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PCPIR

POLICY REVIEW

May 2019













WHITE PAPER

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MESSAGE

India's Petroleum, Chemicals and Petrochemicals industry is now well established and has grown steadily during the last decade. The industry is crucial for the development of the manufacturing sector especially for achieving a $1 trillion manufacturing economy by 2025 as it covers the whole range of daily use items ranging from clothing, housing, construction, furniture, automobiles, household items, toys, agriculture, horticulture, irrigation, and packaging to medical appliances etc.

To support the vision of 'Make in India', domestic as well as foreign investments are crucial for overall industrial development and employment generation in Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs). However, despite the benefits extended under the PCPIR Policy over the past decade, except for Dahej PCPIR, all other PCPIRs have not been able to attract desired investments and failed to grow organically.

Now the time has come to address the specific issues related to each PCPIRs by ensuring robust policy reforms to drive investments and making India a key hub for both domestic and international markets.

I am glad to note that, a White Paper has been jointly prepared by FICCI National Petrochemicals Committee and Mott MacDonald to bring out the challenges and issues related to the development of PCPIR.

I am sure, it will be found useful by all stakeholders.



(Prabh Das)


PCPIR
POLICY REVIEW

Foreword



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Clusters play a vital role in success of the petrochemical industry owing to benefits in terms of cost-economics, shared resources and linkages. This has been amply demonstrated through thriving petrochemical hubs in the Rotterdam Cluster, Jurong Island, Houston Bay Area, and closer home in Dahej PCPIR.

Government of India unveiled the PCPIR policy in 2007, intended for the development of Global Scale Industrial Corridors, for achieving synergies of value-added manufacturing, research and development. PCPIRs intend to reap the benefits of co-siting, networking and greater efficiency using common infrastructure and support services. PCPIR at Dahej has gained investments of more than INR 8,59,280 Crore, generating over 8 lakh employment opportunities. Factors such as pre-existence of established industrial region, infrastructure and favourable policies contributed towards its development as a successful PCPIR. However, other PCPIRs at Andhra Pradesh, Odisha and Tamil Nadu could not replicate the success of Dahej PCPIR due to limited access to infrastructure, logistics and utilities and other issues.

This paper highlights various factors essential to the success of PCPIRs, along with key challenges faced by PCPIRs in India, and recommends the need for development of infra-structure, strong logistics network, framing of favourable policies and introduction of suitable schemes and subsidies to enable PCPIRs to function smoothly and attract large investments.

Mott MacDonald thanks FICCI for the opportunity to collaborate on this important initiative. We look forward to your kind insights and feedback at manoj.mehta@ficci.com and ajey.nandurkar@mottmac.com.


PCPIR
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PCPIR
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1

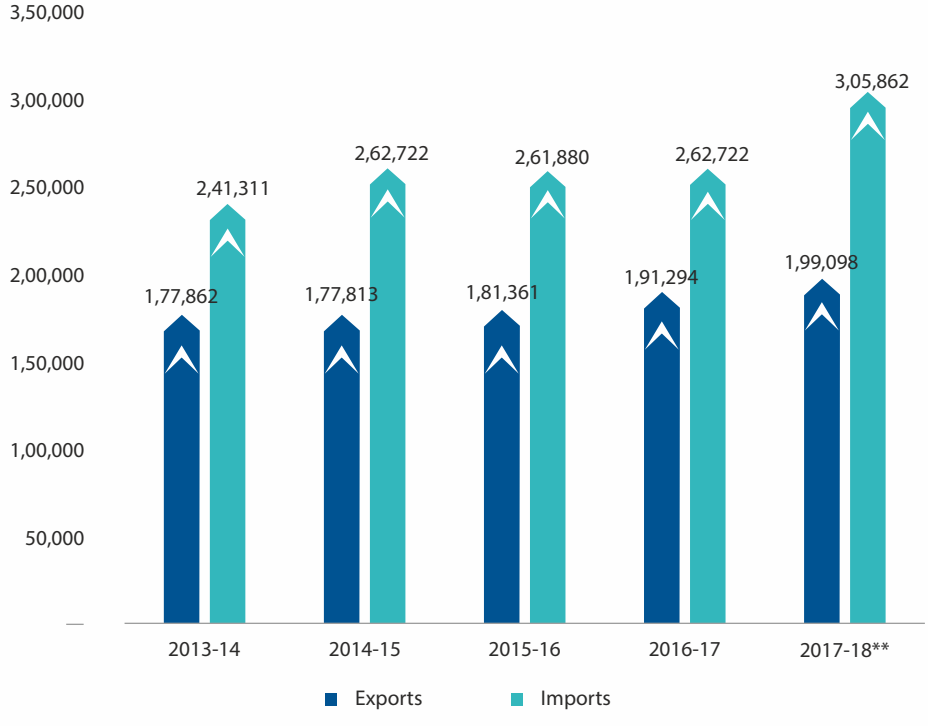
PCPIR Policy Overview

1.1 Growth in India's Chemicals Sector

India's chemical industry is estimated at $163 Bn in FY18 and it is expected to grow at ~9% per annum to reach $304 Bn by FY2025.

Trends in exports and imports of chemicals and chemical products (excluding pharmaceutical products and fertilizers) during 2013 - 14 to 2017 - 18 (up to September 2017) are depicted in the following figure:

Figure 1: Trends in Export of total Chemicals and Chemical Products by India (₹Crore)



***These are estimated values, which have been derived from the data published by the GoI till Sept 2017*
Source: Annual Report (2017 - 18) - Ministry of Chemicals

From the above data, it can be observed that the trade deficit is widening. This has created a need for setting up petrochemical clusters downstream, adjacent to the refineries, with state-of-art infrastructure to facilitate ease of doing business at one place. The eco-system of entrepreneurship and employment thus created would also meet the rising demand for

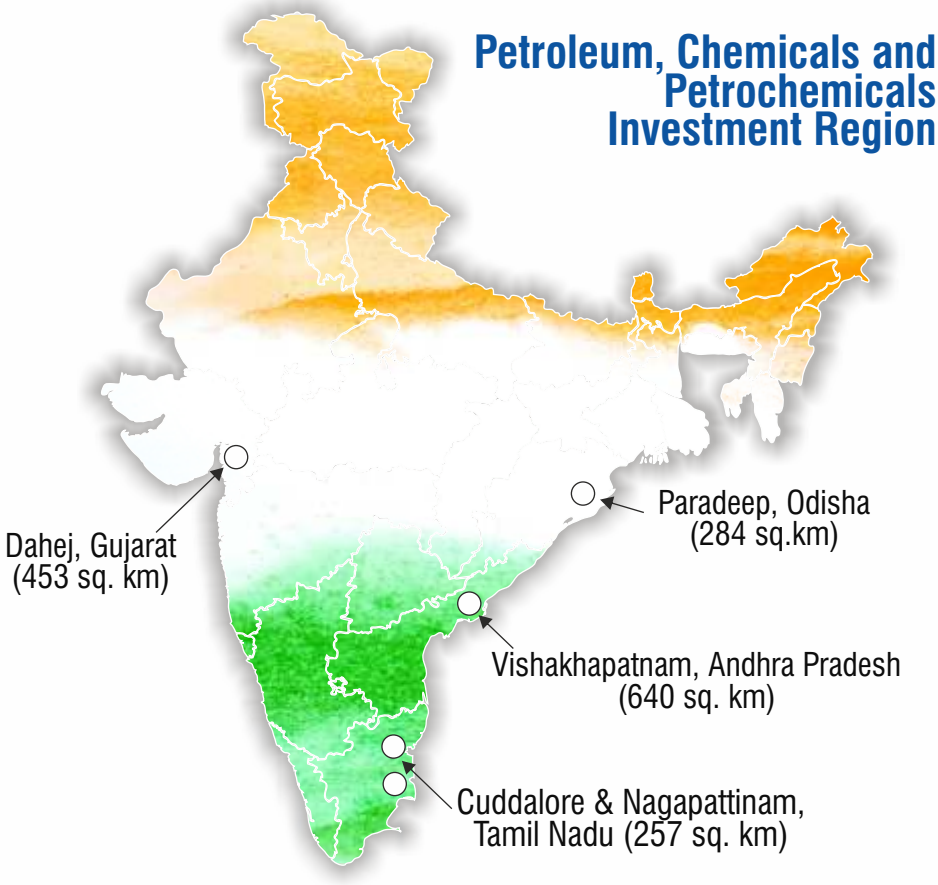
petrochemical intermediates and polymer/plastic products. Integrated Petroleum, Chemical and Petrochemical Regions (PCPIR) help attract investments and make India self-sustainable and as a global hub for petrochemicals.

1.2 PCPIR Policy Overview

The Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) policy, announced by the Government of India (GoI) in April 2007, envisages the development of Global Scale Industrial Corridors in the Petroleum, Chemical and Petrochemical sectors of the country in an integrated and environmentally friendly manner. Aimed at achieving synergies of value added manufacturing, research and development, PCPIRs intend to reap the benefits of co-siting, networking and greater efficiency using common infrastructure and support services. The consequent establishment of high-class infrastructure is targeted at promoting competitive environment conducive to setting up new business units, and providing a boost to manufacturing, exports and employment generation in the targeted sectors.

To promote investment and industrial development in these sectors, the Government of India has approved four PCPIRs depicted in the map below:

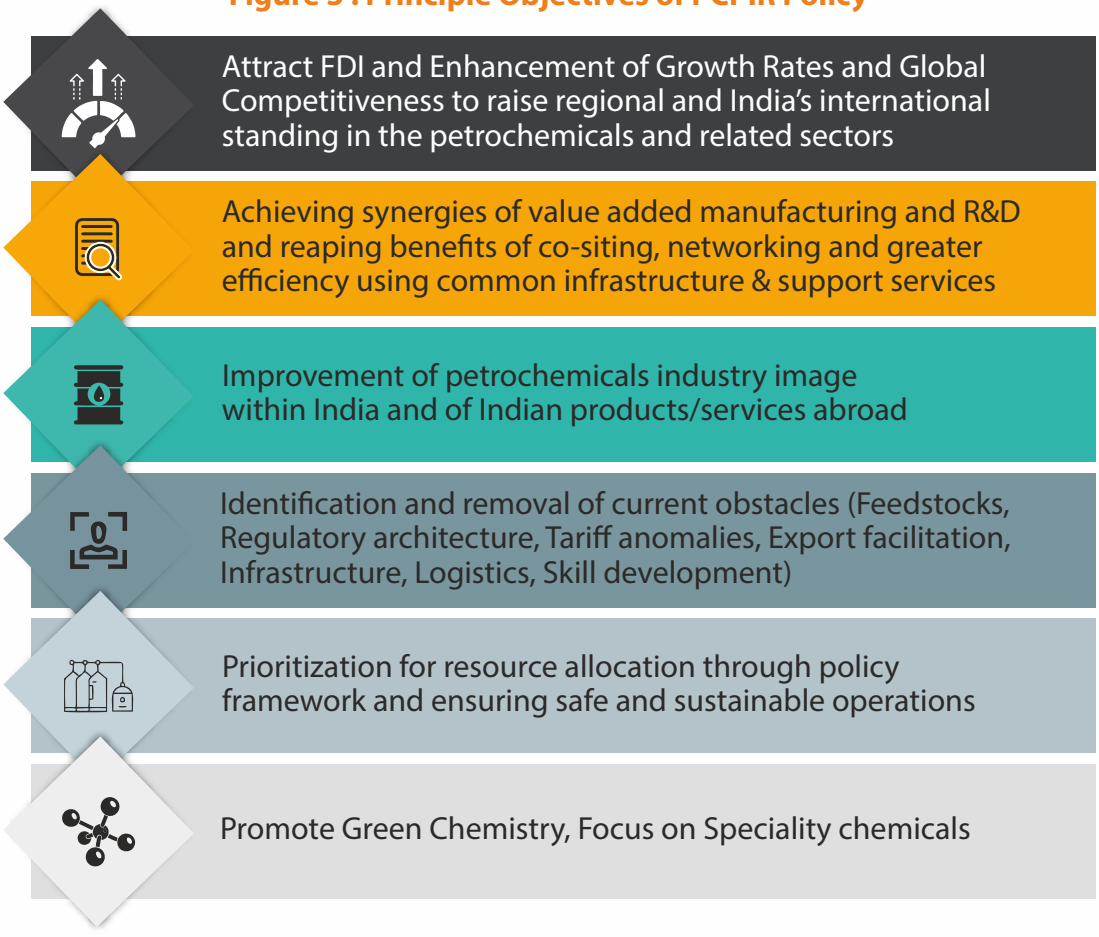
Figure 2 : India's PCPIR Regions



1.2.1 Policy Objectives

The key objectives of the PCPIR Policy are listed below:

Figure 3 : Principle Objectives of PCPIR Policy



1.3 Role of the Governments

1.3.1 Central Government

Under the PCPIR Policy, the following responsibilities and actions come under the purview of the Central Government:

- To consider all applications for establishment of PCPIRs and expeditiously approve proposals that are found feasible.
- To establish a High-Powered Committee to ensure necessary coordination among central ministries and state government, and monitor the progress of environmental and other clearances, as well as development of the PCPIR, at required intervals.
- To ensure the availability of external physical infrastructure linkages to the PCPIR including Rail, Road (National Highways), Ports, Airports, and Telecom, in a time bound manner.
    - This infrastructure will be created and upgraded through Public Private Partnerships to the maximum extent possible. Central Government will provide the necessary viability gap funding through existing schemes. Wherever necessary, requisite

budgetary provisions for creation of these linkages through the public sector will also be made.

- To support the concerned state government and its agencies for information dissemination for promotion of domestic as well as global investment in the PCPIR.

1.3.2 State Government

Under the PCPIR Policy, the following responsibilities and actions come under the purview of State Governments:

- Playing the lead role in setting up of the PCPIR. This primarily involves: identifying a suitable site, preparing the proposal and notifying the site under the relevant Act [1].
- Establishing a Management Board for development and management of the PCPIR. This may be done under the relevant state Act; the state will legislate a new Act if necessary.
- While applying for a PCPIR, the State Government is to ensure that after notifying the area, all physical infrastructure and utilities linkages under its jurisdiction is provided within a stipulated time frame. The State Government will notify a nodal Department, which will coordinate these linkages. This Department along with relevant authorities will facilitate all clearances required from the State Government.
- Providing for and facilitating development of the following infrastructure:
  - Power connectivity and availability of reliable and good quality power. The units may also seek open access as per the regulations of the State Electricity Regulator Commission.
  - Provision of bulk requirements of water;
  - Road connectivity (State roads);
  - Sewerage and effluent treatment linkages, from edge of PCPIR, to the final disposal sites;
  - Appropriate infrastructure to address the health, safety and environmental concerns.

1.3.3 Policy Concept

The Policy launched in April 2007 conceptualizes the PCPIRs to encapsulate the following key features:

- A PCPIR would be a specifically delineated investment region spread over an area of around 250 square kilometres comprising of processing and non-processing areas.
  - The minimum processing area for the PCPIR will be about 40% of the total designated area, i.e., around 100 sq. km. It would have manufacturing facilities including production units, environmental protection mechanisms along with associated logistics and other services. The processing area may or may not be contiguous.

[1] *The State Government will notify the PCPIR area under the relevant Act and assist in acquisition of the land necessary for setting up the infrastructure, processing and non-processing areas. The acquisition of land if any must be in accordance with law and must provide for rehabilitation as per the laid down norms. As far as possible acquisition of agricultural land may be avoided.*

- Non- processing areas would include residential, commercial and other social and institutional infrastructure.

- The PCPIR may include one or more Special Economic Zones, industrial parks, free trade zones, warehousing areas, export-oriented units, and growth centres, duly notified under the relevant Central or State Legislation or policy. All the benefits available under the relevant legislation or policy will continue to remain available to the said Zones or Parks forming part of the PCPIR.
- The PCPIR could cover the existing settlements, industries, estates and services, and would therefore benefit from and be complementary to the region.
- The concerned State Government may not acquire the entire area comprising the PCPIR, but it will have to notify the same under the relevant Acts for proper planning and zoning to ensure coordinated development.
- Each PCPIR would have a refinery or petrochemical feedstock company as an anchor tenant.
- The internal infrastructure of the PCPIR will be built and managed by a developer, or a group of co-developers.
- The external linkages will be provided by GoI and the concerned State Government.
- The users of external as well as internal infrastructure will pay for its use, except to the extent that the government supports the service through budgetary resources.

1.4 Institutional Framework and Procedures

Department of Chemicals and Petrochemicals	High-Powered Committee	Management Board	Supervisory Body
The Department of Chemicals and Petrochemicals (DoC&PC) will be the nodal department of the Government of India for the PCPIRs	A High-Powered Committee constituted by the Government of India will scrutinize applications for setting up the PCPIR, and subsequently monitor and expedite the progress of implementation.	This Board, constituted by the concerned state government for each PCPIR under the relevant legislation, is responsible for the development and management of the PCPIR. It will also be empowered to issue/expedite state level approvals. If the state legislation permits, the Board may be an SPV in a corporate form headed by a CEO with sufficient autonomy, with the participation of the Developer as well as the anchor tenant.	The State Government is also to constitute a supervisory body as a PCPIR state level Empowered Committee to: • monitor, review & appraise PCPIR's functions and performance • deal with issues relating to disputes between the stakeholders • Any other function as may be prescribed by the State Government.

1.4.1 Procedure and Guidelines

The application for notification of a PCPIR and Project Proposal is moved by the concerned State Government to the nodal ministry (i.e. the Department of Chemicals & Petrochemicals).

DoC&PC ensures, in consultation with the State Government and the central ministries concerned, that the proposal is as per this Policy. It then places it before the High-Powered Committee for its recommendations and further on to the Cabinet Committee on Economic Affairs (CCEA) for decision.

The Note submitted to the CCEA for approval of a PCPIR will clearly state the commitments of GoI to the provision of infrastructure (National highways, Railways, Ports, Airports, Telecom) in a time bound manner.

Each PCPIR isnotified separately by DoC&PC after CCEA approval. Each concerned central Ministry then prepares detailed project reports and obtain financial approvals as per extant guidelines of Ministry of Finance.

DoC&PC will enter into a Memorandum of Agreement with the State Government, indicating the respective commitments and timelines of the Central and State Government, after the PCPIR has been approved by CCEA and notified by the DoC&PC.

The Management Board, after notification of the PCPIR, prepares a detailed master plan using the expert assistance of a technically qualified consultant, who is selected through a transparent process.

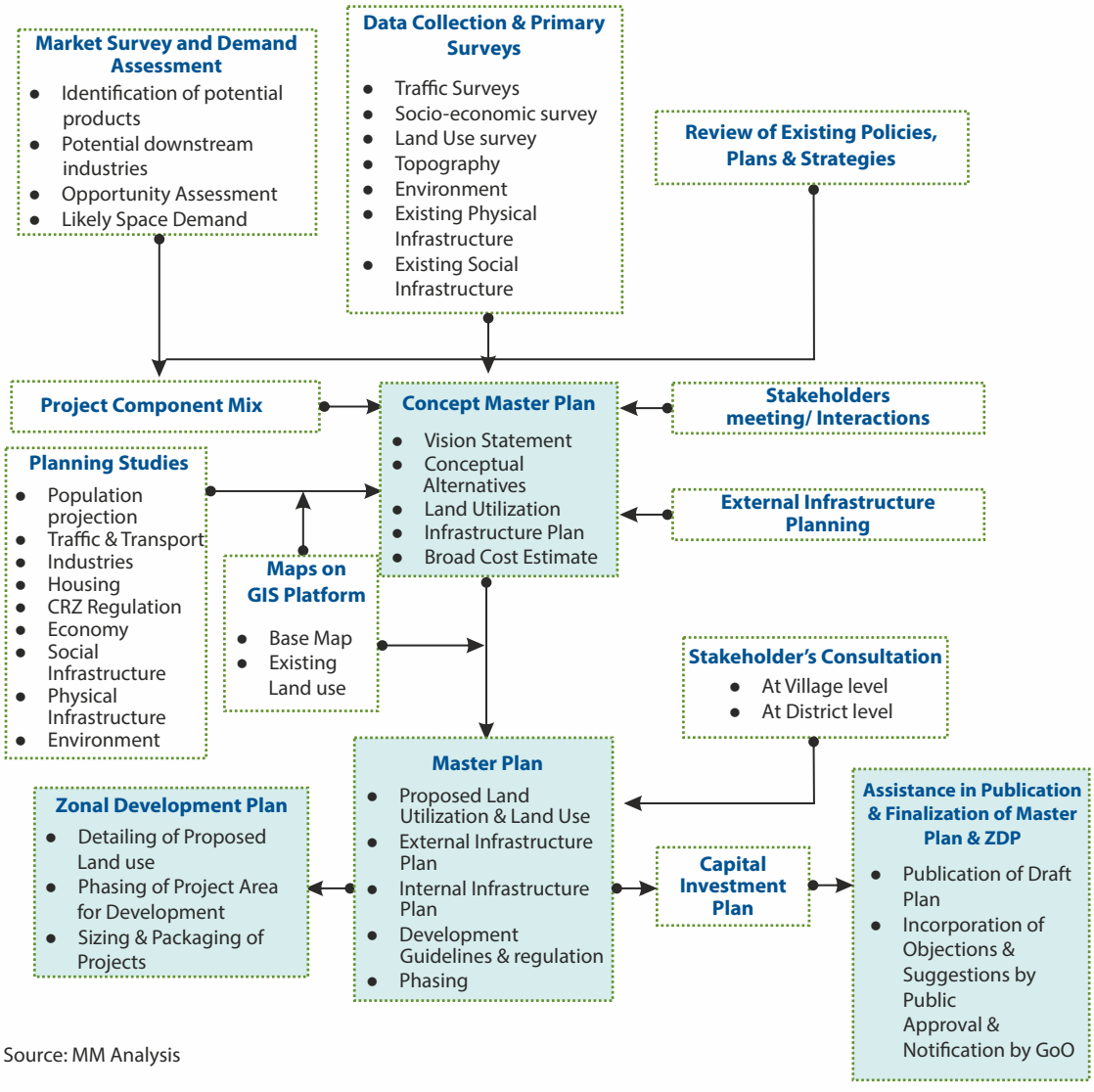
The finalized master plan is appraised by the competent authority under the relevant state law to give it appropriate statutory status.

In case an amendment is required to the concept and design of the project, as encapsulated in the preliminary project report submitted by the State Government, the same may be done in accordance with procedure provided in the State Law.

Proposals for setting up units in the PCPIR will be granted approval by the Management Board, or such authority to which these powers are delegated, after obtaining the necessary clearances and within a stipulated period, as prescribed by the concerned state government.

**The master plan consists of a regional development plan specifying land use for processing and non-processing areas, as well as technical details regarding the number and nature of downstream units that may come up in the PCPIR, based on available feedstock. It needs to be prepared in consultation with the anchor tenant, if in place by the time when the master plan is being prepared.*

Figure 4 : Master Plan Methodology



Source: MM Analysis

- In addition to the above, the following guidelines need to be kept in view while considering a PCPIR Proposal:
  - Potential generation of additional economic activity and future growth.
  - Potential investment from domestic and foreign sources for production of goods & services.
  - Potential domestic and international linkages for Petrochemical investment facilities.
  - Willingness and commitment of the State Government.
  - Interest of major anchor industry including PSUs.
  - Present infrastructure linkages to the proposed site & cost of required upgradation.
  - Land Availability, especially close to port
  - Port connectivity/port condition (available draft, existing facilities, natural calamity risk).
  - Maintenance of ecological balance and sustainable development in the region and ensure conformity with Environmental Laws in force.

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2

Review of the Four PCPIRs

2.1 PCPIR Region-wise Snapshot

As discussed in the sections above, India currently has four approved PCPIRs. The following table provides a snapshot of the key features and indicators of these four PCPIRs:

Table 1 : PCPIR Region Wise Snapshot

Indicator	Gujarat	Andhra Pradesh	Odisha	Tamil Nadu
Location/ Region	Dahej, Bharuch	Vishakhapatnam – Kakinada	Paradeep	Cuddalore-Nagapattinam
Date of Approval	Feb 2009	Feb 2009	Dec 2010	July,2012
Date of MoA	07.01.2010	01.10.2009	03.11.2011	20.02.2014
Total Area (Sq. Kms.)	453	604	284.15	257
Processing Area (Sq. Kms.)	248	270	123	104
Anchor Tenant	ONGC Petroleum addition Limited (OPaL)	Hindustan Petroleum Corporation Ltd. (HPCL)	Indian Oil Corporation Ltd. (IOCL	Nagarjuna Oil Corporation Ltd. (NOCL)
Refinery / Cracker capacity in MMTPA	Cracker: Ethylene: 1.1 Propylene: 0.6	9.3 to 15 (expansion of existing refinery) 15 (Greenfield).	15 (Greenfield refinery).	12 (Refinery).
Anchor Project Status	Polypropylene unit (commissioned) in March 2017	Anchor Tenant for Greenfield project yet to come on board.	Commissioned in February, 2016	Construction work, stalled since 2011, yet to restart.
Total amount of infrastructure projects approved (Rs. crore) *	7,750	19,031	13,634	13,354

Indicator	Gujarat	Andhra Pradesh	Odisha	Tamil Nadu
GoI share in form of VGF (Rs. crore) *	81	1,207	716	1143.00 1500 .00 (budgetary support)
Proposed Investment (Rs. Crore) *	50,000	3,43,000	2,77,734	92,160
Investment made till FY18 (Rs. Crore)	85,928	43,744	45,000	8,100
Projected employment (number)*	8,00,000	11,98,000	6,48,000	7,50,000
Employment generated till FY-18 (number)	1,32,000	1,11,000	38,000	13,950
Status of Master Planning notification	Development Plan sanctioned	Final Master Plan approved.	Preparation of Master Plan is in process.	Will be taken up after formation of PCPIR Management Board.
Status of EIA	Received Environment Clearance/CRZ in 14th September, 2017	Environmental Clearance for APSEZ and Pharma City is obtained. Facilities for CETP's and marine outfall in pharma SEZ,Brandix SEZ are operational.	The proposal was considered by the EAC in its 165th meeting held on 16-17 January, 2017,and recommended for grant of ToR.	Will be taken up after formation of PCPIR Management Board.

* indicates proposed figures at the time of planning
Source: CIPET, Union Ministry of Chemicals and Fertilizers

2.1.1 Implementation and Infrastructure Status of Each PCPIR

2.1.2 PCPIR at Dahej, Gujarat

- Spread across 44 villages of Vagra and Bharuch talukas in Bharuch district
- Development plan has been sanctioned
- Environment and Coastal Region Zone Clearance was granted by Ministry of Environment, Forests and Climate Change for Dahej PCPIR on September 14th, 2017.
- Actual investment (made/committed) in Gujarat PCPIR is Rs. 85,928 crores (till FY18)
- Actual employment for 1.32 lakh persons has been generated

- The anchor tenant project i.e. ONGC Petro additions Limited (OPaL)'s cracker stands commissioned in March 2017.
- Gujarat Industrial Development Corporation (GIDC), the nodal agency for Dahej PCPIR has so far allotted 5,000 hectares of land to nearly 650 industrial units in the PCPIR, of which around 200 units, including a mega petrochemical project of ONGC Petro additions Ltd (OPal), have gone into production.

Table 2 : Existing and Proposed Infrastructure at Dahej PCPIR

Medium	Projects
Rail Connectivity	
Existing	• Connected to Delhi – Mumbai Broad Gauge railway line at Bharuch • broad gauge Bharuch-Dahej rail line (62 km)
Proposed	• Delhi-Mumbai Dedicated Freight Corridor (DFC) will touch the PCPIR on the eastern side • Bharuch-Dahej broad gauge line to be connected to the DFC at Dayadra Jn.
Road Connectivity	
Existing	• 50 km of four-lane Dahej-Bharuch State Highway connecting six lane Delhi-Mumbai National Highway and National Expressway
Proposed	• Ahmedabad-Vadodara National Expressway to be extended to Mumbai • Up-gradation of 8 km of port linkage • 42 km of State Highways within PCPIR to be upgraded to four lane • Construction of 25 km of coastal roads • Up-gradation of Dahej-Vagra-Bharuch Road • Escape Route (for security purpose) • Link Road (Stretch linking PCPIR to NH-8)
Port Connectivity	
Existing	• Old Port of Gujarat Maritime Board (GMB) • Liquid Chemical terminal (1.80 MMTPA) of GCPTCL • LNG port (10 MMTPA) of LNG Petronet Ltd. • Liquid Fuel jetty (3.50 MMTPA) of Reliance • Solid cargo jetty (4.50 MMTPA) of Birla Copper • Solid cargo port of Adani Group (3 MMTPA) to be expanded to 12 MMTPA
Proposed	• 40 MMTPA ports by Sandesara Group (Solid Cargo, Liquid Cargo and Container Port) with investment of Rs.1500 crore • Marine Shipbuilding Park by Gujarat Maritime Board • Ro-Ro Ferry Service, Common User Jetty by GMB with investment of Rs.250 crore
Connectivity by Air	
Existing	• 250 km from international airport at Ahmedabad • 90 km from domestic airport at Vadodara • 85 km from domestic airport at Surat
Proposed	• Greenfield airport for PCPIR • Airstrip at Ankleshwar

2.1.3 PCPIR at Andhra Pradesh (Vishakhapatnam - Kakinada)

- Draft Master Plan has been completed and published
- Draft Environmental Impact Assessment Study stands completed
- Actual investment made in Andhra Pradesh PCPIR is Rs. 43,744 crore
- Actual employment for 1.11 lakh persons generated.

The proposed infrastructure for VK - PCPIR is as below:

Table 3 : Proposed Infrastructure at Vishakhapatnam – Kakinada PCPIR

Medium	Projects
Proposed Rail Connectivity	• Kakinada Port to South Central Railway line via Kakinada SEZ (38 km) • APSEZ to Gangavaram Port (26 km) • Connectivity for APSEZ: PCPIR to South Central Railway Trunk Line (7.15 km) • Rail Freight Stations with CFSs, (Container Freight Stations) ICDs, (Integrated Container Depots) warehouses
Roadways Upgradation	• 536 km – Rs. 4,381 Crores • National Highways NH-16 (Formerly 5): 4 lane to 6 lane: 190 km, Status: Project Awarded to M/s Transstroy • NH-214: 2 lane to 4 lane: 40 km; Status: Planning Stage • State Highways SH-97: 2 lane to 4 lane: 42 km; Status: Planning Stage • Major District Roads MDRs: 2 lane to 4 lane: 75 km; Status: Planning Stage • Dedicated PCPIR Expressway 138 km 4 lane road between Gangavaram Port and Kakinada Deep Water Port
Port Projects	• Upgradation of Visakhapatnam Port • Upgradation of Kakinada Deep Water Port
Airport Projects	• New Visakhapatnam International Airport • Air Cargo Complex & Captive Airstrip at Kakinada • Upgradation of Rajahmundry Airport
Other External Infrastructure	• Wastewater Treatment CETPS (Common Effluents Treatment Plants and STPS (Sewage Treatment Plants) • Marine Outfalls • Water Supply Schemes • Power Supply (Substations and Feeder Lines) • New Captive Power Plants (2 x 500 MW) • Logistic Hubs other than rail CFSs, (Container Freight Stations) ICDs, (Integrated Container Depots) Warehouses

2.1.4 PCPIR at Paradeep, Odisha

- The draft Master Plan has been prepared
- Environmental Impact Assessment (EIA) has been initiated.
- The actual investment made in Paradeep PCPIR is Rs. 45,000 crore
- The actual employment for 38,000 persons generated.
- The anchor project i.e. Indian Oil Corporation Limited (IOCL)'s refinery stands commissioned in February 2016.

Table 4 : Existing and Upcoming Infrastructure at Paradeep PCPIR

Medium	Projects
Rail and Logistics	• PCPIR Connected with a Broad Gauge double line • New Paradeep – Haridaspur rail line to be operational by 2016 • CONCOR building a new Logistics Hub in PCPIR over 60 Ac of land
Roadway Upgradation	• 4 - lane NH 5 A (being upgraded to 6 lane) • 2 - Lane Cuttack-Paradeep already completed. • A 4-lane road connecting Paradeep to Bhubaneswar is being taken up • A Coastal Corridor connecting PCPIR with Dhamra & Astarang Port is being taken up
Airport Connectivity	• Nearest: Biju Patnaik International Airport in Bhubaneswar.
Port Connectivity	• **Paradeep Port**: 277 MTPA capacity, deep draught, all-weather sea-port • **Proximity to Dhamra Port**: Deep drought all weather port; Capacity of 25 MMTPA

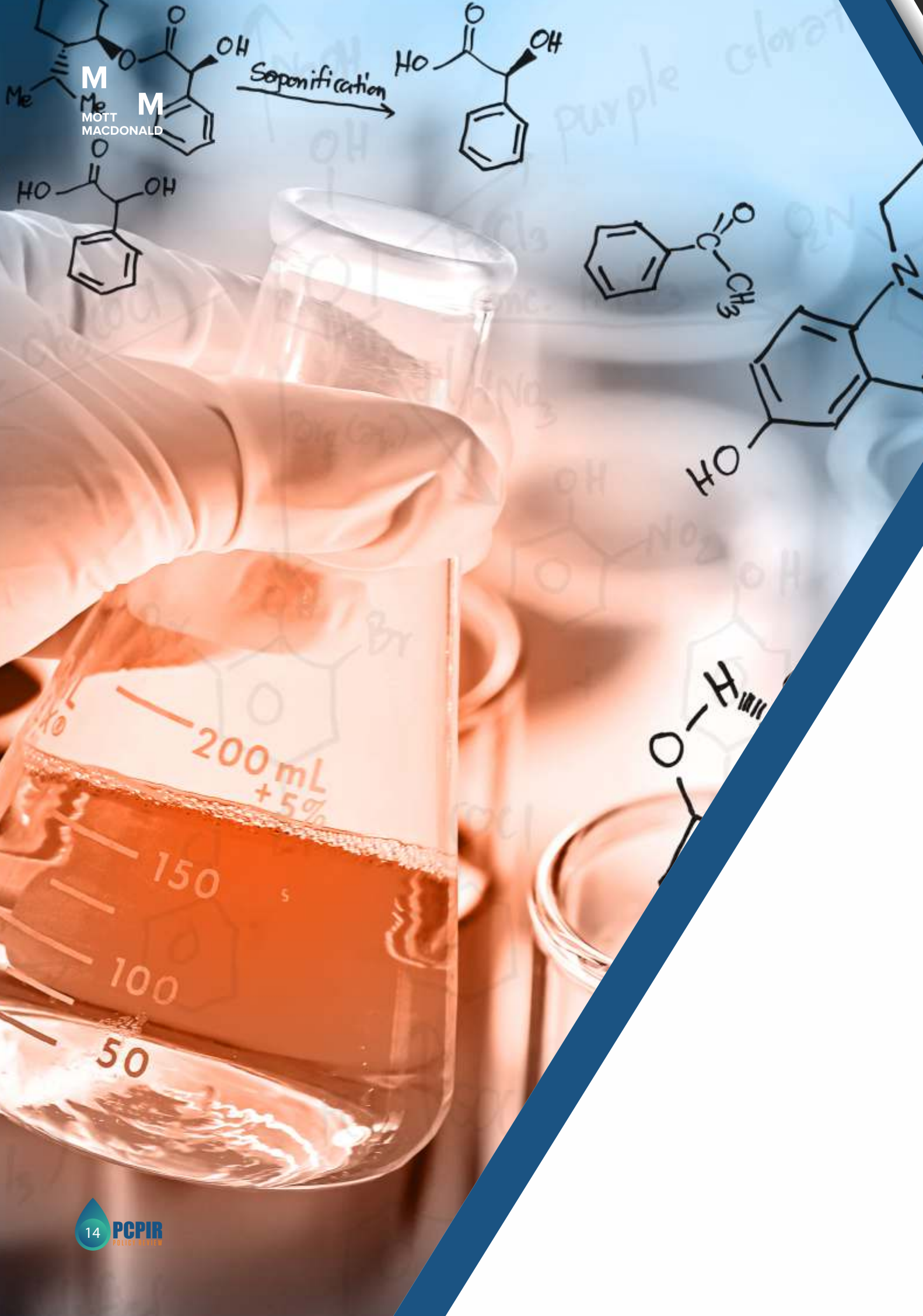
2.1.5 Cuddalore- Nagapattinam PCPIR in Tamil Nadu

- Upon completion of the Districts Level Notification process, the final notification of the Tamil Nadu PCPIR has been issued by Government of Tamil Nadu on 20.6.2017 notifying the delineated PCPIR area in the Cuddalore and Nagapattinam Districts as a Local Planning Area, under Tamil Nadu Town and Country Planning Act, 1971.
- The actual investment made in Tamil Nadu PCPIR is Rs. 8100 crore
- Actual employment for 13,950 persons generated

2.2 Overall Status of the PCPIRs

Proximity to the port in addition to environmental benefits such as effluent treatment plants are major benefits of PCPIR. Moreover, it is a symbiotic ecosystem wherein raw material manufacturers are also present and this can mutually benefit companies.

However, despite the intended and stated benefits of the PCPIR Policy, except for Dahej PCPIR, the current approach and methodology for implementation of PCPIR has not been successful in reaping the intended results over the past decade. In fact, the Andhra Pradesh Government announced that it would shelve a planned petrochemical investment project, as it failed to attract any investment.


Saponification
200 mL
+5%
150
100
50

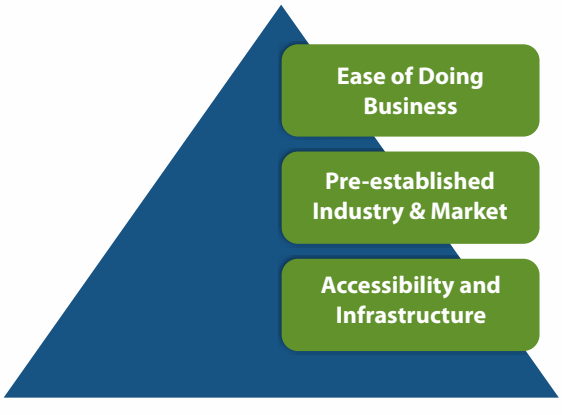
3 PCPIR Progress - Successes & Failures

3.1 Successful PCPIR Projects - Dahej, Gujarat

The Petroleum Chemicals and Petrochemical Investment Region (PCPIR) in Dahej, Gujarat, has attracted more investments than the other three notified PCPIRs in India. Therefore, Dahej is the only success story for India's PCPIR Policy that was launched in 2007.

- The PCPIR at Dahej has attracted investments from increasing number of companies - domestic and international. The region attracted projects entailing investments worth Rs 25,163 crore in 2017-18
- Indirect investments in allied industries is also being generated
- Home grown companies like Emami group, MRF Limited, Grasim Industries Limited, Bodal Chemicals Limited and GACL-NALCO Alkalies and chemicals Ltd (GNAL) have proposed their greenfield and brownfield projects in the PCPIR, which is spread across 44 villages of Vagra and Bharuch Talukas in Bharuch
- More than Rs 950 crore worth of investments in the PCPIR region have also been proposed by foreign firms. These include:
  - South Korea-based Kukdo Chemicals committing Rs 320 crore and
  - Sweden's Perstorp proposing an investment of Rs 650 crore
- An estimated direct employment of 14,000 will be generated through these investments.
- 200 out of 650 industrial units including a mega petrochemical project of ONGC Petro additions Ltd (OPal), have gone into production

3.1.1 Key Drivers for Success of Dahej PCPIR



Ease of Doing Business:

- Investment is the key contributor for the success of any project. In terms of Ease of Doing business Gujarat is in fifth position among the other states with a score of 97.99%[2] which indicates a friendly policies, environment and protection for the firms investing in the region. This is a reason for Dahej PCPIR attracting Rs. 85928 Cr so far.

Pre-established Industry:

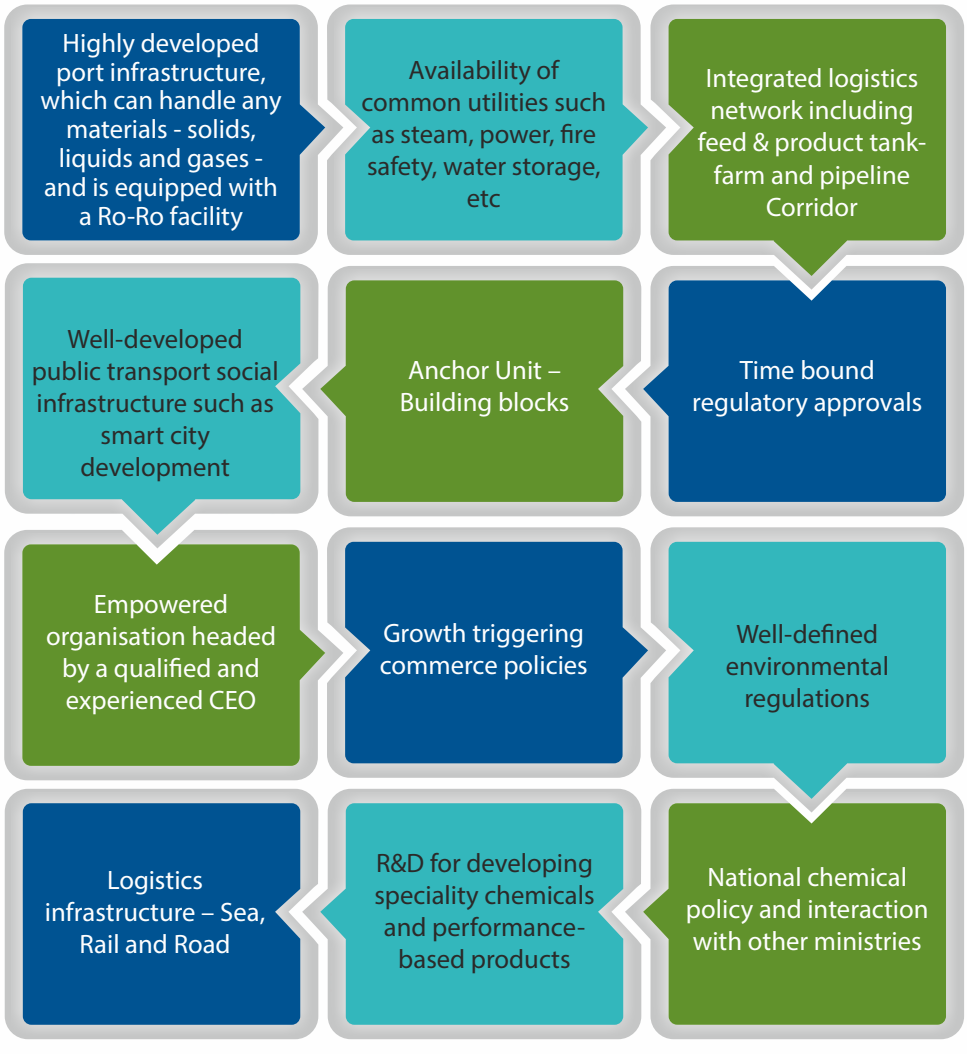
- Gujarat is hub for many petrochemical and petroleum refineries. Companies like Reliance, Indian Oil etc., have already established their refineries and to invest in Dahej is preferable as the movement of raw materials and intermediate products will be more convenient.

Accessibility and Infrastructure:

- Dahej PCPIR is well connected to the Kandla Port; acting as a catalyst for trade and investments.

3.2 Factors of Success for PCPIR

For successful PCPIRs, the following facilities are essential:



[2] *DIPP, World Bank Rankings 2018*

3.3 Key Challenges Faced by Unsuccessful PCPIRs

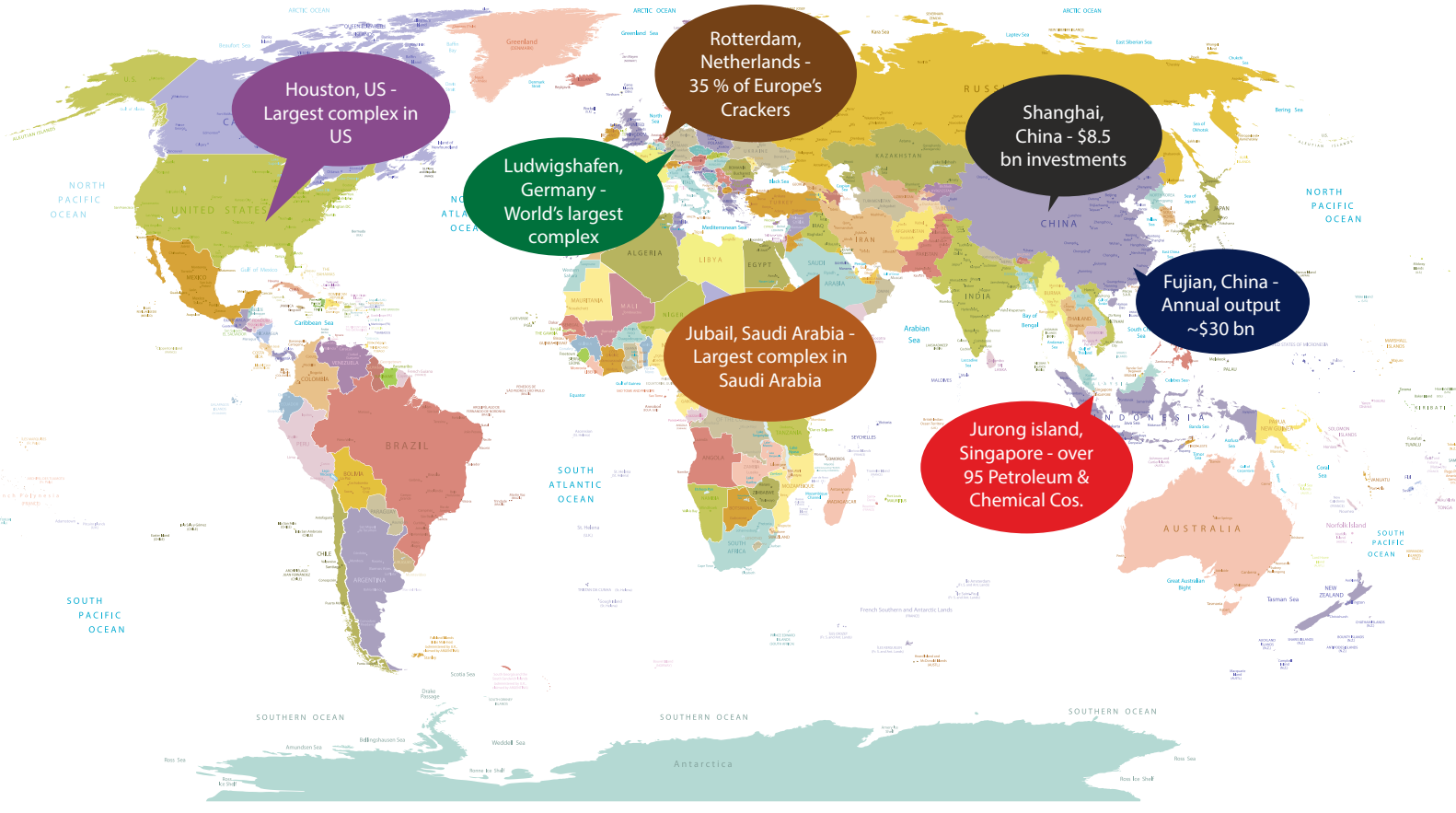
Observing the growth patterns of the four PCPIRs in India over the past decade, it can be established that except for Dahej, all the other three PCPIRs have failed to attract the target investments and have displayed signs of slow or negligible growth. Some of the key challenges that these three PCPIRs have faced, that have stunted their development are as follows:

Limited Access to advanced technologies	Indian players have not been able to partner with international companies having access to advanced process technology to make petrochemical intermediates. This is mainly due to not finding mutually acceptable terms (in terms of stakeholding)
Elusive ROI	• Absence of attractive financial schemes • High financial risks with new projects
Logistics & Infrastructure Challenges	• Yet to meet the global standards • Lack of well-developed roads, frieght corridors, ports, airports
Absence of Utilities	• Lack of utilities like electricity, water, alternate energy, sewerage systems and ETPs • Vishakhapatnam has been a victim of poor power and water availability
Land acquisition & Regulatory Issues	• Slow pace of acquisition & limited government support • Absence of a Single Window for approvals
Limited Planning and Focus	• Limited planning and pre-feasibility planning • No integration of feedstock supply chain and R&D
Lack of facilitative Policy Regime	• No incentive to downstream industries because of high interest rates and lack of export incentives
Feedstock for Downstream	• Anchor tenant is not sparing feedstock for downstream units • Available polymers are being converted into bulk polymers by anchor tenants
Absent Infrastructure for Green Chemicals	Due to environmental concerns, there is a push away from conventional raw materials. The current infrastructure in Indian PCPIRs require integration with the upcoming changes to process alternative raw materials.

3.4 International Petrochemical Hubs

Direct and indirect benefits of setting up and developing a successful PCPIR are far-reaching and multiple. The advantages of the symbiotic ecosystem which is created at a PCPIR - wherein, the raw material suppliers as well as manufacturers benefit from being present in the same investment-attracting geographical periphery - are multi-fold. Consequently, PCPIRs and Petrochemical hubs have been established in several countries. Some of the successful ones are mentioned in the figure below:

Figure 5 : Successful Petrochemical Hubs in the World



3.4.1 Port of Antwrep

The chemical industry in the Netherlands forms part of one of the strongest chemical clusters in the world - The Antwerp-Rotterdam-Rhine-Ruhr Area (ARRRA). This interconnected cluster is responsible for supply of a huge array of products to the competitive European manufacturing industry for both domestic and export markets.

Key Drivers and Factors of Success

- Location advantage of being in Europe (a market which is central to all trading nations)
- State-of-art infrastructure offering a suite of logistics advantages and market penetration in the industrial and commercial heart of Europe.

- A highly integrated industrial environment with numerous partners - suppliers, contractors and customers - in the oil and chemical sector, with unrivalled connectivity throughout the process chain.
- Both Belgian and Flemish Governments have implemented several stimulating investment incentives ranging from tax-related schemes on to employment, training and R&D advantages.
- The greater Antwerp region hosts a diversified range of technical support services like EPC companies, process optimisation, process control, automation & instrumentation, maintenance, heavy lifting, health, safety & environment (HSE), quality control, storage and dispatching of all products, in all aspects.
- Presence of a large range of highly competent Belgian and international service providers, to deal with diverse financial, legal and taxation matters
- A skilled labour market as the Flemish region is renowned for its highly educated, multilingual and productive workforce.
- A smooth administrative handling of projects by the Antwerp Port Authority.
- Government has supported by providing funds and various tax and not tax related incentives for R&D, skill and technological development activities

Key Challenges Faced by the Rotterdam Industry Cluster

While ARRRA enjoys several business-boosting factors, the area still has faced its share of challenges as listed below:

- **Impact of Financial Crisis**: Prior to the financial crisis, the industry cluster was the engine for economic growth at the ports. However, the oil refining and chemical industry were significantly affected by the demand drop by direct consumers and processing industries due to the crisis. This demand has not completely recovered to pre-crisis levels in all cases.
- **Decrease in Business on Ports**: Due to the decline of the industry cluster, the overall port economy is no longer growing in tandem with throughput. Shifts in the global energy landscape are at the root of this decline, which is causing the port's three industrial core sectors - refining, chemical and energy - to be under pressure simultaneously.
- **Slump in European Refining Sector**: The European refining sector has been battling a structural decline in the demand for oil products in Europe for years on the one hand, and the increased competition of globally emerging oil refining regions, which now also includes the US that has opened its light tight oil supplies, on the other hand. The European petrochemical sector is unable to effectively compete based on the cost of raw materials and energy - which represent 60% to 80% of production costs in the bulk chemical sector - especially with the sector being driven by the US exploitation of shale gas.

- **Shift towards Renewable Energy**: Moreover, the European energy sector is in transition, driven by the EU's energy and climate policy, as well as that of individual countries, because of which the production of renewable solar and wind energy is steadily increasing, and conventional power plants increasingly operate less profitably. In the Netherlands there is increased political pressure to phase out coal-fired power plants.

Due to the low oil price, a cheap euro and a recovering economy, the effects of the cost of raw materials and energy were somewhat moderated in 2015, enabling oil and chemical companies to once again achieve better margins. The Port of Rotterdam has benefitted from these factors recording the highest trade and transport of oil by sea in the past 40 years. However, this oil flow is expected to structurally decline over time.

3.4.2 Jurong Island

Jurong island is a petrochemical complex built on artificially amalgamated islands. The island spreads over to an area of more than 3,000 ha and hosts more than 95 companies from the US, Europe and Asia. Today, Singapore is the third-largest oil refining centre in the world, the largest bunkering port and, one of the top 3 oil trading hubs in the world

Key Drivers and Factors of Success

- **Location Advantage:** Located in South-Eastern Asia, which is a demand-intensive region for chemicals and petrochemical products, Singapore has been successful in attracting trade and investments.
- **Favourable Policies:** Laws and policy frameworks are supportive towards foreign investments.
- **Government Support:** The Government of Singapore has encouraged development of the petrochemical hub through provision of various subsidies, tax benefits, investment in infrastructure, and forming policies that promote such projects. Investments hav e been made by the Government towards R&D, innovation-centric training and skill development.
- **Industry Integration:** The integrative design and strong logistical capabilities have attracted large number of the major chemical manufacturers
- Presence of large number of global chemical companies in Singapore serve as an established industrial base for the development of the petrochemical complex
- **Advanced Logistics:** Availability of reliable Infrastructure and logistic facilities has been successful in attracting investment from across the globe Logistically, Singapore's location is ideal to act as a regional hub for Southeast Asia's chemical industry. Lack of investment in markets such as Indonesia, Philippines, Vietnam and until recently Malaysia has allowed the Jurong Island cluster to establish a strong position, both in scale and competitiveness.

- **Technological Advancement:** Singapore being a centre for global excellence in technology has piloted Industrial Internet-of-Things (IIOT) solutions into their manufacturing processes, achieving great efficiencies. With the use of a tracker system to boost worker safety and efficiency, the company has started to save several man hours a year.

Key Challenges

- **Lack of Natural Resources:** Largely dependent on imports for feedstock
- **Manpower constraint:** Chemical industry being a manpower intensive industry, the lack of manpower in the country poses a major challenge to the development of the chemical and petrochemical industries
- **Chinese Competition**: China, from long has been a strong competitor to all evolving industries in the world with large processing capacities, high exports and low priced services globally

3.4.3 Houston

Port of Houston, the largest petrochemical complex in the US, is located in Houston, Texas.

Key Drivers and Factors of Success

- **Location Advantage**: City of Texas, which has an evolved industrial cluster, provides a strong base for development of a petrochemical complex
- **Strong Supply chain with modern logistics facilities**: Presence of well-managed strong supply chain and logistics has been crucial for sustainability and development of a logistics intensive petrochemical complex
- **Surplus natural resources**: Availability of cheap natural gas bring down the cost of production, due to low energy costs
- **Infrastructure**: Availability of proper infrastructure has helped attract larger investments
- **Abundance of skilled manpower**: Availability of skilled labour force has also been an important factor that supported development in the region
- **Government Support**: The government has supported the development of industrial hubs by provision of various tax relaxations and funding for infrastructure development, plant and equipment setup and skill development activities along with various tax benefits such as goods in transit and tax -free access to electricity
- In addition to above advantages, the government offers subsidies for implementation of greener technology

Key Challenges Faced

Weather conditions in Houston are unpredictable. The region is prone to storms and floods that may halt industrial operations and logistic services

3.4.4 Kaohsiung

Port of Kaohsiung is the largest harbour in Taiwan. It has presence of a large number of domestic and international petrochemical industries. The port is located in southern Taiwan, adjacent to Kaohsiung City, and surrounded by the city districts of Gushan, Yancheng, Lingya, Cianjhen, Siaogang, and Cijin. It is operated by Taiwan International Ports Corporation, Taiwan's state-owned harbour management company.

Key Drivers and Factors of Success

- **Location Advantage:** The Port of Kaohsiung sits at the hub of trade routes linking NE Asia, SE Asia, and China. There are 372 shipping lanes linking to 5 continents, 367 ports and 102 countries
- **Integration:** The presence and integration of various upstream and downstream petrochemical industries has enabled the growth of locally developed industrial clusters into a petrochemical hub
- **Tax incentives:** The Kaohsiung Economic Processing Zone (EPZ) offers of tax incentives namely:
  - Duty free import of machinery and equipment, new materials, goods, fuel, semi-products, samples and finished products
  - Zero commodity tax, value added tax and deed tax
  - Reduced business income tax (set to 10% of operating income)

Key Challenges Faced

Increasing number of ports and terminals has weakened Kaohsiung ports competitiveness in recent years. This has led to falling operating profits.

3.4.5 Jubail

Jubail is the largest industrial city in Saudi Arabia. Located in the oil-rich Eastern Province on the Gulf coast, it is primarily a hub for energy-intensive industries. Major petrochemical companies like Saudi Aramco and Total have their presence in the industrial city. Jubail produces about 7 per cent of the world's petrochemicals.

Key Drivers and Factors of Success

- **Infrastructure:** Jubail has developed industrial locations furnished with all the neces-

sary infrastructure required for setting up large scale manufacturing units. All types of local and international communication facilities are also available

- **Utilities:** Jubail has the capability to operate continuously without failure of power or supplies in any of its existing facilities
- **Land availability**: Long-term lease on land is provided by the government at very low prices
- **Financing:** Loans of up to 75% of capital investment are available for potential investors. The repayment period for loans can be extended up to 20 years. In addition, the Saudi Industrial Development Fund extends medium to long-term interest free loans to newly established industrial companies / existing companies looking to expand or upgrade their facilities
- **Tax incentives:** Custom duty exemption is available for import of plant and machinery and raw material for industries

Key Challenges Faced

- **Technological capability**: Ability to produce such chemicals is dependent on building up technical capability, investing in research, and encouraging invention. Currently, this is an area where Saudi Arabia, and the region, lag in comparison to global counterparts.
- **Manpower**: Largely reliant on expatriates for skilled/ unskilled labour and managerial resources, sourcing sufficient numbers of technically skilled and experienced Saudi personnel remains a challenge

3.4.6 Guangdong

Guangdong is a province in China on South China sea coast. It has presence of large number of petrochemical companies and is still attracting investments from large petrochemical companies. Guangdong contributes to 12% of total economic output of China.

Key Drivers and Factors of Success

- **Infrastructure:** Availability of reliable infrastructure along with technological advancements has helped Guangdong evolve as an industrial hub.
- **Manpower:** Guangdong has 110 million residents with 130 institutions of high learning and has enough man power available.
- **Location Advantage:** Guangdong has well established supply chain and is well connected to land, sea and air routes.

Key Challenges Faced

China's new anti-pollution measures to drive up the cost of production

3.5 Rebates/ Incentives at Select Petrochemical Hubs

Rebates, incentives and subsidies offered are given in Table 5 .

Table 5 : Tax rebate/incentives/subsidies support

Petrochemical Hub	Tax rebate/incentives/subsidies
Antwerp	Financial Support • Support up to €100,000 for companies active in transportation • Support of up to €200,000 for start-ups • Subsidies are granted for basic industrial research and repayable loans for the development of new products and processes • SMEs receive special attention under various subsidy arrangements • Favourable tax policies such as Innovation Income Deduction • Low interest rates • Capital bonuses to attract foreign investment Tax Benefits • Favourable tax policies such as Innovation Income Deduction: companies can deduct up to 85% of their net innovation income from the taxable base • Reduced tax rate for innovation income • Tax incentives for R&D activities Patent Income Deduction grandfathered • Companies are entitled to an 80% deduction of their gross patent income from the taxable base Tax exemption of regional subsidies • Subsidies granted by the Belgian Regional Institutions to support R&D are exempt from corporate tax
Jurong	Intellectual Property Development Incentive • Tax reduction by 5-10% after qualifying a percentage IP income Research Incentive Scheme for companies • 50% support on manpower cost • 30% support on Training cost • 30% support on licensing, royalties and technology acquisition Training grant for Company • 30% support on Training, skill development Productivity Grant • Co-funding to improve energy, water, land and labour efficiency Enterprise development Grant • Up to 70% support on innovation and business capability upgradation

Petrochemical Hub	Tax rebate/incentives/subsidies
Houston	Texas Enterprise Fund • USD 1,000 to USD 10,000 per job creation Texas skill development Fund • Provision of job training , training cost USD 1,800 per trainee State Sales and Use Tax refund • Refund on investment for every job creation State Sales and Use Tax Exemptions • Tax exemption on machinery, equipment, natural gas and electricity Local Incentives • Property tax abatement: 50% abatement per year, upto 10 years • Goods in transit exemption • Freeport Exemption
Kaohsing	Tax Incentives • Duty free import of machinery and equipment, new materials, goods, fuel, semi-products, samples and finished products • Zero commodity tax, value added tax and deed tax • Reduced business income tax (set to 10% of operating income)
Jubail	Financial Support • Land lease at low price • Loans for up to 75% support on investment • Loan repayment extension up to 20 years Tax Exemptions • Custom duty exemptions on imports of plant and machinery and raw-material

Source: Secondary Research



4

Way Forward

PCPIRs were launched almost a decade ago. However, barring Dahej (South Gujarat), where the anchor tenant ONGC Petro-additions Ltd has initiated operations, the other three have hardly seen any progress or investment attractions. The Union Ministry of Chemicals and Fertilizers is therefore contemplating revising the PCPIRs Policy as these special zones have not met their desired success.

4.1 Proposed Revisions in PCPIR Policy

Currently, the country imports 10 million tonnes of chemicals and petrochemicals worth ₹65,000 crore, which is likely to grow to 46 million tonnes and over ₹200,000 crore by 2030. The combination of factors including failed PCPIRs and the need to facilitate investments for growth of the domestic petrochemicals-related sectors to improve trade balances, the Centre is mulling over several revisions in the PCPIR policy. Some of the key proposed revisions include:



Bringing down the land requirements for a PCPIR from 250 sq km now to about 50 sq km.

Looking at the concept of multiple anchor tenants or cracker project investors at the seaport-based PCPIRs.

To address the key issue of the anchor tenant in the PCPIR not sparing feedstock for downstream units and converting the available polymers into bulk polymers, the Center is contemplating setting up petrochemical clusters downstream, adjacent to the refineries, that will have all the infrastructure for doing business at one place.

There are targeted changes being proposed for the Visakhapatnam and Kakinada PCPIR in Andhra Pradesh, which was given a quiet burial after cancelling the public hearing announced in December 2014; but is now appeared to have been revived.

- Owing to public outcry over possible pollution to be caused by the petrochemical units, there is speculation that to avoid the name PCPIR, it is being implemented as part of Vizag-Chennai Industrial Corridor funded by Asian Development Bank. The region is announced to be developed as a mega petrochemical hub.
- Now clearances for investment in petrochemical complexes will be given as part of VCIC.
- The Center has also directed the officials to finalise the Master Plan and anchor tenants to implement the project. PCPIR in Andhra Pradesh, the largest-ever in size in any State, has already received Central clearance.

PCPIRs are infrastructure-driven projects where the Centre provides support for development of external physical infrastructure linkages such as rail, road, port, airport, telecom through Viability Gap Funding (VGF). The Ministry is evaluating the scope of budgetary funding into these projects, apart from the specified mode of VGF and through public private partnership (PPP). The policy aims to attract investments worth $100 billion through PCPIRs.

The proposed policy revisions come at a time when other States such as Kerala, Karnataka and Maharashtra have evinced interest in setting up PCPIRs.

4.2 Recommendations and Areas of Importance

To turnaround the current state of dysfunctional PCPIRs, there is an urgent need for the following:

Government Support

- **Dedicated management:** Appointment of full-time CEOs heading each PCPIR and dedicated managerial/ technical teams to oversee the establishment and functioning, with government grant for functioning

- **Single window fast track clearance**: Introduction of a single window for approvals/ clearances will speed up the process of newer establishments and development in the PCPIRs
    - **Benefits to tenants:**
        - Income tax rebates
        - Duty free import of feedstock
        - GST rebate
- **Policy Stability:** The current PCPIR policy needs review and changes for investments in these regions to gain traction. After changes are made to the policy, considering sensitivities of the stakeholder, the policy needs to be stable for a period of 20-25 years. This will increase investor confidence
- **Chemical industry modernization fund:** The government can allocate specific funds and introduce more subsidies / incentives to encourage the development in domestic chemical and petrochemical sector
- **Skill Development:** A master plan or framework should be established to ensure skill development for all personnel involved in the chemicals and petrochemicals sector. This would ensure continued supply of skilled labor
- **Review of Policies:** Existing laws, regulations and trade policies should be reviewed to understand necessary policy amendments. This would pave the way for improving the ease of doing business and provide impetus for attracting investments into the country
- **Cess on imports:** Imposition of an additional cess on petrochemical imports would not only reduce imports but at the same time would help create a fund that can be used for promoting investments in domestic chemical and petrochemicals sector
- **Evaluation of the impact of FTAs and tariff rationalization:** FTAs need to be carefully evaluated for tariff rationalization as trade largely affects the need for domestic petrochemical production. Cheaper imports may suppress the growth of domestic petrochemical industry

Promotion

- **Brand building:** Conducting Trade shows, Delegations and other promotional measures for encouraging exports and FDI
- **Embassies and Consulates:** Role of Embassies and Consulates should be clearly defined. This would help in export promotion
- **Onboarding of anchor tenants:** PCPIRs need to be aggressively marketed to petrochemical majors with favourable terms relative to other ancillary tenants

Enabling Infrastructure

- **Logistics, infrastructure and pipeline network:** Well-established logistics, infrastructure and pipeline networks would reduce the cost of production and delivery to target market
- **Building corridors:** Building pipeline corridors for transfer of raw materials will ensure uninterrupted supply of raw material for smooth functioning of the industries

Planning and Execution

- **Masterplan incorporating best international practices:** The master plan for PCPIR should incorporate practices, strategies and schemes adopted by various successful petrochemical hubs in the past
- **Selecting empowered organisation for execution:** Development of PCPIR involves large scale investments. Contracting established organisations for anchor tenant could avoid project halt/delay and ensure continued financial viability
- **Viable PPP model:** A viable PPP model would ensure supply of adequate funds for the project
- **Shared utilities and facilities:** Sharing of utilities and facilities among various units in the PCPIR region would cut down the total development cost; this needs to be envisaged at the master planning stage
- **Feedstock strategy along the value chain:** A feedstock strategy along the entire value chain will ensure availability of feedstock for the downstream industries, which today is one of the key issues
- **Effective project and programme monitoring and evaluation:** An effective framework for programme and project monitoring and evaluation is essential. Timely implementation of all milestones pertaining to development of the PCPIR would avoid blocking of investments/funds in the project.
- **Waste water treatment:** Functioning CETP and discharge lines will prevent wastage of water ensure safer disposal of harmful chemicals. Move should be towards self-regulation with stiff penalties for violation
- **Consolidation of small capacities**: Operating on smaller capacities might not be economical due to minimum investment requirement on PCPIR infrastructure development. Hence, smaller players may jointly invest for development in a PCPIR to hedge the risk that comes from high investments

With the synergy of feedstock availability, the Indian oil and gas PSUs have invested in a big way in world-scale petrochemical complexes and continue to do so. If successful, PCPIRs could create an eco-system of entrepreneurship and employment while at the same time meet the rising demand for petrochemical intermediates and polymer/plastic products.

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Abbreviations

Abbreviations	Description
APSEZ	Andhra Pradesh SEZ
ARRRA	Antwerp-Rotterdam-Rhine-Ruhr Area
CETPS	Common Effluents Treatment Plants and STPS
DFC	Dedicated Freight Corridor
EIA	Environmental Impact Assesment
EPC	Engineering, Procurement and Construction
EPZ	Economic Processing Zone
FDI	Foreign Direct Investment
GNAL	GACL-NALCO Alkalies and Chemicals Ltd.
GIDC	Gujarat Industrial Development Corporation
HPCL	Hindustan Petroleum Corporation Ltd.
HSE	Health, Safety & Environment
IOCL	Indian Oil Corporation Ltd.
IIOT	Industrial Internet-of-Things
LNG	Liquified Natural Gas
MW	Mega Watt
MMTPA	Million Metric Tonne Per Annum
NE	North-East
NH	National Highway
NOCL	Nagarjuna Oil Corporation Ltd.
OPaL	ONGC Petro additions Limited
PCPIR	Petroleum, Chemicals and Petrochemicals Investment Region
PPP	Public Private Partnership
SE	South- East
SEZ	Special Economic Zone
SH	State Highway
STPS	Sewage Treatment Plants
US	United States
VGF	Viability Gap Funding

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