**
FY 10	26.5	140	4.3	2	1
FY 11	28.1	142.3	4.7	2.3	1
FY 12	27.8	141.9	6.7	3.1	1
FY 13	25.5	131.5	8.2	3.2	1
FY 14	24.5	121.8	8	2.7	1
FY 15	25.6	129	6.7	2.4	1
FY 16	26.8	134.9	7.2	2.9	1
FY 17	26	130.8	6.7	2.7	1
FY 18	26.6	134.1	6.1	2.5	1
FY 19	27.4	137.9	6.3	2.5	1

In recent years, low price, easy availability, fear of losing yield and high income expectation are some of the factors which have led the overuse of urea. The Urea is being seen as pollutant of surface and ground water by environmentalist because of its overuse in agriculture by farmers, not only in India but across the globe.

Results from the field survey revealed that most of the farmer respondents were unaware of the nutrient status of their soils and the crop-specific recommended application rates or scheduling regimes. Majority of the respondents believed that more fertilizers they used, higher would be the yield gains (Pandey and Diwan, 2017).

[24] Based on data available in Fertilizers Statistics 2018-19, FAI, New Delhi

Recent finding in state of Punjab suggested that the introduction of 45 kg bag of urea by replacing 50 kg urea bag has resulted in reduction of consumption of urea after 100% neem coating of urea. It is worthwhile mentioned that Government of India had introduced the concept of 100 percent Neem coating in 2015. The Government wanted to curtail the usage of urea because neem coating increases 'N' use efficiency by 10%. But the reduction in usage is not because of Neem coating but because of changed packing of urea bag. The farmers go by number of bags and not by requirement in kilogram. Therefore, they are using two to three bags of urea per acre and the usage of urea decreased by 10 to 15 kg per acre because of the small packing (Chaba, 2019).

Pandey and Diwan (2017) inferred that the farmer's farm management behaviour is strongly influenced by factors like food security and income pushing environmental quality at second place. Furthermore, results of the study indicated that excessive nitrogen loadings in farm soil which is an indicator of potential future nitrate contaminated zones emerging in agricultural intensive regions. These finding highlights the urgency for reorientation of support system by the government and policy reforms which can trigger sustainability into agriculture.

5.2.4 Black marketing of Urea

The low subsidized price at which urea is sold has encouraged illegal diversions by the industry and smuggling to adjoining areas in Nepal and Bangladesh. The Economic Survey of 2015-16 estimates such theft to be as high as 41% of the amount supplied. As a result of the low price and the illegal diversions, farmers are rationed and not always able to buy all the urea they want. The excess demand has resulted in black marketing and according to the Cost of Cultivation survey of 2013-14, 51% farmers end up paying prices higher than the statutory MRP. The across state variation in MRP is displayed as under

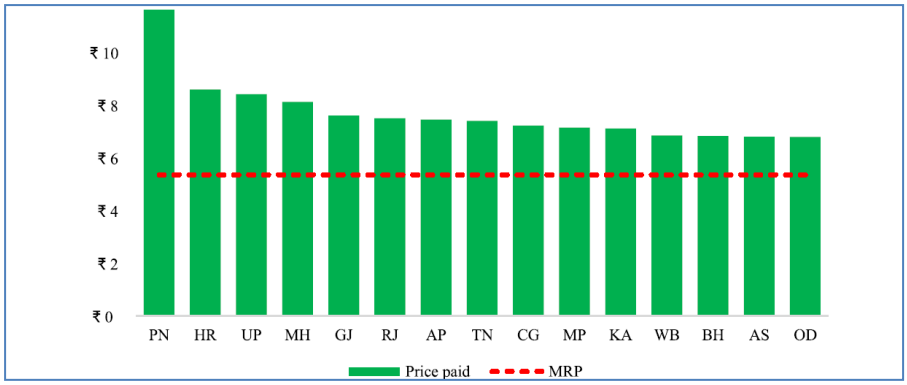


Figure 11: Price paid by Farmers for urea (per Kg) and MRP[25]

The black market prices are on average 61% higher than the MRP. The extent of overcharge varies by state and is displayed in Figure below (Source: Reproduced from Economic Survey 2015-16)[26]which compares the average price of purchased urea with the MRP.

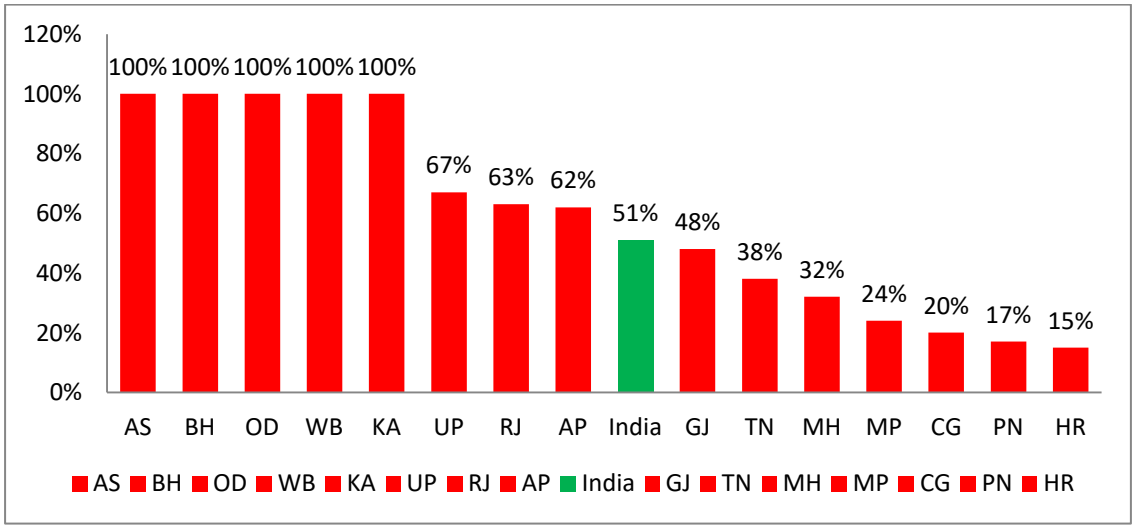


Figure 12: Comparison of urea purchased by farmer with MRP across the state

5.3 Concerns of Urea Industry

Any attempt to rationalize urea subsidy revolves around the cost of production (concession price) of urea by unit. The concept of concession price inherited from Retention Price Scheme (RPS), cost plus based pricing scheme. The fixed costs and energy norms were revised three years based on the actual of previous years. The RPS for urea Industry remained in force till 31.3.2003. Under RPS, the technical parameters namely specific consumption norms of purchased input items (feedstock /fuel etc.), assessed production level based on capacity utilization norm, raw water consumption norm, by-product norm, utility norm, electricity demand norm etc. were

[25]Cost of Cultivation survey of 2013-14
[26] Economic Survey 2015-16

fixed. The system continued upto 2002-03. The concession price had two main components

a) Variable cost (Feedstock, Water and Bag)
    - Increase/decrease in price of feedstock (Gas), bags and water is pass through and reimbursed subject to adherence of norms prescribed by the policy for each unit. Variable cost was updated on quarterly/ yearly basis.

b) Fixed Cost (Conversion cost and Capital Related Cost)
    - Conversion cost constitutes many items such as salaries and wages, repair and maintenance, administrative and social overhead, insurance, selling expenses etc. Some of these cost e.g. salaries and wages are subject to inflationary pressures; whereas others like repair and maintenance increase with the age of plants and machinery, technology used, etc.
    - Capital Related Cost comprise of return on net worth (12% post tax guaranteed in RPS), interests on long and short term borrowed funds and depreciation. As the unit recovers its cost in the initial years, these costs comes down over the time. The reduction in CRC was also captures every three years in RPS.

Under RPS, retention prices for all urea producing units was revised on three year pricing period basis, covering cost of production, interest and 12% post tax return on net worth. The difference between the Cost of Production under RPS and the maximum retail price of urea is paid as subsidy. Under RPS, consumption norms were revised, capacities were re-assessed from 1.4.2000, vintage allowances on capacity and consumption norms was withdrawn and capacity utilization norm was revised to 95%/90% for gas based and Naphtha/FO based units respectively w.e.f. 1.4.2002.

After RPS in 2003-04, first, second and third stage of New Pricing Scheme (NPS) was introduced and cost plus scheme was replaced with normative cost and logic of lower of group's average or unit's own cost was adopted. Group concession scheme under NPS introduced from 1.4.2003. All units were classified into six groups based on vintage and the feedstock.

Under NPS, in place of unit specific consumption norm, pre-set energy norms were fixed. Other technical norms namely non-plant energy norm, assessed

production level based on capacity utilization norm, utility norm, by-product norm, water norm, electricity demand norm etc. were also fixed. For each group, weighted average group price was worked out excluding the outliers (RPS more than +/- 20% of group average). The concession rate is determined as lower of Unit's own RP or Group Weighted Average. Under NPS I and II, outliers above Group Weighted Average were given 50% as outlier benefit. Only MFL was given this benefit up to 30.09.2006. Variable cost component is escalated on quarterly/yearly basis. Introduction of NPS led to immediate closures of some units (FACT- urea division) and some of the unit's return compressed considerably. But it introduced element efficiency among the urea units.

The NUP-2015 has continued with most of the provisions of modified NPS-III and recognizes the fixed cost of later. Moreover, it has also implication on the production of urea beyond RAC because it takes into account minimum fixed cost of urea industry while reimbursing the subsidy for quantity produced beyond RAC.

Today, more than 50% of the Urea units are incurring net losses on urea operations despite producing efficiently beyond RAC. This has led to the industry's inability to invest in R&D, new agri-technology and introduction of innovative nutrient products to improve farm productivity and has been preoccupied in mere survival.

The root cause of many ills of the urea industry is the many anomalies that has continued from RPS to latest policy i.e. NUP-2015. At present, the methodology of calculation of variable cost and fixed cost is mixture of cost plus and normative group based policy.

5.3.1 Changed priority of Urea Pricing Policy

The objectives of RPS and NUP-2015 have changed from increased domestic production and consumption of urea to increase in urea use efficiency, balanced fertilization, and equity in subsidy distribution across the country, increase in crop yield, improvement in soil health, efficiency and cost optimization in the supply chain and reduction in subsidy outgo from Government of India. The comparative account of NPS-III, modified-NPS-III and NUP-2015 has been given in table below to show that apart from minor changes most of the provisions of RPS have continued directly or indirectly.

Table 13: Comparison of NPS-III, modified NPS-III and NUP-2015

Particulars	NPS - III	mNPS-III	NUP –2015
Period of the Policy	01.10.2006 to 31.03.2010 extended till mNPS-III date.	Implemented for a period of one year from the date of notification 02.04.2014.	01.06.2015 to 31.03.2019 extended till further order.
Type of Fuel used as inputs	NG, RLNG , Naphtha, FO/ LSHS, COAL etc. purchased and consumed by each unit.	NG, RLNG COAL etc. purchased and consumed by each unit.	NG, RLNG , with Pooling of Gas (Energy to all the urea industry is provided at uniform rate) , Coal.
Grouping of Urea units	Urea units are classified in to six groups based on feed stock of the unit. Group–I Pre 92 Gas based Group-II Post 92 Gas based Group –III Pre 92 Naphtha based Group-IV Post 92 Naphtha Based Group-V FO/LSHS based Group-VI Mixed feed/fuel based	Same as NPS- III	Urea units are classified in to three groups based on their energy norms and actual energy achieved.
Energy Norms	Unit wise Energy norms are fixed in the form of G.Cal per MT of Urea.	Same as NPS- III	Unit wise Energy norms are fixed in the form of G.Cal per MT of Urea for the year 2015-16 to 2017-18. Further, Targeted energy norms are given to each group from 2018-19. Group-I 5.5 G.Cal Group-II 6.2 G.Cal Group-III 6.5 G.Cal
Bag cost	Moving Average of last three year preceding to the year under consideration with one year gap. For the year 2019-20 average of 2015-16, 2016-17 and 2017-18.	Same as NPS- III	Same as NPS- III
Water cost	Water norms are fixed per MT of urea. Purchase rate of water is taken as actual.	Same as NPS- III	Same as NPS- III
Saving in Energy	Saving in energy consumption over pre-set energy norms is paid as per basic rate of weighted average of feed /fuel used.	Same as NPS- III	Saving in energy consumption over pre-set energy norms is paid as per basic rate of pooled gas.

Fixed Cost	Group average fixed cost or individual fixed cost whichever is less are given to units. Further, Fixed cost of each units are fixed based on costed year 2002-03.	In addition to Fixed cost provided in NPS-III following are added : 1 An addition fixed cost of Rs.350/MT of urea are provided in the mNPS –III. 2 Special compensation of Rs.150/MT of urea for old units. 3 Minimum fixed cost Rs. 2300 /MT of urea.	Fixed cost as per NPS-III and additional provision added under mNPS-III which are not implemented till date by Govt.
Incentive for Production Beyond 100%	Production between 100 and 110% of RA are incentivised on gain sharing formula between Govt. and unit in the ratio of 65:35. Further, total incentive will be capped at the units own concession rate. Production beyond 110% of RA are incentivised at their own concession rate subject to overall cap of IPP. **IPP Policy 2008:** Production beyond 110% of RA and upto cut-off level are incentivised at their own concession rate subject to overall cap of IPP. Production beyond cut off level are compensated at 85% of IPP.	Production between 100 and 110% of RA are incentivised on gain sharing formula between Govt. and unit in the ratio of 65:35. Further, total incentive will be capped at the units own concession rate. Production beyond 110% of RA and uptocutoff level are incentivised at their own concession rate subject to overall cap of IPP. Production beyond cut off level are compensated at 85% of IPP.	For production beyond RA, units will be entitled for their respective variable cost and a uniform per Mt incentive equal to the lowest of the per MT fixed cost of all the urea units subject to IPP plus other incidental charges .

From the above comparative account and preceding paragraph, in spite of change in objectives of NUP-2015, it is apparent that basic concept of RPS and NPS have continued in NUP-2015 with slight change in averaging and grouping of units in following provisions

- Basic method of calculation of concession rate of unit on the Variable and fixed cost

- Component of Fixed Cost
- Revising energy norms of units on the last three year average
- Quarterly and yearly escalation and de-escalation of concession price
- Recognition of taxes and levies

During the discussion with representatives of urea industry, many issues were raised regarding the pricing policy and suggestions were made. Some are enumerated below:-

a) Revision in Fixed Cost

Fixed cost of the urea units were fixed long back based on costed year 2002-03 during NPS-III. From last 17 years, urea industry is being reimbursed their fixed cost without any escalation in any element of fixed cost except once, in 2006-07 and that too based on 2002-03. All the elements of cost of production have increased many folds since then. The NPS regime continued till March 2014. The New pricing scheme NPS-III was due for revision from April 2010. But after long protracted consultations and discussion and debate on recommendations of Group of Ministers (GoM), the government notified revision of fixed cost with increase in only four elements of fixed cost viz., Salaries and wages, contract labour, Selling expenses and repairs and maintenance from 2002-03 to 2012-13. The delayed subsidy payment due to inadequate budgetary provisions, increase in requirement of working capital and further erosion of return complicated the matter. The revision of CRC of old as well newer units was not looked in to.

The revision in Modified NPS-III mandates increase in Rs. 350/MT for all the units, minimum fixed cost Rs. 2300/MT after taking in to account Rs. 350/MT and additional Rs. 150/MT for gas based urea units older than 30 years in 2012-13.

The DoF agreed and recognized minimum fixed cost of Rs.2300/MT for urea industry, based on the cost data collected and analyzed by DoF from all urea manufacturing units, weighted average Group cost of Gas based units under NPS-III and also similar decision taken by DoF in case of restart of Trombay unit of RCF in year 2009. Three units *viz.*, KRIBHCO-Hazira, NFL-Vijaipur I and RCF-Thal were found to be eligible for minimum fixed cost of Rs. 2300/MT. The Modified NPS-III has not been implemented (till the writing of this paragraph) because of some difference in interpretation, although barring few viz., RCF many companies have been booking the entire revised fixed cost as income in their accou[27]nt on accrual basis after notification of policy in April 2014.

KRIBHCO-Hazira, NFL-Vijaipur I and RCF-Thal urea plants were commissioned during 1985 to 1988 and are of similar vintage. The Normative Fixed cost fixed for these plants based on cost data for FY 2002-03 under NPS-III was very low since by that time these plants were almost fully depreciated and it had no or very low interest cost and, therefore, their CRC was very less. If the policy would have been implemented as notified, KRIBHCO, NFL Vijaipur I and RCF-Thal would have got Rs. 2300/ MT as minimum fixed cost.

The non-implementation of revised minimum fixed cost provision of Rs.2300/MT will lead to lowering of credit rating of urea companies, hiking interest rates and difficulty in raising working capital. E.g. KRIBHCO has already incurred losses to tune of Rs 140 Crores (from 2014-15 to 2018-19) in its Urea operations after considering Rs 2300/MT as fixed cost. It is running a ~34 year old plant with reimbursement of 18 year old fixed costs. Instead of 12% Post Tax returns committed to urea manufacturers, 50% of urea units are getting negative returns on its urea operations.It will also result in lowering of the credit rating of urea companies and make it difficult to raise about Rs 5000 Crores of working capital.tne return from urea manufacturing activities is shown below in table 14.

On 13th March 2020, CCEA has approved the revision of fixed cost and all units will get Rs. 350/MT and Rs.150/MT as additional fix cost and vintage allowance (only for gas based units which are 30 years old). The detail is awaited at the time of writing of this dissertation.

Table 14: Negative return from Urea manufacturing activities[28]

Negative Return from Urea Manufacturing activities					
Particulars	2014-15	2015-16	2016-17	2017-18	2018-19
Profit After Tax (PAT)-excluding provisions of Modified NPS-III Policy (Rs. Crores)	-684.28	-213.27	-108.53	-841.80	-736.69
Profit After Tax (PAT)-including provisions of Modified NPS-III Policy (Rs. Crores)	49.33	629.39	761.04	-4.82	71.46
PAT as % of Net-worth – excluding provisions of Modified NPS-III Policy	-4.43%	-1.44%	-0.73%	-6.14%	-5.43%
PAT as % of Net-worth – including provisions of Modified NPS-III Policy	0.28%	3.51%	4.23%	-0.03%	0.43%
Note: Based on the data received from 25 urea units					

[28]Fertilizers Association of India (FAI), New Delhi.

New Energy Norms under NUP-2015:

Targeted energy norms given under NUP-15 are very low for the urea industry. Some of the units in urea industry are very old and based on old technology and as such the scope of improvement is limited in such units. Their capacity is also very low in comparison to new units. The payback for the Energy savings projects is to be recovered by the units from the difference in energy savings achieved, which shall be paid to the units at the pooled gas rate. As the pooled gas prices are also dependent on the cost of imported RLNG and INR-US$ parity, the recovery of huge amount CAPEX incurred on energy saving project is uncertain.

b) Production beyond 100%:

DoF has tried its best to minimize both the anomalies across the industry by implementing Gas Pooling policy and NUP-2015. But still some old units are getting difficulties to match with new energy norms. Increasing pool gas price is again a hurdle for high energy norm's units to produce beyond 100% because overall cap of IPP, which is beyond the control of Indian urea industry.

It is very difficult for high energy norms units to invest heavy CAPEX to reduce the energy. As the IPP of Urea is moving in the range of US$ 225-300 PMT for last several years (2015-16 to till date) and going to be in same range during 2020[29], some of the urea units with high energy norms are not in a position to recover their CAPEX through increase in production beyond 100% because of restriction of IPP for such production. The industry demands to remove, the cap beyond the RAC production torecover their investment on energy saving project before 2025.

c) Delay in the payment of Subsidy:

Outstanding payments have increased the working capital requirement manifold. Urea industry has to incur very large amount of interest to manage their working capital requirement. The DBT Subsidy Policy has only prolonged the delay in payment of subsidy which was earlier paid on receipt of material in a district. Now, it is paid only after sale to the farmers. It means a delay of 4-6 months since it is a seasonal commodity. Urea pricing policy includes only 45 days' working capital in calculating cost of production of each unit. As per the DBT scheme, the subsidy has to be paid within one week of raising the bills. But this is not paid in the defined period, due to non-availability of sufficient budget.

[29]December 2019, FAI Annual seminar, New Delhi.

d) Issues faced by Units utilizing Coal as fuel:

In the NUP-2015, the coal based units have also been given same targets as given to the units using 100% of fuel as NG/RLNG. There is demand from the industry that units using coal may be given some relaxation in target energy norms based on proportion of energy used as coal in the total energy consumed by the unit. This would save subsidy outgo of the Government as the cost of coal is about 1/4th the cost of pooled gas. Besides, there will an also be a savings in foreign exchange for the country. The two coal based units are discussed here

- SFC Kota

As per the study report submitted by DCM Shriram, SFC Kota has implemented/modified previously various schemes on energy reductions and capacity enhancement. In the main Ammonia Urea plants for reduction of natural gas energy, scope for further feasible modification is very limited, as the same is capital intensive (Capital expenditure of Rs 367 Croress). Besides, there are limitations in space to accommodate the additional equipments. The only major energy saving scheme is changeover of Power generation from coal to natural gas. However, NG being costlier source of energy than coal, this is not a viable option as it shall lead to increase in subsidy outgo to government of India.

- KFCL Kanpur

Apart from Energy Saving Schemes anticipated in Reforming and Synthesis section of Ammonia Plant, the other major energy Saving scheme is changeover of Power generation from bought out Power and coal based boilers i.e Installation of Gas Turbine &HRSG based on NG to generate the power and steam with total Capital expenditure of around Rs 400 Cr. NG being costlier source of energy than coal, this is not a viable option as it shall lead to increase in subsidy outgo to government of India as RLNG prices are likely to increase in future.

In view of above, if SFC Kota and KFCL Kanpur, fully switching over from mixed energy to natural gas energy, subsidy burden to Government is increasing. It is only because natural gas energy is costlier than coal energy. Definitely, the energy number will be lower as per NUP-2015, but production cost of urea will be higher. As such, both the units are not going ahead with major energy saving schemes and shall not be able to meet Energy norms by March 2020. On this ground these units may allowed to operate at higher energy norms.

e) Imported Vs indigenous urea

There is general impression that the high subsidy in India is also accounted for by low production efficiency of indigenous urea unit and consequently the cost of production is also higher. To support this argument, it is sometimes claimed that in recent years the price of imported urea (Rs. 22,708/MT during FY 2018-19) is lower than average concession price (Rs. 25511/MT and Rs.28068/MT, Average concession price of Group II and Group-III respectively) of indigenous urea units under NUP-2015. The concession rate of urea units under NUP-2012 and old units using NG/RLNG/naphtha is abnormally high. If the country becomes dependent on import, then it would be exploited by traders in terms of foreign exchange.

This impression is not valid because comparison is not on a "like to like" basis. When one considers the price of imported urea, it is only the IPP and other incidental charge incurred by the Government of India on handling charges including port charges, storage and bagging. The inland transportation and inventory carrying costs are not taken into account while comparing the cost of production of urea from indigenous plant plus subsidy paid on transportation to ensure FOR delivery. Moreover the production activities in country contribute to local taxes, overall development of the region and direct (Urea sector has low employment opportunity) and indirect employment opportunity in various allied sectors.

The cost of capital in resource rich countries is less as compared to India. In India, the new capacity is being generated at a much higher cost now and consequently the capital investment is significantly higher resulting in higher provision of depreciation, return and interest in concession price build up. The price of NG is very low and is also not comparable in most other countries particularly the Gulf, Middle East and USA where the main feedstock is gas.

f) Prices of Inputs, Particularly Gas:

The domestic gas production is also attaining plateau and new sectors are getting priority in gas allocation. This development introduces an element of great difficulty in supply of domestic gas to the urea industry. As has been brought out in preceding chapters, one of the important factors resulting in increase in subsidy is the steep increase in the price of main inputs, NG and RLNG (price of RLNG is affected directly by devaluation of Indian Rupee) besides rise is cost of other inputs chemicals, labour bags etc. The price of imported RLNG is beyond the control of the urea industry and the government also. However, the government can certainly help in

reducing the cost of production by taking a pragmatic view on allocation of domestic gas, price of gas to urea sector because it is a pass through item in subsidy calculation if the units adhere to certain norms. The tax structure and rate on NG/RLNG has been shown in the following figure

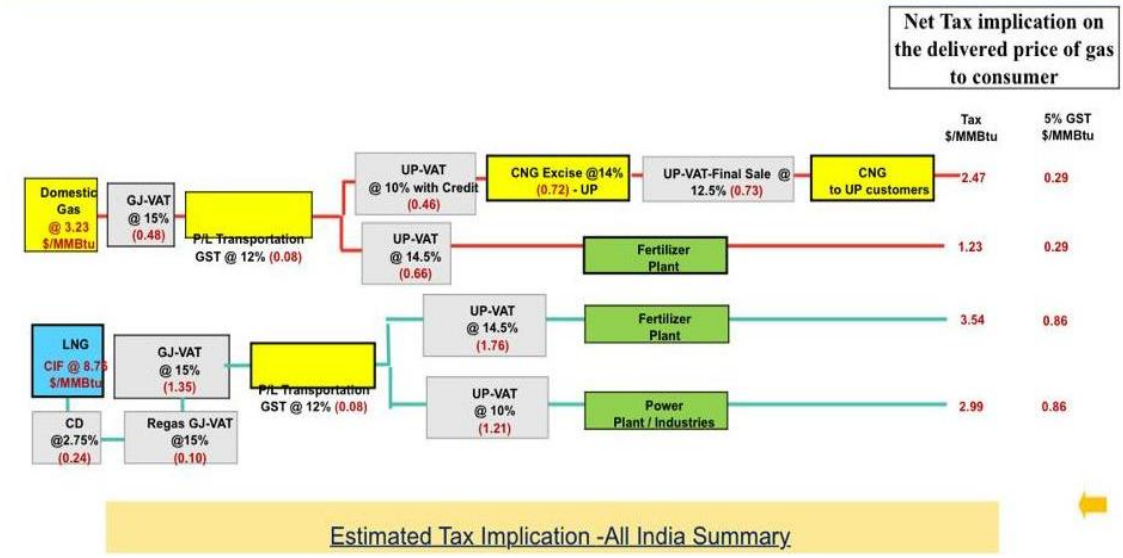


Figure 13: Implication of various taxes on Domestic Gas and RLNG[30]

5.3.2 Uniform Freight Policy

The Uniform Freight Policy was introduced vide Department of Fertilizers Notification dated 17/07/2008. The policy comes into effect from April-2008. The salient features of the policy areas under

A. Primary Movement: It includes rail Movement from Plant/Port to the rake point in the destination district. Actual railway freight paid is reimbursable as per the Railway Receipt. It also takes in to account direct road movement from Plant/Port to Block head quarter. Primary freight for direct road movement of fertilizers is restricted upto 500 kms.

B. Secondary Movement: Reimbursement on movement from railway rake point to block by road is paid on normative rates Per MT Per KM (PTPK) basis.

PTPK base rates have been suggested by Tariff Commission based on the study of actual expenditure incurred on movement of the fertilizer. Based on the recommendations of Tariff Commission, DoF issued a notification on 01/09/2011 notifying the district wise revised road transportation rates for urea dispatches by all

[30] Personal discussion with representative of GAIL

the units for the years 2008-09 and 2009-10. Further yearly rates for secondary movement have been notified upto the year 2016-17.

These rates are escalated and de-escalated based on the composite road transport index (CRTI) on the basis of published indices of Wholesale Price Index (All commodities), WPI – HSD, WPI-Tyres and Tubes and Cost of Truck.

The lead distance for each block in the district are based on average district lead (average of leads from nearest rail/rake port to block headquarter). The average leads from rake point to block level for districts have been approved by DoF and these are available in the iFMS.

5.3.2.1. Implementation issues

The revised rates are notified at the end of each financial year and it creates problem for the companies. The actual reimbursement entitlement is not known as companies claim only after a gap of months on finalization of rate by the government. The WPI is notified at the end of financial years while the companies have to transporter throughout the year.

The DoF changed the methodology for calculating reimbursement of secondary road freight by introducing the comparison of normative rates with the actual expenditure incurred by the company vide circular dated 21/05/2012.After prolonged deliberation it was decided in 2016 that the reimbursement of secondary freight will be allowed on the monthly basis at the lower of:

(a) Normative Per MT Per Km (PTPK) rates as notified by Department of Fertilizers from time to time;

OR

(b) The actual expenditure incurred by the company on secondary freight during the said month, duly certified by company's statutory auditor.

This circular further complicated the freight policy Issues regarding this circular: -

i. The comparison with actual expenditure each transaction-wise was introduced w.e.f. April-2008 onwards. This was not as per the Uniform Freight Policy and recommendation of the Tariff Commission and government original notification.

ii. Lead distances as applicable on 01/04/12 were made applicable on movement undertaken from April-2008 onwards i.e. retrospectively.

iii. The circular was amended on 17/06/2016 where the comparison of actual expenditure incurred on each transaction was replaced with monthly expenditure incurred.

iv. The system for generation of Differential Freight Claims as per the circular dated 17/06/2018 was enabled in iFMS for claim generation from February-2018 onwards.

v. The claims which were generated from 2008-09 onwards and submitted to FICC/DoF for payment.

vi. District wise Urea Road freight rates have been notified up to 2016-17 and PTPK for the period 2017-18 and 2018 -19 yet to be notified by DoF.

Thus a total time of more than 10 years has been taken up by DoF in finalizing the process of payment, while the companies have suffered due to the uncertainty. It is one of the reasons for black marketing of urea because the dealers and retailers are sometimes forced to take urea from the railway rake point directly during peak demand season. The companies reimburse the claim of dealers as per last year rate and ultimately lead to loss to the dealer/retailers. Thus an implementation issue of the freight policy leads to under recovery of dealers and company as well which also leads to overcharging of urea to recover these losses.

5.3.3. Coastal movement of Fertilizers:

The module for claiming Coastal Freight has not been implemented in iFMS and the claims are prepared manually. Department has raised many issues while processing of claims and claims have been returned and re-submitted many a times. The claims pertaining to the year 2017-18 and 2018-19 are yet to be released for payment by DoF.

5.4. Investment in Urea Sector

There has been dearth of private investment in urea sector since 1990s to 2013-14 as no urea plant was added. The main argument given for the non addition of capacity is uncertainty of feedstock supply, price of feedstock and government controlled input and output price. Many incentives have been given under investment policy NIP-2008 and NIP-2012 for urea sector. After announcement of New Investment Policy-2012, two new modern plants have been established and CFCL-III has started production in 2018-19 but another plant *viz.*, Matix Chemical and

Fertilizers in state of West Bengal could not operate due non-availability of feed stock till date.

5.5 Revival of Closed Units

In last five years, the government is reviving five closed fertilizer plants namely Talcher (Odisha), Ramagundam (Andhra Pradesh), Sindri (Jharkhand) of Fertilizer Corporation of India Ltd. (FCIL), Gorakhpur (Uttar Pradesh) and Barauni (Bihar) of Hindustan Fertilizer Corporation Ltd. (HFCL) by setting up new Ammonia Urea plants each having production capacity of 12.7 Lakhs MT per annum. It is expected that subsequent to commissioning/ start of the above plants, the indigenous urea production will be enhanced by 63.5 Lakhs MT per year leading to corresponding reduction in import of urea. The estimated cost of all the 5 plants is Rs 37,971 Croress.Barauni unit of HFCL and Sindri and Gorakhpur units of FCIL are being revived by M/s. Hindustan Urvarak & Rasayan Limited (HURL), a Joint Venture of National Thermal Power corporation Limited (NTPC), Coal India Limited (CIL), Indian Oil Corporation Limited (IOCL), FCIL and HFCL.

Talcher unit is being revived by M/s. Talcher Fertilizers Limited (TFL), a Joint Venture of Rashtriya Chemicals & Fertilizers Limited (RCF), CIL, Gas Authority of India Limited (GAIL) & FCIL. Ramagundam unit by M/s. Ramagundam Fertilizers & Chemicals Limited (RFCL), a Joint Venture of Engineers India Limited (EIL), National Fertilizers Limited (NFL) & FCIL.

The cost of production from these new plants is very high (because of high cost of investment and price of feedstock). It is considered as a strategic investment by the Government of India for development of eastern part of India. The Haldia-Jagdishpur gas pipeline of GAIL will supply gas to these plants and will eventually lead to economic growth along the pipeline in coming years. Moreover, many old units are more than 40-50 year old and need to be replaced by new efficient units.

5.6 IPP and Cost of Production

The cost of production of urea is decided by the urea pricing policy of the Government of India which determines both costs of inputs as well as output.

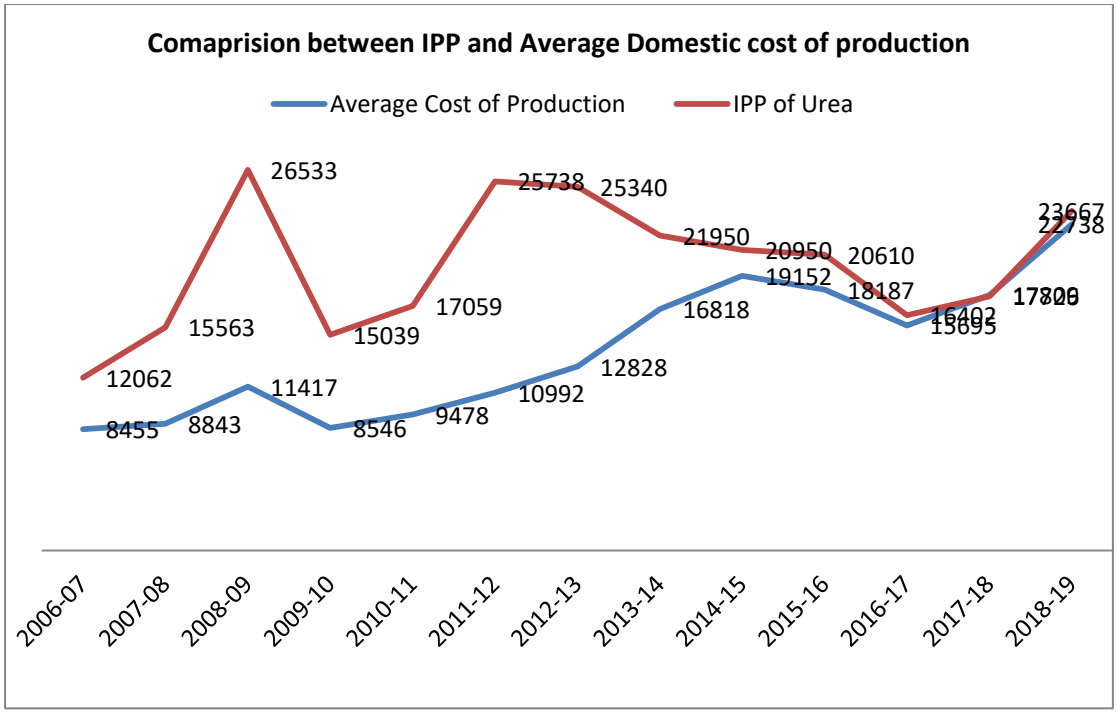


Figure 14: Comparison between IPP and cost of production of Domestic Urea[31]

While the price of imported urea is influenced by the global demand-supply situation, exchange rate of INR, geo-political situations in supply regions e.g. recent US- Iran and other issues e.g. closures of coal based plants in China on environmental consideration has resulted in high urea price for India etc. Thus, the comparison of cost of production by Indian urea units and import parity price is not justified.

5.7 Maximum Retail Price (MRP) of Urea

At present, MRP of urea is fixed by the Government of India currently Rs 245 for a 45 kg bag of urea or Rs. 5377/- per MT (exclusive of the Central/State Taxes), which includes Rs. 180/MT as dealer margin for companies of private and public sector and Rs. 200/MT for Co-operatives sector. In 2012, an additional Rs. 50/MT was included in MRP to compensate retailers for acknowledging the receipt and reporting the stock in mFMS (iFMS). An extra MRP of 5 % is charged by fertilizer manufacturing entities on Neem Coated Urea. The difference between the delivered cost of fertilizers at farm gate and MRP payable by the farmer is given as subsidy to the fertilizer manufacturer/importer by the Government of India. It may be recalled that the urea prices have not increased for almost a decade now. Last time the revision

[31] Based on data collected from http://fert.nic.in/

in urea prices happened in 2010 when the government raised MRP to Rs 5,310/MT from Rs 4,830/MT.

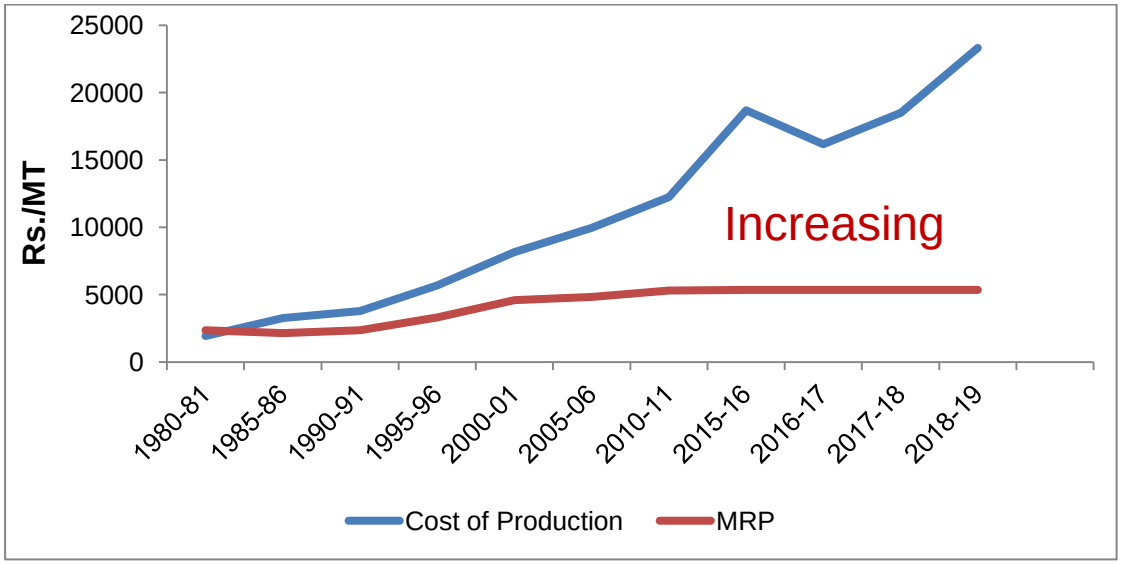


Figure 15: Cost of production of urea and MRP over last forty years[32]

Any rise in urea price is, therefore, likely to affect the income of farmers cultivating rice, wheat and sugarcane which are fertilizer-intensive crops. Therefore, any attempt at raising price of urea is likely to see stiff resistance from the farmers and politician alike.

5.7.1. Effect of Additional Cost due to Non recognized Input Taxation (ACTN)

In the states of UP and Gujarat, additional tax was levied by state governments as Additional VAT over and above normal VAT on raw material used for production of urea. e.g. The State Government of Gujarat introduced Additional VAT w.e.f 1st April, 2008 on Natural Gas, Naphtha and LSHS @ 2.50% and State Government of U.P. introduced additional VAT on Natural Gas, Naphtha and LSHS @ 5% w.e.f. 19th February 2010, which was not recognized in the urea pricing policy. The Government of India did not reimburse the additional VAT to the urea units which are situated in these two states. The impact of additional VAT, ACTN was allowed to collected from the Farmers by increasing the MRP of Urea in that State by the Government of India. The Government of Uttar Pradesh used to levy Additional VAT on Natural gas due to which an amount of Rs. 34 for 50 kg bag (additional Rs. 680/MT) over and Rs. 31 for 45 kg bag of urea was collected over and above the MRP of urea from the farmers in the State of Uttar Pradesh. However, UP Government has withdrawn the additional

[32] Based on the data available in Fertilizers Statistics 2018-19 and data collected from FICC.

VAT from Natural Gas w.e.f 14.11.2018. The government of Gujarat has also withdrawn the additional VAT.

Table 15: Rate of ACTN in State of Gujarat and Uttar Pradesh (Rs./MT)[33]

UP		Gujarat	
Year	Rate of ACTN	Year	Rate of ACTN
2011-12	289	2011-12	200
2012-13	364	2012-13	189
2013-14	515	2013-14	410

The above example has been given to make point that MRP can be increased in phased gradual manner to bring down excess use of urea and its diversion to non agricultural sector.

5.7.2. Why to revise MRP of urea?

i. Urea price is an important factor that may help to improve urea use efficiency.

ii. Widening gap between MRP and concession/import price has been resulting in huge fiscal imbalance

There should be gradual increase in MRP periodically. Lesson can be learnt from Experience of High Speed Diesel (HSD) Price Decontrol. HSD was under Administered Price Mechanism (APM) and all price revisions were approved by the Government. The thought behind keeping HSD under APM was that it is a sensitive input for transportation and agriculture and volatile price variations may affect the users. The under-recovery to Oil Marketing Companies (OMC) was subsidised by the government under APM. In January-2013 a decision was taken by Government for a calibrated increase in the HSD price and an increase of 50 paise per month was approved. The retail price of HSD in Delhi was Rs. 47.65 per litre at the time of this decision in Janauy-2013. The prices increased slowly and the monthly increase was absorbed well by the users. The retail price of HSD in Delhi increased to Rs. 57.28 per litre in June-2014. On 19/10/2014, the government decontrolled HSD prices and now the OMC price of HSD is fixed at the formula which is based on Import Parity Price of HSD. This was further changed to daily revision in retail prices from June-2017. The reform has been well accepted by the user especially commercial transportation and farmers. The impact of price increase has not been that adverse on

[33] Based on data available from Department of fertilizers and FICC

inflation indices. However, there has been a huge savings achieved on the fuel subsidy bill of government.

There is urgent need to bring the MRP of urea to realistic level. The excessive use of low priced urea is anyway resulting in to harmful effect rather than benefits of higher yield being perceived by the farmers. Moreover, the average price elasticity of fertilizers in India is estimated to be around -0.30 (Gulati and Narayanan 2003).

5.8 Environmental Pollution Due to Urea Use

The overuse of nitrogenous fertilizers is detrimental to the soil and the crop. It also pollutes the groundwater; the nitrogen from fertilizers, which is converted to nitrate by the bacteria in the soil, leaches into the groundwater and washes out of the soil surface, entering streams and rivers.

The Hon'ble prime Minister of India, in the 38th edition of his "Mann ki Baat" radio address to the nation (November 26, 2017), strongly urged the farmers to take a pledge to halve their consumption of urea, which is the most widely used fertilizer, supplying nitrogen, or 'N', to plants, by 2022. The reason behind this exhortation was the indiscriminate use of urea in agriculture which is scrutinized by the environmentalist as pollutant, as wasteful expenditure of scarce resource by economists and at the same time considered as main culprit for declining soil health.

According to the reply given by the Minister of Chemical and Fertilizers in the Lok Sabh[34]a on 11/12/2018, there is no harmful effect of chemical fertilizers with recommended doses and its judicious use. The study conducted by Indian Council of Agricultural Research under All India Coordinated Research Project on "Long-Term Fertiliser Experiments" in different soil types (fixed location) under dominant cropping systems has revealed that even in plots receiving NPK fertilizers, the deficiency of micro and secondary nutrients surfaced after few years affecting soil health and crop productivity. The limiting nutrients do not allow the full expression of other nutrients, thereby, lowering the fertilizer responses and crop productivity. Highest decline in crop yield was observed in plot receiving only Urea.

Besides, there is possibility of nitrate contamination in ground water above the permissible limit of 10 mg NO_3-N/L due to excessive use of nitrogenous fertilizers including urea particularly in light textured soils that has consequence on

[34] Based on replies of questions available at https://loksabha.nic.in/

human/animal health if used for drinking purpose. There is also possibility of release of N_2O in the atmosphere through the process of de-nitrification of nitrogenous fertilizers, particularly, under submerged soil condition, thereby, contributing to global warming[35].

The nitrogen deficiency in Indian soil is well known. The nitrogen use efficiency (NUE) in India is 22% while global average is 45-55% whereas optimal utilization is 60- 90% and in some cropping pattern NUE is reaching around 70%[36] .

All over the India, urea is applied in agricultural field by manual broadcasting. The nitrogen in agriculture is very complex cycle and has multiple inputs and output as well as multiple loss pathways while P losses are almost exclusively through runoff and erosion to surface waters. The unutilized nitrogen is stored temporarily in the soil but lost to environment through multiple leaky channel and polluting air (Nitogen oxide-PM2.5, NH3, dinitrogen (N2) etc), water (nitrate and dissolved nitrogen) and soil (organic nitrogen acidification). Recent findings suggest that nitrous oxide and nitric oxide act as Green House Gas and add to climate change.

Ammonia is not harmful as such but contributes to PM2.5 by reacting with NOx and SO_2. PM2.5 can cause respiratory and cardiovascular diseases. NO_x react in sunlight with volatile organic compounds to form tropospheric ozone which can trigger respiratory problems in sensitive individuals. The agriculture is minor contributor because fertilizers contribute 10% to 35% of the total ammonia input to the atmosphere.

Nitrate contamination of groundwater, which leads to conditions such as methaemoglobinaemia (commonly known as blue baby syndrome), has reached far beyond WHO safe limit in Punjab, Haryana and Rajasthan. The greatest risk of nitrate poisoning (methemoglobinemia) occurs in infants fed with well water contaminated with nitrates, and affects particularly babies who are four months old or younger Drinking water contaminated with nitrates or eating food similarly affected has a potential role in developing cancers of the digestive tract, and has also been associated with other types of cancer (Greenpeace, 2009).

[35] Based on replies of questions available at https://loksabha.nic.in/
[36] December 2019, Annual Seminar, Fertilizers Association of India, New Delhi.

Chapter 6

Way Forward

The economists have questioned inflating fertilizer subsidy bills earlier also but now it has assumed more significance because it is becoming unmanageable. The Government has to make special banking arrangement (SBA) to ward off the delayed subsidy payment and liquidity crunch. The stagnant carry over liabilities of previous years has become a permanent feature in domestic urea sector since past few years.The key purpose of this section is an attempt to consolidate the various issues impacting the urea sector and to propose socially desirable, technically feasible, economically sustainable and politically acceptable implementable solutions. However, a concerted effort will be needed by different stakeholders in order to make win-win situations for all.

At this juncture, one important question arises as how to reduce and rationalize subsidy burden. The following section will examine various possibilities.

6.1 The Urea industry

Any attempt to rationalize subsidy revolves around the cost of production of urea by unit which include variable cost (Feedstock, Water, Bag) and Fixed Cost (Conversion cost and Capital Related Cost. The fixed costs of all units remained at same level of NPS-III which was based on costed year 2002-03. The revised fixed cost is yet to be implemented by the Government of India after the notification of Modified NPS-III by the DoF in April 2014. If revised FC of Modified NPS-III implemented, it will increase subsidy outgo of Rs. 986 Crores per annum (up to RAC) production. Therefore, in the recent increase of subsidy the FC has no contribution as it has been same since NPS-III. The revision in FC cannot absorb a major part of the urea subsidies because a very low proportion (10 to 15 per cent) of the total cost of production is assigned to it and remaining is accounted for variable costs (feed stock, bags and water), and 95% of variable cost goes for feedstock. There has been considerable improvement in waste water consumption and discharge also. The cost of bags is linked to price of crude oil and functions of quantity and location of individual plants can be made uniform for all units but have negligible effect on subsidy outgo.

Thus major contributor to increase in subsidy is variable cost. The energy consumption norms and cost of feedstock decide about 95% of variable cost.

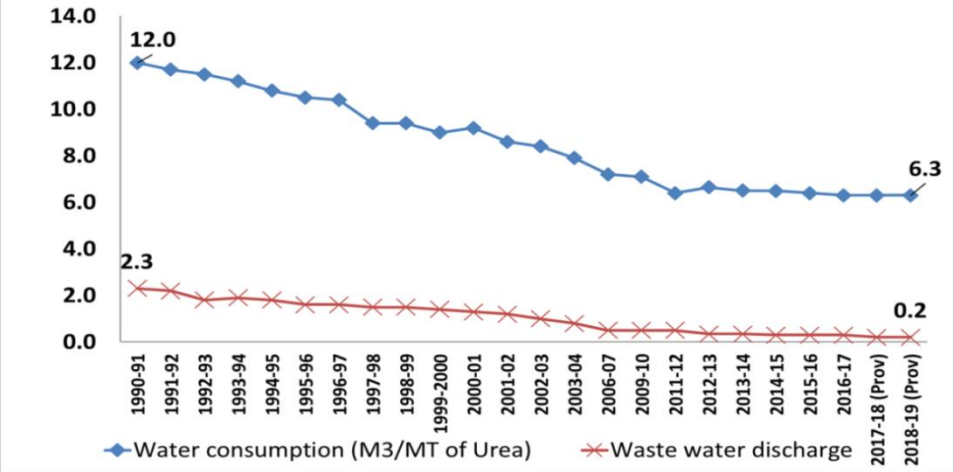


Figure 16: Water consumption and waste water Discharge from urea plants in India[37]

6.1.1 Supply and Cost of Feedstock

In thriving and growing economy like India, the production of low cost domestic gas has been static or declined over last five years. Apart from this, the supply of NG to urea unit has faced many challenges. The many domestic urea units are comparable to the best plants in the world in terms of energy efficiency (CSE 2019). But these units are producing urea at higher rate than the IPP because of cost of feedstock.

Since 2014, change in priority in gas utilization policy of Government (HC extraction by refineries, City Gas Distribution, nuclear plants, fertilizer, SME, Power), and freedom of pricing and marketing of gas by producers under new licensing policy of 2016 for High Pressure-High Temperature Areas (HPHT/Deep water) area and closure of production of KG D-6 gas by Reliance Gas has drastically reduced the share of domestic gas supply to urea units. The increased share of RLNG (from 38% to 68%in total supply of gas to fertilizer sector) in pooled gas in last five years and devaluation of INR to US $ are main reason for cost of production and higher subsidy. The Indian rupee has depreciated nearly 7.2% against the US dollar since the start of FY2018. As per ICRA estimates, for one US dollar rise in gas costs, the cost of production for urea rises by Rs. 1,800-2,000/MT while for every one-rupee depreciation against US dollar, the same rises by Rs. 240/MT at a constant gas price (Ghosal, 2018).

[37] Based on data collected from FAI, New Delhi

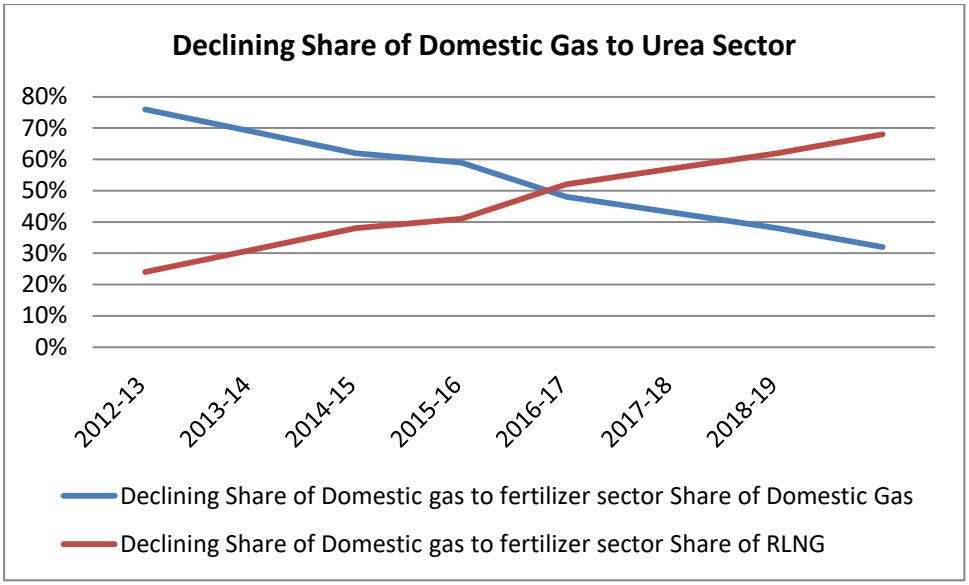


Figure 17: Declining Share of domestic gas in the total supply of gas to Urea sector[38]

6.1.2 Scope of improvement in Energy Efficiency of existing urea units

6.1.2.1 Heterogeneous urea industry mixture of new and old plants

At present, the world class performance of efficient units of Group-I is well recognized and appreciated every time, also at the same time existence of units which are more than 50 years cannot be overlooked from safety point of view. They have been able to survive because of various urea pricing policies which have no exit provisions and are supported by the government till the time these units are producing urea. A market system or a uniform pricing system in some manner would have enforced a self-correction in urea industry. The question arises is whether we should continue a system which has supported inefficient units?

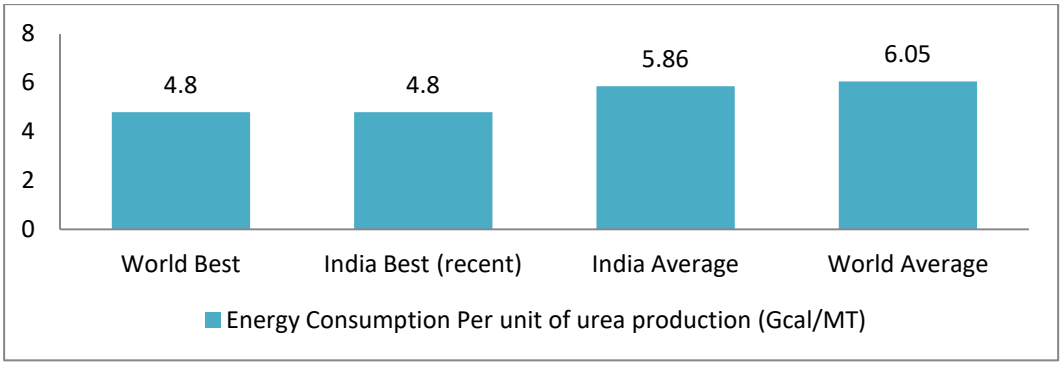


Figure 18: Energy consumption norm in India and World[39]

Almost all plants of NUP-2015 had come up in RPS and continued under NPS. In RPS, the units are given normative life period of 15 years and accordingly

[38] Based on data available at https://www.ppac.gov.in/

[39] Based on data collected from FAI, New Delhi.

capital related charges were calculated and given as part of fixed cost till date. An exit policy is there for the plants which are coming under NUP-2012, wherein the government ensure the subsidy for 100% production capacity for eight years from the start of production subject to compliance to other provisions.

The fixed cost data of concession price indicates that the capital related charges in respect of old units are very low as compared to the new units. Because of their old technology and vintage, where there is more requirement of energy as well as man force. E.g. there are more than 950 employees in KFCL and 35% of the energy is used for movement of machines by power. Though these units are energy inefficient, the costs of these units are comparable with relatively new units because of coal usage and low CRC.

6.1.2.2 Energy Efficiency of existing urea units after NUP-2015

On the basis of actual energy consumption and preset norms, the units have been divided into three groups and revised energy consumption norms have been fixed for next three financial years and target energy norm have been fixed for 2018-19, which was extended to April 2020. The government has allowed the target norms to continue up to 2025.

After the announcement of aforesaid policy, some of the urea units are in dilemma- still undecided to implement the energy saving scheme to achieve the target set by Department of Fertilizer e.g. KFCL and SFC. Their main concern is techno economic feasibility of energy saving schemes. Production of ammonia urea is energy intensive. Ammonia is the intermediate product for the production of urea. The energy consumption in ammonia production has the greatest impact on specific energy consumption of urea. About 80% of energy for urea production comes through ammonia production energy and 7% through byproduct steam generated in ammonia plant which finally goes to urea plant.

6.1.2..3 Energy Reduction Potential for Existing Ammonia urea Plants

Significant energy savings have already been achieved in the past by improvement of the steam reforming ammonia process. The high cost of natural gas in the production of ammonia has stimulated a drive towards decreasing the unit consumption of natural gas. The consumption has been decreased mainly through technological improvements and through efficiency increase in production

6..1.2.4 Energy consumption for Existing Ammonia Urea Plants

The existing old operating plants cannot compete with new plant with respect to energy consumption. The new ammonia urea plants are being designed as per available specification of natural gas i.e lean gas, where as all the existing plants in India have been designed as per rich gas available in that period. The change in specification of natural gas during operation may influence the overall energy efficiency of urea production. In the production of Ammonia and Urea, the main thrust is to optimize the configuration of the plant complex in such a way that the overall energy consumption shall be minimum; however this is applicable for only new ammonia urea plants.

In India, most of the Ammonia and Urea production plants have improved their energy efficiency over the years. The improvement in energy efficiency is a result of concerted efforts of the industry by implementing various possible energy saving schemes. Nevertheless existing urea units cannot achieve the energy level of new plants.

6.1.2.5 Plant Vintage

All twenty five units came in last 50 years at different point of time. The vintage of Indian ammonia urea Fertilizers plants indicates that:

- The average age of Group-I plants is more than 23 years.
- The average age of Group-II plants is more than 33 years
- The average age of Group-III plants is more than 44 years
- Four plants i.e. IFFCO Kalol, SFC Kota, KFCL Kanpur and ZACL Goa are more than 40 years old.
- The latest operating ammonia urea plants in India has been built in 1999.

Despite their age, the Indian ammonia urea plants are on an average the most energy efficient in the world. This can be attributed to the efforts of improving and upgrading existing ammonia urea plants. During implementation of revamp measures, some new equipment has been added / replaced in the plant. But the basic plant structures, critical equipment and machinery and large proprietary equipment have more or less, kept intact.

6.1.2.6 Ensuring Health & Safety of the Plant

- The basic and foremost requirement for the present groups of plants to perform efficiently, even in coming eight years from now i.e. up to 2025,

directly relates to sustaining of sound health and safety of the plants till 2025 and beyond.

- The plants at RCF-Thal, KRIBHCO-Hazira and IFFCO-Kalol, have already performed continuously for last 30-31 years. Majority of the other plants, have been operating efficiently for last 24-25 years and more.
- Therefore, before embarking on the exercise of finding additional energy saving measures, detail Health Study and Safety Audit of individual plants need to be essentially carried out.

In the present context, it is envisaged that Health Study and Safety Audit becomes necessary, as these are the only tools which can ensure that plants will be capable of operating till 2025 and beyond.

The energy efficiency of unit is totally under the control of a unit which can be improved by investment and use of new technology. The units belonging to Group-I have already achieved the maximum energy efficiency as discussed in the earlier section. If the weighted average energy consumption norm of 25 urea units from 1st June 2015 to 01st April 2020 is considered, there has been considerable reduction from 6.227 to 5.827 G. Cal over last five years.

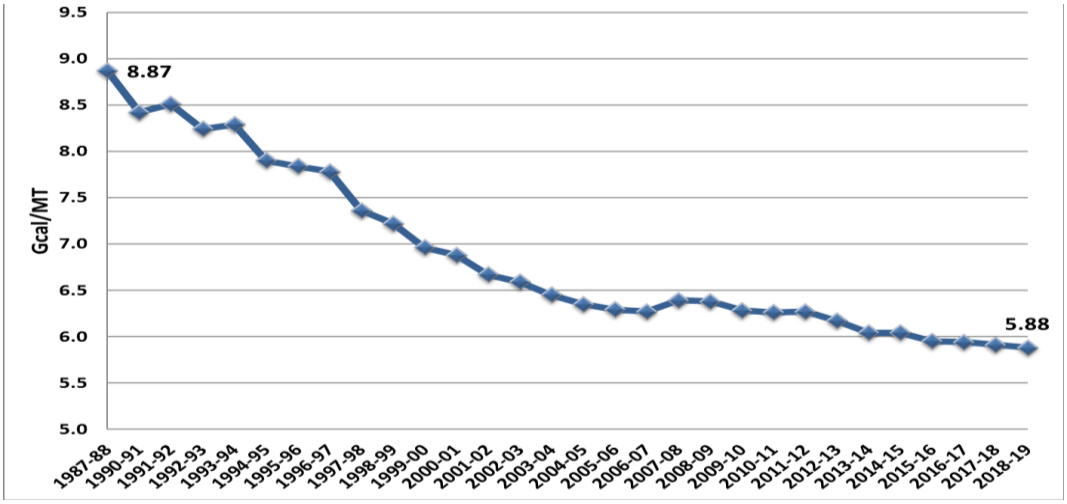


Figure 19: Trend in Energy Consumption of domestic Urea Plant[40]s

(Source: Input received during discussion with ex- employee of PDIL)

6.1.3 Additional Production from Existing Urea Units

Almost all 25 ammonia / urea plant complexes presently operating in the country have augmented their original installed capacities, to economically achievable

[40] Based on data collected from FAI, New Delhi

maximum capacities. Further increase in capacity is not possible. Therefore from "capacity increase" point of view, there is no possibility of achieving any energy saving by 2025, as all plants have reached their maximum achievable economic capacity. The actual energy consumption in a plant depends on the age of the technology and the scale of the plant. For example, a typical ammonia urea plants established in 1970s would be a 600/1000 MTPD gas based process with an efficiency of 7.0 to 8.0 G.Cal/MT of urea and a plant established in early 1990s would be 1500/2600 MTPD with efficiency around 6.0 Gca/MT of urea in comparison to modern day plant of 2200/3850 MTPD with energy efficiency of around 5.0 G.Cal/MT of urea.

6.2. Government

6.2.1. Domestic Gas Allocation

The domestic gas allocation under the control of the Government and its pricing is linked to international gas marketing hub and regulated by the Government under APM, Non- APM and NELP gas pricing regime. However, under gas production under marketing and pricing freedom regime, gas produced is being auctioned. The gas pipeline infrastructure continues to plague with the problem of demand versus infrastructure. Therefore, private non-state involvement in pipeline infrastructure can be encouraged without linking this to firm up contracts. There has been clamour among the gas producing and marketing companies for effective price delivery and Government's disengagement from setting gas prices, which can adversely affect the indigenous urea production. Taking into account rising costs of urea production and resultant subsidy burden, the Government should allocate enough domestic gas to urea sector to facilitate the new capacity addition and ramp up the production from the existing units. The urea industry uses both chemical value and heat value of the gas distinguished from the power sector, which uses only the heat value. NG/RLNG is supplied to urea units after extraction of C_2 /C_3 fraction. This create imbalance within the plant where sufficient CO_2 is not available for conversion of entire ammonia produced in lean feed gas and also result in high energy consumption. Low pressure of gas also create problem because of overdrawal by some units results in drop of pressure of some stream.

Adequate supply of Natural gas can be a viable option for India only if the Government takes a decisive and consistent role. The Government should intervene

in domestic gas allocation to urea sector and try to supply 31.5 mmscmd of gas to urea sector to make production cost more competitive.

6.2.2 Reform in Gas Pricing Policy for Urea Sector

i. As part of gas pricing reform, the upstream gas price has been linked with international markets, which have different dynamics and limited similarity to the Indian markets. Thus, more complexity and uncertainty has been introduced in price formation of gas. The cure would involve reforming and rationalizing upstream gas pricing mechanisms.

ii. Natural gas is out of ambit of Goods and Services Taxes (GST) and has a high tax component compared to coal. Limited availability of NG coupled with higher incidence of taxes makes the use of gas uneconomical for producing urea in India when compared with other countries. Therefore, the delivered cost of gas of a urea units consist of high tax component on top of the wholesale price of gas – both upstream and LNG import prices, which differ from state to state. These components include an import duty on LNG; purchase taxes levied by the states where the gas pipeline crosses, and finally the VAT on all the previous elements. Another means of making gas more attractive for the sector would be to reduce the input costs by having a uniform taxation structure for natural gas across all of India's states.

iii. Due to short supply of domestic gas, most of the units are using high cost RLNG and share of RLNG is increasing in the feedstock basket. At present, custom duty of 5% charged on RLNG can be exempted for urea production.

6.2.3. Improvement in Gas Pooling

GAIL has been appointed as pool operator for gas pooling mechanism for urea sector.

i. All companies have entered in to long term contracts purchase of RLNG either from GAIL, IOCL or Petronet. These days price of long term contracted RLNG is very high compared to spot RLNG. As it is impacting the government subsidy substantially, there should be a mechanism with the intervention of the government that the gas suppliers in such situations should try to off-load such contracted quantities at international level; and for the quantities so offloaded

spot RLNG at lower price can be purchased by the fertilizer companies. This will substantially reduce the subsidy.

ii. While participating in EPMC tenders being floated by GAIL on quarterly basis for supply of RLNG to urea plants; as per tender condition, supply of RLNG to urea plants is on Reasonable Endeavour (RE) delivered basis, other suppliers have to book firm capacities in Gas pipeline. This exposes these suppliers to potential Ship or Pay charges and prevents a level playing field for these suppliers.

iii. At the time of booking capacities in Gas pipeline, other suppliers have to follow Petroleum Natural Gas Regulatory Board (PNGRB)'s Access Code provisions like Imbalance charges, Unauthorized Overrun Charges; the transporter presumably waives these charges and hence is at an advantageous position as compared to other suppliers.

iv. Inclusion of natural gas under GST regime will also facilitate supply of RLNG to various plants at better prices as presently, suppliers have different tax structures.

v. Accurate/Proper estimation of Gas requirement for EPMC tender by urea plants: Based on availability of domestic and other gases, urea plants assess the Gas requirement. But in case of large variation in Gas demand estimation and actual consumption, there are chances of GTA penalties as a result of which suppliers tend to lose interest for that plant while bidding. This results in reduced participation in the tender and at times, it results in a supplier getting the award even if its bid is not very competitive. Hence, urea plants should also make a judicious assessment of Gas requirement for the tender and variation in supply of domestic gas should be minimized.

vi. Creation of Gas Exchange will also ensure wider participation of more players and hence will result in better prices. Hence, creation of Gas Exchange should be expedited.

vii. Consequently, there needs to be an adequate mechanism to protect urea sector from higher gas prices. The gas pooling scheme in the fertilizer sector has proved to be a success. Moreover, further reforms in urea markets like introduction of linking the MRP of urea to delivered gas price on quarterly/seasonal basis to ease subsidy burden on the Government and ensure timely payment to gas companies by the urea units must be implemented.

viii. Although regulatory provisions provide for access to gas pipelines, the existing pipeline companies are both transporters and marketers of gas, leaving little opportunity for external companies to access consumers, even if they may have cheaper gas. In 2012, PNGRB suggested unbundling the activities of transportation and marketing through measures such as account segregation, legal segregation, and also recommended a timeline for ownership/management control unbundling. Recently, the CCEA has approved segregation of marketing and transporting business of GAIL by incorporating a new subsidiary which will work at arm's length distance.There is an element of rent in the procuring gas as the process of procurement is neither rational nor transparent. Therefore, all concerted efforts must be taken to bring transparency and reduce conflict of interests.

6.2.4. Adequate Budgetary Provision

In the year 2018-19, out of a total expenditure of Rs. 73,435.21 Crores, and Rs. 16,020.37 Crores was spent to settle the dues from previous year. In annual budget of 2020-21 of Government of India, the budgetary allocation for the fertilizer subsidy for Financial Year (FY) 2020-21 (BE) has been reduced to Rs. 71,309 Crores, as against the revised estimate of Rs. 79,998 Crores for FY 2019-20. The issue of insufficient subsidy provisioning and carryover liabilities of past years has adversely impacted the liquidity situation of urea industry.

Table 16: Arrears of Subsidy of last four years[41]

Year	Amount (Rs. Crores)
2015-16	43,356.23#
2016-17	39,057.11#
2017-18	32,053.21*
2018-19	39,053.21@
2019-20	60,000 @@
# = Source DOF *= Estimated at FAI based on data of 23 fertilizer companies @@ = Estimated	*= Estimated at FAI based on data of 23 fertilizer companies @ = Estimated at FAI based on data 28 fertilizer companies

NIP-2012. Given It is going to be tighter in near future because new capacity (12.7 Lakhs MT per annum) of CFCL-Gadepan III has started operation and producing of urea annually at high cost under urea production stood at 239 Lakhs MT

[41] Based on data collected from FAI, New Delhi

while consumption was at 320 Lakhs MT in 2018-19, India, thus, is a second largest urea importer in world. The average cost of production for natural gas-based urea plants in 2015-16 is Rs. 19454/MT to Rs. 25993/MT in 2019-20 (IInd quarter). While the IPP of imported urea for year 2018-19 remained at Rs. 21613/MT exclusive of stevedoring, bagging and handling charges at port (Rs.1095/MT).

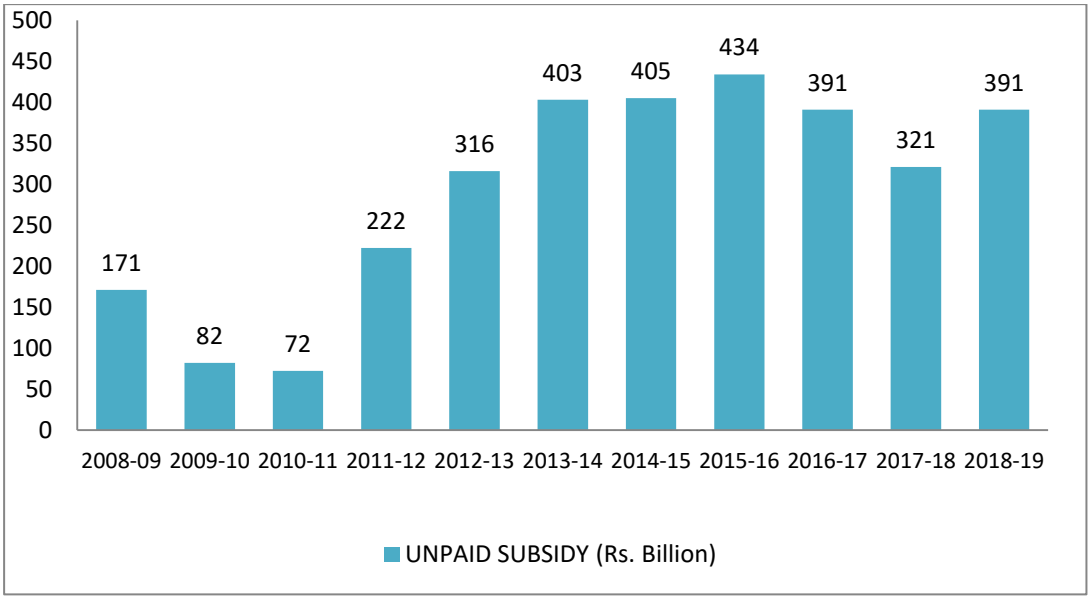


Figure 20: Carry over Liabilities (Unpaid Subsidy) Of IndigenousUrea Sector during the Last Five Years[42]

6.2.5 Revision of MRP

The Government's decision of non-revision of MRP of urea has resulted in more subsidy outgo on urea in comparison to other fertilizers over the years. So far GoI has targeted reduction in subsidy by tightening energy efficiency norms and tweaking other parameters. Subsidy can also be reduced by increasing/decreasing MRP on regular basis with increase or decrease in the price of feedstock, which has not been done so far in last one decade.

The MRP is free for P& K fertilizers and companies can fix reasonable MRP after taking in to account prevalent market price of inputs and subsidy announced by the government. At present, the Government gives subsidy and reduces the MRP around 30-35% and 75% of cost of production/import of P & K and urea respectively. The difference in subsidy calculation policy in P & K fertilizers and urea has increased share of urea subsidy in entire subsidy allocation of Government of India. Between FY 2000-01 and FY 2018-19, urea subsidy has increased from Rs 9,500

[42]Based on data available on http://fert.nic.in/

Crores to Rs 45,000 Crores, and as per FY 2019-2020 budget estimates it will be over Rs 43,000 Crores.

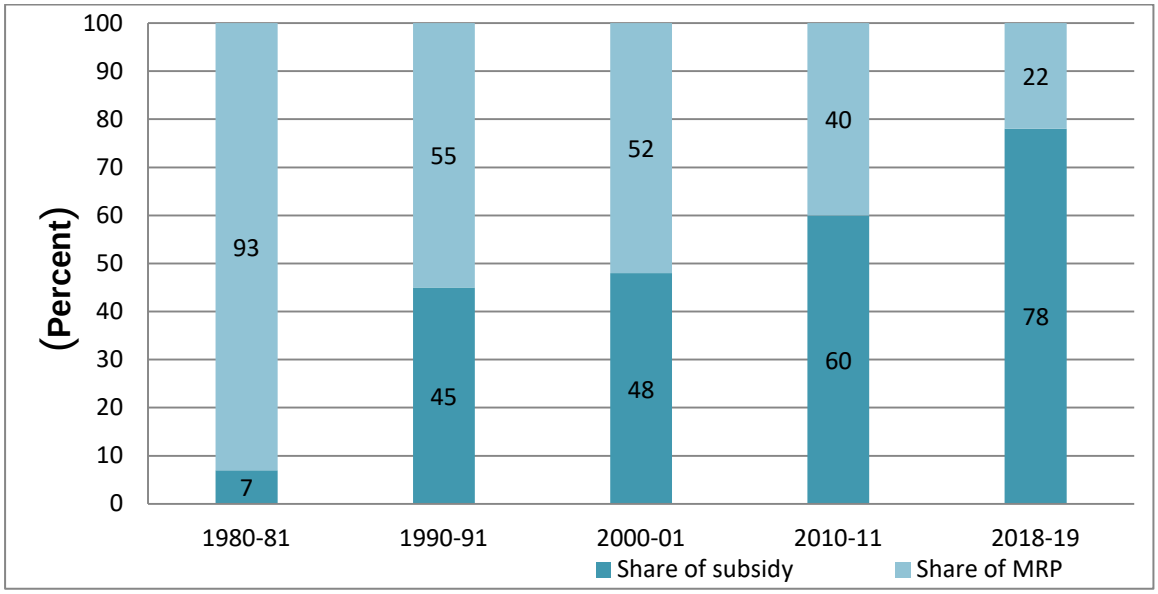


Figure 21: Increasing share of Subsidy to Total Cost of Indigenous Urea[43]

6.2.5.1 Dual MRP of urea

A number of weighty arguments have been given by theeconomists for removal of agricultural subsidies, which include among others the unsustainable and mounting fiscal burden of subsidies, distorting affect of subsidies on resource allocation, inefficient and wasteful use of scarce economic resources like water and electricity due to subsidized prices of inputs, adverse environmental impact of excessive or unbalanced use of inputs like fertilizers, prevailing regional and crop bias in use of subsidies; and cornering of bulk of subsidies by rich farmers (Singh, 2004).

By raising urea price so as to shift the subsidy burden to the farmers now would be regionally unjust. Fertilizer prices were kept low when farmers in the better agricultural environments of north western region, Andhra Pradesh, Tamil Nadu, etc, were learning its use and adopt it on a large scale. But now, when its use in southern and eastern states is picking up in a big way, removal of subsidy will seriously affect urea consumption. Therefore, there should be dual price policy in favour of the areas, which until now have been low consumers of fertilizer.

The database will reportedly be launched with 60 million farmers. Their landholdings will also be mapped. The states governments have been asked to verify the landholdings of the farmers. In the PM-KISAN scheme itself, the government has got a database of more than 9 Crores farmers. Out of which, 84% are now Aadhaar-

[43] Based on data available at http://fert.nic.in/ and discussion with officials of FICC

authenticated. The master database of farmers is aimed to help the government identify the needs of farmers based on their landholdings and the crop varieties that they produce. The government is discussing ways to reduce use of chemicals and fertilizers to boost the productivity of land. A better planned, regionally differentiated, sequenced and gradualist approach of subsidy reduction scheme needs to be adopted (Shanthi, 2020).

6.2.6. Amendment in Pricing Policy

6.2.6.1 Revision of Fixed cost

For reducing subsidy, GoI has mainly relied on revision of energy efficiency norms. The other part is the fixed cost which was based on costed data of 2002-03. Several units especially pre-1992 old units have low fixed costs which have escalated substantially over the years. Units which are part of the post 1992 have a big cushion in fixed cost because these units have very high element of depreciation, interest on working capital, and return on net worth. Therefore, as far as post 1992 units are concerned, higher energy norms, or increase in other elements of fixed cost does not affect their profitability substantially, whereas pre 92 units such as KRIBHCO-Hazira, RCF-Trombay, NFL-Vijaipur, and RCF-Thal are badly affected due to norm revision. They have no cushion in fixed cost unlike post 92 units. The cushion for these old units was mainly in form of savings from lower actual energy consumption vis-à-vis target energy norms which is being mopped out gradually. It is therefore, not fully correct in revise only the energy norms of post 92 companies and to continuewith fixed costs.

The fixed cost of all units should be revised once group wise for last time and link the updated fixed cost with WPI for escalation and de-escalation on yearly basis. The normative average of fixed cost of group or the lower of the group, can be considered. This will simplify the workings at Government end with no monitoring of energy and other costs because group target have fixed already. The government can introduce Nutrient Based Subsidy progressively for domestic urea production after 2025 (target energy norms of groups have been extended up to 2025).

6.2.7. Simplification in Introduction of New fertilizer

The present fertilizer subsidy scheme is implemented by the Department of fertilizers for chemical fertilizers only (Urea and P & K fertilizer) and does not cover organic fertilizers, bio-fertilizers, and liquid fertilizers. The Central Government has constituted a Central Fertilizer Committee (CFC) under Fertilizer Control Order

(FCO), 1957 for analysis and recommendation of new fertilizer for inclusion in the FCO. CFC constituted a technical group consisting of a Chairman from ICAR and other members/scientists/experts from the field of agriculture.

In Lok [44]Sabha on 4/01/2019, according to the reply given by the Minister of Chemicals and Fertilizers Government of India has simplified the procedure for inclusion of new fertilizer in Fertilizer Control Order (FCO). The fertilizers are notified / specified on the recommendation of Central Fertilizer Committee (CFC) constituted under Clause 38 of FCO, 1985. The Standing Committee of Agriculture has recommended for constitution of Fertilizer Development and Regulatory Authority, in order to streamline the process of certification of fertilizers, continuous quality check, imposing penalty for sub-standard and spurious quality of fertilizers, promoting innovation in fertilizer sector and fixation of pricing etc. A committee has been constituted to examine the existing mechanism of quality control of fertilizers in view of the recommendation made by the Standing Committee and make necessary recommendation. The committee will submit its report shortly.

6.2.8. Measures to Check Smuggling of Fertilizers

Unconfirmed reports suggest that there is rampant smuggling of urea across the border to the neighbouring countries because price of urea is much lesser in India as compared to other countries. These smuggling can reduce substantial amount of subsidy leakage.

Retail Prices of Urea in Selected Countries (Sept/Nov 2019)

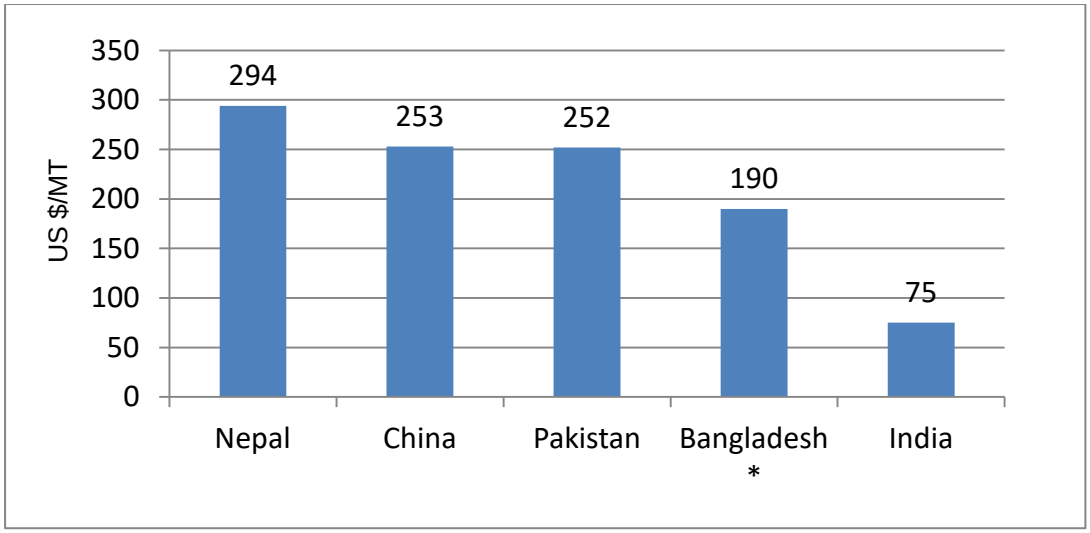


Figure 22: Price of urea in our Neighbouring Countries[45]

*** Price in January 2019**

[44]Based on replies of questions available at https://loksabha.nic.in/

[45] Based on data collected from FAI, New Delhi.

The Government of India has declared fertilizer as an essential commodity under the Essential Commodities Act, 1955 (ECA) and notified Fertilizer (Control) Order (FCO), 1985 &Fertilizer (Movement Control) Order, 1973 under the ECA. The State Governments have been adequately empowered to check smuggling of fertilizers. State Governments are empowered to conduct search, make seizures and take punitive action against any person violating provisions of FCO, 1985 and EC Act, 1955. As per reply given by the Minister of Chemicals and Fertilizers in Rajya Sabha on 28/12/2018.The details of seizure of fertilizers along Indian Borders during the from year 2015 to 30.11.2018 by the Border Guarding Forces of all land borders collected by Ministry of Home affairs are as follows

Fertilizers seizure (in KG)[46]

Border	2015	2016	2017	2018 (Up to 30.11.18)
India Pakistan and India Bangladesh border	7749	587	1515	557
India-Nepal and Indo China Border	2,23,250	70,650	64,300	36,987
Indo Myanmar Border	12,000	Nil	Nil	1,100
Indo Bhutan Border	Nil	Nil	Nil	Nil

It has also been informed by the Ministry of Home Affairs that the following measures have been taken by Border Guarding Force's to check cross border smuggling along Indian Borders

i. Vulnerability mapping of BOPs has been done and being reviewed from time to time from the point of view of cross-border crimes. Strengthening of BOPs is done by deploying additional manpower, special Surveillance, Equipment, vehicles and other infrastructure support.

ii. Effective domination of the borders by carrying out round the clock surveillance of the border viz patrolling, laying nakas, establishing of observation posts all along the IB and strengthening of existing defences of the BOPs.

iii. Erection of Border fencing and Installation of Border floodlight on the International Border along Pakistan and Bangladesh Borders.

iv. Use of Water crafts/boats and floating BOPs for domination of riverine area along India-Pakistan and India-Bangladesh Border.

v. Sharing of intelligence and close liaison with sister agencies.

[46] Based on replies of questions available at https://rajyasabha.nic.in/

vi. Conduct of special operations along the border and in-depth areas. Introduction of Force multipliers and Hi-tech Surveillance equipment".

vii. Random checking and nakabandi to check illegal activities.

6.2.7 Joint Venture

Many economists suggest that it makes a lot of sense for India to discontinue the domestic urea production from inefficient units and supply the gas to other sectors e.g. Power because urea can be imported from countries where natural gas is abundant and thus costs of production are low but power cannot be imported. The average total production of Urea in the country of the last three years is 240.74 Lakhs MT (LMT) to 241 LMT and the total consumption (sales) of 305.48 LMT approximately. The gap is fulfilled through imports from international spot market. In the last 3 years, average imported urea is 63.12 LMT and average expenditure is Rs 12797.31 Crores.

OMIFCO is a joint venture between OMAN Oil Company with 50% stake and IFFCO and KRIBHCO with 25% stake each. A Urea Off-Take Agreement (UOTA) was signed between OMIFCO and Government of India in 2005 for supply of Urea to Government of India for 15 years (till July 2020). Over the last 15 years, the Government of India has imported a total of 285.56 LMT from OMIFCO. The effective savings to the Government of India in importing Urea under the UOTA as compared to the imports under global imports under Government account made through global tendering by STEs, is estimated at Rs. 13,295.80 Crores from 01.01.2012 to 13.07.2020. The secured urea supplies from OMIFCO to the Government of India over the last 15 years have helped in ensuring timely availability of urea to the farmers. The issue of Joint venture projects have been addressed in the New Investment Policy -2012 and Joint ventures in resource rich country has given equal pricing to Greenfield plants. But capital requirement, political stability and many geopolitical considerations are main guiding principles for fruition of JV.

The figure indicates that global supply of urea in coming years is almost matching the demand at capacity utilization of 85-90%. Thus, it is expected that there is over supply in urea till 2030 and price of urea in international market will be in the range of US$ 250 to 300/MT in international market during 2020. The softening of urea price during 2014-17 was because of supply of urea from coal based urea units in China. In China, many coal based urea plants have been shut down on environmental concerns, the capacity curtailment in China is insufficient to invert the trend of

decreasing global operating rates until the mid-2020[47]s. (FAI Annual Seminar, December, 2019).

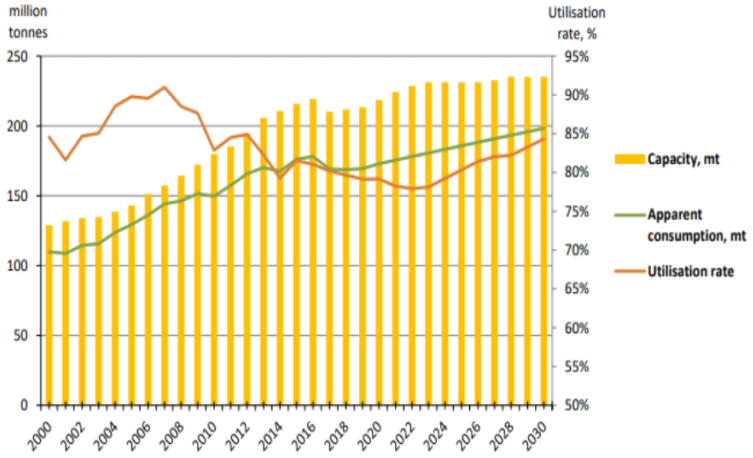


Figure 23:'N' outlook in coming years worldwide.[48]

6.2.8 Long Term Supply Arrangement

The demand supply gap is met through import by canalizing agencies viz., MMTC, STC and RCF. On request of DoF these agencies import urea on government account from international spot market. The entry of India in international market for urea import spurts the price of urea immediately. Therefore, India being the second largest importer of fertilizers in the world, Long term Supply Arrangement can be another option, as it may not lead to hardening of the international price of urea on a long- term basis and long capital investment outside the country. Pre-determined shipment schedule give better opportunity in planning shipment during demand seasons and do not put pressure on port capacity which otherwise leads to bundling of supplies leads to mismanagement. An option of forward contracting can be looked in to as a schedule of supplies required is generally known in advance before the onset of Kharif and Rabi after taking into account the domestic production. It gives suppliers and consumers opportunities to minimize their risk of supply and market fluctuations. At present more than 50 to 60 Lakhs MT of urea is imported mostly from spot markets. Therefore, it is suggested that India should go for long term supply agreement with resource rich country.

6.2.9 Measures to control environmental pollution due to overuse of Urea

The government initiatives like providing soil health cards to all farmers of the country, linking fertilizer use to soil health card, 100% neem coating of imported and

[47] Based on data available at FAI annual Seminar, during December 2019, New Delhi.
[48] Based on data available at FAI annual Seminar, during December 2019, New Delhi.
.

domestic urea, reducing the weight of urea bag from 50 kg to 45 kg and ban on early transplanting of paddy and crop residue burning by some states (Punjab Haryana and western Uttar Pradesh) is going to address the problem of environmental problems and resultant health risks.

There is onerous task for industry to enhance efficiencies in production and application, provide for farmer centric plant nutrition, promote enhanced nutrient use efficiency through extension and outreach to farmers for promoting promote 4Rs (Reduce, Reuse, Recycle and Recover) in nutrient use. The industry need to invest in research and development for innovative products and services and seize this new opportunities.

The ICAR is recommending soil test based balanced and integrated nutrient management through conjunctive use of both inorganic and organic sources (manure, bio-fertilizers etc.) of plant nutrients to ensure judicious use of chemical fertilizers preventing deterioration of soil health contamination of groundwater and environment.

In addition, split application and placement of fertilizers, use of slow releasing N-fertilizers and nitrification inhibitors, growing leguminous crops and use of Resource Conservation Technologies (RCTs) are also advocated

Soil Health Management (SHM) Scheme under National Mission of Sustainable Agriculture (NMSA) aims at promoting Integrated Nutrient Management (INM) through judicious use of chemical fertilizers including secondary and micro nutrients in conjunction with organic manures and bio-fertilizers for improving soul health and its productivity; up-gradation of skill and knowledge of soil testing laboratory staff, extension staff and farmers through training and demonstrations.[49]

6.3 Farmers

The demand of urea depends on farmers which are guided by many factors as discussed in earlier chapters. Therefore, action of farmers during use of urea has direct implication on subsidy outgo. Some of action which are imperative are discussed in next sections

6.3.1 Soil Health Card Scheme

After green revolution, sharp increase in use of chemical fertilizers to meet the nutrient demand of HYV and decrease of soil organic matter due to intensive

[49] Based on the reply to question available at https://loksabha.nic.in/

cropping pattern led to severe deterioration of soil health. Soil Scientists, Economists and most of the Policy makers agree that farmers by and large are using some fertilizers, particularly Urea excessively. The main reason is that Urea is available at the a price even cheaper than salt. Farmers are excessively using Urea knowingly or unknowingly to compensate usage of DAP and Complexes.

To control the indiscriminate use of chemical fertilizers, the Soil health Card scheme was launched by the Government of India during the financial year 2014-15.

The scheme provides for the analysis of soil composition by the State Governments once in every two years so that remedial steps can be taken to improve soil nutrients. Farmers can track their soil samples and also obtain their Soil Health Card report. Under the SHC scheme, samples of farmers' land are collected and after testing in the laboratories for over a dozen nutrients, the SHC is issued to the farmers mentioning the level of such nutrients in their fields so that farmers can use the fertilizers as per the actual need. It was expected that SHC was an excellent way of protecting, ensuring proper mixture of fertilizers and thus maintaining quality of soil.

Under the Central Government's Soil Health Card Scheme Phase-I (Years 2015 to 2017) 10.74 Crores cards were distributed; while under the Phase-II 11.69 Crores cards have been give away during the period 2017-19. The Government of India has claimed that a study conducted by the National Productivity Council (NPC) has proved that the application of Soil Health Card recommendations has led to a decline of 8-10% in the use of chemical fertilizers and also raised productivity by 5-6% (PIB 5 February 2020).

There is need location-specific interventions towards balanced fertilisation and integrated nutrient management. The Government must find out ways and means to ensure to reduce the use of chemical fertilizers in areas where it is used excessively and should be open to increasing their use in region of less use. It needs comprehensive approach requires a strict enforcement of recommendations of SHC and embrace of scientific temper and a firm rejection of anti-science postures. Imbalanced use of Urea decreases 'N' use efficiency, thus leads to increase in cost of production and lowering of net profits. Therefore, the farmers need to follow the advisory given by the extension officers while applying fertilizers to the field.

6.3.2 Balanced Fertilizer Use

The issue of balance fertilizers as per soil and crop has long history and sincere efforts had been made earlier but due to many externalities in could not be implemented as per its design.

In 1952, under technical aid from United States of America Technical Cooperation Programme (TCP) initiative was taken to popularize fertilizer to boost agriculture production. For this purpose many demonstration plots in farmers' field (around 200,000 annually) were organized all over the India. Establishment of soil testing labs, delineation of major soil types of all the districts of all provinces where the integrated integral part of TCP programme (Saha, 2013). The purpose behind doing this was to find out the suitability of different types of soil for agricultural production and promotion of new technology in agriculture to increase food grain production.

India being large country has many six major soil types (CIET, 2017) which are further divided into zonal and inter zonal subtypes. The N, P and K are major plant nutrients. Depending on the irrigation facilities climatic conditions different crops are grown which differ seasonally and temporally. Thus the requirement of fertilizer requirement depends on soil type, its fertility status, crop grown, and type of fertilizers used and method used for of fertilizer application. Therefore, 4:2:1 ratio for diverse country like seems to be unacceptable.

Chand and Pavithra (2015) concluded that there is no scientific rationale to support the NPK norm (4:2:1) in the current situation. Such norms are meaningful only at a disaggregated level, and when plant nutrients are used in adequate quantity. This officially-accepted perception, a product of 1950s experiments, has led to wrong policies on fertilizers. Estimating actual and normative quantity of N, P and K for each state of India corresponding to the current cropping pattern, it is found that contrary to the notion that there is excess use of nitrogen in India, 12 major states were found using less than the required level. India, in fact, faces large deficits in use of P and K. It calls for curtailing the use of N in one-third of the states and raising it in the remaining two-thirds states. They also inferred that farmers tended to reduce imbalance in NPK use but external shock and policy distortions reversed the trend, as was evident in year 1992 and 2010.

In August 2016, the standing Committee Agriculture (2015-2016) in 29th [50]report impact of Chemical and Fertilizers and pesticides on agriculture and allied sectors in the country has noted that there's imbalance in fertilizer use in terms of NPK as it is evidenced by their wider consumption ratio of 6.7:2.4:1 in the country as against their desirable ratio of 4:2:1. Even the pattern of use of fertilizer varies widely among different crops. Fertilizer use in potato, sugarcane, cotton, wheat and paddy are among highest at the level of 347.2, 239.3, 192.6, 176.7 and 165.2 kg/hectare respectively. Even among these crops, there is excessive use of nitrogenous fertilizer.The situation is more grim in agriculturally important States like Punjab and Haryana where NPK use ratio is as high 25.8:5.8:1 and 22.7:6.1:19 in 2017-18 respectively. The high subsidy on urea (around 78% of cost of production in 2018-19) and static MRP since 2010 is blamed for overuse of urea *vis-a vis* other P & K fertilizers.

6.3.3 Integrated Nutrient Management (INM)

The balanced fertilizer can be achieved by using multipronged approach to and Integrated Nutrient Management (INM) can be one of the answers. The INM encompasses conjunctive use of chemical fertilizers including, secondary and micronutrients, organic manures, composts/vermicomposts, bio-fertilizers and green manures.

6.3.3.1 Background

The use FYM is prevalent since ages in the India. During British rule, at many places in many districts of Western Ghat regions of state of Karnataka, old revenue records indicate that to service one acre of paddy field four acres of wooded area (e.g. *Bane* land in Coorg district and *Soppina Betta* land in North Kannda District) were granted during survey settlement of lands under Madras residency and old Mysore areas. The leaves along with branches from the wooded area were collected and used as bedding material for cattle shed. After week, entire bedding materials mixed with dung and urine used to store throughout the years and used as organic manures. The practice is still prevalent in remote villages of these districts.

During 1940s, there were two type of fertilizers used in India; first the bulky organic manure which are farm yard manures (FYM), green manure, compost, urban

[50] Based on the report available at https://loksabha.nic.in/

sludge and night soil and secondly chemical fertilizers viz., Ammonium sulphate and super sulphate.

In 1951, the investigators at the Central rice Research Institute (CRRI) concluded that farmers could obtain the maximum yield by applying 20-40 pounds of nitrogen per acre. In other experiments that were designed to compare the relative efficiency of green manure versus ammonium sulfate, or a combination of natural and chemical fertilizers, the data indicated that when nitrogen was applied at the rate of 20 pounds per acre, green manure provided better yields than ammonium sulphate. In fact, field experiments demonstrated that yields began to decrease when nitrogen levels were raised to 60 pounds per acre (Saha 2013).

The scientists had proved that crop rotation with leguminous crop increased the yields of subsequent crops, especially when compared to such rotation without using leguminous crop.

Vidya Sagar (1991) observed that in many districts of south India, the addition of farm yard manure (FYM) along with chemical fertilizers significantly shifted the response curve to the right-an aspect not accounted for in any fertilizer response study. For balanced fertilization, the mix is important and the actual mix varies across regions. But, the use of FYM is declining over the years.

According to Shang *et al*, (2014), Soil fertility quality index is a useful indicator that helps to improve sustainable land use management and achieve economical yield in agriculture product. The changes of integrated soil fertility quality index (IFQI) in topsoil differed between fertilization treatments with greater increases in treatments receiving organic fertilizer amendments, such as farmyard manure or crop straw. The high grain yields and low production variability can be simultaneously achieved by increasing IFQI in intensive cropping systems.

The Indian Council of Agricultural Research (ICAR) under All India Coordinated Research Project on 'Long-Term Fertilizer Experiments' has assessed the impact of different combination of chemical fertilizers (NPK) on soil health and crop productivity in different soil types (fixed locations) under dominant cropping systems. The investigation over the last few decades indicated that inadequate and imbalanced use of nutrients and low use of organic manures may cause deterioration of soil health including multi-nutrient deficiencies affecting crop yields. Continuous use of nitrogenous fertilizer alone produced the highest decline in crop yields at almost all the locations showing deficiencies of other nutrients. Even in NPK

fertilized system, the deficiency of micro and secondary nutrients surfaced after few years affecting crop productivity. Only integrated use of optimal dose of NPK and organic manure maintained soil health/quality with higher crop productivity **(**Standing Committee on Agriculture, 2015-2016**)**[51].

The Long Term Fertilizer Experiments have indicated very clearly that the response to the fertilizers could be raised significantly with balanced application of fertilizers. (Standing Committee on Agriculture, 2015-16). But it is not yielding desired result as the adoption of INM is restrained by following factors

- Unavailability of quality organic fertilizers at affordable price
- Use of cattle as source of fuel in rural area
- Crop residue are used as cattle feed or fuel
- Extra cost and time required to grow green manure, and prepare land for agriculture
- Extra cost on handling and application of bulky organic fertilizers
- Inconstancies in yield of agricultural products

[52]According to the reply given on the floor of Rajya Sabha on 28/12/2018, the Minister for Chemical and Fertilizers replied that the Government has introduced a scheme named “Soil Health Management Scheme" under National Mission for Sustainable Agriculture (NMSA). Soil Health Management (SHM) is one of the components under the NMSA that aims at promoting Integrated Nutrient Management (INM) through judicious use of chemical fertilizers including secondary and micro nutrients in conjunction with organic manures and bio-fertilizers for improving soil health and its productivity.

For balanced fertilization, the customized mixture fertilizers are very important which vary from state to states and in some states these mixtures are recommended for specific crops. At present there are 144 registered manufacturers of granulated mixture fertilizers with installed capacity of 42.54 Lakhs MT and mostly concentrated in western and southern India. These units source subsidized fertilizers from manufacturers and importers and make mixtures according to demand in the region. e.g. 20 (N) 0 (P) 10 (K) used for tea in Tamil Nadu state government of Tamil

[51] Based on the reply to question available at https://loksabha.nic.in/

[52] Based on the reply to question available at https://rajaysabha.nic.in/

Nadu, while government of West Bengal has approved 10 (N) 5 (P) 10 (K) for tea in the state (Fertilizers Statistics 2018-19).

6.3.4 Pragmatic Measures for Reduction in Urea Application

Weaning the farmers away from Urea or motivating them for reduced application of Urea requires introduction of:

1) Novel nitrogen efficient crops or products which provide instant and sustained release &response.
   a) Nanotechnology based products such as **'IFFCO Nano N'** has benefits in terms of efficacy, sustained release and reduction in Urea by 50 % besides, benefits in terms of logistics and economics.
   b) Promotion of slow and controlled release fertiliser such as polymer coated and fortified fertilisers, Urea super granules (USG) atleast in some selective crops/ geographies can be an option. Neem coated Urea (NCU) is there but sulphur coated urea (SCU); zincated or micronutrient coated urea needs policy push.
   c) Microbials such as Endophytic Nitrogen fixing organism / Biofertilisers application to cropsneeds to be revisited for their efficient role in nitrogen fixation and assimilation in crops.
   d) Seaweed extract based products and biostimulants have demonstrated efficient nutrient assimilation by crops with reduced nutrient application. These products along with soil conditioners can help reduce urea application to crops.
   e) Improving secondary (Sulphur) , micronutrient (Zn, Mo, B, Fe) & beneficial nutrient (Cl, Co, Ni, Si) cropfertilisation for better Nitrogen use efficiency and overall crop productivity.
2) Large scale organic and green manuring, legume / cover crops
   a) For enhancement of organic matter in soils for better nutrient use efficiency and higher microbial population. Focus on carbon fertilisation is becoming imperative for higher nitrogen use efficiency.
3) Promotion of Innovative Agro-Technologies
      i) Drip – Fertigation in crops has categorically demonstrated that nutrientuse efficiency (NUE) is 3 times more for Nitrogenover conventional application. It needs to be promoted atleast in some of the crop clusters.
4) Soil test crop response (STCR) based nutrient management should be promoted and need based nutrient application/ availability through decision support systems

(DSS); Agro – advisory services / Govt machinery / ICT measures has to be assured.

5) There is pressing need for diversifying agri inputsand their methods of applicationfor fully utilizing soil &crop potential. Brief Summary of diversified holistic product portfolio is enlisted as below:

Table 17: New generation of fertilizers its benefits and mode of application[53]

SN	Input	Mode of application	Benefit	% Increase in crop productivity
1	Liquid Biofertiliser – NPK Consortia	Seed Treatment , Soil Application, Drip	Saves 20-25 % of chemical Fertilisers, Economical	10-15 %
2	Biostimulant – Seaweed Extract	Seed treatment, Soil application, Drip & Foliar Application	More flowering, fruiting, stress resistance and higher yield	11- 36 %
3	Water Soluble Fertilisers	Drip – Fertigation; Foliar Application	High Nutrient efficiency	>20-30%
4	Nano Fertilisers	Foliar	Highly efficacious at low quantity ; reduction in 50 % fertilizer application	15-30 %

- Reducing Fertiliser application by 25-30 % and applying : 1) Liquid Biofertilisers such as NPK Consortia @250-500 ml/acre; 2) Seaweed extract - Granule @ 10 Kg/acre followed by 2 foliar application of Seaweed liquid @ 250- 500 ml/ acre in combination with Water Soluble Fertilisers (Like 18-18-18; 19-19-19) @ 1 kg / acre leads to 15-20 % increase in yield. This has been practically tested by IFFCO and farmers have also experienced it during the crop production.
- IFFCO Nano N experiments / Farmer Field trials are recording positive outcomes which have to be provided handholding through policy and research support.

6.4. Nutrient Based Subsidy (NBS) for Urea:

The duration of NPS Stage-III Policy was from 1.10.2006 to 31.3.2010. It was extended till any other policy is formulated. In 2010, Department of Fertilizers formulated and circulated modified NPS-III policy note initially in August 2010 for Inter Ministerial Consultations to address the following concerns of the industry

- under-recovery of urea units
- encourage use of Coal (cheap energy source)

[53] Based on personal ddiscussion with representative of Marketing Division of IFFCO

- continuation of production from high cost units based on naphtha/ FO/LSHS
- restart of closed units
- usage of CBM/Coal gas
- provide additional dispensation to units under severe financial crunch to help them to restart

Planning Commission observed that Urea should be brought under Nutrient Based Subsidy (NBS) policy immediately with high cost non-gas units being given an extra minimum fixed subsidy, if necessary. Department of Expenditure (DOE) also observed that Urea should be brought under NBS policy immediately. DOE also suggested a model for implementation of NBS.The matter on policy beyond NPS-III for existing urea units was referred to Group of Ministers (GOM) on 5th January 2011, wherein GOM recommended that a Committee under chairmanship of Shri Saumitra Chaudhuri, Member, Planning Commission to examine the proposal for introduction of NBS in urea, including various options thereof, and making suitable recommendations. The committee recommended following outline for NBS in urea

- There will be a notional gas price pooling for 17 gas based urea units. This will be operated by the FICC/Department of Fertilizers.
- Four gas based units (RCF Trombay, GSFC and two units of BVFCL) are kept out of this gas price pooling arrangements.
- The 21 gas based units have been classified depending on various established parameters as follows:
    - Pre-1992 gas-based – 4 units
    - Post-1992 gas-based – 6 units (excluding NFCL-II, which is of post 1992 naphtha plants vintage)
    - Pre-1992 – 2 units that have switched over from naphtha to gas
    - Post-1992 units that have switched over from naphtha to gas including NFCL-II – (3 units) and “mixed feedstock” units – (2 Nos) total of 5 units
- A flat basic subsidy of Rs. 4,000 per tonne would be available to all gas-based units with an additional group-wise subsidy.

- This additional subsidy will be phased out to two differential rates over the period of next three years i.e. to Rs 4,000/MT for Group A&B and Rs 5,000/MT for the rest of the Groups.
- The concepts of "cut-off quantity and energy norm, as presently used, are being carried forward.
- An increase in 10% MRP was proposed for FY 2011-12, thereafter the fertilizer companies will be free to change the retail selling price of their product within reasonable limits. All incidences of taxes, including recently introduced 1% Excise Duty and State VAT, if any, will be passed on to the consumer after adjusting for any input tax credits that may exist.
- The gas price pooling will be based on actual gas price paid and will, therefore, have to be periodically updated. Increase or decrease in gas prices will be passed on to the consumer through the selling price. Restrictions regarding the add-ons for neem-coated, zincated and other kinds of modified/fortified urea will be suspended. Units will, however, make sure that there is adequate supply of plain urea, if the farmer wants plain urea.
- The subsidy regime for Naphtha and FO/LSHS units will continue to be along the present lines except following changes.
- Along with the other units they will be free to set the retail selling prices within reasonable levels.
- Of the increase in net selling price, at least Rs.80 per MT will go to reduction in subsidy. Fuel price increase will be passed through as being presently done. This arrangement will continue upto March 2013. (Source:Department of fertilizers)

The NBS in urea was not implemented although it was implemented for P & K in from April 2010. The reasons given for non-implementation of NBS were as follows

i. It would not be affordable for small and marginal farmer to purchase fertilizers at higher costs as these farmers get negligible benefit from increase in Minimum Support Price.

ii. Recent reports, after implementation of NBS in P&K sector, had indicated that the scheme had not led to any relief to farmers in terms of reduced selling price of subsidised fertilizers or wider variety of fertilizers to

choose from. On the contrary, both the farmgate prices and subsidy bill of Government in P&K fertilizers sector were growing incessantly.

iii. The report of Committee was another attempt towards pricing policy of existing units in six broad groups in the same lines as existed in NPS-III. The report further proposed increase in MRP by 10% with complete decontrol from FY 2012-13.

iv. In addition, the report was resulting in differential gains to all the gas based units and is resorting to pooling of Natural gas which may have legal complications in future.

v. Viability of non-gas based units, particularly Southern units, was to be protected.

6.4.1 Nutrient Based Subsidy (NBS) in Urea for balanced fertilization?

Now almost nearly after one decade, all 25 units under NUP-2015 are gas based, divided into three group and implementation of gas pooling prices has considerably narrowed the gap in cost of production of various urea units within a group.

There is growing demand for the urea industry to bring urea also under NBS on the premise that it will be a step forward to achieve the desired objective of promoting the balanced use of fertilizers and many other advantages which can be summarized below

A. Farmer centric advantages of NBS in urea:

- Easy Availability of Urea.
- Urea available at fair price range.
- Balanced Fertilization of Soils.
- Reduction in excessive use of Urea.

B. Industry/ Govt centric objectives:-

- Growth Impetus for Fertilizer Industry.
- Moving towards Free Market Trade in fertilizer
- Impetus for bringing efficiency and competitiveness in Fertilizer Industry.
- To work as a catalyst for bringing new Innovative and efficient products
- Optimization of Subsidy Outgo.

Moreover, farmers will also benefit from the price variations in urea in competitive market conditions. Despite of increased uniformity in urea sector as

compare to pre NUP-2015 era, there are following constraints in extending Current NBS in urea sector, even if we consider differential subsidy to different group for different period of time as suggested in 2011.

1. Urea contains 46% of "N" instead of feedstock used (NG/RLNG/Naphtha)
2. But the cost of N in indigenous units are not uniform, as cost of production (COP) of different units of indigenous urea varies substantially because of
    a. Unit wise different cost
    b. Energy norms of 14 units which will continue up to 2025 as per notification of government.
    c. Concession price of three naphtha units are different and is very high
    d. Cost of production of New units under NIP-2012 are need to be treated differently because of high investment cost
3. The numbers of small and marginal farmers have grown to 86.08% of the total holdings in 2015-16 against 85.01% in 2010-11 (Agriculture Census report 2015-16).
4. Presently there is price variation of only about 5% between various brands of P&K fertilisers (DAP/NPK etc.) which are under NBS. The manufacturers use similar source for N, P and K and therefore, it is easy to determine subsidy.
5. Cost of Production of domestic Urea varies from Rs.23000 to Rs.38000/MT. There is Variation of 65%.
6. Average cost will be about Rs.26000/MT.
7. Import price will be about Rs.24000/MT. (300x 1.05x 71) +2000= 24,365/MT
8. As per current scenario NBS for urea will be about Rs.18.901 x 460=Rs.8694/MT
9. Average price of urea will be Rs.26000 – 8694 = Rs. 17000/MT
10. If N rate is increased, subsidy on DAP/NPK will increase**.**
11. Shift will be towards N oriented complex like 20:20:0:13, 28:28:0, 19:19:19. Distortion in NPK ratio will continue.
12. Exporters of Urea to India will be benefited and domestic units with higher cost of production than import will be discouraged**.**

6.5 Agricultural Extension System

In our country the presence of multiple agencies can be used to address different needs of heterogeneous farming communities and complement each other.

The education, knowledge transfer and awareness are keys to long term sustainable use of any resource. Likewise information about inputs, advisory, support service need of farmers across the country are provided by multiple agencies from private, public, community based and Non Governmental Organizations (NGO). Example of extension systems of different categories are as follows

i. Public Sector
    a. State departments of Agriculture/Horticulture/Animal husbandry, State Agriculture University (SAU), Regional institutes of ICAR, Commodity Boards like Rubber Board, Coffee Board, Spices Board, Coconut Development Board etc.,
ii. Private Sector
    a. Input (Fertilizers, Seed, Pesticides Etc.) Dealers, Model Fertilizers Shops, Agricultural Business Firms e.g. IFFCO Bazar, ITC e- Chaupal.
iii. Non Governmental Organization
    a. MYRADA (Karnataka), Ramakrisha Mission (Jharkhand)

In Indian context, 2013 survey of National Sample Survey Office (NSSO) highlighted the prominence of farmer to farmer exchange of information in Indian agriculture (NSSO as sighted in Sajesh *etal,* 2018). The multiple actors in extension provide excellent opportunity to address the wide range of farmers in different area from different socio- economic conditions. The synergy among different extension agencies can affect the farmers' decision like use of fertilizers, diversification to non food crops. There are more than two Lakhs eighty five thousand retailers across the country belonging to different ownership and active presence of these agencies among the farmers can be harnessed by the government and urea industry for effective extension services for balanced use of fertilizers.

Why extension is necessary?

Desai (1986) has said that the evidence also shows that the pace and pattern of growth in fertilizer use were influenced more decisively by the developments of the agricultural research, extension, credit, and fertilizer distribution plus supply systems rather than by marginal changes in prices of either crops or fertilizers. This is not surprising because farmers, though rational, are not omniscient. They need location-specific information on the responses of crops to fertilizer use to judge which of the crops could be profitably fertilized and to work out details of fertilizer practices. Agricultural research system which generates such information and the extension

system which delivers it to farmers influence these decisions of farmers.Agricultural research and extension systems have been behind upward shifts in response functions by developing and spreading new technologies in crop production and educating farmers in efficient use of fertilizer.

Given the existing subsidy system to fertilizer sector where urea is being subsidized more heavily as compared to other fertilizers, it will take time to correct farmers behaviour pattern for the application of fertilizers through proper awareness creation. This something that India cannot achieve overnight. The balanced application of fertilizers is key to sustainability to production and policy should be directed to create more awareness in this aspect (Gulati and Banerjee, 2020).

6.6 Compost

6.6.1 History

The compost from farmland/city garbage can be a good source of organic carbon and canalso provides primary/secondary nutrients to soil. The history of using compost from urban waste goes back to 1950s. Saha (2013) has reported that during the last half of 1950s, the costly imported chemical fertilizers became more prohibitive with the Suez Canal crisis due to increased transportation cost. The Ministry of Agriculture, therefore, expressed especial interest in using compost manure to increase crop production. The policy makers hoped to train individuals in the techniques of producing compost, and then commission them as compost inspectors in each of the country's National Extension and Community Project sections. Trained village leaders and village-level workers would assist the inspectors in developing local manure resources. Consequently, various state governments modified their municipal acts to direct municipalities to convert all available refuse into compost manure. During Gram Sudhar Saptah (village development/improvement week), which was celebrated during the first week of October to commemorate Mahatma Gandhi's birthday, villagers participated in community development schemes, including digging compost pits and composting refuse

In January 2016, the government approved a scheme to promote use of city compost. Under the policy, a provision has been made for Market development assistance of Rs. 1500 per MT of city compost for scaling up production and consumption of the product. It was envisaged that Market development assistance

would lower MRP of city compost for farmers. It was decided that Fertilizer companies and marketing entities would also co-market City Compost with chemical fertilizers through their dealers' network. In its effort to educate the farmers about benefits of compost, the government decided to involve Krishi Vigyan Kendra (KVK) and Agriculture University to carry out field demonstrations and launch IEC campaigns across all the states.

Budget provision and expenditure on compost in last four years (in Crores)[54]

Year	Requirement projected	Final Allocation	Expenditure
2016-17	0.00	15.00	0.55
2017-18	15.00	14.80	7.26
2018-19	20.00	10.00	10.00
2019-20	27.00	32.00	31.99

According to reply given by the Minister of Chemical and Fertilizers, in Rajya Sabh[55]a on 28/12/2018, Under National Mission of Sustainable Agriculture (NMSA), 100% financial assistance upto a maximum limit of Rs.190.00 Lakhs per unit is provided to State Government/ Government agencies for setting up of mechanized Fruit/ Vegetable market waste/ Agro waste compost production unit. Similarly for private agencies/Individuals, assistance of 30% of project cost upto Rs. 63 Lakhss per unit is provided for establishment of Waste Compost Production Unit (3000 TPA capacity)

The IACR Council has developed technology so that farmers can prepare various types of organic manures such as phosphocompost, vermicompost, bio-enriched compost etc. using available rural organic wastes. The council also recommends green manuring and in-situ crop residue recycling.

Waste Decomposer developed by National Centre of Organic Farming (NCOF), Ghaziabad, has been distributed to farmers across the country for on farm production of organic manure from organic waste.

There are many reasons for slow development of compost market in country, some of them are listed below

[54] Based on information available from http://fert.nic.in/
[55] Based on reply to the questions available at https://rajyasabha.nic.in/

6.6.2 Why couldn't take off?

- The vacillating manufacturing and selling cost of the compost, associated additional costs, questionable product quality, no direct incentive/subsidy to farmers and lack of knowledge among other concerns, ensured city compost didn't become a popular option for farmers.
- The money allocated for MDA subsidy in the last three years is so meager (Rs 15 Crores for 2016-17 and 2017-18 and Rs 10 Crores for 2018-19) that it could not meet the requirement of even 2 per cent of the SBM's target.
- In addition, the process to claim MDA is so tedious that most manufacturers and fertiliser companies have not received any payment under it.
- Another issue with the policy is the conflict of interest. A firm producing chemical fertilisers and its dealers are unlikely to be enthusiastic about selling organic compost till there is a legal mandate. The current policy has subsidy but no legal targets. They are just "supposed to" co-market fertilisers with city compost in a way that there are 6-7 bags of urea and 1-2 bags of city compost.

The government is trying to promote use of compost by addressing the following problems procurement of compost;

- Lack of organized marketing channels,
- Presence of heavy metal
- Cultural issues regarding the use of urban waste in farm
- Absence of product standards and certifications.
- Farmers are looking for more awareness/training programs in case of usage of compost and organic fertilizers.

6.7 Direct Benefit Transfer (DBT)

In conventional sense, the DBT is an attempt to change the mechanism of transferring subsidies to the beneficiaries by the Government of India . The ultimate goal is to transfer subsidies directly to the people through their bank accounts. The Department of Fertilizers has implemented Direct Benefit Transfer System across all States/UTs w.e.f. March, 2018. At present the DBT is being implemented by the Government in fertilizer sector is different from the DBT which is being implemented in other departments of Government of India. Under this DBT system, 100% subsidy on various fertilizer grades is being released to the fertilizer companies and not farmers, on the basis of actual sales made by the retailers to the beneficiaries through

Point of Sale (PoS) devices installed at each retailer shop. The farmer's or buyer's identity is authenticated either through biometric, Aadhar based Unique Identification Number, or Voter Identity Card, or Kisan Credit Card, etc,. Thus, although introduction of DBT in Fertilizer sector from 2018 is a bold step, is not DBT in real sense and expected that it is a step towards implementation of "Actual DBT".

The stated government objective of DBT is to facilitate endpoint transaction visibility in sale of fertilizers at the end point/retail point and thereby reduce diversion of fertilizers and plug the leakages. Apart from this, other objectives of DBT in fertilizers are as follows:

- Creation of Aadhaar seeded data base of beneficiaries
- Transparent and faster tracking of movement of fertilizers along the value chain i.e. from manufacturers to beneficiaries.
- Minimize diversion of fertilizers.

Due to complexity and challenges in translation of DBT in fertilizer sector, the following considerations were taken for implementing DBT:

a) Selling price of fertilizer will not move to market price, unlike LPG. Farmer will not be required to pay market price upfront.
b) At the time of sale transaction, the farmer will purchase at subsidized MRP, however the subsidy amount will be paid by the Government on behalf of farmer, directly to the manufacturer.
c) As of now subsidy is paid to the Manufacturer on basis of "Receipt at retailers", as per proposed model the subsidy will be paid based on "Actual Sales" captured on PoS device.
d) Subsidy to Manufacturer will be paid on weekly basis.

The preference will be given to Aadhar based biometric authentication as this is linked to land records and the soil health card of the farmer. This in turn would enable generation of recommendation of appropriate mix of fertilizers compatible with the soil health profile of the agricultural land held by the beneficiary. However, the recommendation is not binding on the beneficiary and the sale of fertilizers would be on a "no denial mode", irrespective of status of buyer. The implementation of DBT in Fertiliser Sector poses many challenges due to its inherent complexities.

i <u>Increase financial burden on Companies</u>

a. It has only prolonged the delay in payment of subsidy which was earlier paid on receipt of material in a district. Now, it will be paid only

after sale to the farmers. It means a delay of 4-6 months since it is a seasonal commodity. Urea pricing policy includes only 45 days' working capital in calculating cost of production of each unit. As per the DBT scheme, the subsidy has to be paid within one week of raising the bills. But this is not paid in one week as per the DBT scheme. The interest on increased requirement of working capital due to such delay in payment are tentatively Rs.500/ MT (discussion with IFCCO)

b. Large quantities of urea always remain in the stock with manufacturer/ wholesaler/ retailer for which subsidy cannot be claimed under the DBT system which results in increase of working capital requirement and interest cost.

ii Urea Policy vs. DBT

a. The subsidy payable under Urea policy is being worked out by FICC for the inputs being utilised in production during the year. The RAC and beyond RAC quantity are thus determined for the year and GIT quantities are also identified for the release of subsidy. However, under DBT system, the rate being paid may vary as the subsidy rate is linked to date of sale (which generally take place in subsequent financial year also.) rather than earlier system of applying concession rates linked with receipt.

iii Over payments / Underpayments in increasing / reducing concession rates

a. As there is a significant time lag in sales of urea to the farmer and the lead time for sale through POS may be upto 6-10 months, in cases where the concession rates have increased in next financial year, the companies shall first receive higher amounts of subsidy that is actually payable to them. However, in a reverse case, there would be significant under payment to the company. These shall have to be adjusted by issuing a separate notification based on revised manual calculations.

iv In order to address the complex process of disbursement of Fertilizer Subsidy in March 2016, DBT was implemented with the help of PoS machine which has IT enabled solution for identification of Farmers and linking the entire process with various stakeholders (Manufacturers, Wholesalers, Retailers and Government Officials). It has little impact on other stake holders, except

Manufacturers who are the only sufferer for any omission and error of any stakeholder in the process.

v Payment of DBT subsidy is often pending due to lack of adequate budget provisions from time to time.

vi Sales are happening without PoS devices or without Aadhaar Authentication. The main reasons are attributed to failure of Aadhaar Authentication, Poor internet Connectivity, farmers aggression and large number of farmers requiring fertilizers during peak season.The Retailers / Farmers have no options than to opt for using alternate AadhaarorExcess quantities booked to another farmer present at that time or asks farmers to authenticate later or arrange another Aadhaar The instances of failure of Aadhaar Authentication have reduced but still it is a major constraint. There is no legal provision in FCO for mandating Retailers to sell only through PoS Machines. No punitive action for Wholesalers and Retailers for not abiding RO process. Wholesalers issue material without entry in RO Module which is a constraint in building Stock in PoS machines. There is no incentive for wholesalers for conducting RO entries. However, only Manufactures are held responsible for any mistakes committed by any stakeholder (Wholesalers, Retailers and State Officials).

vii Net Connectivity at village level is very poor. Response time for each transaction is relatively much in POS machine as compared to earlier process, resulting into delayed processing of transactions and accordingly farmers get upset. The Retailers complainsabout the frequent failure of internet connectivity during the Sales Process. They are confused about the successfully completion of particular transaction in the process.

viii There is no formal Grievance Redressal Mechanism for farmers and other stakeholders. Presently issues are forwarded to District Consultants/DBT monitoring cell and published in social media groups such as “What’s App”. It has no tracking of complaints, escalation matrix and resolution of complaints.

In India, we do not have the sophisticated database of land records which is pre requisite for successful implementation of target benefit transfers. The land being state subject, the level of computerization of land records, mutation, linkage of Aaadhar with Record of Revenue and verification of land right varies widely from state to state because of historical reasons related to revenue administration system like Ryotwari, Zamindari, Mahalwari system in pre independence era.

Ideally, the subsidy would go to the farm operator and would involve a cap based on the farm operator's wealth and requirement of fertilizers as per recommendation of SHC. The State, however, lacks the information to implement such an ideal subsidy. Land records are in the process of being computerized but in many cases farmers are not the owners of the land.

Moving fertilizer subsidies to DBT would also stimulate efficiency improvements. If land records are in workable condition, these changes can be made. The stumbling block is Aadhar authentication. Investments have to be made to make Aadhar authentication seamless and error-free. The transition to direct transfers has been initiated in some states. The policies, as of now, are intended as add-ons and do not replace the other distortionary subsidies in agricultural sector. The data base on land ownership and use is also inadequate to implement such policies sensitively. This will have to be a priority item for investment in the immediate future.

6.8 Organic Fertilizers

The increase in demand for organic products and growing scrutiny by many interests group on environmental pollution due to chemical fertilizers have created a buzz in the global fertilizer market and but not so in India.

But while presenting the Union Budget in February 2020, the finance Minister announced Sixteen Action Points for Agriculture, Irrigation and Rural Development of and total Rs. 2.83 LakhsCrores to be allocated, out of which Rs. 1.60LakhsCroress was reserved for Agriculture, Irrigation and allied activities. The budget also stated government's intent to rationalize fertilizer subsidy by encouraging balanced use of fertilizers including traditional organic ones as against incentivized use of chemical fertilizers.

In India, benefits of the fertiliser subsidy were received by farmers who practice chemical-based farming. While farmers who do not use chemical fertilizers do not receive a similar support and backing from the government. During 2015-16, around 48.4 per cent of total gross sown area is irrigated, and remaining is rain-fed; farmers in rain-fed and hilly regions use lower volumes of chemical fertilizers.

ZBNF (mentioned in July 2019 Budget) was also included in the action points.The budget announcement of February 2020 regarding promotion of organic fertilizers and push for ZBNF have brought organic farming has brought the organic

fertilizers in forefront. Many states have started using organic fertilizers like Sikkim, and other north eastern states, Himachal, Uttarakhand, etc.

The first step to promote organic fertilizers need the difficult task of convincing the farmers and a community driven holistic approach is required through extension in gradual manner. The promotion of organic fertilizers in place of chemical fertilizers may face huge challenges because of following reasons

a. The challenge is convincing farmers to shift to organic, which might result in an immediate commercial impact on their income.
b. Lack of capacity building efforts in the form of on-farm training, meetings and workshops
c. Lack of incentivizing schemes by the government organizations, given in the form of monetary benefits and subsidies
d. Fertilizer sector is highly regulated and governed by government policies. While the government provides subsidies for chemical fertilizers and pesticides, there is no such provision for organic inputs. Farmers are mainly dependent on their resources and the traditional methods and so, often use half-baked information.
e. There are total 1319 permanent and 182 mobile soil testing laboratories in 2018-19 and is not enough to cover the country like India and paucity of soil testing facility has significant attributes in promoting of organic fertilizers but also balanced fertilizer use (fertilizer statistics 2018-19).

The quality organic fertilizers production, certification, must be encouraged and need to be used with other chemical fertilizers for optimum results. It requires latest technology and marketing assistance by the government in initial stage. It not only protects our soil health but also sustains the environmental and natural resources. The organic input units established under various schemes in the country should be encouraged to produce quality product constantly to ensure regular supply. Establishment of organic input marketing channels is the need of the hour for expansion of organic farming in the country.

In Rajya Sabha[56], Minister of State for Planning (IC) and Chemicals & Fertilizers, in a written reply to a question on steps taken by Government to open Model Fertilizers Retail Shops to provide quality fertilizers and for hiring of farming

[56]Based on reply to questions available at https://rajyasabha.nic.in/

equipment in the country, informed that during Budget 2016-17, it was announced that over a period of three years, 2000 Model Fertilizer Retail Shops would be opened across the country. The target has been achieved and 2044 Model Fertilizer Retail Shops have been made operational, the Minister informed. (PIB 2018). The government has to take similar targeted approach to promote organic fertilizers in untouched and target areas for promotion of organic fertilizers through dealer/distributor network or subsidy for organic inputs.

Hardy (2017) concluded that manure-N compared to urea-N for irrigated rice generates substantially higher GHG emissions, increases costs and increases labour demand.Labour use is significantly higher for manure, and the gender balance is more equal. Manure is substantially more expensive as a source of nutrients compared to synthetic nutrients, yet Manure GHG emissions are dominated by increased methane associated with the high manure organic matter content. This suggests that manurecould offer GHG emission savings for dryland crops, compared to urea. Thereis a substantially higher labour demand associated with manure, whichresults in high application costs even with free manure.

The widespread adoption of organic farming practices would lead to net increases in GHG emissions as a result of lower crop and livestock yields.There are undoubted local environmental benefits to organic farming practices, including soil C storage, reduced exposure to pesticides and improved biodiversity. However, these potential benefits need to be set against the requirement for greater production elsewhere. As well as increased GHG emissions from compensatory changes in land use to make up for production shortfalls, there are substantial opportunity costs from reduced availability of land for other purposes (Smith *et al.* 2019).

According to a new report from professional services firm Grant Thornton in collaboration with FICCI, food production in India has increased by more than five times over the last five decades, increasing from more than 50 million tonnes in 1950-51, to 272 million tonnes in 2016-17. The consulting firm predicts even stronger growth in the coming decade, which would be cause for relief in light of the predicted spike in demand for food grains to 355 million tonnes by 2030 (Consultancy.in, 2018).

There is no scope to add additional land under agriculture, to feed growing population complete conversion to organic farming is not possible and more intensive food production is the only solution.

Government of India efforts for promoting Organic fertilizers

In reply given by the Minister of Chemical and fertilizers in Rajya Sabha[57] on 28-12-2018; following measures are being taken by the government to promote organic fertilizers.

In addition, ICAR is recommending soil test based balanced and integrated nutrient management through conjunctive use of both inorganic and organic sources (manure, bio-fertilizers etc.) of plant nutrients with 4Rs approach i.e right quantity, right time, right mode and right type of fertilizer to ensure balanced use of chemical fertilizers. The ICAR has developed integrated nutrient management packages for various crops/ cropping systems in different agro-ecological regions of the country.

- The Council has developed technology so that farmers can prepare various types of organic manures such as phosphocompost, vermicompost, bio-enriched compost etc. using available rural organic wastes. The council also recommends green manuring and *in-situ* crop residue recycling.
- Indian Council of Agricultural Research under Network project on Soil Biodiversity, Bio-fertilizers has developed improved and efficient strains of bio-fertilizers specific to different crops and soil types. Liquid Bio-fertilizer technology with higher shelf-life has also been developed.
- The ICAR also imparts training, organizes front-line demonstrations etc. to educate farmers on all these aspects.
- Under National Mission of Sustainable Agriculture (NMSA), 100% financial assistance upto a maximum limit of Rs.190.00 Lakhs per unit is provided to State Government/ Government agencies for setting up of mechanized Fruit/ Vegetable market waste/ Agro waste compost production unit. Similarly for private agencies/Individuals, assistance of 30% of project cost upto Rs. 63Lakhss per unit is provided for establishment of Waste Compost Production Unit (3000 TPA capacity).
- Under Parampragat Krishi Vikas Yojana (PKVY), financial assistance is provided at the rate of Rs.50,000 per ha per farmer for three years, out of which 62% i.e., Rs. 31,000 is provided for organic conversion, organic inputs, on-farm input infrastructure.

[57]Based on reply to questions available at https://rajyasabha.nic.in/

- Under MOVCDNER, assistance is provided for on-farm and off-farm inputs production infrastructure @ Rs 3750/ha each for 3 years.
- Waste Decomposer developed by National Centre of Organic Farming (NCOF), Ghaziabad, has been distributed to farmers across the country for on farm production of organic manure from organic waste.
- The Government of India has also approved the policy on promotion of city compost using city waste which has been notified by the Department of Fertilizers on 10.2.2016 wherein Market Development Assistance (MDA) of Rs. 1500/MT in the form of subsidy has been provided for scaling up production and consumption of city compost.

Although government of India has initiated various schemes like Soil health cards, direct fertilizer subsidy payment transfer scheme, crop insurance scheme, Paramparagat Krishi Vikas Yojana for organic farming and dissemination of information through mobile apps and multimedia methods, still the lack of stringent check and non-compliance of these are not giving fruitful results Integrated approach for managing fertilizer at ground level in reality. Agriculture research and education for improved fertilizer management can be instrumental in developing awareness and enhancing intangible knowledge capacities among the farmers.

6.9 Zero-Budget Natural Farming (ZBNF)

The chronic indebtedness among Indian farmer is because result of degradation of soil, depleting ground out, erratic weather, unregulated use of chemical fertilizers and pesticides and crop loss. In the 19th century, Justus von Liebig and Friedrich Wöhler, the two scientist of organic chemistry advocated the use of chemical fertilizers in agriculture. In developing world like India, the chemicalization in agriculture came in to prominence after green revolution of the 1960s.

In 21st century, the ill effects of intensive agriculture have given the space for non-chemical alternatives in agriculture. The Organic farming is gaining popularity in India. Rudolf Steiner's bio-dynamics, Masanobu Fukuoka's one-straw revolution and Madagascar's System of Rice Intensification (SRI) were examples of specific alternatives proposed. In India, such alternatives and their variants included, among others, homoeo-farming, Vedic farming, Natu-eco farming, Agnihotra farming and Amrutpani farming. Zero Budget Natural Farming (ZBNF), popularised by Subhash Palekar, is the most recent entry into this group Mr. Palekar is also critical of organic

farming. For him, “organic farming” is “more dangerous than chemical farming”, and “worse than [an] atom bomb”. He calls vermicomposting a “scandal” and *Eiseniafoetida*, the red worm used to make vermicompost, as the “destructor beast”. He also calls Steiner’s biodynamic farming “bio-dynamite farming”. His own alternative of ZBNF is, thus, posed against both inorganic farming and organic farming (Ramkumar and Arjun, 2019).

There are four wheels of ZBNF, *viz.*, Bijamrit, Jivamrit, Mulching and Waaphasa. Bijamrit is the microbial coating of seeds with formulations of cow urine and cow dung. Jivamrit is the enhancement of soil microbes using an inoculum of cow dung, cow urine, and jaggery. Mulching is the covering of soil with crops or crop residues. Waaphasa is the building up of soil humus to increase soil aeration. In addition, ZBNF includes three methods of insect and pest management: Agniastra, Brahmastra and Neemastra (all different preparations using cow urine, cow dung, tobacco, fruits, green chilli, garlic and neem) (Ramkumar and Arjun, 2019).

It is an emerging set of agricultural practices designed dramatically to reduce farmers’ direct costs (hence “zero budget”) while boosting yields and farm health through the use of non-synthetic inputs sourced locally ("natural farming”). ZBNF being practised at small scale in India, particularly in the state of Andhra Pradesh, Himachal Pradesh, etc.

The principles of zero-budget natural farming seek to steer away from the prevailing focus on per hectare productivity, and instead focus on a holistic approach that also values human, social and environmental benefits and costs from agriculture. The use of excessive urea in agriculture brings arrays of positive and negative externalities, where the costs or benefits that are externalized to third parties like, negative externalities include the pollution of water bodies from nitrate leaching from excess use of urea and adverse impact on human health, the fact which is not known to most of the farmers.

The economics of ZBNF and its impact on ecosystems and biodiversity has not as yet known but its proponent claim that it has positive ecological effects on soil quality, fertility and water retention capacity and multiple socio-economic benefits.

6.8.1 Unsubstantiated claims

i. ZBNF is hardly zero budget because cost of formulations have to be purchased, wages of labour, value of family labour, land rent, costs of maintaining cows etc. add to cost.

ii. There are no independent studies to validate the claims that ZBNF plots have a higher yield than non-ZBNF plots.

iii. In India, different types of soils are deficient in various macro and micro nutrients but ZBNF practitioners appear to insist on one blanket solution for all the problems of Indian soils.

iv. Soil is like a banking system the more one can add nutrient in scientific and efficient way and same can be withdrawn in the form of yield. In ZBNF, the Jivamrit prescription is essentially the application of 10 kg of cow dung and 10 litres of cow urine per acre per month. For a five-month season, this means 50 kg of cow dung and 50 litres of cow urine. Given nitrogen content of 0.5% in cow dung and 1% in cow urine, this translates to just about 750 g of nitrogen per acre per season. This is totally inadequate considering the nitrogen requirements of Indian soils.

This system could support improved food production for low-input farmers. In addition, because inputs of crop residues are high, the soil is unlikely to degrade. “However, the maximum potential nitrogen supply is likely to be only 52–80 per cent of the average fertilizer application rate. This means that yield penalties are likely in higher input systems; so widespread conversion of farms from all sectors to zero budget natural farming is not recommended (Smith *et al,* 2020).

6.10 Summing Up

6.10.1 Scope of Energy Efficiency in Existing Urea Units

a) By 2025, some of the plant complexes shall be expected to have completed 38 – 40 years of production / operation, presumably under safe and sound health conditions.

b) The remaining, out of the 25 nos. of plant complexes, are expected to have completed 32- 33 years of operation and more, by 2025.

c) Normal ‘Life’ period of fertilizer plants in India, have been recently increased from 18 to 25 years. Notwithstanding the above increment in ‘life period’, the projected plant operation periods of (38 – 40) and (32 –

33) years, are well beyond the revised safe plant life period of 25 years (Appendix-1).

It is very hard to deny the element of risk that will be involved, by operating present plant complexes till 2025.

i. As observed during last decade or so, influx of new, energy – saving revamp measures (for fertilizer plants) have tapered down to bare minimum, thereby indicating, technological excellence to have reached its maximum.

ii. Moreover, it can be said that, almost all fertilizer plants in India have witnessed implementation of latest energy saving measures.

iii. Against the above backdrop, possibility of further energy reduction through revamp measures looks very bleak.

iv. Instead, it can be said that, with the passage of time (to 2025), efficiencies of all rotating machines and efficiencies in some of the static equipment, shall start decreasing, thereby reflecting in higher energy consumption vis-à-vis, lesser energy saving.

v. For revamping the said plants, it requires huge capital investment but the corresponding payback period shall become unrealistic in that case. Accordingly, it is felt that without investing at a major scale, the most optimistic scenario is to run the Plants as long as they can run without impairing safety of personnel & equipment. However, Process Licensor may be required to critically review the technological status of the different Plants on case to case basis regarding the possibility of implementing further revamp measures.

In view of the above, the Indian fertilizer complexes can consider themselves to be fortunate, even if they are able to sustain the present level of energy consumption norms, while approaching 2025.

6.10.2 Future of Old Urea Units

There is need to have trade-off between old and new plants. The old units must be given chance and time to restructure, invest in energy efficiency to achieve the target envisaged in the New Urea Policy-2015. Further, necessary time period must be given to do so (may be up to 2025). It is necessary that since a replacement of an old plant will normally have gestation period of three years before production can be expected, such old plants should be allowed only for five years leading to eventual

exit. One of the important reasons for introduction of exit policy is to have energy efficient production. Because energy resources used in urea production are not renewable, it must be used in efficient and economical manner to reduce production cost of urea, as continuation of such unit leads to avoidable wastage of scarce energy resources.

6.10.3 Supply of Feedstock

In supply and cost of domestic gas the urea industry has no role and the government of India has to intervene. However, in ensuring the competitive Gas Supply to Urea, the industry can play proactive role. At present, the urea units are not taking any efforts to get gas at competitive pricing and the companies are not interested in bidding for domestic gas which is produced under HPHT pricing regime because entire gas cost is pass through in urea pricing policy. Therefore, following need to be attempted

i. Fertilizer plants may explore participating into the bids of domestic gas production being auctioned under marketing and pricing freedom regime.

ii. The Government authorities and industry must plan policy and strategies for sourcing energy for urea industry on long term basis rather than relying on adhoc basis. It may be appreciated that fertilizer industry will always be a marginal player in the Indian energy market and its leverage will always be limited. This makes it all the more important to work out a strategy to overcome this challenge and continuously improve on it.

iii. FAI may pool gas demand of Urea sector and act as Aggregator to explore spot LNG volumes which are available at much more competitive rates as against Long terms RLNG.

6.10.4 Uniform Freight Subsidy Scheme

This micromanagement of movement and freight subsidy policy need overhaul because which was aimed for Free on Road (FOR) delivery of urea leads to breach of MRP. As done in the P& K fertilizers the secondary movement may be subsumed in the MRP, which any way is extracted from the poor farmer and ultimately benefits of subsidy doesn’t go to farmers.

6.10.5 Domestic Gas Allocation by the Government of India

Adequate supply of Natural gas can be a viable option for India only if the Government takes a decisive and consistent role. The Government should intervene in domestic gas allocation to urea sector and try to supply 31.5 mmscmd of gas to urea sector to make production cost more competitive.

6.10.6 Gas Pricing

iv. The cure would involve reforming and rationalizing upstream gas pricing mechanisms.

v. At present, custom duty of 5% charged on RLNG can be exempted for urea production.

vi. Another means of making gas more attractive for the sector would be to reduce the input costs by having a uniform taxation structure for natural gas across all of India's states.

6.10.7 Improvement in Gas Pooling

a) Accurate/Proper estimation of Gas requirement for EPMC tender by urea plants: Based on availability of domestic and other gases, urea plants assess the Gas requirement. But in case of large variation in Gas demand estimation and actual consumption, there are chances of GTA penalties as a result of which suppliers tend to lose interest for that plant while bidding. This results in reduced participation in the tender and at times, it results in a supplier getting the award even if its bid is not very competitive. Hence, urea plants should also make a judicious assessment of Gas requirement for the tender and variation in supply of domestic gas should be minimized.

b) There should be a mechanism with the intervention of the government that the gas suppliers in such situations should try to off-load such contracted quantities at international level; and for the quantities so offloaded spot RLNG at lower price can be purchased by the fertilizer companies. This will substantially reduce the subsidy.

c) While participating in EPMC tenders being floated by GAIL on quarterly basis for supply of RLNG to urea plants; as per tender condition, supply of RLNG to urea plants is on Reasonable Endeavour (RE) delivered basis, other suppliers have to book firm capacities in Gas pipeline. This exposes these

suppliers to potential Ship or Pay charges and prevents a level playing field for these suppliers.

6.10.8 Sufficient Budgetary Provision for Urea Subsidy

Adequate budgetary support and clearing all outstanding liabilities is also a must for better financial health of industry and for successful implementation of ambitious Direct Cash Transfer (DCT) to the farmers in near future.

The RBI permits for two months against subsidy receivables. This needs to be increased to at least 6 months under DBT scheme. RBI has issued circular to the scheduled commercial banks and financial institutions on February 12, 2018 redefining rules where even one day delay in repayment of interest or principal will designate the account as special mention account. This can push many fertilizer companies to insolvency.

6.10.10 Revision of MRP of Urea

There is need for gradual need of upward revision in the MRP of urea linked with increase or decrease in gas price as done in Diesel just before start of Rabi and Kharif season.

A dual price system for fertilizers for different categories of farmers, though justified on equity grounds, will not be practicable to manage immediately. It may be possible to have a regionally differentiated level of MRP of urea to push urea use in states which are lagging in urea usage. This needs to be supported by appropriate extension efforts for encouraging optimum and balanced use of urea and other fertilizers. The sale of fertilizer should be linked with land record and soil health card. All these must be Aadhar linked. Any extra purchase of fertilizers beyond recommended level must be sold on full market price.

Currently, the Government has a database of beneficiaries for soil health cards, Kisan Credit Cards, crop insurance scheme, PM-KISAN and other government schemes. Now, all the database has been linked and integrated and one Aadhaar-authenticated data, which will be used as a reference point for all government-run schemes. Bringing all databases under one umbrella is expected to help the Government reach out the authentic beneficiaries only.

6.10.11 Reform in Urea Pricing Policy

Revision of Fixed Cost

The fixed cost of all units should be revised once group wise for last time and link the updated fixed cost with WPI for escalation and de-escalation on yearly basis. The normative average of fixed cost of group or the lower of the group, can be considered. This will simplify the workings at Government end with no monitoring of energy and other costs because group target have fixed already. The government can introduce Nutrient Based Subsidy progressively for domestic urea production after 2025 (target energy norms of groups have been extended up to 2025).

Subsidy for production beyond RAC

After commissioning of new urea capacities of around 9 million MT, the Government purchase of urea beyond RAC should be based on the respective energy cost of the companies and average fixed cost.

6.10.12 NBS in Urea Sector for Balanced Use of Fertilizer

It can be concluded that NBS in urea can be implementation in due course of time when heterogeneity among the urea industry come to desirable level within next three to five year. NBS brings the efficiency among the units and decontrol of urea pricing under NBS is not the only path for desired balanced use of urea.One of the most important hurdles in NBS in urea is provision of adequate subsidy in budget allocation and clearing of carry over liabilities of past years. Moreover, decontrol of price of urea is very sensitive and political matter and in case of sudden decontrol there will be more shock waves in already stressed farm sector.

6.10.13 Simplification of Procedure To Include New Fertilizers In FCO

Under present arrangement as per guidelines specified in FCO, the on direction of Central Fertilizers Committee directs technical group to examine the agronomic aspects, specifications and field trials reports of any proposed new fertilizer before inclusion in FCO. This system of certification of new fertilizer is cumbersome, time consuming and bureaucratic. The new-product approvals in India take approximately 800 days. Apart from this delay there are other barriers like price controls, which slow down the entry of new product in market. The present process needs reform so that the industry can introduce new customized fertilizers with better efficiency and according to requirement of crop and soil as well.

6.10.14 Joint Venture in Resource Rich Countries

It is necessary to have reasonable self-sufficiency may be to a level of 70% of total requirement from domestic production and 30 percent can be met either from long term supply agreement from resource rich country at government to government level and setting up joint venture company and production facility in gas rich country. It become important to have the benefit of low cost urea from international market in light of limited production of NG in India and increased requirement of from CGD and power sectors. The urea can be imported but power cannot be imported. The cost of capital is also lower in the many of these resource rich countries as compared to cost of capital in India. Joint venture aboard has many advantages, viz., certainty of supply and protection from wide fluctuations in international market.

6.10.15 Long Term Supply Agreement

Long term Supply Arrangement can be another option, as it may not lead to hardening of the international price of urea on a long- term basis and long capital investment outside the country. Pre-determined shipment schedule give better opportunity in planning shipment during demand seasons and do not put pressure on port capacity which otherwise leads to bundling of supplies leads to mismanagement. An option of forward contracting can be looked in to as a schedule of supplies required is generally known in advance before the onset of Kharif and Rabi after taking into account the domestic production. It gives suppliers and consumers opportunities to minimize their risk of supply and market fluctuations.

6.10.16 Guidelines for Rational Use of N

The concerted efforts of farmers, government and industry and non-government organization are needed to bring the balanced use of fertilizers. A few guidelines for rational use of 'N' fertilizer are indicated below which can be implemented with collaborative efforts of aforementioned entities:

- 'N' fertilizer (Urea) application should be invariably balanced not only with P & K but also with deficient Secondary nutrient and micronutrients.
- Soil Test based fertilizer prescriptions have to be adopted. The industry and government must ensure adequate provision of ready mix customized fertilizers at affordable rate for different crops in different regions as per prescription of SHC. Farmers should insist for 'S' and micronutrient testing

as NPK alone is no longer sufficient. Fertilizers should be issued on the basis of crop to be sown and area under cultivation as being done in some of the developed nations.

- Loss of 'N' is usually less when Urea is top dressed before irrigation.
- Modified 'N' scheduling using leaf color chart gives better 'N' use efficiency
- All round publicity for Importance of Balance fertilization and Integrated Nutrient Management while Creating awareness among the farmers regarding the harmful effect of overuse of urea.
- Promoting use of Organic Fertilizers and bio-fertilizers and organic fertilizers by the Government and fertilizers companies through demonstration plot and other extension activities
- Encouraging Micro- Irrigation and Fertigation practices
- Inclusion of Legumes curtails 'N' requirement by more than 25% depending on cropping system and availability of Irrigation. Legumes and oil seed could be introduced in place of water intensive crops like paddy and sugarcane as cash crop, green manure and forage crops or as a short duration grain crops while promoting Farm yard residue management for better agriculture.
- Soil Mapping should be done and recommendations of Fertilizer use should be issued from time to time locally through social media, TV channels and model fertilizer shops.
- Subsidy on Urea should be gradually decreased and the same on P & K fertilizers should be increased to encourage balanced use of Fertilizers.
- Subsidized urea should be restricted to agronomical requirement of the crop grown in an area. Extra Urea if required by farmer should be supplied without any subsidy.
- Differential pricing should be introduced in Urea and same should be extended to other fertilizers also as and when their application becomes excessive due to subsidy regime.

6.10.17 Agricultural Extension System

For balanced use of nutrients, agriculture extension and education use be used as effective tool as it has not been used extensively in our country. There are arrays of agencies involved in extension activities. Under the state agriculture department the

strength of these extension agencies can be used for efficient use of nutrient. Thus, following need to be done

i. The Prime Minister Shri Narendra Modi announced launch of 10,000 Farmers Producer Organizations (FPO) all over the country on 29th February 2020 to face the challenges in access to agricultural inputs and technology to marketing of outputs (PTI 2020). The FPO can act as platform for convergence of various extension agencies as demand driven, location and crop specific information can be provided effectively. Similar examples are operating in Kerala where the Coconut Development board is helping Coconut producers collective at village level. It acts as platform for State Agriculture Department, SAUs, Agri-business, Input dealers/ retailers and Panchayati Raj Institutions.

ii. The State Agriculture Department can act as facilitator and enabler to assign role to various extension service on the basis of their strength. E.g. Sikkim IFFCO Organics Limited A joint venture between IFFCO and Government of Sikkim to provide agri-inputs and services for organic farming along with providing facility of processing and marketing the organic produce (https://www.iffco.in)[58].

iii. Off late growing presence of social media (What's app, Facebook and You tube) can also be utilized for catering the specific need of a district/block

6.10.18 Promotion of City Compost

To create a demand for quality compost, it is necessary to ensure that robust waste management systems are developed in cities, with source-segregation and promotion of decentralized waste management at its heart. We also need a much more serious policy to scale up production and consumption of city compost. It should also support other factors such as by reforms in terms of fertilizer control order norms, defining testing frequencies, better testing laboratories, and stringent targets for fertilizer companies etc. There is clearly a need and demand for quality city compost in India waiting to be recognized.

[58] Based on information available at (https://www.iffco.in) and personal discussion.

6.10.19 Policy Framework for Organic Fertilizers

A separate policy framework is needed for promotion of organic fertilizers in similar line. The government is promoting organic farming through fair and organizing exhibitions in cities but for actual support and growth of organic farming and its product sustainable market is needed. For equivalent production by using organic fertilizers at place of chemical fertilizers, large land size is needed.

6.11 Conclusion

This research aimed to evaluate the effectiveness and implementation of New Urea Policy 2015 during last four years. Based on a qualitative and quantitative analysis of energy consumption norm, additional production beyond RAC, cost of production of urea from different urea units in response to the provisions of NUP-2015, it can be concluded that the NUP-2015, Government of India has implemented this effectively with verifiable outcomes. During the implementation of policy two amendments to the policy related to target energy norm and calculation parameter for additional production andIPP were announced to accommodate the genuine concerns of the industry. It is basically sound, forward looking policy and has fared well in achieving its stated objectives. The urea industry has become more energy efficient with noticeable fall in average energy consumption norms, more than twenty Lakh MT of extra production beyond RAC and more homogeneity in cost of production of urea among heterogeneous urea units. In recent years, externalities like DBT, short supply of domestic natural gas, implementation issue in gas pooling; low price of urea in international market have affected the additional production adversely. Therefore, the government needs to accommodate the concerns of industry arising due to implementation of DBT and Gas Pooling and timely payment of subsidy to industry.

Focused discussion with technical experts and interview of representative of urea industry gave new insight for future policy. The viability of urea industry under urea pricing policy and decision to subsidized urea are two different issue and need to be tackled separately. The old plants have to be phased out and give space for new energy efficient urea plant. The Government should not micro manage the input and output cost of each urea units. The rising demand of domestic gas from other sector, growing share of RLNG in gas pool and changed priority to urea industry merit a strong case for Joint venture project in resource rich country and long term urea supply arrangement from other countries. The environmental pollution due to over use of fertilizers is under serious scrutiny not only at national but international level.

Due to paucity of time and non-availability to detailed data and antecedents of larger apprehensions, I did not go into the detailed working and options for proposed policy for urea units of different groups of NUP-2015 and its financial implication of Government and industry. The dissertation doesn't go in to the details of mode of transfer of subsidy to the farmers but softly intend for a pragmatic approach.

First of all, the results of this study indicated that most of the urea units have taken different measure to become more energy efficient and competitive. More specifically, additional production beyond RAC has increased considerably reduced import of urea by more than 2 Million MT. Gas pooling has given level playing field to all units and brought more homogeneity among units in term of cost of production of urea. But from the industry perspective, partial tinkering of the parameters of the energy norms, delayed subsidy payment due to implementation DBT and increased working capital requirement because of gas have seriously affected the financial health of indigenous production capacity. It qualifies serious attention of the government. The concerns of urea industry due to implementation of DBT need deliberation and redressal regularly.

The urea subsidy has many stakeholders. The government of India has tried to control the subsidy through pricing by implementing stricter energy consumption norms intermittently and non- revision of fixed cost since more than a decade. There is no more scope to improve energy efficiency and additional production among the existing urea unit because of vintage and technical and economic reasons. The fixed cost account for less than 18-20% of total cost of production. Thus revision of fixed cost will not contribute much in reducing the subsidy outgo. The timely payment of subsidy can help the all units to save huge amount on interests on working capital.

The government can reduce subsidy by accommodating the demand of domestic gas to urea sector and rationalizing of tax structure on input i.e. gas by bringing it into GST and reducing import duty on RLNG used for urea sector.

NBS in urea is long pending demand of urea industry which wants decontrol of urea sector from government subsidy regime. NBS in urea is misnomer as there is no variation in content of 'N' in urea irrespective of feedstock used. At this juncture, the stage is not set for implementation of NBS and decontrol of MRP of urea. The supply of adequate amount feedstock at reasonable rate, timely payment of subsidy to the units and adequate budgetary provision are crucial and can address the major concerns of industry. It is expected in coming years, the implementation of NBS in urea will also pave path for DBT to farmers.

The continuously increasing gap between the concession price and the MRP of urea implies distortions in the economy resulting in large fiscal imbalances. Removal of such imbalances is necessary for the healthy growth of the urea industry as well as economy. Thereby, the revision of MRP of urea needs special attention and there is

strong ground for upward revision of MRP in phased manner. Considering the crisis in Indian agricultural immediate decontrol of MRP of urea is not recommended because it will affect majority of small and marginal farmers adversely. The Indian farmers have been accustomed with highly subsidized urea and it will take time to change their behaviour. Moreover, dual pricing of urea can be implemented on trial basis where the N:P:K ratio is very high either region wise or on basis of landholding.

The total decontrol of urea price with DBT to farmer is possible only when it be possible to roll out all over the country without any technical and financial hurdles. The Government's contribution in form of subsidy in the cost of production of urea need to be brought down to manageable level by linking MRP of urea to price of feedstock (may be revised twice per annum).

Gas pooling requires more participation of fertilizer units. The balance use of fertilizers, reform in freight subsidy scheme, decontrol of movement of urea, simplification in process of adding new chemical and organic fertilizers in FCO, demand change in approach and simplification. The introduction of crop specific customized fertilizers can reduced the consumption of urea.

At the same time the government has to pay attention on farmers as they have important role in entire gambit of urea subsidy. Strict implementation of recommendation of SHC and effective targeting of subsidy require creating master data base of farmers involved in agriculture, digitization of land record and linking it with aadhar card. PM-Kisan has made considerable progress by collecting details of eight crores farmers. This recent advancement may solve the problem for DBT in accurately identifying beneficiaries and spread of digital technology to hinterland.

Imbalance use of fertilizers need immediate handling and is matter of great concerns and it can be done by collaboration of government, farmers and urea industry. Farmers have important role to play because their decision to buy and use fertilizers has direct implication on demand and consumption of urea. Therefore, different approach has to be taken. Here, agriculture extension and education assume a significant role. Extension is the art of communicating between the laboratory and the farm. In India, extension is typically administered through the ministry of agriculture, agri-business entities, or through a pluralistic system of community organizations and NGOs. In my understanding the extension is neglected area and it

can be used as tool for balanced use of nutrient, in promotion of integrated nutrient programme and in diversification of crops. Recent announcement of launching

Farmer Producers Organization (FPO) can play active role in area specific extension progamme. The role of agriculture extension should be targeted to change in behaviour by convincing them. A mission mode approach on the line of "Swachh Bharat" "Swachh Krishi" can be implemented by using all electronic and print media throughout the country.

There is a need for coordination between law enforcing agencies along the international border and respective state department to stop smuggling of urea to neighbouring countries. The provisions of EC Act and FCO should be amended for stricter punishment for diversion of agricultural grade urea for non-agricultural uses.

To better understand the implications of these results, recommendations following future studies can be taken

i. Effect of introduction of second generation smart subsidy in other countries and its applicability in Indian scenario
ii. Role of various stakeholders in rationalization of urea subsidy
iii. Role of agriculture extension in balanced use of fertilizers
iv. Reform in Uniform freight subsidy scheme
v. Road map to Uniform Pricing Policy for domestic urea units

In a political democracy like India, any reform must qualify the test of economic viability, socio-economic desirability and political acceptability and urea pricing policy is not an exception.The government needs to walk an extra mile and engage the industry on policy formulation front to achieve the well being of farmers which promoting sustainable nutrient use in agriculture. Any further inception of reform in urea pricing policy should also keep the Gandhaian dictum of decentralization in consideration by involving the farmers, urea industry and experts from field of agriculture and economy in policy making.

Reference

Bhushan, C., Arora, S., Trivedi, V., Srivastava, S., Subramanian, K. & Verma, S. (2019). *Grain by grain, Green rating of Fertilizer sector*. Centre for Science and Environment, New Delhi.

Central Institute of Educational Technology (2017) soil types of India. Accessed from website https://nroer.gov.in/

Chaba A. A. (2019 December 26). Over 24 Lakhs soil health cards issued in Punjab, but fertiliser usage down by only 7% in two years *The Indian Express*. Retrieved from https://indianexpress.com/

Chand, R. and Pavithra, S. (2015). Fertiliser use imbalance in India Analysis of States. *Economic and Political Weekly,L,* (44), 98-104. Retrieved from https://www.jstor.org

Chander, S. & Nand, S. (2017).*Impact of Fertilizer Policies on Farmers and Industry*.Pre-print of Annual Seminar Papers. Fertilizers Association India, New Delhi. Session 4, 1-8.

Corbeau, A. S., Hasan, S. and Dsouza, S. (2018). *The Challenges Facing India on its Road to a Gas-Based Economy*. King Abdullah Petroleum Studies and Research Center (KAPSARC). Doi: 10.30573/KS--2018-DP41

Consultancy.in. (2018, February 12). Food grain demand in India will reach 355 million tonnes in 2030. Retrieved from https://www.consultancy.in

Department of Agriculture, Co-Operation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India (August, 2019). *Agriculture Census 2015-16 (Phase-I) All India Report on Number and Area of Operational Holdings*. Retrieved from http://agricoop.nic.in

Department of Fertilizers. *AnnualReport* (2017-18)., Ministry of Chemicals and Fertilizers, Government of India. Retrieved from http://fert.nic.in.

Desai, G. M. (1986). Policies for Growth in Fertiliser Consumption: The Next Stage. *Economic and Political Weekly, 21*, (2),928-933

Deshpande, R. M. (2019).*DBT issues and Remedies.Indian Journal of Fertilizers, 15*(9), 124-138.

Fertilizers Association of India (November 22 2019). Fertilizers Statistics 2018-19.

Ghosal Sutanuka (2018, May 31). Fall in rupee, rising gas costs to increase urea subsidy shortfall to Rs 9,000 Crores. The Economics Times. Retrieved from https://economictimes.indiatimes.com.

Gilland, B. (2015).Nitrogen, phosphorus, carbon and population Science *Progress, 98, (4), 379– 90.* doi:10.3184/003685015X14437845647018

Greenpeace, (2009). Chemical fertilizers in our water; An analysis of nitrates in the groundwater in Punjab. Retrieved from http://www.indiaenvironmentportal.org.in

Gulati, A. and Banerjee, P. (2020). Goal Setting for Indian Agriculture. *Economic & PoliticalWeekly LV*, (9), 34-37.

Gulati, Ashok and Sudha Narayanan (2003): The Subsidy Syndrome in Indian Agriculture, Oxford University Press, New Delhi

Gupta, U. (2019, October 7). India's fertilizer policy flawed, policymakers still stuck to the 1970s/80s. *Financial Express*..Retrieved from https://www.financialexpress.com

Gupta, U. (2020, January 13). Why PM Modi must not give up on fertilizer DBT? Financial Express. Retrieved from https://www.financialexpress.com

Hardy A. G. (2016). The sustainability of changes in agricultural technology: The carbon, economic and labour implications of mechanisation and synthetic fertiliser use. *Ambio,45*, (8), 885-894. Published by: Springer on behalf of

Holden, S. T. (2018). "The Economics of Fertilizer Subsidies," CLTS Working Papers 9/18,Norwegian University of Life Sciences, Centre for Land Tenure Studies. at: https://www.researchgate.net/publication/327652377 accessed on 20 January 2020.

Huang, J., Gulati, A. and Gregory, I. (2017).*Fertilizers Subsidy- which way Forward.* IFDC/FAI report. Retrieved from https://ifdc.org/2017/01/23/new-publication.

Kumar S. (1999).New Fertiliser Policy: A Practical Approach. *Economic and Political Weekly,34*, (1/2), 57-63

Mohapatra, J.K. (2019).*New Urea Policy 2015* - Has it incentivized Energy efficiency of the Domestic Urea Industry. *Indian journal of Fertilizers. 15* (3), 218-224.

Mukundan, R. (2013).*Issues relating to Implementation of Pricing Policies and Industry.* Preprint of Annual seminar papers. Fertilizers Association India, New Delhi. Session 4, 1-5.

Pandey, C. and Diwan, H. (2018). Integrated approach for managing fertilizer

Intensification linked environmental issues. *Management of Environmental Quality: An International Journal,29* (2), 324-347. DOI 10.1108/MEQ-09-2017-0093

Policy Muddle. (2001). *Economic and Political Weekly, 36,* (51), 4681.

Press Information Bureau. (2018, 16 March). *Model Fertilizer Retail Shops made operational across the country***.** Retrieved fromhttps://pib.gov.in.

PTI. (2020, February 29). PM Modi launches 10,000 Farmer Producer Organisations move to turn farmers into businessmen. Financial Express. Retrieved from https://www.financialexpress.com/

Rajalakshmi, N. (2019, October 09). Soil health still far from ideal; excessive use of urea fertilizers continues. BL Research Bureau. The Hindu Business line. Retrieved from https://www.thehindubusinessline.com

Ramakumar R. And Arjun S.V. (2019 October, Stirring up the truth about Zero Budget Natural Farming. The Hindu Retrieved from https://www.Thehindu.Com.

Ravinutala, S. (2016). Redesigning India's Urea Policy (Doctoral dissertation). John F. Kennedy School of Government, Harvard University.

Raviprasad, G. (2019, February 21). How much urea does India really require? The *Indian Express.*Retrieved from https://indianexpress.com

Sagar, V. (1991). Fertiliser Pricing: Are Subsidies Essential? *Economic and Political Weekly,6*, (50), 2861-2864. Retrieved from https://www.jstor.org

Saha, M. (2013). Food for Soil, Food for People: Research on Food Crops, Fertilizers, and theMaking of Modern Indian Agriculture. *Technology and Culture*, *54*, (2), 289-316. Retrieved from https://www.jstor.org

Shang, Q., Ling, N., Feng, X., Yang, X., Wu, P., Zou, J., Shen Q. and Guo, S. (2014). Soil fertility and its significance to crop productivity and sustainability in typical agroecosystem: a summary of long-term fertilizer experiments in China. *Plant and Soil,381*, (1/2), 13-23. Retrieved from https://www.jstor.org.

Shanthi S (2020). Government to Launch Aadhaar-Linked Master Database for Agri-Schemes. Accessed from https://inc42.com/buzz/ on 28/02/2020.

Sharma, V.P. & Thaker, H. (2010). Fertilizer Subsidy in India: Who are the Beneficiaries*? Economic & Political Weekly, xlv* (12), 68-76.

Singh, R. (2004). Equity in Fertiliser Subsidy Distribution. *Economic and Political Weekly*, *39*, (3), 295-300. Retrieved from https://www.jstor.org

Smith, L. G., Kirk, G. J. D., Jones, P. J. and Williams, A. G. (2019). The greenhouse gas impacts of converting food production in England and Wales to organic methods. Nature Communications. doi.org/10.1038/s41467-019-12622-7. Retrieved from www.nature.com/naturecommunicationsRoyal Swedish Academy of Sciences. Retrived from https://www.jstor.org.

Venkateshwarlu, S. and Sen, A (2002). Fertiliser Industry in India: Moulded by GovernmentPolicies. *Economic and Political Weekly*, *37*, (4), 326-336. Retrieved from https://www.jstor.org

Vittal, N. (1984).Fertiliser Pricing Policy: Some Issues. *Economic and Political Weekly*, *19*, (50),25-32. Retrieved from https://www.jstor.org

(https://loksabha.nic.in/)

(https://rajyasabha.nic.in)

UNEP. (2020, February 24). What does UN environment programme bring to the table in Zero budgeting Natural Farming. Retrieved from https://www.unenvironment.org.

Bibliography

All in the Name of the Poor: Who will be the real beneficiaries of the Direct Benefit Transfer scheme? (2013) *Economic and Political Weekly*, *48*, 13. Retrieved from https://www.jstor.org

Alkon, M. and Urpelainen J. (2018). Trust in Government and Subsidy Reform: Evidence from a Survey of Indian Farmers. *St Comp Int Dev*, *53*, 449–476. https://doi.org/10.1007/s12116-018-9266-1

Anand, A. and Kaur, M. (2019). Perspective of Economists and Extension Personnel towards Agricultural Subsidies in Punjab.*Economic Affairs*,*64*, (1), 41-46. DOI: 10.30954/0424-2513.1.2019.6

Ashra, S. and Chakravarty, M. (2007). Input Subsidies to Agriculture: Case of Subsidies to Fertiliser Industry Across Countries. *VISION-The Journal of Business Perspective.11*, (3), 36-58.

Debraj Bagchi (2014).*The Indian Subsidy Debate: Why or Why Not?Journal of Economic Policy and Research, 9* (2), Institute of Public Enterprise.

Dholakia, R. H. & Majumdar, J. (1994). *Estimation of Price Elasticity of Fertilizer Demand in India.* IIMA Working Papers WP1994-07-01_01273, Indian Institute of Management Ahmedabad, Research and Publication Department.

Javdani M. (2012). Malawi's agricultural input subsidy: study of a Green Revolution-style strategy for food security. *International Journal of Agricultural Sustainability, 10,* (2), 150–163.doi.org/10.1080/14735903.2012.675731

Jitendra (2020, February 18). Union Budget 2020-21: An expert's guide to rural distress,Nirmala Sitharaman's Budget has all the ingredients to deepen India's farm crisis.*Down to Earth.*Retrieved fromhttps://www.downtoearth.org.in

Fan, S., Gulati, A. & Thorat, S. 2007. *Investment,* subsidies, *and pro-poor growth in rural India.* IFPRI Discussion Paper 716. Washington DC: IFPRI.

Chirwa, E. & Dorward, A. (2013). *Agricultural Input Subsidies: The Recent Malawi Experience*. Published to Oxford Scholarship Online: January 2014 DOI:10.1093/acprof:oso/9780199683529.001.0001

Gulati, A. Banerjee, P. 2016. *Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options.* Working Papers id:11083, eSocialSciences. Retrieved from https://ideas.repec.org.

Gulati, A. and Narayanan, S. (2000). Demystifying Fertiliser and Power Subsidies in

India.*Economic and Political Weekly, 35*, 10, 784-794. Retrieved from https://www.jstor.org

Kumar, Y. (2018). Input Marketing Strategy for Rejuvenation of Soil Health. *Indian Journal of Fertilisers, 14,* (9), 1-16.

Kishore A., Praveen, K. V. and Roy, D. (2013) Direct Cash Transfer System for Fertilisers:Why It Might be Hard to Implement. *Economic and Political Weekly*, *48*, 52, 54-63.

Malik, M. T. R. and Pazir, D. (2019). Fertilizer subsidies and Indian Agriculture. *Research Journal of Humanities and Social Sciences, 10*(1). 2019 DOI: 10.5958/2321-5828.2019.00044.5

Mukherjee, S. (2010). Nutrient-Based Fertiliser Subsidy: Will Farmers Adopt Agricultural Best Management Practices? *Economic and Political Weekly, 45*, (49), 66-72.Retrieved from https://www.jstor.org

Nasrin, M., Bauer S., Arman, M. (2018). *Assessing the impact of fertilizer subsidy on farming efficiency: A case of Bangladeshi farmers*. Published by De Gruyter. This work is licensed under the Creative Commons Attribution. https://doi.org/10.1515/opag-2018-0060.

Praveen, K.V. (2014).Evolution and Emerging Issues in Fertilizer Policies in India. *Economic Affairs: 59*(2): 163-173. DOI Number 10.5958/J.0976-4666.59.2.016

Quizon, J. (1985). Withdrawal of Fertiliser Subsidies: An Economic Appraisal. *Economic and Political Weekly, 20,* 39, A117-A123. Retrieved from https://www.jstor.org

Ramaswami, B. (2019). Agricultural Subsidies**;** Study Prepared for XV Finance Commission.Report by Indian Statistical Institute, New Delhi. Retrieved from https://fincomindia.nic.in/

Ratings criteria for the fertiliser industry February 2018. Retrieved from https://www.crisil.com.

Report of the working group on Urea Policy (2005) department of Fertilizers, Ministry of Chemicals and fertilizers, Government of India.

Revamping Pricing. (2003). *Economic and Political Weekly, 38*, (11), 1001. Retrieved from https://www.jstor.org

Roy, A. K. (2001). Why Not Coal-Based Fertiliser Plants? *Economic and Political Weekly, 36,* (21), 1790-1792. Retrieved from https://www.jstor.org

Sajesh,V. K., Padaria R. N., and Sadamate V.V.. (2018). Pluralism in Agricultural Extension in India: Imperatives and Implications Economic Affairs, *63*, (4), 1017-1025. DOI: 10.30954/0424-2513.4.2018.27

Sebayang, V. B., Sinaga, B.M., Harianto and Kariyasa I. K. (2019).The Impact of Domestic Policy on Farmers' Welfare and Maize Processing Industry in Indonesia.*International Journal of Economics and Financial Issues*, *9* (3). Retrieved from http: www.econjournals.com

Sharma, V. P. (2012). *Dismantling Fertilizer Subsidies in India: Some Issues and Concerns for Farm Sector Growth*. Working Paper, September 2012. http://vslir.iimahd.ernet.in:8080/xmlui/handle/123456789/11384.

Sidhu, J. S. and Sidhu, D. S. (1985). Price-Support versus Fertiliser Subsidy: An Evaluation.*Economic and Political Weekly*, *20*, (13), 17-22. Retrieved from https://www.jstor.org

Wijetunga C. S. and Saito K. (2017). Evaluating the Fertilizer Subsidy Reforms in the Rice Production Sector in Sri Lanka: A Simulation Analysis. *Advances in Management & Applied Economics, 7, (1)* 31-51. Retrieved from https://econpapers.repec.org.Retrieved from https://www.jstor.org

Appendix

Appendix-1

Capacities of various Fertilizer Plants with original and augmented capacities

Sr. No	Name of plant	Original Capacity of NH_3 plant MTPD	Revised capacity of NH_3 plant MTPD	Original Capacity of Urea plant MTPD	Revised capacity of Urea plant MTPD	Commission year
	Group-I Plants					
1	NFL Vijaipur-I	1350	1750	2X1100	2X1515	1987
2	NFL Vijaipur-II	1350	1864	2X1100	3231	1997
3	IFFCO Aonla-I	1350	1864	2X1100	3245	1988
4	IFFCO Aonla-II	1350	1864	2X1100	3245	1996
5	IFFCO Phulpur-II	1350	1864	2X1100	3245	1997
6	KRIBHCO Hazira	2X900	2X1100	4X1100	4X1662	1985
7	CFCL Gadepan-I	1350	2000	2X1300	2X1750	1994
8	CFCL Gadepan-II	1350	2000	2X1300	2X1750	1999
9	IGF Jagdishpur	1350	1520	2X1100	2X1310	1988
10	KSFL Shahjahanpur	1350	1520	2X1120	2X1310	1995
11	NFCL Kakinada-I	900	1325	1500		1992
12	NFCL Kakinada-II	900	1325	1500		1998
13	TCL Babrala	1350	2000	2 X1125	2 x 1750	1994
B	**Group-II Plants**					
1	RCF Thal	2 x1500	2 x 1750	3 x 1710	3 x 2020	1985
2	IFFCO Kalol	910	1100	1200	1650	1975
3	GNFC Bharuch	1350	1350	1800	1930	1982
4	GSFC Vadodara	1350	----	1100	----	1974
C	**Group-III Plants**					
1	NFL Bathinda	900	900	1550	1550	1979 #
2	NFL Nangal	900	900	1550	1550	1978 #
3	NFL Panipat	900	900	1550	1550	1979 #
4	IFFCO Phulpur-I	950	1250	1670	2130	1981
5	SFC Kota	450	700	600	1000	1969
6	KFCL Kanpur	3X415	-	3X682	-	1969
7	RCF Trombay-V	900	1070	1000	1350*	1982
8	ZACL Goa	660	1100 *	1400	1800 *	1973

Source: Fertilizer statistics 2018-19

feed stock changeover project from fuel oil to natural gas and plants commissioned in 2012-13

* Under implementation/execution.

Appendix-2

List of Urea Unit with Capacity and Energy Norms

Sl No.	Name of the Unit	NPS_III_Energy Norms	NUP-2015 Norms	NUP-2015 Norms (w.e.f 01.04.2018)	Capacity (MT)
		Gcal/PMT	Gcal/PMT	Gcal/PMT	MT
1	2				3
	Feed-Stock: Gas Pool				
1	IFFCO-Aonla	5.69	5.656	5.5	864600.000
2	INDOGULF-Jagdishpur	5.534	5.501	5.5	864600.000
3	KRIBHCO-Hazira	5.952	5.952	5.5	1729200.000
4	NFL-V Pur	5.952	5.904	5.5	864600.000
5	NFCL-Kakinada	5.712	5.693	5.5	597300.000
6	CFCL-Kota	5.621	5.587	5.5	864600.000
7	YFIPL	5.417	5.333	5.417	864600.000
8	KFL	5.712	5.643	5.5	864600.000
9	NFCL-Kakinada exp.	5.712	5.672	5.5	597300.000
10	IFFCO-Aonla exp.	5.522	5.505	5.5	864600.000
11	NFL-V Pur Exp.	5.712	5.569	5.5	864600.000
12	IFFCO-P,PUR EXP.	5.883	5.744	5.5	864600.000
13	CFCL-II	5.678	5.533	5.5	864600.000
		5.718	**5.659**	**5.494**	**11569800.000**
14	GNFC-Bharuch	7.989	6.301	6.2	636900.000
15	GSFC-Baroda	6.935	6.741	6.2	370590.000
16	IFFCO-Kalol	6.607	6.231	6.2	544500.000
17	RCF-Thal	6.938	6.598	6.2	1706897.000
		7.088	**6.495**	**6.2**	**3258887.000**
18	IFFCO-P,PUR	7.584	7.145	6.5	551100.000
19	KFCL-Kanpur	7.847	7.847	6.5	722700.000
20	SFC-Kota	7.847	7.585	6.5	379500.000
21	RCF -Trombay-V	9.569	8.538	6.5	330000.000
22	ZACL-Goa	7.308	7.308	6.5	399300.000
23	NFL-Nangal	9.517	7.095	6.5	478500.000
24	NFL-Bhatinda	10.221	7.479	6.5	511500.000
25	NFL-Panipat	9.654	7.614	6.5	511500.000
	Sub Total	**8.657**	**7.553**	**6.5**	**3884100.000**
	Gas pool units Total	**6.567**	**6.198**	**5.826**	**18712787.000**
		12.61	**12.61**	**12.61**	
26	BVFC- Namrup II	12.688	12.688	12.688	240000.000
27	BVFC- Namrup - III	12.654	12.654	12.654	315000.000
					555000.000
	Feed-Stock: Naphtha	**7.356**	**7.356**	**7.356**	
28	MCFL-Mangalore	8.337	8.337	8.337	379500.000
29	MFL-Madras	7.382	7.185	7.185	486750.000
30	SPIC-Tuticorin	7.688	7.606	7.606	620400.000
	Total -Naphtha				**1486650.000**
		6.810	**6.471**	**6.136**	
	Grand Total				**20754437.000**

Appendix-3

List of Urea Unit with Concession rate in last Five years

Sl No.	Name of the Unit	Fixed Cost at 2002-03	2014-15	2015-16	2016-17	2017-18	2018-19 (Q3)	2019-20 (Q2)
		Rs/MT	Rs/MT	Rs/MT	Rs/MT	Rs/MT	Rs/MT	Rs/MT
1	2							
	Feed-Stock: Gas Pool							
1	IFFCO-Aonla	2123.000	16460.000	16647.000	14449.000	16408.000	22783.000	20879
2	INDOGULF-Jagdishpur	2062.000	20582.000	16802.000	13993.000	16018.000	22808.000	20955
3	KRIBHCO-Hazira	1484.000	13846.000	16504.000	14485.000	16695.000	24004.000	21895
4	NFL-V Pur	1285.000	16497.000	16658.000	14204.000	16388.000	23783.000	21689
5	NFCL-Kakinada	3067.000	11835.000	17900.000	15536.000	17610.000	22620.000	22693
6	CFCL-Kota	2577.000	18722.000	17999.000	14870.000	16822.000	23476.000	21389
7	YFIPL	3100.000	17311.000	17081.000	14696.000	16643.000	23511.000	21674
8	KFL	2536.000	16141.000	16950.000	14853.000	16930.000	23852.000	21899
9	NFCL-Kakinada exp.	3125.000	11736.000	17086.000	15552.000	17627.000	22610.000	0
10	IFFCO-Aonla exp.	2541.000	16613.000	16634.000	14510.000	16470.000	23180.000	21359
11	NFL-V Pur Exp.	2403.000	15870.000	16920.000	14600.000	16624.000	23351.000	21459
12	IFFCO-P,PUR EXP.	3497.000	27840.000	19938.000	15906.000	17832.000	24298.000	21897
13	CFCL-II	3306.000	24725.000	18546.000	15437.000	17441.000	24168.000	22251
		2441.822	**17541.653**	**13841.475**	**14793.720**	**16837.133**	**23499.642**	**20544.4**
14	GNFC-Bharuch	2129.000	19892.000	15495.000	14759.000	16787.000	23371.000	20130
15	GSFC-Baroda	3187.000	15158.000	19788.000	17917.000	20365.000	28132.000	26222
16	IFFCO-Kalol	2432.000	16133.000	17938.000	16125.000	18388.000	25656.000	23412
17	RCF-Thal	1727.000	14552.000	18104.000	16291.000	18298.000	25695.000	23307
		2089.384	**15928.690**	**15251.127**	**16148.762**	**18252.788**	**25511.421**	**23035.1**
18	IFFCO-P,PUR	3213.000	28560.000	20040.000	16699.000	19819.000	25722.000	24124
19	KFCL-Kanpur	2826.000	35702.000	24572.424	21271.000	23343.000	29704.000	27426
20	SFC-Kota	2964.000	17603.000	19473.000	17623.000	19500.000	26747.000	24503
21	RCF -Trombay-V	2330.000	15369.000	23783.000	21700.000	24571.000	34169.000	32027
22	ZACL-Goa	2497.000	42664.000	25369.000	18303.000	20976.000	30151.000	27627
23	NFL-Nangal	2707.000	29807.000	20738.528	17961.000	19634.000	25550.000	23682
24	NFL-Bhatinda	2609.000	22699.000	19490.120	17850.000	19938.000	26889.000	24927
25	NFL-Panipat	2799.000	31503.000	20462.248	18311.000	20185.000	27243.000	25153
	Sub Total	**2771.637**	**28916.884**	**19954.226**	**18749.099**	**21007.291**	**28068.850**	**25993.8**
	Gas pool units Total	**2448.902**			**15850.699**	**17949.248**	**24798.000**	**22109.3**
		5413.000			**13920.000**	**13529.000**	**13529.000**	
26	BVFC- Namrup II	2710.000	16681.000	17141.000	11056.000	10874.000	10874.000	
27	BVFC- Namrup - III	3878.865	13292.000	13730.000	12294.486	12022.108	12022.108	

Appendix-4

Subsidy paid to different Urea nits in last five Years

Sl. No.	Company- Plant Name	Indigenous Urea(Rs. in Crores				
		2014-15	2015-16	2016-17	2017-18	2018-19
1	RCF-Thal	2,342.37	2,595.28	3,328.60	3,343.98	2,410.90
2	RCF-Trombay	456.81	613.73	825.57	792.29	817.56
3	MFL	1,675.85	933.28	1,331.44	852.13	1,372.75
4	NFL-Bhatinda	1,042.48	1,763.11	1,559.39	1,017.35	889.31
5	NFL-Panipat	3,015.71	1,594.57	1,425.68	1,292.80	823.26
6	NFL-Vijaipur-I	966.22	1,098.84	1,316.72	1,426.96	1,162.84
7	NFL-Vijaipur-II	1,053.59	1,364.55	1,413.34	1,606.77	1,219.45
8	NFL-Nangal	660.94	1,661.96	1,377.64	1,277.16	759.54
9	BVFCL- Namrup-II	94.55	101.48	94.95	88.84	46.16
10	BVFCL- Namrup-III	157.82	268.20	284.06	342.52	152.26
11	GSFC (State Govt)	318.53	311.13	664.18	551.98	565.61
12	GNFC (State Govt)	1,285.97	1,558.47	1,524.98	1,224.54	895.72
13	KRIBHCO	2,336.81	2,935.68	3,151.23	2,828.19	3,053.70
14	IFFCO-PHULPUR-I	1,409.72	1,120.92	1,104.52	1,210.58	802.43
15	IFFCO-PHULPUR-II	1,863.02	1,951.45	1,546.47	1,680.65	1,137.75
16	IFFCO-KALOL	562.36	869.92	906.81	862.66	768.36
17	IFFCO-AONLA-I	2,166.77	1,547.07	1,411.90	1,139.64	1,078.87
18	IFFCO-AONLA-II	978.40	1,591.22	1,330.83	1,158.72	922.58
19	NFCL-I	640.87	386.32	1,015.53	1,101.03	910.77
20	NFCL-II	457.32	630.28	1,043.10	1,000.82	905.54
21	CFCL-I	1,997.36	1,375.82	1,506.73	1,294.84	1,589.45
22	CFCL-II	1,607.43	1,620.19	1,606.37	1,519.35	1,298.56
23	TATA CHEM / YARA	1,567.91	1,619.97	1,562.16	1,530.45	1,428.29
24	ZACL	1,533.95	1,439.63	832.92	744.11	761.78
25	SFC	508.06	536.34	682.34	615.87	643.89
26	INDOGULF / GRASIM	1,613.43	1,623.85	1,542.60	1,349.51	1,131.77
27	SPIC	1,814.82	1,137.22	1,700.72	1,496.23	1,674.30
28	KSFL / KFL	1,052.57	1,433.84	1,334.23	1,151.07	1,058.51
29	MCFL	1,463.99	760.19	1,083.82	725.20	744.53
30	KFCL	1,554.38	1,755.49	1,491.17	1,747.46	1,163.06
Total		**38,200**	**38,200**	**40,000**	**36,973.70**	**32,189.50**

Appendix-5

State-wise/Company-wise major Urea manufacturing units

Sl. No.	Name of the State	Name of the Company	Name of the fertilizer manufacturing units	Fertilizers Produced
1	**Andhra Pradesh**	Nagarjuna Fertilizers and Chemicals Limited.	Nagarjuna Fertilizers and Chemicals Limited.: Kakinada-I	Urea
			Nagarjuna Fertilizers and Chemicals Limited.: Kakinada-II	Urea
2	**Assam**	Brahamaputra Valley Fertilizers Corp. Limited.	Brahmaputra Valley Fertilizers Corporation Limited., Namrup-II	Urea
			Brahmaputra Valley Fertilizers Corporation Limited., Namrup-III	Urea
3	**Goa**	Zuari Agro Chemicals Limited.	Zuari Agro Chemicals Limited.: Goa	Urea, DAP & Complexes
4	**Gujarat**	Indian Farmers Fertilizers Co-operative Limited.	Indian Farmers Fertilizers Co-operative Limited.: Kalol	Urea
		Krishak Bharati Co-operative Limited.	Krishak Bharati Co-operative Limited.: Hazira	Urea
		Gujarat Narmada Valley Fertilizers & Chemicals Limited.	Gujarat Narmada Valley Fertilizer & Chemicals Limited. : Bharuch	Urea & Complexes
		Gujarat State Fertilizers & Chemicals Limited.	Gujarat State Fertilizers & Chemicals Limited. : Vadodara	Urea, DAP, A/S & Complexes
5	**Haryana**	National Fertilizers Limited.	National Fertilizers Limited. : Panipat	Urea
6	**Karnataka**	Manglore Chemicals & Fertilizers Limited.	Manglore Chemicals & Fertilizers Limited. : Manglore	Urea, DAP & Complexes
7	**Madhya Pradesh**	National Fertilizers Limited.	National Fertilizers Limited. : Vijaipur-I	Urea
			National Fertilizers Limited. : Vijaipur-II	Urea
8	**Maharashtra**	Rashtriya Chemicals & Fertilizers Limited.	Rashtriya Chemicals & Fertilizers Limited.: Trombay	Urea & Complexes

			Rashtriya Chemicals & Fertilizers Limited., Thal	Urea
9	**Punjab**	National Fertilizers Limited.	National Fertilizers Limited. : Nangal-II	Urea
			National Fertilizers Limited. : Bhatinda	Urea
10	**Rajasthan**	Chambal Fertilizers and Chemicals Limited.	Chambal Fertilizers and Chemicals Limited. : Gadepan-I	Urea
			Chambal Fertilizers and Chemicals Limited. : Gadepan-II	Urea
			Chambal Fertilizers and Chemicals Limited. : Gadepan-III	Urea
		Shriram Fertilizers & Chemicals Limited.	Shriram Fertilizers & Chemicals Limited. : Kota	Urea
11	**Tamil Nadu**	Madras Fertilizer Limited.	Madras Fertilizer Limited. : Chennai	Urea & Complexes
		Southern Petrochemicals Inds. Corpn. Limited.	Southern Petrochemical Inds.Corpn.Limited. : Tuticorin	Urea
12	**Uttar Pradesh**	Indian Farmers Fertilizers Co-operative Limited.	Indian Farmers Fertilizer Co-operative Limited. : Phulpur-I	Urea
			Indian Farmers Fertilizer Co-operative Limited. : Phulpur-II	Urea
			Indian Farmers Fertilizer Co-operative Limited. : Aonla-I	Urea
			Indian Farmers Fertilizer Co-operative Limited. : Aonla-II	Urea
		GRASIM Industries Limited	GRASIM/IGF : Jagdishpur	Urea
		Yara Fertilizers India Pvt. Limited.	Yara Fertilizers India Pvt. Limited./TCL : Babrala	Urea
		KRIBHCO Fertilizers Limited.	KFL/Kribhco Shyam Fertilizers Limited. : Shahjahanpur	Urea
		Kanpur Fertilizers & Ciment Limited.	KFCL : Kanpur	Urea
13	**West Bengal**	Matix Fertilizers & Chemicals Limited. (not operational)	Matix Fertilizers & Chemicals Limited. : Panagarh	Urea

Appendix-6

Cumulative Requirement, Availability and Sales of Fertilizers during the year 2018-19 (in LMT)

State	Urea			DAP			MOP			NPK		
	Requirement*	Availability	Sales	Requirement*	Availability	Sales	Requirement*	Availability	Sales	Requirement*	Availability	Sales
Andaman and Nicobar	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Andhra Pradesh	16.70	14.22	13.66	3.76	3.30	3.00	2.86	2.59	2.42	12.50	11.90	10.37
Arunachal Pradesh	0.04	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Assam	3.35	3.98	3.92	0.65	0.74	0.64	0.80	0.84	0.78	0.05	0.18	0.17
Bihar	21.00	21.95	21.84	5.00	7.59	6.78	2.10	2.65	2.23	3.50	3.49	3.32
Chandigarh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chhattisgarh	6.00	7.85	7.58	3.50	3.94	3.23	1.20	1.06	0.91	1.50	1.42	1.14
Dadra and Nagar Haveli	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daman and Diu	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delhi	0.08	0.21	0.21	0.04	0.03	0.03	0.02	0.01	0.01	0.02	0.00	0.00
Goa	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.03	0.03	0.03
Gujarat	19.60	21.55	21.03	5.00	5.23	4.63	1.41	1.43	1.43	4.65	6.41	5.60
Haryana	19.00	22.05	21.58	6.20	6.25	5.78	0.85	0.87	0.71	0.27	0.46	0.38
Himachal Pradesh	0.66	0.67	0.67	0.00	0.01	0.01	0.10	0.08	0.08	0.38	0.36	0.32
Jammu and Kashmir	1.33	1.35	1.34	0.72	0.64	0.61	0.26	0.25	0.25	0.00	0.02	0.02
Jharkhand	2.40	2.29	2.29	1.05	0.88	0.84	0.12	0.05	0.05	0.35	0.43	0.41
Karnataka	14.00	13.82	13.41	5.87	6.08	5.59	4.00	3.28	3.03	11.71	15.40	13.41
Kerala	1.40	1.08	1.01	0.27	0.26	0.22	1.24	1.03	1.00	1.67	1.43	1.31
Lakshadweep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Madhya Pradesh	23.00	26.03	25.61	11.50	13.85	12.99	1.25	1.31	1.15	2.80	3.80	3.34
Maharashtra	22.00	22.21	21.80	6.70	6.61	6.09	4.50	4.16	4.00	18.00	22.40	19.58

Manipur	0.24	0.27	0.27	0.12	0.01	0.00	0.12	0.00	0.00	0.00	0.00	0.00
Meghalaya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mizoram	0.09	0.12	0.12	0.06	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Nagaland	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Odisha	5.75	5.67	5.58	2.15	2.19	1.92	1.45	1.50	1.33	3.00	3.01	2.62
Puducherry	0.11	0.11	0.11	0.01	0.01	0.01	0.03	0.02	0.02	0.06	0.04	0.04
Punjab	25.50	30.91	30.49	8.50	8.19	7.63	1.10	0.74	0.60	0.68	0.66	0.59
Rajasthan	19.00	20.56	20.32	6.15	7.51	7.03	0.30	0.41	0.32	0.55	1.08	0.95
Sikkim	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tamil Nadu	8.50	9.13	9.02	3.00	2.60	2.46	3.50	2.92	2.82	5.50	5.82	5.29
Telangana	15.00	13.85	13.75	3.20	2.55	2.28	2.60	1.62	1.51	10.50	12.21	10.57
Tripura	0.39	0.16	0.16	0.06	0.05	0.05	0.14	0.06	0.06	0.02	0.01	0.01
Uttarakhand	2.35	2.80	2.68	0.33	0.36	0.33	0.05	0.07	0.07	0.39	0.36	0.33
Uttar Pradesh	59.50	67.28	65.65	21.00	21.66	19.65	3.50	2.31	2.10	9.00	7.29	6.57
West Bengal	13.00	13.16	13.06	3.50	3.58	3.15	3.25	2.98	2.65	10.54	11.26	9.86
Total	**300.04**	**323.31**	**317.19**	**98.40**	**104.15**	**94.95**	**36.81**	**32.27**	**29.54**	**97.68**	**109.43**	**96.21**

***Requirement is projected at the beginning of each season.**

At the beginning of each season the states and UTs give their projected requirement which is finalized by DAC & FW and conveyed to DOF based on the various factors. However as the season progresses the requirement keep on fluctuating in reality based on factors like monsoon, net sown area, net irrigated area, cropping pattern etc.