VISAKHAPATNAM–CHENNAI INDUSTRIAL CORRIDOR: SUMMARY OF REGIONAL PERSPECTIVE PLAN

A. Approach and Objectives

1. The concept development plan (CDP) was undertaken to assess the potential of the proposed corridor and identify the nodes and the specific industries that need to be targeted for future development. The CDP also set the foundation for an infrastructure strategy to unlock the near-term potential of the corridor.

2. In the CDP, the nodes of Vishakhapatnam, Kakinada, Amaravati region, and Yerpedu–Srikalahasti were identified based on their industrial potential and land availability. In addition, a set of priority projects, particularly last-mile connectivity projects, were recommended to be taken up in the near term. The study also recommended a set of policies to streamline the regulatory process for setting up and operating businesses efficiently in the Visakhapatnam–Chennai Industrial Corridor (VCIC) region. The CDP also set out aspirational socio-economic targets for the state in an accelerated growth scenario.

3. The aim of the regional perspective plan (RPP) report has been to build on the findings of CDP, and provide a more granular perspective of the corridor. The report provides a unified perspective on land requirement, industrial output, urban development, and infrastructure development in the corridor. Detailed demand supply analysis were undertaken to establish infrastructure requirements over the period of 30 years. The gap in infrastructure requirement was expressed in terms of specific project and policy interventions which can improve the industrial environment in the corridor.

B. The Industrial Perspective of VCIC

4. The current industrial output of Andhra Pradesh is estimated at $16 billion.[1] With support from the envisaged interventions, it is estimated to rise to about $64 billion over a period of 10 years in the business-induced scenario, as compared to an estimated $30 billion expected in the 'business as usual' scenario. In terms of employment, the corridor currently employs about 0.27 million people in direct jobs and can produce an additional employment of 1.03 million people in the selected industries in the nine districts of the corridor in 10 years. In 30 years, it is expected that the industrial output would rise to an estimated $295 billion in the 'business-induced' scenario and an estimated $117 billion in the 'business as usual' scenario. Such an output would be able to support an additional 9.5 million jobs in the selected industries in the nine districts of the corridor. Visakhapatnam is the most industrialized node of the corridor, presently generating a manufacturing output of nearly 49% of the entire corridor, followed by Kakinada, Yerpedu-Srikalahasti and Amaravati region nodes.

5. It is envisioned that there will be an increase in the share of manufacturing gross domestic product (GDP) by more than 20% in the overall corridor GDP by 2044-2045, accompanied with greater participation in the global production networks (GPN). Linkages with GPN is crucial for achieving industrial vision for the corridor. It has been analyzed that on the basis of the locational characteristics, the state has a comparative advantage in at least two sectors–electronics and pharmaceuticals, to achieve deepened integration with global value chain. The study also reveals that a strong mix of skills in the domestic workforce is essential for

[1] The figure is for 13 districts of the new Andhra Pradesh for the fiscal year 2014-2015.

achieving the key GPN objectives of building scale and deepening capabilities. Skill development is therefore an extremely critical element.

6. For achieving this vision, state would need to rapidly augment the land availability and also the skill-base of the population.

- It is observed that the available land inventory with the Andhra Pradesh Industrial Infrastructure Corporation (APIIC) is broadly able to service nearly 88% of the node level demand over short term. The incremental industrial land demand expected to accrue over the next 30 years (till 2046) is approximately 67,400 hectares. Approximately 19% of the total incremental demand is expected to come from Krishna and Guntur regions led by auto, electronics, and textiles industries. Vishakhapatnam and West Godavari are likely to account for 18% and 16% of the total incremental demand, respectively, in the next five years.
- For skill development, it is recommended that the state ramp up its skill development infrastructure to 1.5 million capacity per annum from the current 0.285 million per annum by 2030.

7. In terms of key locations that will drive this output, Vishakhapatnam is currently the largest hub for manufacturing sector in the corridor contributing almost 49% of the total industrial output. However, the development of the corridor shall provide the opportunity for dispersing this output. The districts of Krishna, East and West Godavari are expected to garner an increased share of manufacturing, led by sunrise industries like auto and electronics.

C. The Urban Perspective of VCIC

8. Urban infrastructure demand is crucially linked to the growth in the population of the nodes. It is estimated that approximately 10 million incremental population will be added to the existing population owing to the direct and indirect job opportunities that will be created due to industrial growth in VCIC. Vishakhapatnam and Yerpedu–Srikalahasti nodes will account for over 70% of the total population of the four nodes in 2045.

9. Based on the radial distance of the towns and/or cities from the respective nodes, 48 towns and/or cities were identified across the nine districts of VCIC and further analysis at node level was carried out using the population forecasts of these cities or towns. Further, the study team identified seven major cities (Chittoor, Kakinada, Machilipatnam, Nellore, Rajahmundry, Tirupati, and Vishakhapatnam) that have a population equivalent to 50% (as per 2015 population) of the total population of the above mentioned 48 cities. The team carried out a primary and secondary analysis of infrastructure for all 48 cities, while the report presents the detailed analysis and findings in the seven major cities.

10. These cities were identified and selected based on two key factors:
    (i) cities having a population of more than 0.3 million; and
    (ii) located within 50-60 kilometers (km) of the node.

11. In the RPP, the status of urban service infrastructure has been compared with the benchmarks to arrive at the project list and the investment requirement. The capacity of urban service infrastructure is found to be deficient in most cities. The total water demand among the top seven cities is 675 million liters per day (MLD); however, there is a shortfall in per capita water supplied in most cities. Vishakhapatnam, Kakinada and Tirupati are at 80% of benchmark;

while others are at 60% of benchmark level [135 liters per capita per day (lpcd). Rajahmundry is an exception with 161 lpcd supply. Nonrevenue water is high across all the identified cities and metering is absent in almost all cities. While Vishakhapatnam has 21% households with metered water connections, others have less than 4%.

12. The coverage of underground drainage and sewerage network is extremely low in cities like Kakinada, Machilipatnam, and Chittoor. In addition, none of the urban local bodies (ULBs) except Greater Visakhapatnam Municipal Corporation (GVMC) have sewerage treatment plant (STP). As a result, sewerage in most cities is released into the larger water streams or sea without any scientific treatment. Investing in projects and funding operations is a challenge as well; except Vishakhapatnam and Tirupati, most ULBs have no cost recovery mechanism in place.

13. A similar situation exists in solid waste management. Around 1,850 metric tons of solid waste is generated across 7 key towns in Andhra Pradesh and that gives average per capita generation of 588 grams in each city. Collection and transportation process is predominantly manual, with limited use of mechanized vehicles. Absence of transfer stations in most of the key cities restrict the scope for using heavy vehicles for transportation of waste. Machilipatnam, Kakinada, and Rajmundhry do not have any transfer stations. There is limited amount of land available for scientific disposal of waste and many cities do not have any site available. As a result, processing of waste is also negligible.

14. Urban transport is fairly dependent on intermediate and personal transportation modes. Andhra Pradesh State Road Transport Corporation (APSRTC) is the nodal agency for operating intra-city and inter-city bus services across all urban areas. City bus service system is lacking in most of the cities and towns. Vishakhapatnam is the only city which has a city bus transportation system.

15. Projects and investments were identified across each sector within the four nodes. Total urban sector investments estimated across all nodes over the next 30 years is $14.73 billion, of which about 69% is expected to be in the period of 2031-2045. Nearly 16% of the total investment is towards immediate interventions required across sectors in the nodes and/or shortlisted cities. Majority of the investment is expected to be in the Vishakhapatnam node (about 41% of the total investment), followed by Yerpedu–Srikalahasti node, accounting for 32%.

Table 1: Estimated Total Investment Required (Node-Wise) until 2045

($ million)

Sector	2015-2020	2021-2030	2031-2045	Total
Vishakhapatnam node	1,102.8	815.8	4,068.8	5,987.5
Kakinada node	398.5	387.2	1,359.8	2,145.5
Amaravati region node	279.0	278.7	1,364.8	1,922.5
Yerpedu-Srikalahasti node	601.7	723.3	3,346.8	4,671.8
Total	**2,382.0**	**2,205.0**	**10,140.3**	**14,727.3**

16. Investments between the years 2015 and 2020 are envisaged largely with a view to clear the existing capacity deficit and to ensure efficient delivery of service standards as per guidelines from the High Powered Expert Committee, Ministry of Urban Development. Majority of the short-term projects identified are in the area of water supply, sewerage and storm-water drainage sectors.

D. The Infrastructure Perspective of VCIC

17. The transport system for handling freight in the corridor comprises two major modes–roads and railways. Use of maritime coastal transport and inland water transport (IWT) systems is limited, despite the corridor's long coastline (800 km). Use of other modes of transport like aviation is less prevalent.

18. Despite railways being an economical mode of transport, the rail-road freight mix in the corridor has been skewed towards roads. Further, due to the short freight movement distances, road has emerged as the preferred mode of freight transport in the corridor. Almost 40% of the freight traffic (inbound: 25% and outbound: 15%) generated by the nodes is for import or export via gateway ports, while another 18% is domestic in nature – generated and terminated within the district of the node and in certain cases the surrounding districts. 42% of freight traffic is in relation to the secondary hinterland comprising other districts and states.

19. The figure below sets out the broad status of node level connectivity infrastructure in the corridor.

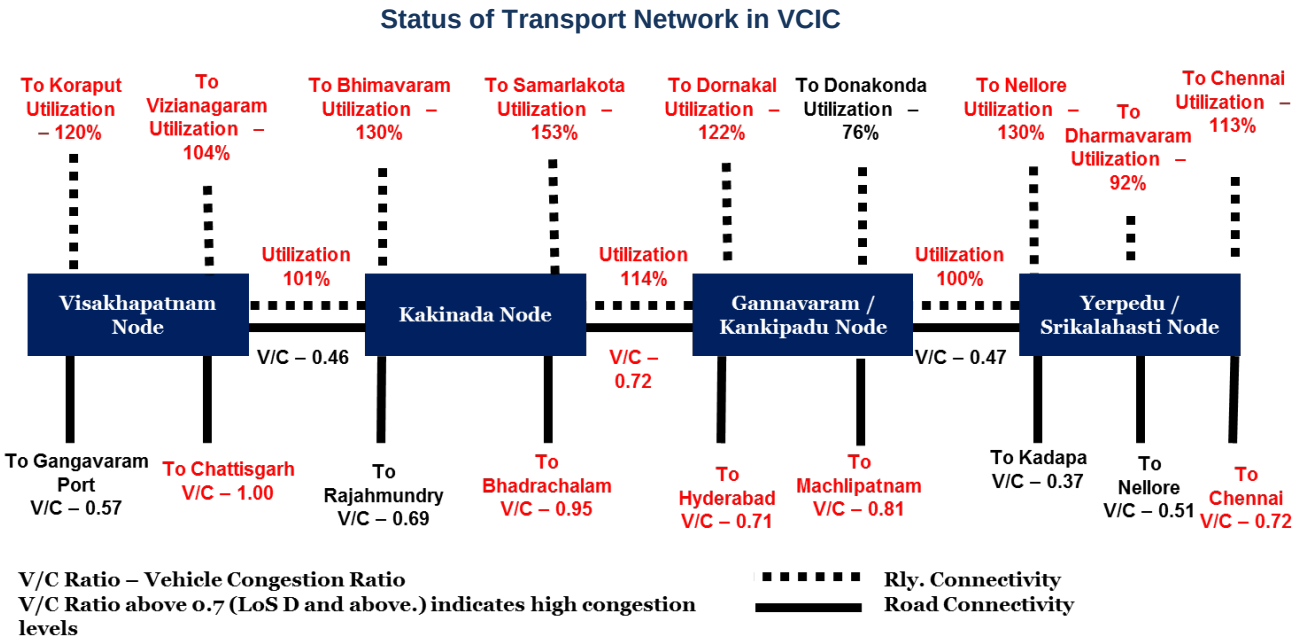


Figure 1: Status of Transport Network in VCIC

20. Almost 75% of the key road network (2,600km) identified in VCIC is operating at level of service (LOS) C or worse–over half the railway network operates at over 80% capacity utilization, indicating heavy congestion levels. The LOS for the spinal national highway–16 and the Chennai–Kolkata trunk railway line are poor, indicating severe stress on the existing logistic system in the corridor. These congestion levels severely undermine the benefits, associated with a node-based approach of corridor development

21. From the assessment on the congestion levels of the grid road network, it is observed that the capacity augmentation is warranted for around 2,300 km (state highways & MDR) of

road network in the short term. Of particular concern is the connectivity from node to hinterland–1,227km of identified roads and connectivity to ports are in need of intervention. Similar to the railway network, over 58% of rail lines in VCIC is saturated (congestion levels over 90% of the chartered capacity) mainly owing to lack of infrastructure as estimated 50% of the rail network is single line. Projects proposed by the Pink Book of Indian railways are well targeted, but slow in progress.

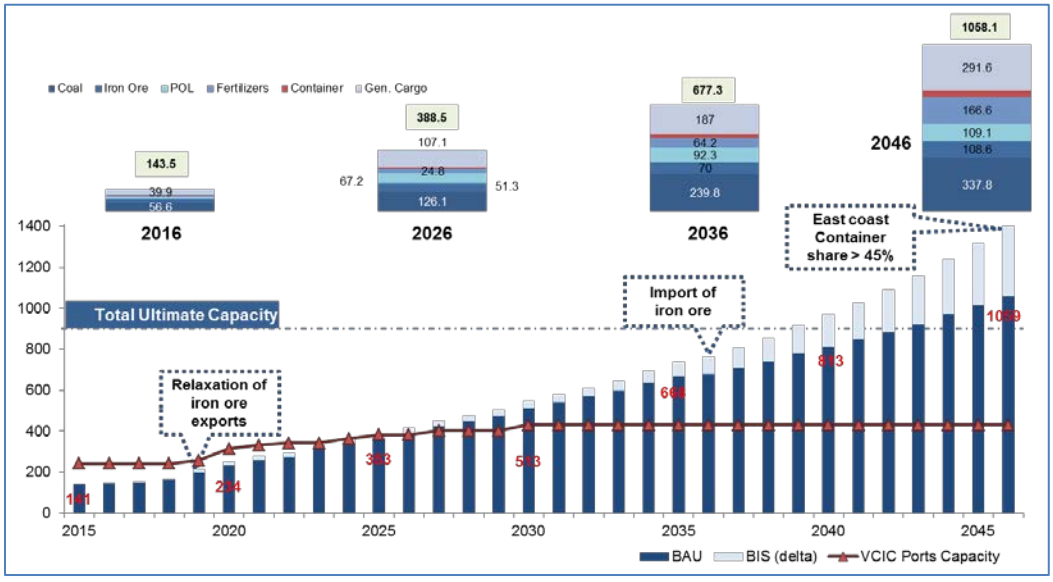
22. The four nodes in the corridor are aligned with the spinal National Highway–16 road and Kolkata-Chennai railway line. For the purpose of analysis, each node has been mapped against a set of gateways proximal to the node:

Table 2: Node–Gateways Mapping

Node	Gateways
Vishakhapatnam Node	Visakhapatnam–Gangavaram port cluster and Visakhapatnam airport
Kakinada Node	Kakinada port cluster and Rajahmundry airport
Amaravati region	Proposed Machilipatnam port and Vijayawada airport
Yerpedu Srikalahasthi Node	Krishnapatnam port and Tirupati airport

23. Being a coastal corridor, ports are expected to be key drivers of industrial growth in VCIC. In the year 2014-15, ports in the VCIC region together handled a cargo volume of 141.4 MTPA. Cargo throughput has increased at VCIC ports by ~30 percent since FY10, mainly driven by increased throughput at non-major ports. Coal, iron ore, and POL are the major cargo categories traded through VCIC ports. By 2045, the total traffic at VCIC ports is expected to increase to 1,401.0 MTPA (10X from current traffic)

24. The following exhibit shows the gap in demand and supply of cargo handling facilities at the AP ports.



Source: Study team analysis

Figure 2: Consolidated Cargo Projections and Gap Assessment at VCIC Ports

25. The analysis indicates that the port capacities are sufficient to meet the demand in the short term, while it would fall short of the 'business as usual' demand estimate by 2025. In the 'business-induced' scenario, the shortfall in port capacities would crop up by 2023. Coal traffic would account for 30%- 40% of the traffic from the ports in Andhra Pradesh.

26. As income levels and urban population levels increases in the state, air traffic as measured by per capita air trips will also increase and converge towards the all India average trip rate as targeted by Airport Authority of India. In the 'business-induced' scenario, owing to increased economic growth and urbanization levels, air passenger traffic can grow to 6.9 million by FY 2030, i.e., compound annual growth rate 10.7%. The trip rate in 2045 is likely to reach 0.36 which is higher than the current trip rate of Maharashtra (0.33) and Kerala (0.32). In the short-term, however, the presence of competing airports in Bangalore, Chennai and Hyderabad are likely to capture a significant percent of the trips generated in the state. The new international airport at Bhogapuram and the upgraded airport in Vijayawada are likely to lead to a marked increase in the availability of flight services from airports in the corridor, thereby helping to address the trips generated within the state boundaries.

E. Energy Infrastructure in the Corridor

27. In the year 2014-2015, the new Andhra Pradesh state has witnessed energy deficit of 4.9% with 5% peak deficit. The supply of energy has been primarily met by coal-based thermal plants which contribute close to 80% of the supply. Availability of fuel especially gas, stagnation in capacity additions are some of the key issues the state has faced over the years. Visakhapatnam, East Godavari, Krishna and Chittoor, where the four nodes are located, contributed to around 36% of the total demand of Andhra Pradesh for FY2015.

28. From the aspect of transmission and distribution infrastructure, transmission capacity for four districts corresponds to around 40% of the overall transformation capacity. A number of 132kV lines are already overloaded. Distribution transformer capacity for 4 districts covers nodes corresponds to around 33% of the overall distribution capacity of the state. The power plants of APGenco have the highest plant load factor (PLF) in India (80.7%) as against all India average of 65.11%. However, auxiliary consumption of most of the plants is higher than the all India average of 8.55%. Ageing of the plants is also gradually affecting plant performance as number of outages has been on the rise. This necessitates the need for continued plant maintenance to maintain availability. Short supplies of coal, challenges in coal quality are other factors which have also affected performance.

29. It is forecasted that supply availability of power is sufficient to meet projected demand under in 'business-induced' scenario by 2024. The state utilities need to cohesively plan and implement necessary generation capacity as well as the transmission and distribution network requirements that can support such capacity additions. Transmission Corporation of Andhra Pradesh's (APTransco) transmission infrastructure planning is already based on higher demand projections, it can be said that the new transmission capacity planned by APTransco would be adequate to meet the future infrastructure gap and there is no additional infrastructure requirement till year 2024.

F. Project Delivery Plan

30. The sector-wise investment requirement and phasing are summarized below.

Table 3: Summary of Investments Required in VCIC
($ million)

Investments by Sector	Short-term Investment (2015-2020)	Medium-term Investment (2021-2030)	Long-term Investment (2031-2045)	Total
Urban Infrastructure	**2,382.0**	**2,205.0**	**10,140.3**	**14,727.3**
Water Supply	592.3	478.0	2,339.8	**3,410.2**
Sewerage	891.7	275.0	1,355.8	**2,522.5**
Solid Waste Management	73.5	93.7	661.5	**828.7**
Storm Water Drainage	699.2	1,058.5	4,340.2	**6,097.8**
Urban Bus Transport	125.3	299.8	1,443.0	**1,868.2**
Transportation Infrastructure	**3,949.0**	**6,510.8**	**4,622.5**	**15,082.3**
Airports	338.3	86.3	20.3	**445.0**
Roads	3,538.5	1,970.8	1,896.3	**7,405.5**
Railways	72.2	4,453.7	2,705.8	**7,156.7**
Energy	**740.7**	**865.7**	**-**	**1,606.3**
Load Growth and System Improvement	740.7	865.7	-	**1,606.3**
Total	**7,071.7**	**9,581.5**	**14,762.8**	**31,416.0**

Source: VCIC's Regional Perspective Plan.

31. The implementation of the identified projects needs to be executed by a supportive institutional and financing structure. The corridor would be best served by a national industrial corridor development authority (NICDA)-like body at the apex, ably supported by a state corridor management authority. For each node, there shall be a node level special purpose vehicles (SPVs) and project level SPVs, wherever necessary.

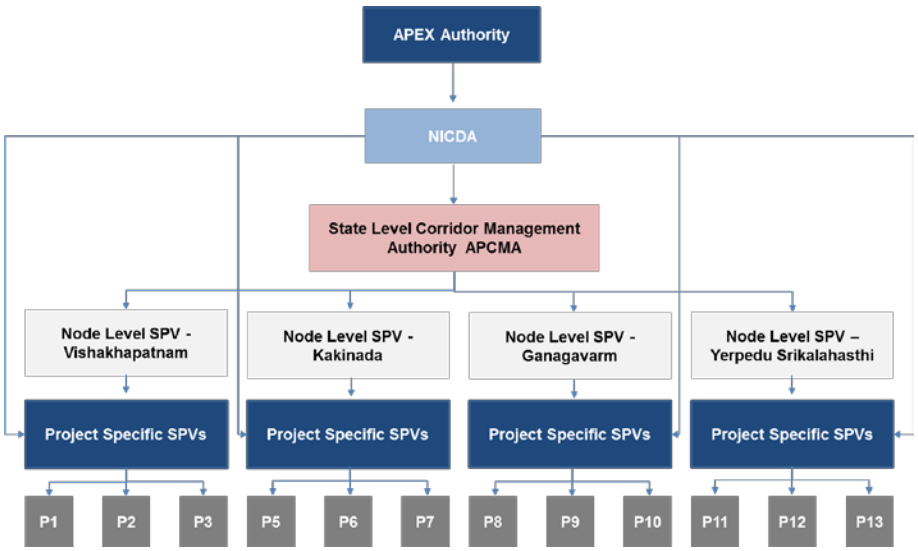


Figure 3: Proposed Institutional and Financing Structure

32. A state level nodal corridor management agency, shall be sufficiently empowered to facilitate policy decisions and prioritization of corridor development related projects. The funds flow will be from NICDA for centrally sponsored funds and Andhra Pradesh Corridor Management Agency (APCMA) for funds secured by the state government. The land contributed by the state government will be held in the node-level SPV. For specific projects of national importance, NICDA may route the funds directly to the project specific SPV. However, the node level SPVs shall be responsible for implementation and operation of the node. The node level SPVs will also be mandated to track the progress of all projects in the node and apprise APCMA on the same.