# Project Profiles
# Kerala Investment Potential

## Mega Projects

Kerala State Industrial Development Corporation
November 2017

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# List of Profiles

| # | Project Name | Sector | Estimated Project Cost | Proposed Location |
|---|---|---|---|---|
| 1 | Electronic Hardware Park | Infrastructure | INR 1200 Cr | Amballur, Cochin |
| 2 | Multi-modal Logistics Park (MMLP) | Industry Infrastructure | INR 1500 Cr | Cochin |
| 3 | Free Trade Warehousing Zone | Industry Infrastructure | INR 250 Cr | Vizhinjam |
| 4 | Port based Cruise Tourism | Tourism | INR 100 Cr | Vizhinjam |
| 5 | Light Metro- Trivandrum | Urban Transport | INR 4219 Cr | Trivandrum |
| 6 | Light Metro - Kozhikode | Urban Transport | INR 2509 Cr | Kozhikode |
| 7 | Marina at Allepey | Tourism | INR 100 Cr | Allepey |
| 8 | Medium Density Fibreboard (MDF) Plant | Manufacturing | INR 200 Cr | Ernakulam-Perumbavoor area |
| 8 | Abattoir and modern meat processing unit | Food Processing | INR 250 Cr | Wayanad or Idukki |
| 10 | Air Taxi | Transport/Tourism | INR 1100 Cr | Trivandrum, Alappuzha, Kottayam, Idukki, Ernakulam, Wayanad and Kasaragod |
| 11 | International Exhibition & Conference Center | Hospitality/Tourism | INR 500 Cr | Kakkanad, Cochin |
| 12 | Cryogenic Warehouse – Cochin Port Trust | Industry Infrastructure | INR 300 Cr | Puthuvypeen, Cochin Port |

# List of Profiles

| # | Project Name | Sector | Estimated Project Cost | Proposed Location |
|---|---|---|---|---|
| 13 | Propylene oxide – Cochin Refinery | Manufacturing | INR 5000 Cr | Kochi (BPCL-Kochi Refinery) |
| 14 | PVC manufacturing – Cochin Refinery | Manufacturing | INR 3000 Cr | Kochi (BPCL-Kochi Refinery) |
| 15 | Super Absorbent Polymer – Cochin Refinery | Manufacturing | INR 900 Cr | Kochi (BPCL-Kochi Refinery) |
| 16 | Elevated Highway | Urban Transport | INR 15000 Cr | Multiple stretches between Trivandrum to Kannur |
| 17 | Inland Waterways and Cruise development | Tourism/Transport | INR 1000 Cr | Multiple (Rivers and backwaters of Kannur and Kasaragod district) |
| 18 | Aerotropolis | Transport | INR 850-1000 Cr | Kannur |
| 19 | Aquaculture and Seafood Exports | Industry Infrastructure | INR 10 Cr (excluding land lease costs) | Vizhinjam Port |
| 20 | Integrated Manufacturing Cluster (IMC) | Industry Infrastructure | INR 10000 Cr | Cochin to Palakkad |
| 21 | Petrochemical Park | Petrochemical | INR 1864 Cr | Ambalamugal, Kochi |
| 22 | Maritime Cluster | Maritime/Ship Repair | INR 3500 Cr | Cochin Port (Wellington Island) |
| 23 | Small Hydro Projects | Energy | INR 850 Cr (Multiple Projects) | Idukki, Trivandrum, Kannur, Kollam, Palakkad |

# Electronic Park

Sector/Industry – Infrastructure

Project Type – Mega

Estimated Project Cost – INR 1200 Crores

Proposed Location – Amballur

# Project Description

- An Electronics Park is proposed to be set up at an extent of 100 acres of land in Amballur where Kerala State Industrial Development Corporation Ltd (KSIDC) is the nodal agency.
- The project aims to promote manufacturing and assembly of electronic hardware and would also include a research and development unit.
- The proposed world class park is estimated to draw investment to the tune of INR 650 crore through manufacturing and assembling of electronic equipment ranging from television, refrigerator, washing machine, computer to mobile handsets and by attracting companies in the semiconductor and electronic components sector.
- A rainwater harvesting system will also come up in 15 acres at the proposed electronics park at Amballur. It is expected that land acquisition and land development works shall be completed within two years and the Park shall be operational by 2020.
- In the first phase, 50 incubation units is planned to be set up. KSIDC envisages implementing the project by PPP mode.

# Market Scenario

The electronics market in India is one of the largest in the world and it is growing and anticipated to reach USD 400 billion by 2022. The market is projected to grow at a CAGR of 24.4 per cent during 2012-2020. In the current scenario, the Indian manufacturing industry contributes only about 2.2 per cent of the world's total manufacturing output. This has resulted in India becoming a major importer of electronic materials, components and finished equipment. One of the initiatives expected to bring about a course correction in the area of electronics manufacturing will be the ambitious Electronics Park Project at Amballur in Kerala – one that will help the country keep pace with the growing local demand for electronic goods.

The electronics industry in Kerala was valued at INR 670 Crore (USD 135 Mn) in 2012. Green Field Electronics Manufacturing clusters are being setup in Ernakulum. Companies are increasingly spending on R&D and stepping up innovation. There is an increasing penetration of high-end electronics products such as High Definition TVs (HDTVs), LCDs, LEDs, and tablet.

Source: http://www.keralacm.gov.in/progress-report/, http://www.thehindu.com/news/cities/Cochin/govt-to-scale-up-amballur-electronic-park/article7510670.ece, Pre-feasibility report March - 2016 Electronic hardware manufacturing cluster at Tirupati, http://environmentclearance.nic.in/writereaddata/FormB/TOR/PFR/18_Mar_2016_145417407LBF95SDWpfr.pdf, http://timesofindia.indiatimes.com/city/Cochin/Rainwater-harvesting-for-Amballur-electronic-park/articleshow/51174671.cms, http://www.constructionopportunities.in/IssueDetailPage?IssueMenuMasterId=3790&ParentMenuId=3790

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Under the first phase of the project an Electronic hardware manufacturing /assembling /programming/ testing and software development unit will be set up. Other facilities planned in future would include tool room, PCB/Chip Design/Embedded Technology Training Centre, Incubation and R&D center, Electronic Testing & Development Centre with training facility, Standard design factories etc. |
| **Land** | KSIDC has identified an extent of 100 acres of land in Amballlur, Mulanthuruthy. 30% of the area is allocated for infrastructure, common amenities and utilities like roads, electrification, water supply scheme etc. and for construction of built up space for industries. The balance area of 70 acres can be leased to entrepreneurs and private developers. |
| **Raw Material & Utilities** | Power, Boundary, land development, internal roads, storm water drains, street lighting, Water and sewage treatment plant, Waste disposal system, Electrification infrastructure, Warehousing, Training Facility, Conference facility, IT & Telecom infrastructure, Tool room, CAD/CAM centre, Plastic molding, Packaging, Testing facilities ,semiconductor and electronic components |
| **Employment Potential** | Considering Kerala's standard for working density at green and white industry / service sector, estimated employment shall reach around 25-30 K , including indirect employment |
| **Cost of the project (INR)** | Expected project outlay for the project is approximately INR 1200 Crores (~USD 185 Mn) |

Source: http://www.india-opportunities.es/archivos/publicaciones/Electronics-january-2016.pdf , https://www.ibef.org/download/Electronics-June-2017.pdf, http://www.thehindu.com/news/cities/Cochin/amballur-electronics-park-to-generate-5000-jobs/article8291519.ece, http://meity.gov.in/writereaddata/files/tender_upload/DPR%20Format%282%29.pdf, http://meity.gov.in/writereaddata/files/tender_upload/DPR%20Format%282%29.pdf

# Project Parameters

| Parameter | Description |
|---|---|
| **Cost of Project (INR)** | Broad cost break-up estimation is provided below:<br>• For 100 acre land a cost around INR 500 Cr is estimated for the land acquisition and infrastructure development.<br>• For interior, landscape and building services including HVAC an investment of ~ INR 700 Cr is estimated (which is likely to be born by tenants/private investors) |
| **Means of Finance** | The proposed Debt - Equity ratio is 60:40. Promoters contribution of INR 480 Cr and Term Loan/Borrowings/Investments in tune of INR 720 Cr.<br>Investors can avail various policy initiatives and support provided by the Government include:<br>• 100 per cent FDI allowed in the electronics hardware manufacturing sector<br>• Modified Special Incentive Package Scheme(M-SIPS) provides capex subsidy of 20-25 per cent for units engaged in electronics manufacturing<br>• As per Make in India Initiative, Electronic Development Fund Policy has been approved which would rationalize an inverted duty structure<br>• Electronic Hardware Technology Park (EHTP) Schemes<br>• Administrative sanction of INR 125 crore granted by the State government |
| **Expected Sales Turnover** | The government hopes to generate business of INR 1,000 crore from the electronic industries that would come up there. The Indian electronics and hardware industry is expected to reach USD 110-130 billion by 2018. By capturing 0.5% share the proposed park would generate revenue in tune of INR 3000 Cr by 2020. |

# Competitive Landscape

In India, the domestic manufacturing capacity is less than 45 per cent of the consumption, exposing the huge gap in the demand and supply situation. The free trade agreements signed with various countries has made it mandatory to ensure rapid growth of domestic manufacture of these goods, a major chunk of which are imported from China. In March 2017, Xiaomi announced its 2nd manufacturing plant along with Taiwan based company Foxconn, in Andhra Pradesh. This will help create employment in 100 nearby villages for at least 5,000 people. High production is majorly contributed by accelerating demand for advanced TVs, mobile phones, computers & defence related electronic equipment's during FY07 to FY15. The National Manufacturing Policy of GoI and other export promotion policies specializes firms in production activities and- results for global competition. To be competitive at international level large size electronic hardware technology parks with high class infrastructure is a need for the state to flourish. In Kerala Ernakulam, Kannur and Thiruvananthapuram are key districts with electronics manufacturing clusters.

**Key Players**

**Few key players in Kerala are KELTRON, OEN India Limited, CII Guardian International, KINFRA Electronic Manufacturing Cluster (EMC), TELK, Maker Village Kochi, CDAC, BPL, SFO Technologies** etc.

# Conclusion

The ambitious electronic park project being planned to be developed at Amballur in Kerala is soon expected to uplift the region into an attractive manufacturing destination. The Amballur initiative focuses on encashing on the booming market in India for electronic products which are being utilized in IT, industrial, manufacturing and infrastructure activities. The project which involves development of the first-of-its-kind facility in the state is being envisaged as an electronic hub to promote manufacturing and assembly of hardware, as well as to support the development of qualitative infrastructure. The electronic hub proposed at Cochin is expected to promote electronic hardware manufacturing and assembling units, R&D centres and supporting infrastructure. The project is fully in line with the National Manufacturing Policy of the Government of India for promoting more manufacturing industries in the country for economic growth and employment generation and hopes to generate business of INR 1,000 crore from the electronic industries that would come up there. The proposed world class park is expected to draw investments in the basic infrastructure development and through manufacturers and assemblers of electronic equipment, computer to mobile handsets and by attracting companies in the semiconductor and electronic components sector.

# Multi-modal Logistics Park

Sector/Industry – Infrastructure (Industry)

Project Type – Mega

Estimated Project Cost – INR 1500 Cr

Proposed Location – Cochin

# Project Description

A Multi-modal logistic park (MMLP) including Free trade warehousing zone is proposed to be set up at Cochin in the vicinity of Cochin Port. The Multi-modal logistics park is an enhanced form of a logistics park with various value-added services rendered through rail, road, air and sea modes of transport. Cochin Port Trust intends to establish this project in conjunction with the existing port facilities and services under the Logistics Efficiency Enhancement Programme (LEEP) of the Ministry of Road Transport and Highways (MORTH). Under LEEP, there are also plans to construct Inter-Modal Stations which integrate various transportation modes like rail, road, mass rapid transit system, bus rapid transit (BRT), auto-rickshaw, taxi and private vehicles. Cochin port is the most potential location for multi-modal transportation corridor due to its proximity to National Highway , Rail , International Airport and national/inland waterway connectivity.

The objective of this project is to provide efficient integrated logistics services with dedicated areas in the MMLP which would enable freight aggregation, distribution and multi-modal freight movement by providing services such as Warehouse, Cold Storage, and other value-added services. The MMLP is poised to address the issues of unfavourable modal mix, inefficient fleet mix and under-developed material handing infrastructure. The proposed MMLP is composed of following sub-projects:

1. General Warehouse
2. Cold Storage
3. Container Freight Station (CFS)

In addition to these, a Free Trade Warehousing Zones (FTWZ) is also proposed to be set up in juncture with the MMLP. FTWZ is a special category of Special Economic Zones that are governed by the provisions of SEZ Act and Rules. They are Integrated Zones used as international trading hubs and designated as deemed foreign territory. The FTWZs that form part of the Logistics Parks would improve the logistics infrastructure of the state and facilitate and promote cross-border and international trade. The primary intent of FTWZ is to attract industries catering to Storage, Handling, Transportation, Documentation, Tagging, Packing, Labelling, Palletisation, Quality Assurance, Repair & maintenance, Refurbishment, etc., of goods/ cargo will be ideal for locating in the Parks.

Advantages of the proposed Multimodal Logistics Parks & FTWZ include reduction in transport costs by 10 per cent , reduction in CO2 emissions by 12 per cent , and reduction in freight vehicles by 20 per cent.

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=153623, http://pib.nic.in/newsite/PrintRelease.aspx?relid=159271; http://www.thehindu.com/todays-paper/tp-national/tp-kerala/Multimodal-logistics-park-in-Cochin/article14554608.ece

# Market Scenario

- Cochin Port Trust has achieved the highest growth in operating surplus and third highest growth in cargo traffic among the major ports in 2016-17. The Cochin Port Trust has registered an operating profit of ₹127.72 crore during 2016-17 recording a growth of 80 per cent YoY.
- FTWZ will have the benefits of a free zone like duty deferment which meant duties on the imported goods stocked there need to be paid only when they are transported out of the zone, after resale. This facility will be of immense advantage for industries based on goods requiring longer storage time. FTWZ can cater to various industries such as seafood, tea and coffee, cashew, spices, electrical and electronics, food and beverages, high value products such as gems and jewellery, ship building and repairs, construction related products as well as furniture
- The Cochin Port has been handling around 16 million metric tonnes (MMT) per year of bulk cargo during 2014-2016 period. Again, Cochin Port has been handling approximately 4 lakhs containers every year in TEU terms. Container traffic saw a CAGR of 6 per cent during 2012-16 period. Cochin Port is leveraging its strategic location at the cross roads of trade between East and West to establish the first ICTT of India. The terminal will meet the demand of a convenient pivotal point for consolidating and distributing regional cargo. ICTT has registered a whopping growth of 17.5 per cent in total traffic handled in 2016, hence the container capacity is slated to increase in a phased manner up to 30 lakhs TEUs/year. Connectivity for all mainline carriers on the East-West shipping routes and regular scheduled train services to Inland Container Depots (ICDs) located in Irugur (Coimbatore) and Whitefield (Bengaluru) are catalysts for the impressive growth.
- Cochin Port is also attracting various new businesses through coastal shipping mode with the arrival of the first Ro-Ro car ship in 2016. This ship connects the automobile production hubs in Tamil Nadu (east coast) and Gujarat and Haryana (west coast). Huge car carrier trucks plying on the congested roads dominate the present mode of movement of automobiles for internal consumption in the country. Therefore, the potential coastal transport market segment could be strong; 50 ship calls a year with 1,000 cars per call will be required if 30 per cent of the Kerala market shifts to the coastal transport mode.
- The Ministry of Shipping has identified fourteen Coastal Economic Zones (CEZ) along the coastline of the country under National Perspective Plan (NPP) of Sagarmala Programme. The CEZ are spatial economic regions spread over multiple coastal districts with strong port linkage. Within each CEZ, there could be multiple industrial clusters that could contain industrial units with requisite support infrastructure. Sagarmala project aims to invest INR 70,000 crore in facilitating economic growth by enhancing coastal shipping of goods.

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=159271, http://www.thehindubusinessline.com/news/awards-for-cochin-port/article9709225.ece , http://www.containersindia.in/pdf/INDIAN%20CONTAINER%20MARKET%20REPORT-2016.pdf, http://www.thehindubusinessline.com/economy/logistics/cochin-port-attracts-new-business-through-coastal-shipping/article9154382.ece , http://pib.nic.in/newsite/PrintRelease.aspx?relid=155130 , http://timesofindia.indiatimes.com/city/Cochin/Cochin-Port-invites-expression-of-interest-for-warehousing-zone/articleshow/10429871.cms

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | • Warehouse Capacity: 7,00,000 Cu. Ft (First Phase)<br>• Cold Storage Capacity: 30000 Sq. Ft with capacity of ~80000 tonnes per annum (First Phase)<br>• CFS Capacity: Installed capacity to handle 100 Containers per day (36000/ year)<br>• FTWZ: 100000 Sq. m<br>The cargo and container handling capacity is based on space availability, capacity of the handling equipment's and projected Container traffic at Cochin |
| **Land (Proposed Location)** | Total land Area 100 Acres (available with Cochin Port Trust in vicinity of International Container Trans-shipment Terminal, Vallarpadam)<br>• 25 per cent of land area will be utilized for ware housing of general goods<br>• 20 per cent will be utilized for cold storage<br>• 30 per cent will be utilized for CFS<br>• 25 per cent will be utilized for FTWZ<br>The proposed land for the project is in close proximity to railway station, airport, National Highway and city premises. |
| **Raw Material & Utilities** | The main items required for the ware house and cold storage are Fork Lifts etc. For the CFS facility, two numbers of Reach Stackers having a capacity to lift 45 tons and stack 1+4 Containers are envisage. Using this, laden Containers can be handled easily. Three numbers of forklifts are proposed for handling empty Container.<br>Power requirement is estimated at 1000 KVA |
| **Employment Potential** | • Direct - 60<br>• Loading/Unloading & Security - 125 |

Source: http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=3&tab=1

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Cost of the project (INR)** | The total cost estimated for setting up the Multimodal Logistics Park & FTWZ in Cochin will be approximately INR 1500 Crore (~USD 230 Mn). The costs for developing the FTWZ in 25 acres land will come to nearly INR 250 Cr. The breakup of costs under major heads are as follows: The estimated cost for first phase of the project ~ INR 80 Cr | |
| | Land | 190 |
| | Site Development | 75 |
| | Infrastructure | 750 |
| | Utilities | 35 |
| | Misc. Fixed Assets | 130 |
| | Preliminary & Preoperative Expenses | 100 |
| | Consultancy | 40 |
| | Others (Expansion, Contingency, Deposits etc.) | 180 |
| | Total | 1500 Cr |
| **Means of Finance** | Promoters contribution – INR 600 Cr and Term Loan/Private investment in tune of of INR 900 Cr<br><br>SEZ units (FTWZ) can have external commercial borrowing up to USD 500 million in a year without any maturity restriction through recognized banking channels. | |
| **Expected Sales Turnover** | The expected sales turnover (Revenue) for the project is in tune of ~20 Cr after completion of first phase of the project. Industries catering to Storage, Handling, Transportation, Documentation, Tagging, Packing, Labelling, Palletisation, Quality Assurance, Repair & maintenance, Refurbishment, etc., of goods/ cargo will be ideal for locating in the Park. | |

Source: http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=3&tab=1

# Competitive Landscape

- Vizag multi-modal logistics park was inaugurated in February 2017 due to which movement of container cargo and other cargo from the port city will get a tremendous boost with the commencement of commercial operations at the multi-modal logistics park built at Sheelanagar beside the National Highway by the Container Corporation of India (Concor)
- Government plans to develop 35 Multimodal Logistics Parks (MMLPs) in the country. Cochin is one of the identified locations and with the upcoming MMLP in Cochin, which faces competition from Colombo, Singapore etc. with world-class infrastructure facilities can lead to cost advantages and attract cargo routed to neighbouring ports

**Key Players**

**There are several private logistics service providers, cold storage, and warehouse service providers in the vicinity of Cochin port trust**

**The proposed MMLP shall act as an incentive for all existing players to be part of the larger ecosystem.**

# Conclusion

The project shall be supported by the government for land acquisition. Different operation models like profit sharing, fixed monthly lease rent system etc. with land owners can be worked out. Central Government assistance through the Logistic Efficiency Enhancement Programme (LEEP) of Ministry of Road Transport & Highways (MoRTH), will also be explored. The LEEP aims at enhancing freight transportation across the country through infrastructure, procedural and IT interventions. The government is also working to formulate a uniform policy for the development of MMLPs. 100 per cent FDI is permitted to develop FTWZ. Several countries are expressing their interest in the upcoming FTWZ in order to foster their trade relations with India as they can import goods duty-free and warehouse it in the FTWZ, they can re-export these goods without paying duty. Cochin is one of the few ports that surpassed the Shipping Ministry's traffic target by handling 25.01 million tonnes in the just concluded fiscal year and is an ideal location for the MLP and FTWZ.

Source: http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=3&tab=1, http://www.dailypioneer.com/business-and-finance/government-to-construct-35-multimodal-logistics-parks-gadkari.html,

# Free Trade Warehousing Zone (FTWZ)

Sector/Industry – Infrastructure (Industry)

Project Type – Large

Estimated Project Cost – INR 250 Cr

Proposed Location – Vizhinjam Port

# Project Description

- The proposed Free Trade Warehousing Zone in Vizhinjam will be developed in lines of a special economic zone, wherein the area under development would be classified as a deemed foreign territory and the units operating within the zone would be given special status and provided various fiscal and non-fiscal benefits. FTWZ will be governed by the SEZ Act 2005 and SEZ Rules. The activities permitted within the zone would be limited to packing, de-stuffing, splitting, and other activities related to storage and logistics.
- Proposed FTWZ is a 100000 sq. m facility, which will include customized warehouses for food products, electronics, chemicals, textiles etc. along with cold storage facility, controlled humidity warehouses, enhanced transportation facilities and a well-equipped IT-integrated cargo management system

# Market Scenario

- Cost of importing/exporting from India is relatively higher than in other developed countries, primarily due to inefficiencies in the logistics chain, lack of deep draft port facilities and capacity constrained hinterland cargo evacuation system. Vizhinjam is strategically located along south of the Kerala coast and is only 10 nautical miles away from the East-West world shipping corridor. The port is being developed to provide world class infrastructure for efficient services and to cater for future development potential.
- The average growth in import-export traffic in the region has been about 13% per annum in the last 11 years.
- Indian exporters need not rely on foreign ports for trans-shipment of cargo as Vizhinjam port offers savings in annual expenditure of at least Rs.1000 Crore due to which huge opportunity exists w.r.t export and import of goods. The port location is ideal to tap the potential of development of a deepwater international container port in India that can handle the largest container vessels serving the East-West shipping route which can use facilities of the proposed FTWZ
- In line with the phase-I development of Vizhinjam port, the container terminal capacity for handling the projected traffic is 10,00,000 TEU at 70% berth utilization. However, it is envisaged that the port will have state-of-art equipment to handle the projected container traffic and according to global productivity standards, such ports can achieve a maximum berth utilization rate of up to 80%. Therefore in Phase-1 development of Vizhinjam Port is expected to cater to a maximum container traffic up to 12,50,000 TEU by 2030

Source: http://www.vizhinjamport.in/download/Feasibility-Report.pdf

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | 100000 sq. m facility with provision for packaging, re-packaging, labelling, re-labelling, strapping, refurbishment, crating, carbonisation, fumigation, choking, lashing, tagging, shrink / stretch / bubble wrapping, palletisation, bagging, re-bagging, quality assurance, kitting, de-kitting, sorting assorting, making combination pack, consolidation, agglomeration, washing, cleaning, processing, repairs & maintenance, CKD/SKD assembly, bottling, blending, cutting, polishing, painting, coating, filming, re-sizing, splitting, threading etc. |
| **Land** | 25 acres land is to be earmarked in proximity to Vizhinjam port. |
| **Raw Material & Utilities** | Basic Infrastructure, Counterbalance forklifts, Stackers, Cranes & Grabs, Push carts, Shelves, storage bins, electronic scales, cold storage freezers and cooler facilities, break bulk, containerised and dry cargo storage facility. |
| **Employment Potential** | The zone is expected to provide 200-300 direct and indirect jobs |
| **Cost of the project (INR)** | The total project cost is estimated at 250 Crores (USD 40 Mn) which will include storage facility and value-added services |
| **Means of Finance** | Units in FTWZ SEZ type can explore external commercial borrowing options up to USD 500 million in a year without any maturity restriction through recognized banking channels<br>(Source: Export Promotion Council for EOUs & SEZs, Ministry of Commerce & Industry, Government of India) |

Source: http://genexlogistics.in/free-trade-warehousing-zone-genesis-concept-objectives-and-envisaged-benefits/,, http://www.epces.in/uploads/files/file/FAQ.pdf

# Competitive Landscape

- Vizhinjam port's immediate competition would be with Cochin (Vallarpadam) and VOC (Tuticorin) for its gateway containerized cargo; however, the port would primarily be competing with Colombo in Sri Lanka for container transshipment traffic.

**Key Players**

- **Cochin Vallarpadam ICTT**
- **Tuticorin port**
- **Colombo port**

# Conclusion

- Free Trade Warehousing Zones are envisaged to be essential logistics infrastructure to facilitate export-import trade and to root out inefficiencies associated with movement and valued addition of cargo. FTWZ projects are usually developed through a PPP model. Under PPP mode, it can be developed either by 'Build, Own, Operate and Maintain (BOOM) model or Joint Venture. It is proposed that the government shall support developer for land acquisition and implementation of the project.
- FTWZs are entitled to many benefits such as Income tax exemption on all profits generated through re-exports activity through the FTWZ, Hassle-free re-export process by routing cargo through FTWZ integrated with CFS services, 100% deduction of profits derived from such business for 10 consecutive assessment years out of 15 years beginning from the year the SEZ was notified by the central government. The Government of India's Foreign Trade Policy (2015-2020) aims to increase the value of trade to USD 900 billion by 2020, by aligning with Government's various initiatives to promote exports growth.
- Due to growth across diversified industries with marked entry of foreign players leading to investment in logistic/warehouse such as pharma, automobile, retail, agriculture, FMCG etc. FTWZ in Vizhinjam would attract many leading players to utilize its facilities

Source: http://www.vizhinjamport.in/download/Feasibility-Report.pdf, Vibrant Gujarat 2017 report on Ports, Port Services and Logistics

# Port based Cruise Tourism

Sector/Industry – Tourism

Project Type – Large

Estimated Project Cost – INR 100 Cr

Proposed Location – Vizhinjam Port

# Project Description

In the existing master plan of upcoming Vizhinjam port developed by Adani Ports and SEZ, there is a provision for a cruise terminal which can drive demand for hospitality services in the area thereby contributing to the overall economic growth of the state by boosting tourism. The proposed new cruise terminal which is planned to be developed in the next phase of development is for cruises with 3000 passenger capacity equipped with facilities for international immigration standard operating procedures. This project puts forth opportunities for offering various cruise operators, cruise and passenger services at Vizhinjam Port, as a Port of Call

# Market Scenario

- Global cruise market witnessed a CAGR of 7% in growth of passengers during the period 1990-2015 with more than 22.2 million passengers in 2015.Growth in cruise tourism is expected to continue, reaching more than 25.3 million passengers in 2019.The passenger capacity of the global cruise industry is more than 466,000 beds according to the Cruise Lines International Association
- India is ranked as the 9$^{th}$ most popular tourist destinations in the world and is a preferred cruise destination. Kerala's revenue from tourism (direct & indirect) during 2015 was INR 26,689 Crore which saw increase of 7.25 % over 2014. In Kerala, Cochin port has a dedicated cruise terminal which gets call from major cruise lines like Cunard Lines, Royal Caribbean Lines, Aida Cruises, Costa Cruises etc. every year
- Government of India has relaxed cabotage restrictions for cruise vessels so that it is possible to transport Indians from one Indian Port to another on foreign cruise vessels transiting through India. This was in view of boosting cruise tourism in the country. As part of its cruise tourism development initiatives, Government of India has already identified 6 ports to be developed as 'World class cruise terminals' and to be promoted as 'Integrated Indian Cruise Circuit' – Mumbai, Goa, Mangalore, Cochin, Tuticorin and Chennai
- Vizhinjam Port holds great potential to fit into the Indian Cruise Circuit as a Port of Call due to proximity to renowned beaches such as Kovalam Beach (less than 5 Km away) & Varkala Beach (55 Km away) and other popular tourist attractions like Ayurveda rejuvenation therapies, Sea foods, Backwaters, Hill stations (Ponmudi) etc.
- An average international cruise passenger roughly spends USD 500 during a ship visit to Cochin. With the onset of cruise terminal infrastructure which is technologically advanced and in line with international standards, will lead into increased tourist inflow to the state

Source: http://timesofindia.indiatimes.com/city/Cochin/City-to-get-new-cruise-terminal/articleshow/54772099.cms , http://cochinport.gov.in/index.php?opt=cruisedestination, http://www.livemint.com/Politics/gFMW1phDvWa04KMhTdriKI/India-allows-foreign-cruise-ships-to-operate-along-the-coast.html, http://cochinport.gov.in/index.php?opt=cruisedestination , http://www.cruisemapper.com/ports/cochin-port-228

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Terminal and ancillary facilities to handle 3,000 passenger capacity cruise ships cum multipurpose cargo vessels. Various opportunities in line with the ancillary services required for passengers and cruise are:<br>• Tour Operator and Tourist Information center along with a help desk manned round the clock to cater to the passenger needs, inquiries and distribute city maps, brochures on tourist attractions, heritage sites etc.<br>• Shops selling souvenir, gifts, jewellery, ethnic wear etc.<br>• Restaurant<br>• Hotel<br>• Foreign exchange counters<br>• Communication Center<br>• Entry/Exit Clearance counters<br>• Parking facilities |
| **Land** | Requisite land is already earmarked in the existing master plan for development of Vizhinjam port by Adani ports & SEZ. Land lease possibilities can be explored with Adani Ports & SEZ |
| **Employment Potential** | Such a tourism facility can attract nearly 250 direct and indirect jobs. |
| **Cost of Project** | The total cost for the project is estimated at ~ INR 100 Cr (USD 15 Mn) |
| **Means of Finance** | Debt-Equity ratio of 70:30 is proposed for the project. |

Source: https://incredibleindia.org/lang/images/docs/trade-pdf/surveys-and-studies/study-reports/Cruise%20Tourism%20-%20Potential%20&%20Strategy%20Study.pdf

# Competitive Landscape

- Cochin Port has a dedicated cruise terminal which has a modern world class fully air-conditioned Cruise passenger facilitation centre “SAMUDRIKA”, where all statutory clearances like Customs and Immigration for cruise passengers are given under single roof.
- For the first time in India, Indians can look forward to embarking on a home port cruiseliner from Mumbai and going to enchanting destinations within India such as Goa and Kerala enroute to popular foreign destinations like Maldives and Colombo

**Key Players**

- Cochin Port
- Colombo Port

# Conclusion

Cruise tourism is as a major business prospect for Vizhinjam. A well equipped cruise terminal with extensive docking facilities, well-developed transportation network will attract lot of well-equipped in-terminal service providers and support facilities. Vizhinjam Port holds great potential to fit into the Indian Cruise Circuit as a Port of Call, which opens up huge opportunity for cruise & passenger based service providers.

Several lease and other operating models can be worked along with Adani Ports & SEZ in the next phase of development of Vizhinjam port which has a provision for cruise terminal. Government of India has launched several cruise tourism development initiatives to boost investor sentiment in the sector.

Source: http://timesofindia.indiatimes.com/city/delhi/Costa-Cruises-enters-India-to-begin-homeport-cruises-from-Mumbai/articleshow/53280863.cms,

# Light Metro - Thiruvananthapuram

Sector/ Industry – Urban Transport

Project Type – Mega

Estimated Project Cost – INR 4219 Crores

Proposed Location – Thiruvananthapuram



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# Project Description

- Thiruvananthapuram Metro Rail is a proposed light metro rail project in the city of Thiruvananthapuram which spans across 19 stations with a route length of 21.82 km and the estimated completion period is 5 years
- The proposed route would cover 19 stations namely Technocity, Pallipuram, Kaniyapuram, Kazhakoottam Jn., Kazhakoottam, Karyavattom, Gurumandiram, Pangappara, Sreekaryam, Pongumoodu, Ulloor, Kesavadasapuram, Pattom, Plamoodu, Palayam, Secretariat, Thampanoor, Killipalam, Karamana
- Kerala Rapid Transit Corporation Limited (KRTL) is a Special Purpose Vehicle (SPV) of the Government of Kerala, set up for the implementation and subsequent operation and maintenance of the Metro Rail System in Thiruvananthapuram

# Market Scenario

- Thiruvananthapuram is the second largest city in Kerala after Cochin. The city does not have any public transport system other than Bus services. Due to high land cost and extreme reluctance of the public to part with their lands, widening of roads to accommodate Mass Transit System is almost unthinkable. Therefore, an elevated or underground guided public transport system is unavoidableis the only solution to meet the traffic requirements of the city
- The roads in the city are narrow with only 15 Km of 4 lane roads and are congested all the time. The average city speed during peak hour is only about 20 Km/hr. All the city buses are also over crowded especially during peak hours. It is estimated that 36,73,50 people would get the benefits of the new transportation system by 2031
- With the projected person per hour per direction (PHPDT) requirement of 11296 in 2021 and about 17000 in the year 2041 for Thiruvananthapuram, it is clear that ordinary bus systems or a Bus Rapid Transit (BRT) system would not be able to meet the traffic demands of the city.

Source: Detailed Project Report for Thiruvananthapuram Light Metro Rail Project, October 2014, DMRC

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Capacity of 3 coach<br>• 600 passengers with 6 persons/ sq. m<br>• 750 passengers with 8 persons/ sq. m |
| **Land** | • Total requirement: 11.96 hectares<br>• Government: 8.92 hectares and Private: 3.04 hectares<br>• 19.54 Acres of Government land at Pallippuram, Thiruvananthapuram assigned to KRTL for construction of depot/ yard for the Light Metro Rail project |
| **Project Facilities** | • Inspection and workshop facilities, stabling lines in depot, test track, power supply, water supply, sewerage and drainage works, ancillary workshops, watch towers, parking facility<br>• Total power for the corridor is 23.3 MVA |
| **Cost of the project (INR)** | • INR 4219 Crores (USD 650 Mn) over a period of 5 years |
| **Means of Finance** | Proposed funding model (Debt-Equity Ratio = 60:40)<br>• Equity by GoI = 20%<br>• Equity by GoK = 20%<br>• Debt = 60% (International agencies, national funds, market borrowings etc.) |
| **Expected Sales Turnover** | • The revenue of Thiruvananthapuram Light Metro Rail mainly consists of fare box collection and other incomes from property development, advertisement, parking etc. Rental income of 83 crores is estimated for 2020-21<br>• Other revenues from property development and advertisement have been estimated at 10% of the fare box revenues during operations<br>• Economic rate of return has been estimated as 17.99%. |

Source: Detailed Project Report for Thiruvananthapuram Light Metro Rail Project, October 2014, DMRC

# Competitive Landscape

- Travel options within the city are limited to bus transport, and other road transport means limiting public transport option to buses alone as the entire district is extensively covered by the operation of buses
- Railways are used for commutation within Kazhakootam, Petta and Trivandrum Central Stations. Also, there are limited trains which have stoppage at all 3 stations. Commuters usually use railway lines for intra district travel and opt for autos, taxis and buses for travel apart from private vehicles

# Conclusion

- The main advantage of the Light Metro System is that it can negotiate very sharp curves and steep gradients. The moving dimensions for the Light Metro Trains will not need extensive widening of the Roads and hence large scale demolitions can be avoided.
- The project is the initial stage of development and land acquisition process is ongoing. The state government has taken several steps to expedite the acquisition process in order to complete the project within the projected timelines
- The huge prospects of the project to build urban infrastructure in the district can further usher economic development of the state at large and makes it a lucrative investment option
- Delhi Metro Rail Corporation for the 1st and 2$^{nd}$ phase of the Delhi Metro was entitled to certain Government of India encouragement through duty and tax concessions for the project. The same is expected for the proposed Light Metro projects, at least in the initial stages
- Kerala Rapid Transit Corporation Limited (KRTL) proposes to engage private investors/players for implementation of the project

Source: http://krtl.in/trivandrum.html, DPR for Phase I Kozhikode Light Metro Rail Project, Government of Kerala, Prepared by DMRC

# Light Metro - Kozhikode

Sector/Industry – Urban Transport

Project Type – Mega

Estimated Project Cost – INR 2509 Crores

Proposed Location – Kozhikode

# Project Description

- Kozhikode Metro Rail is a proposed light metro rail project in the city of Kozhikode which spans across 14 stations with a route length of 13.33 km and the estimated completion period is 5 years
- The proposed route (phase I) would cover 14 stations namely Medical College, Chevayur, Thondayad, Kottuli, New Bus Stand, KSRTC, Mananchira, Palayam, Railway Station, Pushpa, Kallayi, Panniyankara, Vattakkinar, Meenchanda.
- Kerala Rapid Transit Corporation Limited (KRTL) is a Special Purpose Vehicle (SPV) of the Government of Kerala, set up for the implementation and subsequent operation and maintenance of the Metro Rail System in Kozhikode

# Market Scenario

- Kozhikode is the third largest city in Kerala after Cochin and Thiruvananthapuram and is part of the second largest city agglomeration in Kerala with a metro population of 20,30,519 (as per census 2011).
- The city does not have any public transport system other than Bus services. It is seen that a number of important highways pass through the city. All other roads in the city are narrow with only 15 km of 4 lane road and they are congested all the time. The average city speed is only about 25 km/hr. All the city buses are also over crowded especially during peak hours.It is estimated that 23,97,32 people would get the benefits of the new transportation system by 2031.
- With the projected person per hour per direction (PHPDT) requirement of 6079 in 2021 and about 12000 in the year 2041 for Kozhikode, it is clear that ordinary bus systems or a Bus Rapid Transit (BRT) system would not be able to meet the traffic demands of the city.

Source: http://krtl.in/kozhikode.html, DPR for Phase I Kozhikode Light Metro Rail Project, Government of Kerala, Prepared by DMRC

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Capacity of 2 coach:<br>• 400 passengers with 6 persons/ sq. m<br>• 500 passengers with 8 persons/ sq. m |
| **Land** | • Total land requirement is 10.654 Hectares<br>• Government Land: 8.554 Hectares; Railway Land: 0.518 Hectares; Private Land: 1.582 Hectares;<br>• 8.28 Hectares of Government land has been assigned to KRTL for the Light Metro Rail Project |
| **Project Facilities** | • Inspection and workshop facilities, stabling lines in depot, test track, power supply, water supply, sewerage and drainage works, ancillary workshops, watch towers, parking facility |
| **Cost of the project (INR)** | • INR 2509 Crores (USD 387 Mn) |
| **Means of Finance** | Proposed funding model (Debt-Equity Ratio = 60:40)<br>• Equity by GoI = 20%<br>• Equity by GoK = 20%<br>• Debt = 60% (International agencies, national funds, market borrowings etc.) |
| **Expected Sales Turnover** | • The revenue of Kozhikode metro mainly constitutes of fare box collection and other incomes from property development, advertisement, parking etc. Rental income of 49 crores is estimated for 2020-21.<br>• Economic rate of return has been estimated as 17.39%. |

Source: http://krtl.in/kozhikode.html, DPR for Phase I Kozhikode Light Metro Rail Project, Government of Kerala, Prepared by DMRC

# Competitive Landscape

- Travel options within the city are limited to bus transport, and other road transport means limiting public transport option to buses alone
- Railways are used largely for commuting from Kozhikode to other districts and has very limited role to play for travel within the city

# Conclusion

- A reliable and safe public transport system is essential for the very survival of the city itself and also to accelerate its economic growth.
- The project is planned to be clubbed with Trivandrum metro under single management and procurement to achieve benefits of economies of scale
- The project is the initial stage of implementation. The state government has taken several steps to expedite the land acquisition process in order to complete the project within the projected timelines
- Delhi Metro Rail Corporation for the 1st and 2$^{nd}$ phase of the Delhi Metro was entitled to certain Government of India encouragement through duty and tax concessions for the project. The same is expected for the proposed Light Metro projects, at least in the initial stages
- Kerala Rapid Transit Corporation Limited (KRTL) proposes to engage private investors/players for implementation of the project

Source: http://krtl.in/kozhikode.html, DPR for Phase I Kozhikode Light Metro Rail Project, Government of Kerala, Prepared by DMRC

# Marina at Alappuzha

Sector/Industry – Tourism

Project Type – Medium Scale Project

Estimated Project Cost – INR 100 Cr

Proposed Location – Alappuzha District (3500 sq. m. land identified)



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# Project Description

- 'Marina' is a sheltered harbour designed primarily for yachts and other small boats for recreational tourism. The facility is required for safe anchorage and parking of small speed boats, pleasure crafts and yachts. The facility provides safe berths, utility supplies, safety & security, and onshore facilities such as restrooms, F&B, provisioning, repair services etc. It's an infrastructure project for the beach tourism & watersports industry.
- A large no of 'Marina' projects make multi-billion dollar business in developed nations and now in India people are at the advent stage of practice in terms of exploring water sports like yacht-owning, jet-skis, dinghy sailing, canoeing, pleasure cruises, but these all need infrastructure, and specifically marinas. The project has been conceived at Alappuzha District in Kerala, and would have approximately 2000 Sq. m. of area with provision for additional inland canal expansion up to 1500 Sqm to accommodate different sized yachts & boats.

# Market Scenario

- Tourism & Hospitality industry in India is expected to grow from USD 147.7 billion in 2005 to USD 418.9 billion in 2025. Approximately 8 Million foreign tourist have arrived in India in 2015 and the footfall is expected to growth at an average rate of 7% CAGR between 2005-25. [1] State tourism forecast in Kerala for next 30 years portrays a steady 12% annual growth rate of foreign tourist footfall and 4% for domestic tourist footfall. As per the project feasibility study done in 2012 more than 10500 foreign tourists has engaged to waterside tourism facility specifically leisure boating in Allepey which is accounted as 30-40% of total footfall[2]
- The marina project is expected to reinforce infrastructure for canal tourism and watersports activities at Allepey with significance in services such as sightseeing of attractions, backwater tours for families and waterside adventure activities for age group of 15-25. Focusing both on foreign and domestic tourist influx the project has potential for development of additional adjoined amusement facilities such as Theme Park , Dolphin Pool, Health Spa and Food Courts.
- Based on the market response the project scale may vary from medium to large but cannot expand as a mega project due to existing built up structure surrounding the identified land. As a general practice the project needs to accommodate tourism services from local tour operators in terms of days tours and water sports.

1. *Tourism & hospitality , IBEF Publication, Jan 2017.*
2. *Feasibility Report Alappuzha Marina DPR, Directorate of Ports, Govt. Of Kerala, July 2012 (http://keralaports.gov.in/currentproject.htm)*

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Marina facility having Large ( 20 person per craft ) Medium (10 person per craft) and small (4 person per craft) sized yachts as well as 2 seater speed boats and water scooters. Approximately 3,18,000 annual tourist handling capacity only for Marina by 2025. Inclusive of all other facilities the handling capacity shall be doubled as per estimated optimistic scenario. |
| **Land** | 3500 Sqm ( 2000 Sqm for development of boat shelter and extendable inland canal having 1500 Sqm canal area ) for Marina. Additional 6500 Sqm area for water park (excluding of area requirement for dolphin pool and other auxiliary developments) |
| **Raw Material & Utilities** | Civil building materials, STP setup materials – pumps , water-treatment equipment, structural materials, safety equipment, manpower, power and water supply (Locally available) ; Yachts/ Boats and Water-sport equipment ( to be imported or from regionally available suppliers). |
| **Employment Potential** | Total direct and indirect employment potential for 300 jobs |
| **Cost of the project** | The total estimated cost for the project is INR 100 Cr (USD 15 Mn) which includes basic marina facility development, other landside projects like Theme Park, Health spa & Food Court and future expansion with facilities like Dolphin Pool etc. |
| **Means of Finance** | 70% Debt and 30% Equity , having assumed debt payment period for 10 Years. Equity share between - Govt. of Kerala & Developer > 24% & 76% respectively. |
| **Expected Sales Turnover** | Estimated Internal Rate of Return (IRR) for Marina facility – 13.8 % , for Health Spa – 25 -26 % and for Dolphin pool – 15 % approximately , Payback period for Marina – 17 Years. Profitability Index * 1.26 for Marina project and combined 2.67. [ Average DSCR 3.96 ] ** |

** Profitability Index : PI = PV of future cash flows ÷ Capital Investment.*

** * Update of DPR, Directorate of Ports, Govt. Of Kerala, July 2012*

# Competitive Landscape

At present there is no significant infrastructure available at the subject area although National and local tour operators such as Cox and Kings (India) Pvt. Ltd, Aspinwall & Co. Tours Division, SITA (A division of Kuoni Travel (I) P. Ltd), Cruise Lines India, Creek Cruise Cochin, GAC Shipping (India) Pvt. Ltd, Intersight Tours & Travels (P) Ltd, Marvel Tours, Aqua Holidays and several others are sharing the market opportunities. Since such exclusive marina development is first of its kind in the subject region the project has ample opportunity to pioneer in waterside tourism. Apart from certain predicted competition with houseboat services, amusement facilities and other yacht tour programs 'Marina' project has a wider opportunity to collaborate with local tour operators and launch and landmark project regionally.

Since Marina project is an unique infrastructure facility and can be positioned as extended recreational components including theme park, dolphin pool , amenities and food court , relatively standalone tour programs and existing operators will likely intend to get a larger functional and financial benefit from such facility. Thus it is predictable that the project will promote an inclusive regional tourism service at Allepey rather than facing local competition.

**Key Players**

- Ocean Blue Marinas | Kochi International Marinas
- Kerala Watersports & Sailing Organization: KWSO
- Sailing Club House
- Wonderla Holidays Private Limited

# Conclusion

Being famous for the uniqueness of backwater tourism and current trend of rapidly growth of health and wellness tourism in Kerala the 'Marina' project at Alappuzha has a promising market setting to achieve socio-economic success. Although such high end tourism facility might be targeted specifically to foreign tourist but according to domestic tourism trend it also has high potential to attract equally large group of regional and national tourists at all watersport and landside amusement facilities. Since the land is already identified by State Government and feasibility study has been done with updated exercise performed in recent years it indicates supportive intension of the tourism department as well as availability of adequate fund. Based of investment prospect it is recommended to implement the Marina project under long term DBFOT (Design, Built, Finance, Operate and Transfer) mode and the state government is keen on developing the project in PPP mode.

# Medium Density Fibreboard (MDF) Plant

Sector/Industry – Manufacturing

Project Type – Mega

Estimated Project Cost – INR 200 Cr

Proposed Location – Ernakulam-Perumbavoor area

# Project Description

The proposed project is to set up a Medium Density Fiberboard (MDF) Plant at Ernakulam Perumbavoor area. With a capacity of 800 TPA (Tons per Day). MDF is a wood based composite, an engineered wood product made by breaking down hardwood or softwood residuals into wood fibers, often in a defibrator, combining it with wax and a resin binder, and forming panels by applying high temperature and pressure. MDF is dense, flat, stiff, has no knots and is easily machined.

# Market Scenario

- Market size of Indian MDF segment is INR 15 billion (growth at 25% CAGR over the last five years) of which 70% is dominated by a few organized players like Greenply, Mangalam timber, Action, VIR, Shirdi Industries etc. and 30% is accounted by imports. Globally, MDF constitutes ~65% of total panel products compared to ~4% in India. MDF, the engineered wood panel substrate, has been growing at 15-20% CAGR over the last five years, led by increasing awareness and acceptance. It currently accounts for a mere 7% of the wood panel substrate market, while globally it commands a share of over 80%. Going forward, we see strong growth opportunities, led by MDF gradually being preferred over cheap plywood segment and increasing demand for modular furniture.
- MDF markets are now more mature, and price competitive, which has driven producers to improve quality and develop new products and markets. MDF has many benefits as it is available in many sizes, has no natural defects and can be easily machined.
- Kerala produces 95% of the total supply of rubber wood in India. Economic growth has dramatically increased wood demand in India, and this trend is expected to continue. The Indian market for particle board and plywood is estimated in value terms, at over INR 37 bn. Of the total market, particle board including medium density fiberboard (MDF board) accounts for nearly a quarter of the market. Demand in this sector is driven by readymade modular furniture, modular kitchen, ready-to-move into offices/retail outlets etc. The B2B market of small and large readymade furniture makers accounts for larger pie of the demand.

Source: Report on Wood and Panel Products Sector, Asian Markets Securities Pvt Ltd., January 20, 2016, Webpage: http://centuryveneers.com/files/download/31a2a803a756c4a, accessed: 19 July 2017; Article on Medium Density Fiberboard (MDF), Entrepreneur India, Website: http://www.entrepreneurindia.co/project-and-profile-details/14213, accessed: 19 July 2019; Report on Wood panel sector , India Research Building Materials,13 October 2015, Website: http://www.centuryply.com/files/download/6a2f07fb62d2830, accessed: 20 July 2017

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Medium Density Fiberboard (MDF) 800 TPD(Tons per Day) |
| **Land** | 15 acres of Land in Ernakulam Perumbavoor area to be identified. In Perumbavoor, the wood is available at cheaper rate and in good quality. Also Rubber wood and Chipped wood material required for the production of MDF is available in plenty in the proposed locations in Ernakulam Perumbavoor area. |
| **Raw Material & Utilities** | Wood residuals (tree trunk, branches, chemicals) |
| **Employment Potential** | Potential to provide nearly 500 direct and indirect jobs |
| **Cost of the project (INR)** | Estimated total project cost is in tune of INR 200 Cr (USD 30 Mn) |
| **Means of Finance** | Debt-Equity ratio of 70:30 is proposed for the project with promoter equity of INR 60 Cr and private investments/term loans in tune of INR 120 Cr (USD 18 Mn) |

# Competitive Landscape

- Indian states well known for woodwork include Gujarat, Jammu & Kashmir, Punjab, Uttar Pradesh and Kerala. The MDF plant in Kerala has a lot of potential to grow as the demand for housing has consistently grown and is likely to continue in the future. The plywood is expected to face a stiff competition from MDF board as the MDF's homogeneous structure and uniform properties ensure equal strength in all directions and its dimensional stability in variable atmospheric conditions . However, plywood alone accounts for 78% of the wood panel market in India, the rest comprising engineered panels like MDF and particleboard. The country has sufficient availability of tropical wood, however, in recent years, growing concerns about the environment and the need for conservation of forests have led to reduction in the supply of wood. However, domestically- produced MDF faces competition from imports..

**Key Players**

Few Indian Major Players:

- Century Plyboards (India) Ltd.
- Greenply Industries Ltd.
- Mangalam Timber Products Ltd.
- Nuchem Ltd.
- Shirdi Industries Ltd.

Key MDF Manufacturers in Kerala

- K-Board
- Action Tesa

# Conclusion

There is a growing demand for MDF from the real estate sector with boom in Real estate / Commercial / Hospitality / Health care sectors. One of the biggest advantages of using MDF is that it is far more affordable than plywood and can be carved and molded to one's liking.

Rubber wood and Chipped wood material required for the production of MDF is available in plenty in the proposed locations in Ernakulam-Perumbavoor area. Demand in this sector is driven by readymade modular furniture, modular kitchen, ready-to-move into offices/retail outlets etc.

# Abattoir and Modern Meat processing unit

Sector/Industry – Food Processing

Project Type – Mega

Estimated Project Cost – INR 250 Cr

Proposed Location – Wayanad, Idukki

# Project Description

- The proposed project is to set up an Abattoir and Modern Meat Processing Unit and Allied Products at Wayanad or Idukki in 400 Acres of land at any of the aforesaid mentioned location. The project aims to streamline meat production in the state to make it more efficient and hygienic. Wayanad is the second highest in per capita availability of meat. The country has 77 abattoirs and meat processing plants approved by Agricultural and Processed Food Products Export Development Authority. Kerala is one of the leading states in meat consumption with a daily requirement of over 5000 tonnes. Less than 10% of this meat is produced within Kerala and comes from neighbouring states. In addition to this, over 60% of the meat production is in the unorganized sector through illegal slaughterhouses that use unscientific methods of slaughter that result in unhygienic meat, wastage of meat, loss of valuable by-products and creates unsanitary conditions due to improper waste management. Livestock production practise of cattle fattening will be used in order to reduce animal movements thereby fattening cattle herds more quickly and in much more healthier and sanitary conditions in order to obtain better quality meat. Therefore, modern slaughterhouses are an initiative which is to be explored considering the high demand for the product and low domestic supply.

# Market Scenario

- Kerala is one of the leading states in meat consumption (2.46 lakh ton in 2015-16) and Kerala has topped the list on cattle slaughter in the year 2015-2016.In addition to this, over 60% of the meat production is in the unorganized sector through illegal slaughterhouses that use unscientific methods of slaughter that result in unhygienic meat, wastage of meat, loss of valuable by-products and creates unsanitary conditions due to improper waste management.
- In Kerala at least 80% cattle for meat are procured from livestock markets. In India, total meat production increased to 2.43 million tons between July-October 2016-17, as against 2.24 million tones for the same period during 2015-16, registering a growth of 8.74%. India is currently second fastest growing processed meat and poultry market globally with a CAGR of 22% as per a new research from global market intelligence agency Mintel. The sector is estimated to grow at CAGR of 7.5% to become a USD 1.3 trillion valued market by 2020. According to Mintel Market Sizes, Indian organized meat retail sector is expected to witness a CAGR of 15.6 per cent during 2016-20.
- As per APEDA, the total processing capacity in India is over 1 million tons per annum, of which 40-50 percent is utilized. India exports about 13,43,607 tons of meat, mostly buffalo meat.

Source: Article on Beefed' up Kerala hits a record high, New Indian Express, 04th April 2017, Webpage: http://www.newindianexpress.com/states/kerala/2017/apr/04/beefed-up-kerala-hits-a-record-high-1589515.html accessed: 18 July 2017; Article on Meat production registers 9% growth in 2016-2017, Deccan Herald, 17 February 2017, Webpage: http://www.deccanherald.com/content/596787/meat-production-registers-9-growth.html, accessed: 19 July 2017; Article on Indian Food Processing, Indian Brand Equity Foundation(IBEF),June 2017,Webpage: https://www.ibef.org/industry/indian-food-industry.aspx, accessed on 19 July 2017; Annual Report 2016-17, Ministry of Food Processing Industries, Webpage: http://mofpi.nic.in, accessed: 19 July 2017, http://www.worldbank.org/en/news/feature/2016/01/14/malian-livestock-farmers-turn-to-cattle-fattening-to-increase-their-income ,Kerala Animal Husbandry Department say meat consumption in the state stood at 2.46 lakh tonne (1.46 lakh tonne of cow and ox meat and 1.10 lakh tonne of buffalo meat) in 2015-16

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | A plant for the processing of cattle meat with a capacity of 10000 tonnes per annum. |
| **Land** | Land area of ~ 100 acres to be identified for this facility. The proposed districts for this facility is Wayanad and Idukki owing to favorable weather conditions for cattle fattening. |
| **Raw Material & Utilities** | Core processes: Infrastructural facilities such as Lairages, Veterinary examination and sampling, Isolated areas for diseased animals, Slaughter units, Machinery and processing units, Storage areas<br>Supporting processes:<br>• Water Supply – Expected requirement 10,000 – 20,000 litres per day<br>• Effluent disposal – 12,000 – 22,000 litres per day<br>• Solid waste and blood disposal<br>• Hide and skin processing<br>• Electricity – 100 KVA |
| **Cost of the project (INR)** | The total investment cost of the project including working capital is estimated at INR 250 Cr (~USD 40 Mn). |
| **Means of Finance** | The Ministry of Food Processing under Setting-up/Modernization of Abattoirs Scheme provides financial assistance (grant-in-aid) for setting up of new abattoirs at 50% of cost of plant & machinery and technical civil work (TCW) in general areas subject to maximum of INR 15 crore. For difficult areas, the ceiling is 75% of cost of plant & machinery and technical civil work subject to maximum of INR 15 crore. |
| **Employment Potential** | Direct employment of approx. ~ 100 people, Indirect employment can be generated through meat distribution, transportation, animal husbandry, leather manufacturing etc. |

# Competitive Landscape

The major consuming states of meat in India are Uttar Pradesh, Andhra Pradesh (erstwhile), Kerala, West Bengal and Maharashtra. The rising slaughter of buffalo in these states is indicative of increasing consumer demand for buffalo meat. India has several integrated mechanized slaughterhouse-cum meat processing plants and has facilities for slaughtering, processing, packing and cold storage of meat. However, there is an increased demand for hygienic processed food (meat). Market for meat based processed RTE food products is rapidly increasing in Kerala. Meat Products of India Limited (MPI), Koothattukulam is selling ~ 5-30 tonnes of meat products per month. There is increased sale of unhygienic meat across the state due to which MPI is set to open a high-tech slaughterhouse and meat processing plant at Koothattukulam which is a '100% pollution free' slaughterhouse set up with the support of both centre and state governments.

**Key Players**

- Andhra Pradesh , West Bengal , Maharashtra , Delhi , Uttar Pradesh , Rajasthan are the key areas of Processed meat production in India.
- Meat Products of India Limited, Koothattukulam, Kerala
- Goa Meat Complex Limited (GMCL) (Govt. of Goa Undertaking)

# Conclusion

- There is a need of authorized Abattoir / Modern Meat Processing units and allied products to meet local demand of Kerala and such products offer an immense potential in domestic as well as export market. In line with recent concerns regarding cattle slaughter, such facilities with inbuilt cattle fattening techniques or with high standard quality check livestock procurement processes shall eliminate the need for unhygienic cattle trading for slaughter.
- In addition to this, the proposed project possesses wide range of economic and social benefits such as increasing the level of investment, tax revenue, employment creation and rural income.
- Food processing sector offers huge potential for setting up of modern meat processing units. The potential in areas like Frozen meat, ready to eat products, semi-finished products for retails is to be focused.

# Air Taxi Service

Sector/Industry – Services/Tourism

Project Type – Mega

Estimated Project Cost – INR 1100 Cr

Proposed Location – Circuit 1 – Trivandrum, Kollam, Pathanamthitta

Circuit 2 – Alappuzha, Ernakulam, Idukki, Kottayam, Thrissur

Circuit 3 – Malappuram, Kozhikode, Kannur, Wayanad, Palakkad, Kasaragod

# Project Description

- It is proposed that the Government would step in to develop the basic infrastructural facilities like the heliport and helipad. The operations would be carried out by fleet operators like Pawan Hans, Deccan Aviation etc. INKEL Infrastructure Kerala Limited has conducted a feasibility assessment for the project.
- Kerala has been divided into 3 circuits and the project intends to link up tourist destinations in these three circuits. Cochin is proposed as the Central Hub (Heliport) to base the operations with 18 helipads all over Kerala in all the districts.
- Since the helicopter service network is a new concept in the State, the demand projections have been made in the conservative side and the following destinations are proposed to be linked up through 3 circuits namely
    - Circuit 1: Trivandrum (Varkala), Kollam, Pathanamthitta
    - Circuit 2: Alappuzha, Ernakulam, Idukki (Munnar and Thekkady), Kottayam, Thrissur
    - Circuit 3: Malappuram, Kozhikode, Kannur Wayanad (Kalpetta), Palakkad, Kasaragod (Bekal)
- The possibilities of using the helicopter service network for allied usages identified were Disaster Relief, Emergency Medical Services or Air Ambulance Services, Police Services cum Airborne Law Enforcement, Moving VIPs & High-Value Assets, Search and Rescue Operations, Agricultural Operations etc.
- The proposed Helicopter Service network should have a central hub wherein all the aspects of operations can be controlled and supported. In the case of the proposed project, the Heliport (hub) is intended to be set inside the Cochin International Airport Ltd. (CIAL) at Nedumbasserry.
- Based on the outcome of the traffic demand assessment and site assessment, the tourist destinations in the Trivandrum, Alappuzha, Kottayam, Idukki, Ernakulam, Wayanad and Kasaragod are proposed to be linked up through the helicopter service network in Phase I.

# Market Scenario

- According to New Delhi-based Business Aircraft Operators Association, there are 550 aircraft in the general and business aviation categories which are used for charter flights. An increase in organ transplantation and medical evacuation has also seen helicopters being booked in remote areas.
- Seeking to promote helicopter tourism, Indian Railway Catering and Tourism Corporation and Pawan Hans have joined hands under an agreement that would allow flyers to book tickets through IRCTC website. The Memorandum of Understanding has been signed to implement the 'heli project' by making joint use of their capabilities and facilities.
- Key features of the National Civil Aviation Policy 2016 are:
    - Helicopters will be free to fly from point to point without prior ATC clearance in airspace below 5000 feet and areas other than controlled or prohibited or restricted airspace
    - The existing policy of allowing inclusive tour package charters will be further reviewed to include more categories of passenger charter flights recognised globally
    - Under the Regional Connectivity Scheme (RCS or UDN Scheme), the selected Airline operators would be extended subsidies from the Central & State governments such as sharing 20% of the Viability Gap Funding (VGF) for RCS routes, No landing or parking charges at RCS airport, levy of excise duty on ATF for a period of 3 years
- Hiring helicopters and private planes sees steady rise among commoners. People from smaller towns and villages in Rajasthan, Punjab and Haryana are ready to spend up to INR 2-6 lakh for two-hour trips by helicopter. Also, regular users are increasingly chartering aircraft and not always for work-related reasons.
- Kerala is home to the extensive coastline, with large expanse of back waters and amazing greenery in the Western Ghats. Air taxi services can be provided across the State to some of its exotic locations such as the back waters of Allepey, green valleys of Munnar etc.

Source: INKEL Feasibility Study, http://timesofindia.indiatimes.com/india/IRCTC-to-sell-tickets-for-Pawan-Hans-helicopter-service/articleshow/51429194.cms, http://timesofindia.indiatimes.com/india/IRCTC-to-sell-tickets-for-Pawan-Hans-helicopter-service/articleshow/51429194.cms, http://pib.nic.in/newsite/PrintRelease.aspx?relid=146238, https://factly.in/government-launches-regional-connectivity-scheme-udan/

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Capacity** | Phase-I will include setting up of Helipad facilities at Trivandrum, Alappuzha, Kottayam, Idukki, Ernakulam, Wayanad and Kasaragod | |
| **Land** | Land for the proposed helipads and heliport will be under the ownership of government | |
| **Raw Material & Utilities** | Lighting facilities, Wind indicators, Fire-fighting facilities, security requirements such as perimeter fencing, guard posts etc., administrative requirements such as ticket booths, passenger waiting areas, crew cabins etc. | |
| **Cost of the project (excluding land cost) (INR)** | The total cost for developing the project based on assumptions undertaken in the feasibility study* is ~ INR 13 Cr excluding land and helicopter cost. Broad-level breakup of costs are as follows: | |
| | Helipad Area Development | INR 3.3 Cr |
| | Helipad Physical and Technical Requirements | INR 2 Cr |
| | Administrative Requirements | INR 2.9 Cr |
| | Medical facilities | INR 2.1 Cr |
| | Others (Contingency, Interest requirements, Helipad Lighting, Fire Fighting, Ground to Air Communication, Passenger Access Control, Wind Indicator etc.) | INR 3 Cr |
| **Means of Finance** | It is assumed that the project will have a debt equity ratio of 1.5:1 | |
| **Expected Sales Turnover** | Main revenue streams are<br>Expected revenue to infrastructure facility in first year of operation ~ INR 3 Cr increasing at an annual growth rate of 10 per cent | |

Source: * INKEL Feasibility study and assumptions considering inflation in last 5 years

# Competitive Landscape

There are quite a few private helicopter service providers operating in Kerala who provide helicopter chartering services for wedding, film shooting, flower showering, air ambulance, private jet charter for business and leisure etc. However, a dedicated inter-connected network connecting all major tourist destinations in the state is not available.

**Key Players**

Chipsan Aviation Helicopter Services, HeliTaxi , Joy Jets, Helitours India , Rajputana Aviation, ACS – Air Charter Service India Pvt.. Ltd., Fly jettech, Air Charters India, Taj Air (Kerala), King Rotors

# Conclusion

- The helicopter network service is a novel concept and world over it is a practice to setup such networks in a phased manner. While phasing, it also necessary to note that sufficient traffic would be present to justify the trips/ sorties since the operation of such trips are expensive.
- The proposed helicopter service network can be developed through the Public Private Partnership {PPP) mode. In this mode, the Government would provide the base Infrastructure facilities like the heliport and the helipads. Most of the existing helipads in the State are under Government ownership and this would make the development of the basic infrastructure easier since no further land acquisition would be involved.
- Aircraft and helicopter services are poised to become increasingly popular in Kerala as well as India because of several reasons such as unpredictable rail networks and congested roads, long check-in times at airports, many users will shift to use of helicopters to travel throughout country especially in the tourism sector.
- Providing air charter services is considered to be a niche market targeting only a group of users but there is significant scope for exploiting the full potential and for this there is a need for adequate infrastructure facilities to be in place. This would enable better coverage to the tourist destinations in the state and also more usage of the services. More usage of the services would increase the flying hours and thereby reducing the cost of travel through economies of scale.

# International Exhibition Cum Conference Center

Sector/ Industry – Hospitality/Tourism

Project Type – Mega

Estimated Project Cost – INR 500 Crores with INR 100 Crores for Phase I

Proposed Location – Kakkanad, Cochin

# Project Description

- IECC Kochi is proposed to be set up at 20 acres of land earmarked by KINFRA at Kakkanad, Kochi close to the Info Park, Smart City and the KINFRA Export Promotion Industrial Park.
- The proposed IECC shall be comparable to global exhibition centers with respect to operational efficiency, energy efficiency, architecture, layout, interior design, acoustics, visual effects, and other supporting facilities. Likewise, the convention center is envisaged to be a facility for private events and high - end Government-to-Government, business-to-business and business-to-customer meetings, exhibitions and events.

# Market Scenario

- According to Kerala Tourism Trends Trade Survey 2016, Kerala has been pitched as a potential MICE and wedding destination and the tourism industry in Kerala has been offering exclusive packages for MICE and wedding settings. Increasing corporate penetration and role of wedding planners have resulted in rapid growth in the industry and also with the huge numbers that flow in as a part of a single booking promises wider market prospects for the upcoming IECC
- According to the trends survey, the biggest factor contributing to the growth of MICE business in Kerala is availability of good MICE infrastructure and facilities followed by Kerala tagged along lines of a tourist destination
- For a thriving industrial and business sector to grow, expo's & exhibitions play a major role by bringing the seller and customer together under a single platform. All major cities have a permanent industrial exhibition or convention centre which would host various domestic events, different business functions year round. Cochin is a forerunner in the area of MICE tourism
- Total revenue (including direct & indirect) from Tourism for the state in 2016 was INR 29658.56 Crores, showing an increase of 11.12% over 2015

Source: http://www.manoramaonline.com/content/dam/mm/ml/news/latest-news/pdf/2016/jan/Kerala-Tourism-Trends-Trade-Survey-Report.pdf, http://kinfra.org/wp-content/uploads/2013/04/RFP-IECC-Cochin.pdf, https://www.keralatourism.org/tourismstatistics/tourist_statistics_201620170325143623.pdf

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | • Covered exhibition halls (Approx 1, 00,000 Sq. ft)<br>• Convention center with a seating capacity of 5000 persons<br>• Mini conference hall with a seating capacity of 1500 persons<br>• Open exhibition space (Approx 1,00,000 Sq. ft)<br>• Food court |
| **Land** | • Total site area: 6.07 ha<br>• Build-up area: 45409 sq. m |
| **Raw Material & Utilities** | • Water Consumption: 170 KLD (Operation phase)<br>• Power requirement: Supplied from KSEB<br>• Waste Management facility |
| **Cost of the project (INR)** | Total estimated project cost – INR 500 Crores (USD 77 Mn) with INR 100 Crores (USD 15 Mn) in Phase 1<br>It is proposed to use around 10 acres for the exhibition activities in the Phase 1 and the balance land will be developed in the ensuing phases commensurate with the utilization and demand and part of it through private participation for setting up hotels, multiplex, restaurants, paid parking etc. The approximate cost of the project in Phase 1 is INR 100 Crores. |
| **Means of Finance** | The project is proposed be set-up in PPP mode. The built up space shall be made available to investors on lease. |
| **Expected Sales Turnover** | The locational advantage is expected to give a return of more than 20% to the lessee or to the operators of the project |

Source: http://environmentclearance.nic.in/writereaddata/FormB/EC/FORM_1/25032017CGO3GK0QformIA.pdf , http://kinfra.org/rfp-for-international-exhibition-cum-convention-centre-iecc-kakkanad-kochi-kerala.html

# Competitive Landscape

- Due to locational advantage, there a few convention centers functioning in Cochin. However, convention centers with proposed capacity of 5000 persons etc. are limited.
- Convention centre facilities are also provided by five-star category hotels in the city

**Key Players**

- **CIAL Convention Center**
- **RECCA Club**
- **Adlux International Convention Centre**
- **Convention Center in Le Meridian, Marriott, Gokulam Park and other hotels in Cochin such as Gokulam Park etc.**

# Conclusion

- This IECC project, on completion, to be world class in architecture, layout, interior design, acoustics, visual effects, general ambiance etc. with state of the art facilities, making the IECC an attractive destination for public gatherings/congregations, meetings, incentives, conventions and exhibitions (MICE), Industrial promotions, art and craft, trade fairs, etc. IECC Cochin is visualized to be the best (SMART) in its class with all modern facilities
- The investors can explore various options to take space as per their requirement on long lease for developing specific facilities. The lessee may develop the interiors required for operating the specific facilities and will have the right to sub lease the space to other parties or groups having expertise in operating and managing these facilities. The value appreciation of the property, owing to the locational prominence, will enable the lessee/ investor to sublease/ sublet the space easily.
- A total area of 6,23,973 sq.ft is being planned for the International Exhibition Centre and 3,76,298 sq. ft is being planned for the Conference Hall (B+G+1) which will have integrated venue for conferencing, convention and exhibition and equipped with state-of-the-art facilities, audio and video equipment and other auxiliary services.
- Out of the total around 2 lakh sq. ft is available for commercial activities which is intended to be given to prospective investors on long lease.

Source: http://kinfra.org/rfp-for-international-exhibition-cum-convention-centre-iecc-kakkanad-Cochin-kerala.html

# Cryogenic Warehouse

Sector/Industry – Infrastructure (Industry)

Project Type –Mega

Estimated Project Cost – INR 300 Crores

Proposed Location – Puthuvypeen, Cochin Port

# Project Description

- The proposed project is to establish a Cryogenic Warehouse at an area of 10 acres in Puthuvypeen next to the existing LNG terminal. The project has has been earmarked using the cold energy available from the regasification process that can be used for creation of a zero $CO_2$ emission cold-chain hub.
- The concept, popular in Japan and China, is being experimented within India, where the possibility to set up cold storages near LNG terminals exists. Cochin Port has a 5 MMTPA LNG terminal and Regasification Plant owned by the Petronet LNG Ltd. 10 acres of land adjoining the LNG terminal in Puthuvypeen Port Based SEZ is earmarked for setting up the cold storage on PPP basis.
- Cryogenic Warehousing proposed is basically for perishable products like vegetables, meat, fish and also for pharma products. The terminal area is situated in the Special Economic Zone (SEZ) of Puthuvypeen near the entrance to Cochin Port. Recycling of waste cold from LNG re-gasification to help produce the cryogenic air or nitrogen would serve as an energy vector to displace fossil fuels in cooling would produce value for the LNG terminal operators (value from waste re-cycling), cryogen producers (increased sales), fleet operators (lower costs) and society (reduced $CO_2$, NOx and PM emissions, health/social costs, post harvest food and associated losses, infrastructure costs).
- Each tonne of LNG contains the cold energy equivalent of 240kWh, quite apart from the chemical energy contained in its methane molecules, and typically 80% of this cold energy is thrown away.
- The proposed project can utilise this cold energy by recycling it through a co-located air liquefaction plant to help produce liquid air or at around -196C. Once converted into liquid air, LNG waste cold could be used in various applications such as direct heat transfer for over the fence cold port for deep freezing and temperature controlled storage - Cryogenic warehouse.

Source: http://www.financialexpress.com/industry/petronet-plans-to-use-cold-energy-to-set-up-power-units/12293/, http://www.wpsdlocal6.com/story/35369725/frozen-food-2017-global-market-expected-to-grow-at-cagr-615-and-forecast-to-2021, https://setis.ec.europa.eu/system/files/bham_input_action6.pdf, http://dearman.co.uk/wp-content/uploads/2016/05/The-prospects-for-liquid-air-cold-chains-in-India.pdf

# Market Scenario

- The cold chain market is expected to grow at a compound annual growth rate (CAGR) of 13.2% worldwide in 2017; and in India a CAGR of more than 25% is projected[1].
- The shortage of refrigerated vehicles is increasing in India. National Centre for Cold-chain Development (NCCD) estimates that to meet current demand, India requires a further 17,000 refrigerated vehicles.
- International Institute of Refrigeration (IIR) estimates that more than 200 million tonnes of perishable foods could be preserved if developing countries had the same level of cold chain as found in the developed world. As per Birmingham Energy Institute study, the cold from projected Indian LNG imports in 2022 could in principle help produce enough liquid air to fuel half a million liquid air refrigeration units (TRUs)
- Ministry of Shipping and the Ministry of Agriculture are spearheading a project to set up cold chain hubs at Ports with LNG terminals like such as Cochin Port, so that they could be developed as Perishable Handling Centres and Perishable Port Gateways.
- The global frozen food market is forecasted to grow at a CAGR of 6.15% during the period 2017-2021. With the increasing demand for quick meals, the popularity of frozen food products is increasing. Improving living standards, growth of urban settlements, and growing working women population is also adding to this new trend in the global frozen food market.
- Development of cold storage industry has an important role to play in reducing the wastages of the perishable commodities and thus providing remunerative prices to the growers. The facility can be used as a port based coldstore hub for the entire Kerala region. The facility could also be utilised by small and medium food suppliers/producers, marine processing firms etc. Since operation of the facility is through utilising the wasted energy during regasification process, the operation shall be economical compared to conventional cold storage.
- The Cochin LNG terminal is expected to run at 40 per cent capacity by 2019 which shall ensure a continuous generation of waste cold for the proposed warehouse.

Source: 1. http://dearman.co.uk/wp-content/uploads/2016/05/The-prospects-for-liquid-air-cold-chains-in-India.pdf, http://www.financialexpress.com/industry/petronet-plans-to-use-cold-energy-to-set-up-power-units/12293/, http://www.wpsdlocal6.com/story/35369725/frozen-food-2017-global-market-expected-to-grow-at-cagr-615-and-forecast-to-2021, https://setis.ec.europa.eu/system/files/bham_input_action6.pdf , http://profit.ndtv.com/news/budget/article-petronet-lng-to-run-kochi-terminal-at-40-capacity-by-2019-1647630

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | 5 million cubic meters of chilled and frozen buildings |
| **Land** | An area of 10 acres in Puthuvypeen next to the LNG terminal has been earmarked for setting up cryogenic warehousing |
| **Raw Material & Utilities** | A study by E4tech, conducted on behalf of India's NCCD, shows that a typical LNG terminal re-gasifying 7100 tons of LNG/day can produce 2,600 tons of liquid nitrogen, enough to provide the cooling for almost 1,100 chilled and frozen refrigerated trucks operating around the clock and peak time cooling (three hours a day) for 7.5 million cubic meters of chilled and frozen buildings. |
| **Cost of the project** | The estimated total project is INR 300 Crore (~USD 45 Mn) |
| **Means of Finance** | Various means of finance and support is available form Government of India. Few being<br>• Access to low interest fund of Rs.5,000 crores from WIF from the National Centre for Cold Chain Development under the Ministry of Agriculture.<br>• Access to National Clean Energy Fund<br>• Credit linked subsidy at 35% (upto 50%) for cold chain infrastructure<br>• Investment linked 150% tax deduction<br>• Automatic route clearance for 100% FDI with External Commercial Borrowings route open |

Source: http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=20&tab=1, http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=20&tab=1, http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=20&tab=1 , http://nccd.gov.in/PDF/Sea_Port_LNG_Regas.pdf, Cold Chain Technologies Report by Assocham India and Sathguru, May 2017

# Competitive Landscape

- Petronet LNG recently has invited expressions of interest from players to help it develop an integrated cold store facility at its LNG import terminal at Dahej, Gujarat as well. Since the application of the technology is at a nascent stage and with increased focus on environment this field is poised to gain significant competition from cryogenic technology providers, logistics providers etc.
- Sainsbury in the UK has become the first company in the world to introduce a refrigerated delivery truck cooled by a liquid nitrogen powered engine
- Unlike other alternative refrigeration technologies, liquid air can cater to full range of cold chain services - from pre-cooling of produce to warehouse cold storage and long distance vehicle refrigeration. It can also supply the cold for blast freezing and other forms of food processing. Liquid air can find applications beyond agriculture like back-up power and air-conditioning in buildings.

# Conclusion

- There is therefore a huge opportunity to utilize the earmarked area on PPP (DBFOT) basis to build and operate cold chain facilities after tying up with PLL for the cold energy.
- The facility could also be utilized by small and medium food suppliers/producers, marine processing firms etc. The operation of the facility is considered to be far more economical compared to conventional cold storage.
- Dearman, a UK-based technology company, has developed a family of engines that uses liquid air/liquid nitrogen to deliver zero-emission power and cooling.
- National Center for Cold Chain Development is pursuing the potential of clean energy from liquid air based cold chains by recovering stranded cold from LNG re-gasification. The prospect of developing cryogenic warehouse at the Cochin LNG terminal can be developed under this window.

Source: http://www.sagarmala.gov.in/sites/default/files/2.Final%20Master%20%20Plan_Cochin.pdf, http://www.sciencedirect.com/science/article/pii/S1876610216314485, http://www.maritimegateway.com/interviews/riding-liquid-cargo/). http://www.cochinport.gov.in/index.php?opt=projects&sub=20&id=20&tab=1

# Propylene Oxide/ Polyol Petrochemical Plant

Sector/ Industry – Manufacturing

Project Type – World scale Petrochemical Complex

Estimated Project Cost – ~INR 5000 Crore

Proposed Location – Kochi (BPCL-Kochi Refinery)

# Project Description

- The proposed project is for developing a Propylene Oxide (PO) manufacturing plant of 200000 MPA capacity required to produce Propylene Glycol & Polyether Polyols at Kochi is in the vicinity of existing BPCL Kochi Refinery
- PO is a highly reactive versatile compound which has major application for the production of Polyether Polyols (70%) for use in making Flexible, Rigid foams (PU) , Non-foam applications, Glycol Ethers (15%) & Propylene Glycol (15%)
- Flexible foams are used in mattresses, cushions etc. Rigid foams are used in Automotive applications, Building Insulation. Propylene Glycol (PG) is used in the manufacture of Unsaturated Polyester Resin, that finds application in the production of Fibre glass reinforced plastic. Other uses include Pharmaceuticals, Deodorants & Cosmetics.
- Endowed with an excellent port infrastructure with ICTT, bulk cargo terminal, oil terminal and airport connectivity, Kochi is an ideal location for the project. This project will help meet the increasing demand for polyols. The proposed location in the vicinity of refinery makes integration of feedstock supply, utilities, off-sites and other general facilities easy.

# Market Scenario

- The total installed capacity of Propylene Oxide in India in 2015-16 is nearly 36000 MT with a capacity utilization of ~ 70%. Total consumption of PO in 2015-16 was 51000 MT. India imported nearly 25552 MT of PO worth INR 256 Cr in 2015-16.
- PO is a major derivative of Propylene after Polypropylene, The market of PO in India is anticipated to grow at a CAGR of over 8% during 2016 – 2025.
- Currently India imports PO from Korea (68%), Singapore (18%) & Saudi Arabia (14%). Freight costs are high for importing PO. Hence the advantage of having domestic production of PO is necessary to support Polyols production.
- In India, PO demand will be driven by the growth in industry applications such as bedding, mattresses, automobiles, construction and energy efficient buildings.
- Polyol consumption is expected to grow at an annual rate of 11 % CAGR over the next 5 years.

Source: http://www.chemicals.nic.in/sites/default/files/Chemicals%20%26%20Petrochemicals%20Statistics%20At%20A%20Glance%202016_0.pdf

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | 2,00,000 TPA (PO/Polyol/PG & Utilties)<br>• Feed material pre-treatment section<br>• Direct oxidation reaction section<br>• Initial separation section/Solvent recovery/recycle/Catalyst removal<br>• Final distillation section |
| **Land** | 180 acres |
| **Raw Material & Utilities** | • Raw Materials: The main raw materials for manufacture of Polyol are Propylene Oxide and Ethylene Oxide. Other raw materials required are glycerin, sorbitol, glycols, pyrophosphate.<br>• Recirculating Cooling Water: 40,000 m^3/ hr<br>• Pumps, Heat Exchangers, Reactors, Adsorber, Distillation column components, storage tank, flash |
| **Employment Potential** | > 3000 |
| **Licensors for PO plant*** | • M/s Evonik<br>• M/s Sumitomo Chemical<br>• M/s Himtech Engineering |
| **Cost of the project** | INR 5000 Crore (USD 770 Mn)<br>Estimated cost of equipment – INR 2500 Cr<br>• Process Machinery – INR 1500 Cr<br>• Fabricated Equipment – INR 500 Cr<br>• Catalysts – INR 10 Cr<br>• Storage – INR 40 Cr |

Source: http://www.environmentclearance.nic.in/writereaddata/Online/TOR/0_0_23_Mar_2016_1448051701PAPL-FEASILBLITYREPORT.pdf, http://repository.upenn.edu/cgi/viewcontent.cgi?article=1082&context=cbe_sdr , * Suggested licensors

# Competitive Landscape

- PO capacity addition in Middle East, Korea & Singapore will result in increase of imports to India.
- Furthermore, PO is projected to dominate global Propylene market, on account of increasing government regulations for reducing greenhouse gas emissions in environment supported by tremendous growth in the production of light commercial vehicles and packaging industries. [5]
- BASF SE, China National Petroleum Corp. (CNPC), Enterprise Products Partners L.P., Exxon Mobil Corp., Formosa Plastics Group (FPG), Lyondell Basell Industries AF S.C.A., Reliance Industries Ltd., Royal Dutch Shell PLC, Saudi Basic Industries Corp. (SABIC), The Dow Chemical Company, Total S.A., Valero Energy Corp. are some of the leading producers of Propylene.

**Key Players**

- Manali Petrochemicals Limited, Chennai (Polyol- 75,000 TPA , Propylene Oxide - 36,000 TPA) (Plans to invest INR 100 Cr to increase Polyol capacity by 50,000 TPA)
- India Glycols (Methylene glycols - 175,000MTPA, glycol ethers and acetates - 70,000MTPA )
- Huntsman India (Araldite® resins and Aradur® hardeners - 30,000 MTA)
- Expanded Polymer Systems (polyether polyol - 16,250 MT/Annum, aliphatic polyester polyols - 300 MT/Annum, aromatic polyester polyols - 3,000 MT/Annum)

# Conclusion

- In India, strong demand for Propylene Oxide by various end user industries, increasing discretionary income and rapid industrialization are expected to drive India Propylene market during 2016-2025. Moreover, booming automotive, FMCG and furniture sectors is anticipated to aid the country's Propylene industry.
- There is considerable opportunity for the setting up of such downstream and ancillary industries taking into account the nature of products and widespread utilisation in common applications
- The Government of India launched the Automotive Mission Plan 2016-2026 in 2016 with an aim to increase the contribution of automotive sector in the country's GDP to 12% by the end of 2026. Hence, growing automotive sector is expected to positively influence the market of Propylene Oxide in India during forecast period.
- Various technology partnership opportunities can be worked out to develop this plant in Kerala as Propylene Oxide market will grow swiftly owing to enhanced demand from packaging, automotive, footwear Industries which see a widespread potential in Kerala

Source: [5] http://www.prnewswire.com/news-releases/india-propylene-polypropylene-propylene-oxide-acrylonitrile--cumene-market-report-2011-2025---research-and-markets-300441116.html , [6] Global Propylene Market By Application, By Region, Competition Forecast and Opportunities, 2011 – 2025, http://www.business-standard.com/content/b2b-chemicals/manali-petrochemicals-to-invest-rs-100-cr-for-polyols-capacity-expansion-115052100770_1.html, http://www.indiaglycols.com/divisions/chemicals_division.htm , http://www.huntsman.com/corporate/a/Careers/Global%20Careers/India , http://www.expanded.co.in/present-day-operations , http://www.deccanchronicle.com/150904/nation-current-affairs/article/petrochemical-project-takes , http://cpmaindia.com/propylene_about.php , http://www.business-standard.com/content/b2b-chemicals/manali-petrochemicals-to-invest-rs-100-cr-for-polyols-capacity-expansion-115052100770_1.html

# PVC Manufacturing

Sector/industry – Manufacturing

Project Type – Mega

Estimated Project Cost – ~INR 3000 Crore

Proposed Location – Kochi (BPCL-Kochi Refinery)

# Project Description

The proposed project is to set up a PVC manufacturing facility of capacity 150,000 TPA. Polyvinyl chloride, commonly abbreviated PVC, is the world's third largest plastic in production and consumption. A key feature of PVC is that it can be combined with additives and fabricated into a wide variety of forms. These include pipes and fittings, profiles and tubes, windows and doors, sidings, wires and cables, film and sheets, toys and other moulded products and floorings. This quality, together with features such as durability, self-extinguishing property, resistance to most chemicals and oil, mechanical strength and ease of processing, means that PVC is a competitive and attractive option for many end uses in construction and infrastructure, agriculture, electrical products and healthcare. Endowed with an excellent port infrastructure with ICTT, bulk cargo terminal, oil terminal and airport connectivity, Kochi is an ideal location for the project

# Market Scenario

- The total installed capacity of PVC in India in 2015-16 is nearly 1,423,000 MT with a capacity utilization of ~ 101%. Total consumption of PVC in 2015-16 was 2,936,000 MT. India imported nearly 1501311 MT of PO worth INR 8788 Cr in 2015-16 and exported nearly 3000 MT of PVC worth INR 33 Cr.
- Imports of PVC in India are now at almost 50 percent and growing rapidly every year and are expected to reach to USD 3 billion in few years
- Taking into account the demand drivers and CAGR of around 9% from 2002-2015, it is estimated that annual demand growth for PVC will be at least 13% in the next 5 years and is expected to cross 5 million tons in 2020.
- PVC demand in India shall be driven by sectors such as Agriculture, Infrastructure (rural water and sanitation infrastructure, smart cities will boost to PVC consumption), Housing (pipes, doors & windows, conduits, wires & cables) - Potential for PVC in the building and construction sector alone is over 700 KTPA (without taking smart city development into account), green building etc.
- PVC, being recyclable, less energy intensive and having longer life will be in demand in these segments. PVC has packaging as well as other applications in the FMCG, pharmaceutical & retail segments. These sectors are expected to grow in the coming years as the customer base comprising India's young population increases.
- Further, there are a number of applications in India, which are still nascent or currently unexploited like, wall cladding, technologically-advanced pipes for sewerage application, liners for landfill applications, decking, furniture applications, waterproofing membranes and food grain storage.
- These products are well established abroad and with ever-increasing urbanization, changing lifestyles, new technologies in construction and other factors, investments in these sectors are expected in the future. This bodes well for the PVC industry.

Source: http://ficci.in/spdocument/20684/PVC-Report-new.pdf , http://www.chemicals.nic.in/sites/default/files/Chemicals%20%26%20Petrochemicals%20Statistics%20At%20A%20Glance%202016_0.pdf , http://www.business-standard.com/content/b2b-plastics-polymers/imports-hurting-domestic-pvc-manufacturing-industry-a-report-116012000615_1.html

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | 150000 MTPA |
| **Land** | 80 acres |
| **Raw Material & Utilities (for 150000 TPA capacity)** | • Raw material: PVC Resin, Stabilizer, Lubricants, Fillers<br>• Water: 1000 KL/ year<br>• Ethylene: 75000 TPA Ethylene can be made available from BPCL- Kochi Refinery, which is the raw material for production for VCM and VCM is the raw material for PVC<br>• Chlorine: Chlorine which is a by-product of Travancore Cochin Chemicals Ltd., Cochin and can be procured from them |
| **Cost of the project** | Total cost ~ 3000 Cr (~USD 460 Mn) |
| **Licensors for PVC Plant** | • M/s Ineos<br>• M/s Arkema<br>• M/s JNC<br>• M/s Kemone |

* Suspension polymerisation, emulsion polymerisation and bulk polymerisation are the three types of PVC manufacturing process. PVC made from suspension is by far the most common. The licensors is poised to offer advanced technologies.

# Competitive Landscape

- Export of plastic products from India stood at USD 7.64 billion in FY 2015-16. Domestic consumption of plastic is expected to touch 20 million Metric Tonnes by 2020.
- Per capita PVC consumption in India is only 2 kg as compared to China's 10 kg. PVC industries are essential to the growth of the economy with the product finding applications in variety of sectors as well as being a source of employment. Today, close to 50% of the demand for PVC in the country is met by imports. Though level of imports have been increasing over the years and meeting the supply-demand deficit for PVC in the country, it remains to be seen whether this can be sustained over medium to long term when domestic demand grows.
- Very little capacity expansion is seen in countries which are currently exporting to India, meaning that there is an upper threshold beyond which these countries cannot supply. There could be a case in the future where demand for PVC in India could possibly outstrip supply. This would lead to processed PVC products not being available for use as well as a lot of downstream processing facilities having poor capacity utilization levels. Other PVC manufacturing players in India are targeting to fulfil these opportunities and capture market share in this space.

**Key Players**

- Reliance Industries Limited (Dahej* - 3,15,000 tonnes/year, Hazira – 360,000 tonnes/year, Vadodara – 80,000 tonnes/year)
- Chemplast Sanmar (2,92,000 TPA)**
- DCW group (90,000 TPA)
- Finolex (PVC-U Pipes - 2,50,000 MTPA, PVC Resin - 2,72,000 MTPA

*The Dahej complex VCM, PVC and chlor-alkali plant expansion project was implemented in two phases. The total estimated cost of the project was INR 3505 Cr

** The total estimated cost of Chemplast Sanmar Cuddolore PVC plant (140000 TPA capacity) was INR 500 Cr (2005-06)

# Conclusion

This project is poised to be showcases as a key industry representing Kerala in the 'Make in India' initiative. The existing refinery facility along with the proposed PVC manufacturing plant can showcase itself as an upcoming industrial sector offering varied opportunities for the downstream PVC product market.

Source: http://ficci.in/spdocument/20684/PVC-Report-new.pdf, https://www.ibef.org/exports/plastic-industry-india.aspx , https://www.icis.com/resources/news/2015/03/20/9869814/india-s-reliance-operating-all-pvc-units-at-near-full-capacity/ , http://sanmargroup.com/pvc-manufacturing.php , http://www.dcwltd.com/ , http://www.finolexwater.com/about-finolex-industries/ , http://www.chemicals-technology.com/projects/dahej/, http://sanmargroup.com/Compliance/EC%20for%20PVC%20Plant%20capacity%20of%20170000%20TPA%20dated%2028-11-2005.pdf

# Super Absorbent Polymer

Sector/Industry – Manufacturing

Project Type – Mega

Estimated Project Cost – INR 900 Crore

Proposed Location – Kochi (BPCL-Kochi Refinery)

# Project Description

- Superabsorbent Polymers (SAP) are hydrogels which can absorb water many times higher than its own weight. Compared to common absorbents like tissue paper, wood pulp fluff etc. SAP can absorb moisture upto 5 to 100 times of their own weights. Glacial Acrylic acid and Caustic soda is used to produce recipe grade SAP, which is further subjected to cross-linking using chemicals/initiators to produce quality SAP.
- The project plans to set-up a manufacturing unit of Superabsorbent Polymer of 60,000 TPA capacity.
- Endowed with an excellent port infrastructure with ICTT, bulk cargo terminal, oil terminal and airport connectivity, Kochi is an ideal location for the project. This project will be the very first endeavour to supply local demand of SAP as most of the products are being imported now. The proposed location in the vicinity of refinery makes integration of feedstock supply, utilities, off-sites and other general facilities with the refinery easy

# Market Scenario

- According to “Global Superabsorbent Polymer Market 2016-2020”, Superabsorbent polymers market was valued at US$ 39,548.1 Mn in 2015 and is expected to reach US$ 64,761.9 Mn by 2022, growing at a CAGR of 7.3% during the forecast period 2016-2022.
- India imported 151,223 tonnes of other acrylic polymers in primary forms which include Super Absorbent Polymers worth USD 328 Mn in 2016-17 which saw a 25% growth from 2015-16.
- The market for diaper is the largest application for superabsorbent polymers and have been growing with a CAGR of 22.23% over past five years. This is driving the demand for SAP.
- The medical industry has contributed and is expected to fuel more demand for superabsorbent polymers in the market through its wound care segment. Due to its water retention property and advancement in technology, superabsorbent polymers are used in manufacturing medical products which include traditional and advanced wound care products such as bandages and surgical pads among others. These polymers help absorbing exudates and liquids leaving the wound dry. This prevents itching and quick recovery of wound.
- SAP is used in agriculture for drip irrigation techniques which reduces water loss leading to irrigation frequency reduction by 50%. Agriculture sector is poised to fuel demand for superabsorbent polymers in the near future.
- SAP is also used in Sanitary napkins & Adult diapers. The demand is increasing ,with focus on rural markets with regard to female hygiene products.

Source: http://www.credenceresearch.com/report/superabsorbent-polymers-market , http://commerce.nic.in/eidb/Icomq.asp

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | 60,000 TPA |
| **Land** | 20 acres |
| **Raw Material & Utilities** | Glacial Acrylic Acid:- Being produced from the petrochemical complex of BPCL – Kochi Refinery |
| **Employment Potential** | 500 to 1000 direct jobs and up to 2,000 indirect jobs |
| **Cost of the project (INR)** | ~ INR 900 Crore (~USD 140 Mn)<br>The estimated breakup of costs are as follows:<br>• Land - ~ 13 Cr<br>• Building comprising of plant area, office, store, packaging space, processing space, yard, open space - ~ 51 Cr<br>• Machinery, working capital and other expenses - ~ 836 Cr |
| **Licensors for the SAP Plant*** | • M/s Evonik<br>• M/s Yixing Danson Technology<br>• M/s SANYO Chemical |
| **Means of Finance** | Project is expected to come up in JV mode, the JV partner providing the License/ Equity and ensuring marketing of SAP to end-users |
| **Expected Sales Turnover** | • SAP cost per kilogram varies based on absorbency and retention capacities required by application<br>• Assuming plant production capacity of 30% in year 1, the estimated revenue per year will be in tune of INR 290 Cr |

Source: https://dir.indiamart.com/impcat/super-absorbent-polymer.html, http://www.starchemical.in/super-absorbent-polymer.html#super-absorbent-polymer, * Suggested licensors for technology outsourcing , http://www.prnewswire.com/news-releases/global-sap-superabsorbent-polymers-market-driven-by-top-6-companies-at-80-sap-manufacturing-capacity-520573382.html ,

# Competitive Landscape

- Dominated by major players world–wide such as Dow, BASF, Nippon Shokubai, San Dia polymers, Evonik, & LG Chem. There are minor Chinese players
- These large players have inbuilt research and development center. Companies focusing on manufacturing baby diapers focus on product thinness to ensure optimal comfort and minimizing environmental impact. To achieve this, companies are procuring SAP with highly absorbent cores and also reducing the weight of bulkier materials such as fluff pulp. This is one key application which will strive need for innovation in SAP manufacturing and processing.

**Key Players**

- **No domestic player in India. SAP demand is met entirely through imports.**
- **The major end-users are P&G, Unicharm & Johnson & Johnson.**

# Conclusion

- Super-absorbent polymers have immense potential to cater to key environmental issues and the same is being researched extensively worldwide. Plant growth and different physiological activities are restricted by drought stress and the application of super-absorbent polymer could conserve soil water, making same available to plants for increased growth and biomass accumulation especially under severe water stress. Thus, application of SAP is a suitable soil management practice for the locations characterized by severe water stress.
- SAP has been already indispensable for diapers and sanitary products. In many countries, due to falling birth rate and aging population the increase rate of diapers for elderly adults tends to exceed that of diaper for babies, which increases the total demands of SAP. SAP opportunities in this space can become a huge opportunity for the proposed plant at Cochin to capture.
- The synthesis of superabsorbent polymers is done through various techniques such as gel polymerization, copolymer synthesis, suspension polymerization and solution polymerization. Opportunities lie in import of such technologies for synthesization of SAP. .
- Make in India sector policy offers various incentives for research and development, green technology and practices

Source: https://www.gminsights.com/industry-analysis/synthetic-and-bio-super-absorbent-polymer-sap-market , http://www.socochem.com/about-us.html , https://www.thesuperabsorbentsource.com/aboutus.cfm

# Elevated Highway

Sector/ Industry – Urban Transport

Project Type – Mega

Estimated Project Cost – INR 15000 Crores

Proposed Location – Multiple between Trivandrum to Kannur

# Project Description

- An elevated highway is a controlled-access highway that is raised above grade for its entire length. Elevation is usually constructed as viaducts, typically a long pier bridge. Technically, the entire highway is a single bridge. Adopting the same model, Kerala focuses to decongest the roads in the State, which can be further expanded providing connectivity throughout the State.
- An elevated expressway across the State from Kannur to Trivandrum along the western side of National Waterway III that can link major district capitals, airports, major ports, and transshipment terminals has been suggested by the State Government in 2016-17. An amount of INR 50 lakh has been earmarked for carrying out the feasibility study for the proposed elevated highway that is to transform the face of Kerala. The vision is to develop a multimodal and integrated transport system for the State.
- The Elevated Highways are costlier than ordinary highways. However, the advantages of Elevated Highways are manifold such as the pedestals of elevated highways will occupy only two to three meters on the ground and since minimal land acquisition is involved, the work can be commenced immediately.
- New highway, road widening projects in Kerala has faced many restrictions and oppositions with regards to land acquisition and displacement. Also, buses plying through the new highways stopping at regular intervals, operation of the signal systems etc. further reduces vehicular speed and time of travel between districts. Due to aforesaid reasons, elevated highways is a promising option to consider.

# Market Scenario

- Value of total roads & bridges infrastructure in India is expected to expand at a CAGR of 13.6 per cent over FY 09–17 to USD 19.2 billion. In FY 16, road projects worth USD 2.21 billion has been awarded under Public Private Partnership (PPP) mode. Investment of USD 31 billion is expected in PPP during the next 5 years (by 2020) for national highways. Government is planning to offer a bonus of 10 per cent of the total project cost to firms that construct & deliver highway projects before deadline.
- Since people can travel below the elevated highway without paying toll, there is no resistance on collection of toll from the public for the elevated highways and hence, this becomes a viable proposition. Also, the possibility of substantial reduction in road accidents and less fuel consumption will substantiate the initial costs of the project.

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | The proposed routes are from Thiruvanathapuram to Kannur in phases of 25-50 km lengths bypassing high traffic routes. |
| **Proposed routes** | The proposed routes are of 25 km stretches between the following districts:<br>• Trivandrum to Kottayam<br>• Kottayam to Ernakulam<br>• Trivandrum to Kozhikode (bypassing Thrissur/ Ernakulam)<br>• Kozhikode to Kannur<br>• Kannur to Kasaragod<br>The highways shall be access-controlled with toll only at the beginning of each stretch of 25 km |
| **Raw Material & Utilities** | Water, Construction Equipment, Cement bound Material, Concrete |
| **Employment Potential** | It has been estimated that a total number of 4,076 man-days are required for construction of one kilometer of highway |
| **Cost of the project** | INR 15000 Crores (~USD 2300 Mn)<br>For elevated highways, the cost of construction estimated is approximately INR 100 Crores per Kilometre for roads with 24 metres width |
| **Means of Finance** | The project is planned to set-up the project in PPP mode in phases<br>Road projects financing is typically debt intensive with debt equity ratio of 70:30 or even higher. Promoter's contribution ~ INR 4500, Term Loans/Borrowings from External Agencies etc. ~ INR 10500 Cr |
| **Expected Sales Turnover** | Revenue would be generated from toll charges. For a typical Indian highway road project on annuity basis, where government takes the revenue risk,the project IRR is expected to be 12-14% and equity IRR would be 14 -16%. For toll projects, where the concessionaire assumes the traffic risk, the project IRR is expected to be around 14-16% and equity IRR around 18-20% |

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=164460, http://jms.nonolympictimes.org/Articles/June-2014-Article-3.pdf , Guidelines for Investment in Road Sector, www.nhai.org

# Competitive Landscape

- Kerala government is pushing fast infrastructure development in the state to augment its connectivity to major tourism destinations and to ease travel within the state. Road projects are largely undertaken by the Public Works Departments and City development authorities. Under these, different PPP models are executed with national and local players.
- Road infrastructure has been key government priority; sector has received strong budgetary support over the years. Financial institutions received government approval to raise money through tax-free bonds. 100 per cent FDI is allowed under automatic route subject to applicable laws and regulations
- Rising vehicular traffic is a key factor for expansion of roadways:
  - ✓ Sales of passenger vehicles increased at a CAGR of 10.1 per cent during FY 06 – 16 and reached 3.4 million in FY 16
  - ✓ Sales of commercial vehicles in the country increased at a CAGR of 5.5 per cent in FY 10 – 16, with the number reaching 782,814 during FY 16

**Key Players**

- L&T, AFCONS, IL&FS
- Road Infrastructure Company Kerala Limited
- Roads & Bridges Development Corporation of Kerala Ltd.
- Shilpa Projects & Infrastructure Pvt. Ltd.
- Rajdeep Group etc.

# Conclusion

- Implementing elevated highway a promising option in Kerala as the land acquisition issues affect the local people and less land is required for the Project. Since rehabilitation is note required and with restrictions on public transport fleet, no cross roads etc. this will facilitate non-stop travel for long stretches
- It may not be feasible to have long stretches of elevated highway in one go. A shorter stretches of less than 10-50 km shall be taken up initially with provision for expansion.
- Detailed traffic study and feasibility study shall be undertaken by consultants in prior to implementation.
- The project is suggested to be implemented in PPP mode (BOT type is suitable for toll road projects) and can qualify for Viability Gap Funding of government. The project can also explore the Hybrid Annuity Model in which a private player is required only to partly bear financing risk

Source: https://www.ibef.org/download/Roads-February-2017.pdf, https://www.pppinindia.gov.in/faqs , http://www.keralapwd.gov.in/getPage.php?page=NHDP%20Home&pageId=285 , http://www.projectsmonitor.com/guest-articles/we-see-bright-opportunities-in-the-road-construction-sector/ , http://pib.nic.in/newsite/PrintRelease.aspx?relid=135821

# Inland Waterways and Cruise Development

Sector/Industry – Transport/Tourism

Project Type – Mega

Estimated Project Cost – INR 10,000 Crores

Proposed Location – Multiple (Rivers and backwaters of Kannur and Kasaragod district)

# Project Description

- The project plans to develop the inland navigation waterways to reduce congestion on roads and also to promote backwater tourism. This project envisages water connectivity, linking all the lagoons and river estuaries.
- The River Cruises industry comprises the following stakeholders: Department of Inland Water Transport, Department of Tourism, River Cruise Operators/ Cruise Liners, Ship Agents, Tour Operators, Provision suppliers
- The major benefits of Inland Water Transport are cheaper mode of transport, safe and energy efficient, more environmentally friendly and cause least CO2 emission. Diversion of a part of the cargo from road to Inland Water Transport will decongest the roads, reduce accidents and substantially reduce the transportation and fuel cost.

# Market Scenario

- Foreign and Domestic Tourist arrival to Kerala during the year 2016 is 10,38,419 and 1,31,72,535 respectively. Total Revenue (including direct & indirect) from Tourism during 2016 is INR 29658.56 Crores. With regards to inland waterways & cruise development, Kerala has a coastline of around 590 Km and backwater tourism I a key attraction for tourists
- Government support for investments based on integrated water use for irrigation, drinking and industry and for controlled flow, strategic important alternate route for bulk movements, tourism related, new canal systems, river linking projects can be worked out
- Inland waterways in the State offer a unique opportunity for the development of tourism and cargo traffic apart from its navigational importance and potential for fisheries. However, a coordinated development of inland waterway system with focus on tourist infrastructure and cargo movement may be stresses upon for exploiting the potential in these sectors. With a number of lagoons and interconnecting canals and rivers provide an ideal mode for transport. Kerala has four National Waterways which covers a length of more than 450 kms, provides ample scope for Inland waterways and Cruise Development in the State. Further, the State Government has been supporting investment in major infrastructure development projects for promoting backwater tourism in Kerala.

# Project Parameters

| Parameter | Description |
|---|---|
| **Land** | • Rivers and backwaters of Kannur and Kasaragod district. For cruise, around Chandragiri, Tejaswani, Perumba, Kuppam, Valapattnam and the backwaters, among others |
| **Project facilities** | • Cruise Liner, On Board facilities (Cabins, play area, indoor games, restaurant etc.), Off-Board Infrastructure (jetty facilities, lounge area, connectivity to base stations etc.). In order to establish robust waterways systems bypassing problems like low height bridges obstructing traffic and diverting river navigation, reconstruction of bridges and connecting roads is essential alongside with dredging along coastlines, and ongoing maintenance of these is an important aspect of successful implementation of waterway projects |
| **Employment Potential*** | • The total contribution of travel and tourism to employment was 37,315,000 jobs in 2015 (8.7 per cent of total employment). Moreover, as per “Regional Tourism satellite Account for Kerala”, the total number of jobs created directly and indirectly by the sector between 2009 and 2012 turned out to be 23.52 per cent of the total employment in Kerala.<br>• Tourism sector created 14 lakhs jobs as per the report. Therefore, it can be concluded that a project of this scale would create > 2000 direct and indirect jobs. |
| **Cost of the project** | INR 10000 Crores (~USD 1550 Mn).<br>Estimated break-up for road, bridge development works and dredging are given below.<br>• Road development ~ INR 1500 Cr<br>• Bridges reconstruction, dredging and maintenance ~ INR 2000 Cr |
| **Means of Finance** | • The project could be set-up in PPP mode.<br>• Estimated industry average for debt/equity ratio for river cruise projects is 0.6x |

Source: Economic Review 2016, GoK, http://content.icicidirect.com/mailimages/IDirect_DredgingCorp_IC.pdf, http://www.karnatakatourism.org/policy/river_cruise_karnataka.pdf , https://www.thequint.com/news/business/will-indias-navigable-waterways-turn-into-highways-for-transportation

# Competitive Landscape

- River cruises have been predominantly present in rivers that have excellent navigation systems. Cities like Venice and villages in the backwaters of countries like China and India (western coastline and the north-eastern States) thrive on river and canal cruises for livelihood. Some of the best examples of river cruises come from river Amazon, river Nile and river Thames.
- As the wildlife sanctuary at Thekkady, the Periyar river has been dammed to provide an extensive fresh water lake to enable tourists to have boat cruises. In Vembanad Lake and other backwaters, there are areas suitable for aquatic sports and other activities. Houseboats in the waterways help attract a large number of foreign as well as domestic tourists to the State. Thus, development of inland waterways can act as an important tool for promotion of tourism. Also, main tourist centres such as Kochi, Alappuzha, Kodungallur, Ponnani, Thriprayar, Cheruthuruthy etc. along the West Coast Canal route also offers good potential for pilgrim tourism.

**Key Players**

- KSINC
- KSWTC
- KTDC
- IWAI

# Conclusion

- The project offers varied opportunities to capture potential of integrating Inland Waterways with coastal shipping for the movement of cargo to ports. With waterways connecting the ports, it would be economical to distribute the cargo through waterways. It is also possible to integrate inland waterways with coastal ports to accommodate coastal and international traffic.
- According to Government of India scheme for assistance to agencies for tourism infrastructure development, development of cruise terminals can be taken up under the scheme. The Ministry of Tourism would bear 100% of the project cost (not more than 25 Crore) based on the project plan and estimates submitted excluding the items which are the exclusive responsibility of the Central Agencies.

Source: http://tourism.gov.in/sites/default/files/Guideline_5.pdf

# Aerotropolis

Sector/Industry – Infrastructure

Project Type – Mega

Estimated Project Cost – INR 850 - 1000 Crore

Proposed Location – Kannur

# Project Description

- The Aerotropolis consists of an airport city core and outlying corridors and clusters of aviation-linked businesses. The proposed project is in juncture with the upcoming Kannur International airport, first phase of which is ready to be commissioned this year. The three major components of Kannur aerotropolis includes:
    - Traditional Industries - Marine Product Processing, Cashew Processing, Coir Processing, Plywood, Spices, Silk production, Handloom & Textile, Coffee Processing, Handicrafts, Floriculture
    - Induced Industries considering airport as catalyst –Aviation MRO, Aerospace Manufacturing, Aviation Institute, Gems & Jewellery, Logistics
    - Real Estate – As a support facility such as Tourism & Hospitality, Medical facilities, Commercial (IT & Non-IT)
- With the onset of Kannur airport which was envisioned taking into account the future demand of the passenger traffic of the emigration population from North Kerala and the huge tourist volume in the hinterland, the district has a huge opportunity to be developed as an industrial hub in the state. Thus, with vision to have a holistic project catering to the airborne passengers, logistic, industrial and social requirement of the entire hinterland, an Aerotropolis is advised in the subject site at Mattannur in Kannur

# Market Scenario

- Although Kannur has a diverse agricultural and marine base, it is still untapped. The proposed Aerotropolis ought to have a vision of leveraging on the existing untapped potential of Kannur and adjoining Kasaragod district in different spectrums like agro processing, marine processing and tourism.
- Kannur has historically been bestowed with the status of the `Town of Export Excellence' by the Central Ministry of Commerce and Trade and the Kannur airport is likely to facilitate export trade for the export focused industrial clusters
- Major Urban nodes is Kannur and sea port at Azhikkal. The economic drivers are primarily agricultural and fishing zone, hence untapped potential exists in agro processing & tourism sector. Calicut is also a key urban node which is a key target market
- Major products in the region are – cashew, coffee, floriculture, spices, coir products, plywood, handloom, silk and marine products

Source: Feasibility study for landside development of Kannur Aerotropolis by INKEL and Jones Lang

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Land (Proposed landside breakup)** | Industrial park – 612 acres<br>Airport based SEZ – 300 acres<br>Real Estate – 55 acres | |
| **Raw Material & Utilities** | Site access road, power (110 KV substation at Kannur airport), water supply (proposed to be sourced from Pazhassi dam | |
| **Cost of the project (INR)** | The project cost is estimated taking into account various expenditures on account of the following components. The total cost is estimated at INR 900 Cr* (~USD 140 Mn) | |
| | Cost of Land | 700 |
| | Land Development Cost | 80 |
| | Utilities Cost | 70 |
| | Administrative Block | **5** |
| | Contingency | 8 |
| | Preliminary and Preoperative Expenses | 6 |
| | Margin money for Working Capital | 1 |
| | Interest during Construction | **30** |
| **Means of Finance** | Debt-equity ratio of 1.5:1 is assumed.<br>Considering this as regional/industrial development project government support may be availed in terms of Grants/VGF etc. | |
| **Expected Sales Turnover** | The pre-tax project IRR is estimated at 16.67% | |

Source: Feasibility study for landside development of Kannur Aerotropolis by INKEL and Jones Lang, * Assumptions considering inflation in last 5 years

# Competitive Landscape

- Kannur region is home to many industrial sectors such as textile, food & agro, wood and paper related etc. An industrial park that shall subsume the combined potential of these sectors will be first of its kind in the district and north Malabar region itself.
- Due to dearth of a comprehensive industrial setup in the district, major development is poised to come in with the proposed Aerotropolis.

# Conclusion

The proposed Greenfield Aerotropolis in Kannur, Kerala is thus envisaged to be unique development with capability to change the socio-economic scenario of its primary hinterland. With a vision to capitalize the untapped industrial and tourism potential of North Malabar region, the subject project can emerge as a definite winner in creating a large number employment opportunity and making Kannur a 'Destination' of its own.

The feasibility study conducted by INKEL proposed 2 development options for the project namely:

1. Integrated with development plan of Kannur International airport and bid out on BOT mode
2. Treated as separated entities, wherein Aerotropolis will be bid out on BOT mode

However, various models can be worked out with the government

Source: Feasibility study for landside development of Kannur Aerotropolis by INKEL and Jones Lang

# Aquaculture and Seafood Exports

Sector/Industry – Infrastructure (Industry)

Project Type – Mega

Estimated Project Cost – ~ INR 10 Cr (excluding land lease cost)

Proposed Location – Vizhinjam Port

# Project Description

- The proposed project is to built an Aquaculture and Seafood export facility at an area of 20 acres of government land earmarked for fishing harbor and seafood park (with processing and cold storage) at Vizhinjam Port. The aim of this project is to boost the aquaculture industry and seafood export in Kerala to enhance the food security, creation of employment opportunities, generation of income and surplus for trade in fish and fishery products.
- The Aquaculture scenario in Kerala is mostly dominated by shrimp culture especially in coastal area, and recorded rapid progression in production and makes a significant contribution to the foreign exchange earning through exports. The diversification of production by introducing new commercial species, adoption of new technologies and introduction of seafood export units for value added products shall help open a new set of opportunities in the fisheries sector.
- Vizhinjam is a major fishing village in Thiruvananthapuram and proximity of Vizhinjam Port to major international sea route and East West shipping region puts forth tremendous potential towards development of ornamental fish trade and aquaculture of Vannamei, Tiger Shrimps and Bamboo Shrimps.
- Kerala is yet to tap the burgeoning prospects of aquaculture. Empowerment of fish farmers in the state can make them aware of the potential of diversification of aquaculture practices such as integrated farming and cage culture.

Source: Vizhinjam Seaport Project: Land Acquisition Hurdle Solved,21 April 2016, http://entecity.com/news/vizhinjam-seaport-project-land-acquisition-hurdle-solved,accessed 24.07.2017; Report of India Brand Equity Foundation, April 2017, https://www.ibef.org/states/kerala.aspx, accessed 24.07.2017; http://shodhganga.inflibnet.ac.in/bitstream/10603/111440/4/13_chapter3.pdf; Seafood exports at all-time high, The Hindu,11 June 2017, http://www.thehindu.com/todays-paper/tp-national/tp-kerala/seafood-exports-at-all-time-high/article18958985.ece; India's Seafood Export at all-time High in 2016-17:MPEDA, Press Information Bureau Government of India Ministry of Commerce & Industry, 07.06.2017, http://pib.nic.in/newsite/PrintRelease.aspx?relid=164454, accessed: 25.07.2017; Seafood exports could grow 20% in FY17, Business Standard, 06 Aug 2016, http://www.business-standard.com/article/markets/seafood-exports-could-grow-20-in-fy17-116081000007_1.html, accessed on 25.07.2017

# Market Scenario

- The coast of Kerala constitutes approximately 10 percent of India's total coastline. Among maritime states in India, Kerala ranks second in marine fish production. In 2015-16, total fish production in the state stood at 0.68 million tonnes. Kochi Port exported 1,55,989 tons of marine cargo worth INR 4,447 crore.
- Trivandrum port saw 3665 tons of marine exports worth 186 Cr. Efforts are underway to culture fish other than shrimps that have huge potential for export and local consumption like cobia, pompano, groupers and sea bass.
- Kerala registered an 8% increase in its total marine fish catch over the previous year producing 5.23 lakh tonnes in 2016. Kerala has the highest share (49%) of marine fish landings in South-west region
- Seafood exports from the country is expected to exceed USD 6 billion in the FY17 driven largely by demand for Indian shrimps in the global market. In 2016-17, India exported USD 5.78 billion (~INR 37,871 crore) worth of marine products which saw a 23% increase from 2015-16 during which India has seafood worth USD 4.7 billion ( ~INR 30,420 crore). Cultured shrimps account for about 70% of the value of the exports and there has been increased interest in the farming of the shrimps, particularly the Vannamei variety, which has most demand in the market now.
- India being one of the top producers of the seafood, huge market opportunities are there in US, EU, UAE, China and South East Asian countries. Export markets have seen a growth of 20% in shrimp demand
- USA continued to be the largest market in value terms whereas South East Asia stands first in quantity. South East Asia, with a share of 30% in dollar terms, remained the second largest destination for India's seafood products. It was followed by the EU (17.98%), Japan (6.83%), West Asia (4.78%), China (3.50%), and other countries (7.03%). Overall, exports to South East Asia increased by 47.41% in quantity, 52.84% in rupee value, and 49.90% in dollar earnings. Besides frozen shrimp and frozen fish, India's other major seafood product was frozen squid, which recorded a growth of 21.50 %, 59.44 % and 57 % in terms of quantity, rupee value and dollar earnings, respectively.

Source: http://economictimes.indiatimes.com/articleshow/59787946.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst, http://economictimes.indiatimes.com/markets/expert-view/india-has-increased-seafood-exports-and-there-is-no-shortfall-in-shrimp-exports-a-indra-kumar-cmd-avanti-feeds/articleshow/59646611.cms, http://www.icar.org.in/en/node/12770, http://pib.nic.in/newsite/PrintRelease.aspx?relid=164454, http://economictimes.indiatimes.com/markets/commodities/kerala-widens-fish-export-platter/articleshow/50800302.cms

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | • Aquaculture capacity, a minimum of 1000 MT fish/annum<br>• Approx. cold storage (freezer) facility of 5 MT per day |
| **Land** | • An area of 20 acres of at Vizhinjam Port is available for lease with Vizhinjam International Seaport Ltd |
| **Raw Material & Utilities** | • Aquaculture cages<br>• Aquaculture blower<br>• Set-up for hatcheries<br>• Storing area for seafood<br>• Pre-processing plant / Peeling shed<br>• Cold storage - Freezer, containers<br>• Packaging facility |
| **Employment Potential** | • Estimated employment opportunity of ~500 direct and indirect jobs |
| **Cost of the project** | • Cost of the project excluding land cost ~ INR 7-10 Cr (~USD 2 Mn)<br>• Estimated cost for plant and machinery for an aquaculture capacity of 1000 MT is estimated at INR 2 Cr<br>• Estimated cost for cold storage and processing facility is INR 5 Cr<br>• Misc. cost – 1-3 Cr |
| **Means of Finance** | The proposed debt-equity ratio for the project is 70:30<br>Many government schemes can be availed under:<br>• Export promotion council / commodity boards<br>• Apex trade bodies recognized under the EXIM policy of Government of India and other apex bodies recognized for this purpose<br>• MPEDA/Rajiv Gandhi Centre for Aquaculture funding provisions |

# Competitive Landscape

- Vizag, Kochi, Kolkata, Pipavav and Jawaharlal Nehru Port (JNP) were major ports that handled the marine cargo during 2016-17.
- Seafood exports from the country had declined in 2015-16 with the slowdown in global economies and better supply from competing countries such as Thailand and Vietnam.
- States such as Andhra Pradesh and Odisha have opened up opportunities for aquaculture farmers to bring more areas under shrimp production. Gujarat has added aquaculture ponds in a big way.
- According to the available estimates of potential fishery resources of the West Coast, particularly in the south-west coasts, Kerala possesses the richest fishing grounds in the region. Seafood export from Kerala is mainly channeled through the Kochi port

**Key Players**

- Kochi Port
- Vizag, Kolkata, Pipavav, JNP, Krishnapatnam, Tuticorin and Chennai ports
- KINFRA Seafood Park, Aroor
- Many small-medium scale seafood exporters exists in Vizhinjam and Kochi regions

# Conclusion

- The vast fishery resources existing in Kerala need to be exploited properly and carefully adopting scientific fish farming to enhance productivity.
- Development of an aquaculture and a seafood Park at Vizhinjam would significantly value add the seafood produce of the local fishermen fraternity and economically back boost them. Implementation of scientific method in aquaculture confers many economical benefit on the society in the form of employment and income generation, production of food, trade surplus and foreign exchange earnings etc.
- Aquaculture has emerged one of the fastest growing food production activities in the world. This facility can help disseminate the vast potential of the fisheries and aquaculture sector and offer numerous investment opportunities in this industry.

# Integrated Manufacturing Cluster (IMC)

Sector/Industry – Infrastructure (Industry)

Project Type – Mega

Estimated Project Cost – >10,000 Crore

Proposed Location – Cochin to Palakkad

# Project Description

- It is proposed to establish an Integrated Manufacturing Cluster (IMC) in the proposed Kochi-Bengaluru Industrial Corridor from Kochi to Palakkad. The project aims to facilitate investment, foster innovation, enhance skill development, and build best-in-class manufacturing infrastructure. The proposed industrial corridor passes through Palakkad and Coimbatore to link with the Chennai-Bengaluru industrial corridor
- The length of the corridor in Kerala would be nearly 160 Km. The Integrated Manufacturing Cluster that will come along the Corridor will boost the manufacturing activities including Electronics, IT, Biotechnology, Life Sciences, etc. in the districts of Ernakulam, Thrissur, Malappuram and Palakkad.
- The clusters shall be equipped with world-class infrastructure, road and rail connectivity for freight movement to and from ports and logistics hubs, served by reliable power and quality social infrastructure. They will provide a globally competitive environment conducive for businesses.
- The Kochi Bengaluru Industrial Corridor proposes to address the infrastructure bottlenecks through a holistic approach while benefiting from the inherent strengths and competitiveness of each of the KBIC states. Accordingly high impact/ market driven integrated manufacturing clusters are proposed to be developed, at strategic locations, within the corridor to provide transparent and investment friendly facility regimes.
- Such a cluster concept will enable the R&D resources already existing at Trivandrum to be optimally used, to generate more project and business ideas, setting off more virtuous circles. Industry-specific clusters will be set up under central schemes like the Electronic Manufacturing Cluster Scheme of the Department of Electronics & IT and the Modified Industrial Infrastructure Upgradation Scheme of Ministry of Commerce & Industry. The Central Government is preparing a National Plan for Manufacturing Clusters. The Plan aims to bring about convergence in development of industrial areas by the central and state governments so as to bring about optimal utilization of resources

Source: 1. Article on Manufacturing Sector in India,India Brand Equity Foundation(IBEF),July 2017 Webpage:https://www.ibef.org/industry/manufacturing-sector-india.aspx, accessed : 20 July 2017, 2. Article "Government preparing national plan for manufacturing clusters",The Economics Times, 17 July 2017, webpage: http://economictimes.indiatimes.com/news/economy/policy/government-preparing-national-plan-for-manufacturing-clusters/articleshow/59633730.cms; accessed: 19 July 2017 , 3.Report on Kerala Industrial & Commercial Policy Amended - 2015, Website: http://www.ksidc.org/userfiles/industrial___commercial_policy_2015___approved___may_6__2015-old16-9-2015.pdf, accessed:20 July 2017

# Market Scenario

- The India Brand Equity Foundation(IBEF) states that as of July 2016, Kerala had 29 SEZs with formal approval and 25 notified SEZs. A cyber-park, spread over a 68-acre campus, is being developed in Kozhikode.
- Kerala has been promoting knowledge-based industries such as IT/ITeS, computer hardware and biotechnology. It is the first state having a technology park with CMMI level 4 quality certification and a world-class IT campus in Thiruvananthapuram.
- The Industrial Development & Economic Growth in Kerala's gross state domestic product (GSDP) was at USD 68.5 billion over 2014-15 and net state domestic product (NSDP) was at USD 59.70 billion over 2014-15.
- Manufacturing has emerged as one of the high growth sectors in India. India’s manufacturing sector has the potential to touch USD 1 trillion by 2025. There is potential for the sector to account for 25-30 per cent of the country’s GDP and create up to 90 million domestic jobs by 2025.
- Business conditions in the Indian manufacturing sector continue to remain positive. India has become one of the most attractive destinations for investments in the manufacturing sector.
- Cumulative FDI inflows into the electronics sector, including computer hardware and software, increased at a CAGR of 13.56 per cent, with the value increasing from USD 9.8 billion in FY10 to USD 21.02 billion in FY16.
- Demand growth, supply advantages, and policy support have been instrumental in attracting FDI. India has grown as a global manufacturing hub due to its cost competitiveness, trained labor and due to the positive government plans.
- Setting up of Industrial projects in Kerala has became a hassle free operation since Government of Kerala has introduced the Single Window Clearance System in the State. Currently KSIDC is in the process of implementing a Common Application Form in the state

Source: http://www.ksidc.org/userfiles/selection_of_consultant_fo_implementation_of_common_application_form_and_online_clearance_mechanism_in_the_state.pdf, IBEF

# Project Parameters

| Parameter | Description |
|---|---|
| **Land** | Around 1000 acres of land in the possession of central and state PSUs in the region remains unutilized. A 50 kms band with NH 544 as the spine and a length of 160 kms has been proposed within the State for establishing the Industrial Corridor.<br>Another 2000 acres of land can be acquired along the corridor region, and this was announced in the State Budget 2016-17. This will be in different nodes of 50 to 500 acres, situated on either side of NH-66. |
| **Raw Materials & Utilities** | • Infrastructure augmentation<br>• Power Supply<br>• Industrial Grade Water Supply<br>• Solid Waste Management services by ULBs<br>• Connecting roads |
| **Employment Potential** | Targets to create gainful employment opportunities with more than 0.1 million direct employment and at least 0.3 million indirect employment. |
| **Cost of the project** | The total cost estimated for the Integrated Manufacturing Cluster is INR 10,000 Cr (~USD 1550 Mn).<br>For infrastructure activity under PPP, viability gap funding would be available. It is proposed to develop the project on Design, Build, Finance, Operate and Transfer (DBFOT) basis. |
| **Means of Finance** | The project is proposed to be implemented in PPP mode. Government of Kerala will provide the land required for establishing the Cluster. An SPV will be formed involving Government agencies like KSIDC, KINFRA, DIC, etc. to this extent. Land will be the equity of Government of Kerala in the project. All necessary clearances will also be facilitated by the Government.<br>Suggested particulars under means of finance are as follows:<br>• Government Grant – 30%<br>• Equity from Government Agencies and from constituent units – 40%<br>• Term Loan – 30% |

# Competitive Landscape

- KBIC seeks to optimise the present economic and employment potential of the region, stimulate investments particularly in the manufacturing, agro-processing, services and export oriented units and promote overall economic development of the area through creation of high standard infrastructure and an enabling pro-business environment
- Central government has proposed various initiatives to give a push to the Make in India campaign and the National Investment and Manufacturing Zone (NIMZ) in Prakasam district in Andhra Pradesh is one such example. Once the NIMZ becomes a reality, it is estimated to attract investments to the tune of INR 437000 crore, generate jobs to 3 lakh people and earn foreign exchange to the tune of INR 24,000 crore
- With the onset of Sagarmala Programme, many ports including ports in Kerala have been identified across port modernization & new port development, port connectivity enhancement, port-linked industrialization and coastal community development for phase wise implementation over the period 2015 to 2035. This increases the potential for a **m**anufacturing cluster in the state.

**Key Players**

- Manufacturing cluster Chennai, Hyderabad
- Integrated MSME clusters, Tamil Nadu
- VCIC Corridor

# Conclusion

- By introducing a cluster-based approach in the state, it can further strengthen the competitiveness of the sectors through leveraging the economies of scale. Support of the state government of Kerala for land acquisition required for establishing the cluster shall be provided. An SPV will be formed involving Government agencies like KSIDC, KINFRA, DIC, etc. to this extent. All necessary clearances will also be facilitated by the Government. An integrated approach involving industrialists, Government and the society is crucial for achieving faster industrial development of Kerala and the same will be demonstrated through this manufacturing cluster.

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=159037, http://www.thehindu.com/news/national/andhra-pradesh/nimz-works-gain-pace-in-prakasam-district/article8030363.ece

# Petrochemical Park

Sector/Industry – Petrochemical

Project Type –Mega Project

Estimated Project Cost – INR 1864 Crore

Proposed Location – Ambalamugal, Kochi

# Project Description

- KINFRA proposes to develop an Petrochemical Park of international standards at Ambalamugal, in Ernakulam district of Kerala. The project is intended to create an Industrial Park with all modern facilities exclusive for the Petrochemical Industry.
- The Petrochemical and Pharma Park is proposed in 600 acres of FACT land in Ambalamugal, to be transferred to KINFRA. This land already has a large refinery, fertiliser and chemical factories, LNG Terminal & Gas Pipeline Network being established, a Bulk Terminal and International Container Transhipment Terminal (ICTT). The proposal assumes significance in view of the expansion proposal of BPCL, nearness to the Port and Natural Gas infrastructure at the location.
- Petrochemicals play a vital role in economic development and growth of a country. The growth of this industry is closely linked to economic growth of a country. Petrochemicals are considered as enablers for growth of other sectors of the society. They are derived from various chemical compounds, ,mainly hydrocarbons. These hydrocarbons are derived from crude oil and natural gas.
- The basic petrochemicals are synthetic fibres, polymers, elastomers, synthetic detergent intermediates, performance plastics, fibre intermediates, olefins and aromatics.

# Market Scenario

- The capacity of the Kochi refinery of Bharat Petroleum Corporation is being expanded from 9.5 million tonnes a year to 15.5 million tonnes. The expanded refinery will produce 5 lakh tonnes of propylene annually, the basic raw material for the petrochemicals units[3].
- India's production in 2014-15 has been 11,594 thousand MT for major petrochemicals production with polymer constituting around 57%. Indian export of chemicals and petrochemicals stood at US$ 27.43 billion in 2014-15 and constituted 9.4% towards total export.[4] Petrochemicals account for 30 per cent of the country's US dollars 120-billion chemical industry in 2016, which is likely to grow about 11 per cent in the coming years to hit US$250 billion by 2020[5].
- The Indian Government allows 100% FDI in chemicals sector and the domestic petrochemical industry is in the process of investing over USD 25 billion[6].

Source: 1. http://www.thehindu.com/todays-paper/tp-national/tp-kerala/petrochemical-majors-plan-units-in-kochi/article4958950.ece ; 2. http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-chemicals ; 3. http://www.newindianexpress.com/cities/kochi/2016/oct/23/kochi-to-turn-petrochemical-hub-1531065.htm, 3 http://www.thehindu.com/todays-paper/tp-national/tp-kerala/petrochemical-majors-plan-units-in-kochi/article4958950.ece ; 4.http://www.makeinindia.com/article/-/v/make-in-india-sector-survey-chemicals ; 5. http://www.newindianexpress.com/cities/kochi/2016/oct/23/kochi-to-turn-petrochemical-hub-1531065.htm; 6 file:///D:/D/2017/KSIDC/Chemical-and-Petrochemical-Industry-in-India.pdf ll

# Project Parameters

| Parameter | Description |
|---|---|
| **Capacity** | Common Infrastructure Facilities<br>• Internal Roads, culverts & drainage<br>• Water Treatment Plant<br>• Water supply and distribution, recycling system for irrigation & flushing<br>• Dedicated Sub-station & Power distribution System<br>• Street lighting<br>• Telecom & communication systems<br>• Sewerage network<br>• Common Effluent Treatment Plant (CETP) for Industrial Wastewater treatment; also<br>• Industrial Wastewater conveyance & recycling<br>• Rainwater harvesting<br>• Greenery<br>Social Amenities<br>• Canteen<br>• Clinic<br>• Bank / ATM<br>• Gymnasium<br>• Sports Courts<br>• Logistics movement support |

Source: KINFRA

# Project Parameters

| Parameter | Description |
|---|---|
| **Land** | The proposed Petrochemical is to be established in an area of 600 acres at Ambalamugal, Kochi. Out of the total area of 600 acres, it is planned to earmark 450 acres for Petrochemical Industries and balance land of 150 acres for Pharmaceutical sector. The land is currently in possession of FACT Ltd which will be transferred to KINFRA.<br>Land site survey is in progress. |
| **Raw Material & Utilities** | Kerala Industrial Infrastructure Development Corporation KINFRA will develop all basic Infrastructure facilities for the park |
| **Employment Potential** | The proposed part is poised to offer employment opportunities in tune of 300 plus direct jobs and more than 1000 indirect jobs |
| **Cost of the project** | Land cost - INR 1,264 crore<br>Project cost - INR 600 crore<br>Total cost of the project is **INR 1864 crore** (~USD 300 Mn) |
| **Means of Finance** | Kerala Infrastructure Investment Fund Board (KIIFB) will be funding the entire INR 1,864 crore |

Source: KINFRA

# Competitive Landscape

- Deepak Petrochemicals, Kothari Petrochemicals , Hindustan Organic Chemicals, Mareena Chemicals and SK Global Chemicals are few of the players operating in this space.
- With the emphasis on ‘Make in India’ and the many investor summits organized by different states, the interest in this sector is brimming.

**Key Players**

- Indian Petrochemicals Corporation Limited (IPCL), Reliance Industries Limited (RIL) and Oil and Natural Gas Corporation (ONGC) in Gujarat
- Petroleum, Chemical & Petrochemical Investment Region (PCPIR) - a specifically delineated Investment Region being developed in n Andhra Pradesh, Gujarat, Odisha and Tamil Nadu

# Conclusion

The proposed Petrochemicals park offers facilities like Single Window Clearance facility, complete Eco friendly infrastructure, shared common infrastructure facilities and land in parcels and built up spaces available for establishment of units on lease basis. The Department of Chemicals and Petrochemicals, GoI, has also launched some schemes to promote this sector like ‘Setting up of centres for Excellence in Petrochemicals Sector’. This Petrochemicals park will create more employment in the state and would accommodate about 20 small and medium scale companies[1]. This state of the art facility welcomes all investment opportunities to develop their industries here and reap the benefits of it.

Source: 1. http://www.thehindu.com/news/cities/Kochi/petrochemical-park-for-kochi/article6992929.ece

# Kerala Maritime Cluster

Sector/Industry – Maritime

Project Type – Mega

Estimated Project Cost – INR 3500 Cr

Proposed Location – Cochin Port (Wellington Island)

# Project Description

- The maritime gateway to peninsular India, Cochin is the fastest growing logistic centre emerging in to a major International trans shipment terminal. An all-weather natural Port, and located strategically close to the busiest international sea routes Cochin is promoting a major liquid terminal, bulk terminal and maritime industries in its port based SEZs. Additionally due to its proximity to the maritime highway, it is proposed to set up a Maritime Cluster in Cochin adjoining to the port area.

- The proposed cluster is poised to enhance the strength and development of maritime sector and in effect make the port more accessible and competent. Maritime Cluster can be broadly defined as a group of organisations  institutions, business and other industry players in the maritime sector that are geographically located close to each other and enjoy positive synergy between their activities. In India, most of the existing maritime clusters have been developed in an un-planned manner which has led to highly fragment maritime industry and sub-optimal growth over the years.

- Kerala, especially Kochi, has already had an important presence in the maritime field. However, the different stake holders are scattered and there is no common link connecting the stakeholders. Because of this reason, the potential of the maritime activity in the state is not fully explored. The cluster is to be government by a well-tailored maritime policy to create a common platform for all the stake holders functioning in and around Kochi port ranging from manufacturers, logistics, ancillary service providers, universities etc. Such a proposition shall foster the maritime manufacturing potential of the state and transform the maritime dreams of the state.

# Project Description

- The major stakeholders comprises of Governments of Central & State, Shipyards, State and Central institutions, boat builders, ancillary equipment manufacturers, fishermen, logistics, maritime lawyers, insurance, tourism, financiers, Government, tax laws, and many more. At present all the stakeholders are scattered and are disconnected. All these elements need to be consolidated and streamlined into a well-oiled machinery to reap the maximum reward for the State in the maritime sector.

- In cochin, existing cluster consists of cochin shipyard - ship repair and ship building facility, container cargo, commodities trading center, LNG Terminal Jetty, cruise terminal, International container transshipment terminal, Bolghatty Resort, Government bodies like, Kerala State Maritime Development Corporation, Kerala State shipping & Inland Navigation Corporation, private shipyards, institutes like Kerala Maritime University. The scope of this project is to develop and enhance the existing maritime cluster at par with leading international maritime centers and develop a policy guideline for functioning of the maritime cluster

- The proposed project of development of a maritime cluster is Kochi consists of development/enhancement of following components of the existing cluster:

    - **Core Services (Shipping and Port related) -** International Ship Repair Terminal, Boat Manufacturing & Repair facility, Port Modernization, Ship Management Services

    - **Finance and Regulatory Services -** Maritime finance & insurance services

    - **Others –** Port led Industrial park, Cruise Tourism, Watersport activities at Marina and Maritime Museum

# Market Scenario

- India port infrastructure market is projected to grow at a CAGR of over 9% during 2016-2025, on account of heavy funding pertaining to development of ports and related infrastructure such as connecting roads, railways and Coastal Economic Zones. Government's focus on ease of doing business such as allowing 100% FDI under automatic route for projects related to construction and maintenance of ports and harbors provides a promising outlook for future development and growth of port infrastructure market in India.
- Cochin port currently handles ~25 MTPA of cargo out of which liquid cargo- POL, LNG and LPG forms the major chunk while other commodities including containers, fertilizers, coking coal, etc. form a small share of the total traffic. The total traffic at Cochin port is expected to increase to 41-43 MTPA by 2025 and 52-60 MTPA by 2035 driven primarily by the expansion of the BPCL refinery, LNG and LPG imports and growth in container volumes.
- The Kerala Coastal Economic Zone (CEZ) under the National Perspective plan of the Sagarmala Programme is envisaged to provide a thrust to the traditional stronghold industries in the state which have a significant EXIM orientation and linkages with the port. It aims to provide an impetus to the economy of the state, taking into account the favourable conditions it enjoys both as a location for light manufacturing and as a tourist destination.
- Kerala has a coastline of around 580 km. The CEZ in the state of Kerala comprises nine coastal districts of the state Kasaragod, Kannur, Kozhikode, Malappuram, Thrissur, Ernakulam, Alappuzha, Kollam, Thiruvanthapuram.
- The potential for developing a maritime cluster with export oriented industrial clusters can be utilized by providing greater export incentives to the industry, improvement of logistics infrastructure, and simplification of export processes including faster documentation and custom clearance
- According to Ministry of Shipping, India accounts for only 0.45 per cent of the global shipbuilding market in 2016 and could target 3–4 mn DWT of the global shipbuilding capacity by 2025. With the recent policies & initiatives by the Government the unfavorable cost differential faced by the Indian shipyards is expected to reduce. Subsequently, opportunity in defence sector, growth in coastal shipping and replacement of existing vessel fleet is expected to drive growth of the shipbuilding industry in India.

Source: Cochin Port Trust, http://sagarmala.gov.in/sites/default/files/1058476289DraftPerspectivePlans%20ofCEZones.pdf, http://pib.nic.in/newsite/PrintRelease.aspx?relid=154922

# Market Scenario

- For port led industrialization, huge potential has been identified for Kerala CEZ in two potential industries namely furniture manufacturing/processing and passenger cruise tourism.
  - Demand for furniture in India surged at 12 per cent annual rate between 2007 and 2014 creating a USD 25 billion market
  - Kerala currently has major furniture clusters in Taliparamba, Malapuram and Ernakulam and minor furniture clusters in Kollam and Thrissur.
  - Kerala, due to its location and already established ecosystem, is best suited for a port-based or port-proximate furniture manufacturing cluster.
  - Kochi is a popular tourist destination for foreigners and domestic tourists alike. It is already a port of call for cruises connecting South Asia and Middle East and North Africa (MENA). Kochi has the highest relative share approx. 31 per cent as 'port of call' among Indian ports. This reinforces Kochi's popularity as a tourist destination amongst cruise liners.
  - Kochi port saw a CAGR of 37% increase in average cruise passengers visiting the port in 2014-16 period with ~82000 average number of cruise passengers in 2016-17. The number of cruise ships that visited increased from 39 in 2014-15 to 46 in 2016-17 with a CAGR of 9%.
  - Kochi port being located on the south-western coast, is an ideal location to be linked to domestic cruise circuits that connect Kochi, Mangalore, Goa and Mumbai offering cultural and heritage, religious as well as leisure destinations
- The existing "Kochi International Marina" located on the eastern coast of Bolgatty Island adjoining the Bolgatty Palace is a full-fledged marina of international standards in India. The marina is close to the international maritime route at the south west coast of the Indian Peninsula, with favorable conditions and minimum tidal variations throughout the year. By providing adequate facilities for the yacht owners and their crews, with various water sports activities in place, this marina has huge potential to augment the tourist flow to Kerala
- To boost the maritime operations in the state, Cochin Shipyard Limited has chalked up huge expansion plans with a new 310 meter dry which will help them handle ships with much larger capacities and will invest INR 1800 Cr for the project

Source: Cochin Port Trust, http://sagarmala.gov.in/sites/default/files/1058476289DraftPerspectivePlans%20ofCEZones.pdf, http://pib.nic.in/newsite/PrintRelease.aspx?relid=154922 , http://www.oceanblue.in/kochi-international-marinas.html

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Capacity** | Port Modernization | • Setting up of fertiliser bagging facility at Kochi port<br>• Setting up of food grain import terminal at Kochi port<br>• Setting up of edible oil terminal at Kochi port |
| | International Ship Repair Facility | • Facility for repair of ships of capacity up to 25000 DWT, with Ship Lift System |
| | Port-led Industrial Cluster | • Ernakulam could be developed as a furniture manufacturing hub and linked to Kochi port for evacuation.<br>• Modernization of existing boat manufacturing facilities |
| | Cruise Tourism and Marina water sports | • Upgrading infrastructures at Ernakulam Wharf for cruise berthing facilities:<br>  • Construction of Cruise Terminal building<br>  • Development of berth and backup area<br>• Upgradation of existing International Marina with water sports facilities such as Jet Ski, Towables, Bumper boats and Parasail Boats |
| | Maritime Museum | • Enhancement of existing maritime museum to create a Maritime Experiential Museum |
| **Land** | • International Ship Repair Facility - Around 42 acres of land area and 37 acres of water area is given for lease to Cochin Shipyard Limited<br>• Port-led Industrial Cluster - Approx. ~ 180 acres of land is available in proximity of Cochin Port Trust Wellington Island | |

Source: http://sagarmala.gov.in/sites/default/files/1058476289DraftPerspectivePlans%20ofCEZones.pdf

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Employment Potential** | The industrial cluster could also generate around 1 lakh jobs in the next 10 years | |
| **Cost of the project** | The total project cost is estimated at: | **~ INR 3500 Cr (~ USD 540 Mn)** |
| | Port Modernization | ~INR 200 Cr |
| | International Ship Repair Facility | ~ INR 970 Cr |
| | Port-led Industrial Cluster | ~ INR 2000 Cr |
| | Cruise Tourism | ~ INR 20 Cr |
| | Maritime Museum | ~ INR 10 Cr |
| | Marina Watersports activities | ~ INR 20 Cr |
| | Others – Ship Management Services, Finance and Insurance Services, Seafood export facility, Policy Guidelines Consultancy | - INR 250-300 Cr |
| **Means of Finance** | The cost of the project is approx. INR 3500 Cr and is proposed to be financed as Promoter's contribution as equity 1500 Crore and Term Loan from Financial Institutions 2000 Cr. The project may be implemented by relevant Central Ministries, State Governments, Ports and other agencies primarily through the private or PPP mode. | |

Source: http://sagarmala.gov.in/sites/default/files/1058476289DraftPerspectivePlans%20ofCEZones.pdf

# Competitive Landscape

- Proposed Maritime cluster in Kochi will be first of its kind in Kerala.
- Other developing regions such as Vizhinjam ,Poovar and Azhikkal will see development of similar facilities in Ship Building, Cruise tourism, Ship Management and ancillary services.
- Ministry of Shipping under the Sagarmala Programme plans to develop 14 Coastal Economic Zones in India targeting major industrial clusters in each zone

**Key Players**

**Mumbai and Chennai have established themselves as centers of maritime trade in India**

**Other prominent proposed future maritime clusters include Ennore (Tamil Nadu) and Saurashtra (Gujarat)**

# Conclusion

- Maritime clusters are to be one of focal points for economic development along India's coastline and the Sagarmala Programme of the Ministry of Shipping is constantly striving to develop such clusters across major ports in India
- The opportunities in the maritime sector with the onset of the proposed maritime cluster is huge. Kochi has an important presence in the maritime field. With the onset of a common link connecting all the stakeholders under the cluster, immense potential of maritime activity in the State is yet to unfold.
- In the ports sector, PPP has been primarily observed in segments, such as operation and management of ports, construction of deep water ports, container terminals, shipping yards and bulk ports. India's "Maritime Agenda 2010-2020," which replaced the National Maritime Development Programme (NMDP),targets to grow India's port handling capacity to 3.1 billion ton by 2020. The private sector is expected to play a key role in achieving this ambitious target.
- This project aims to attract investments in light of modernizing port infrastructure facilities, ship building and repair facilities, ancillary services, development of industrial clusters etc. leading to robust development of the maritime ecosystem in the state

Source: http://pib.nic.in/newsite/PrintRelease.aspx?relid=149411

# Small Hydro Power

Sector/Industry – Energy

Project Type – Mega

Estimated Project Cost – INR 850 Cr (Multiple projects)

Proposed Location – Multiple Locations

# Project Description

- The proposed project comprises construction and operation of 12 Small Hydro Projects (SHP) across different locations in Kerala under Kerala State Electricity Board (KSEB). These projects are planned to be developed in IPP mode. The combined capacity of 59 MW plants will generate 133.5 GWh annually. SHP projects normally do not encounter the problems associated with large hydel projects of deforestation and resettlement. The projects have potential to meet power requirements of remote and isolated areas. These factors make small hydel as one of the most attractive renewable source of grid quality power generation. Hydropower is a proven, mature, predictable, highest conversion efficiency and cost competitive RE source as it requires relatively high initial investment, but has the advantage of very low operational costs and a long life span, quick start and stop. Hydropower plays a key role in power systems due to its flexibility and reliability (peaking, ancillary services) and in the present scenario, its importance has further increased because of the large scale addition of variable renewable energy power in the form of solar and wind energy in the power system. The proposed hydropower projects are greenfield projects and its lifetime is 30 years. The projects are expected to operate at a PLF of 25 to 50 per cent.
- The details of individual plants, their location, installed capacity and head are given below.

| # | Name of scheme | River/River basin | Location (District) | Installed Capacity (in MW) |
|---|---|---|---|---|
| 1 | **Nakkayam** | Muvattupuzha/ Kiriplavuthodu | Idukki | 12 |
| 2 | **Kallar** | Kallar River/ Vamanpuram | Trivandrum | 4 |
| 3 | **Thommankuthu** | Muvattupuzha/ Kannadiar | Idukki | 3 |
| 4 | **Wanchiyam** | Wanchiam/ Valapatianam | Kannur | 3 |
| 5 | **Kanjirakolly** | Udumpanpuzha/ Valapatianam | Kannur | 2.7 |
| 6 | **Bhavalipuzha II** | Bhavalipuzha/ Valapattanam | Kannur | 7.5 |
| 7 | **Bhavalipuzha IV** | Bhavalipuzha/ Valapattanam | Kannur | 3.5 |
| 8 | **Pappanoor** | Kallada/ Kallada | Kollam | 1.5 |
| 9 | **Ambankadavu** | Ambankadavethode/ Bharathapuzha | Palakkad | 2.4 |
| 10 | **Karlmpuzha** | Karlmpuzha/ Bharathapuzha | Palakkad | 4.5 |
| 11 | **Palagappandi SHES** | Palagapandi/ Bharathapuzha | Palakkad | 4 |
| 12 | **Chinnaparambhuthodu** | Chinnaparambhuthodu and Mandapotty River | Palakkad | 11 |

Source: Project Design Document Form For CDM Project Activities, Gujarat, KSEB

# Market Scenario

- In 2016 of the total power generation installed capacity of 3 lakh MW in India, hydropower contributes about 15.37 per cent which includes large hydro and small hydro power projects.
- The estimated potential of a SHP project (up to 25 MW station capacity) in India is of about 20,000 MW , of which about 4341 MW has been exploited. A target of adding about 5000 MW by 2022 is kept by the Ministry of New & Renewable Energy (MNRE) by installing SHPs.
- Small Hydropower projects can provide a solution for the energy problem in rural, remote and hilly areas where extension of grid system is comparatively uneconomical.
- Kerala depends on drawing power from Central pool to meet its peak demand that some time leads to grid failures in peak demand seasons. SHP can be a potential option to build in-house capacity in the state
- The estimated potential for power generation from small hydro power projects in the country is about 20,000 MW of which about 4341 MW has been exploited.
- Keeping in line with Government of India policy, 24 states have announced policies for inviting private sector investment. About 416 Small Hydro Projects of about 2389 MW capacity have been setup till January 2017.
- Government of Kerala (GoK) has been supporting development of small hydro power projects in the state since 1992. It also has a 'Kerala Small Hydro Policy 2012' to support investments in this sector.
- Kerala has 13$^{th}$ largest potential for small hydro projects in the country compared to the other states. In February 2016, GoK issued a joint statement with GoI to ensure a 24 x 7 supply of power to all. Hydro power is slated to add about 2000 MW to the required capacity in the coming years.
- As per a survey carried out by ANERT (Agency for Non-Conventional Energy and Rural Technology) in 13 districts of Kerala to determine the estimated SHP power potential in the state, Idukki has the highest number of sites with an estimated power potential of 279.95 MW. Based on this survey, ANERT initiated cluster mode development of 14 SHP sites in Peravoor block of Kannur district with the support of NABARD.
- MNRE has launched many initiatives to promote development of SHP in a planned manner and improve reliability and quality of the project by giving various physical and financial incentives, investments have been attracted in commercial SHP projects apart from subsidizing state governments to set up SHPs

Source: Small Hydro Power Program, MNRE, http://mnre.gov.in/schemes/grid-connected/small-hydro/ ; Energy Next, Contributory Artticles, March 20, 2017 - http://www.energynext.in/small-hydro-power-in-india/ ; ANERT Survey , http://anert.gov.in/index.php?option=com_content&view=article&id=159&Itemid=16 ; Joint statement - http://powermin.nic.in/sites/default/files/uploads/joint_initiative_of_govt_of_india_and_Kerala.pdf

# Project Parameters

| Parameter | Description | |
|---|---|---|
| **Facilities** | • Gates<br>• Trench weir<br>• Main inlet valves<br>• Penstocks<br>• Power house facilities – Turbine, Generator, Transformer, Generator (for backup), Electronic metering panels<br>• Switchyard | |
| **Cost of the project (INR)** | Estimated per MW cost* | **INR 12.5 Cr – 16 Cr** |
| | % share of total project cost | |
| | Civil Works | 60%-65% |
| | Electro-Mechanical Equipment | 17%-20% |
| | Indirect costs | 17%-20% |
| | Financing charges | 0.5%-1.2% |
| **Means of Finance** | Standard Debt Equity Ratio for hydro projects is **70:30**<br>MNRE has been providing financial support for the following activities to develop the SHP sector :<br>• Research & Development, Capacity building<br>• Resource Assessment, Detailed Survey & Investigation, DPR<br>• preparation and perspective plan for States<br>• Capital Subsidy to State Sector Projects<br>• Subsidy for Commercial Projects<br>MNRE provides financial support of INR 1 crore per MW limited to INR 5 crore per project for projects in Kerala being set up by private sector | |

Source: http://powermin.nic.in/en/content/faqs-hydropower , *Cost estimation as per Small Hydro Power in India, Energy Next, March 2017 and KSEB, http://mnre.gov.in/file-manager/UserFiles/faq_SHP.pdf

# Project Parameters

| # | Name of scheme | River/River basin | Location (District) | Installed Capacity (in MW) | Net Head (in m) | Land details (in Ha) |
|---|---|---|---|---|---|---|
| 1 | **Nakkayam** | Muvattupuzha/ Kiriplavuthodu | Idukki | 12 | 229 | Forest - 9.8<br>Private - 4.0<br>Govt. - 0.6<br>**Total - 14.4** |
| 2 | **Kallar** | Kallar River/ Vamanpuram | Thiruvananthapuram | 4 | 96.6 | Forest : 4.98 |
| 3 | **Thommankuthu** | Muvattupuzha/ Kannadiar | Idukki | 3 | 36 | Forest : 4.00<br>Private: 1.30<br>**Total : 5.30** |
| 4 | **Wanchiyam** | Wanchiam/ Valapatianam | Kannur | 3 | 197 | Private: 5.00 |
| 5 | **Kanjirakolly** | Udumpanpuzha/ Valapatianam | Kannur | 2.7 | 47 | Private: 13.00<br>Govt. :0.72<br>**Total : 13.72** |
| 6 | **Bhavalipuzha II** | Bhavalipuzha/ Valapattanam | Kannur | 7.5 | 45 | Forest : 7.5<br>Private: 0.50<br>**Total :8.00** |

Source: KSEB

# Project Parameters

| # | Name of scheme | River/River basin | Location (District) | Installed Capacity (in MW) | Net Head (in m) | Land details (in Ha) |
|---|---|---|---|---|---|---|
| 7 | **Bhavalipuzha IV** | Bhavalipuzha/ Valapattanam | Kannur | 3.5 | 10.5 | Private: 6.00 |
| 8 | **Pappanoor** | Kallada/ Kallada | Kollam | 1.5 | 8 | Forest Land Required |
| 9 | **Ambankadavu** | Ambankadavethode / Bharathapuzha | Palakkad | 2.4 | 184 | Private: 6.75 |
| 10 | **Karlmpuzha** | Karlmpuzha/ Bharathapuzha | Palakkad | 4.5 | 95 | Forest : 4.20 |
| 11 | **Palagappandi SHES** | Palagapandi/ Bharathapuzha | Palakkad | 4 | 820 | Reserve Forest |
| 12 | **Chinnaparambhuthodu** | Chinnaparambhuthodu & Mandapotty River/ Bharathapuzha | Palakkad | 11 | 375 | NA |

Source: KSEB

# Competitive Landscape

- The small hydro electric projects that are currently present in Kerala under KSEB are: Kallada (15MW), Peppara (3 MW), Lower Meenmutti (3.5 MW), Peechi (1.25 MW), Poozhithode (4.8 MW), Vilangad (7.5 MW), Malampuzha (2.5 MW), Urumi I (3.75 MW) & II (2.4 MW), Chembukadavu I (2.7 MW) & II (3.75 MW), Chimmony (2.5 MW) and Adyanpara (3.5 MW)
- As per MNRE, Karnataka has the highest potential of over 4000 MW for small hydro power projects. The state has allotted about 273 projects since 1995 with total capacity of 1524 MW with only 9 MW being allotted in FY16-18 period.
- Minar Renewable Energy Projects Private Limited (8MW capacity in Pathankayam in Kodenchery), M/s Tecil Chemicals and Electro power Ltd. and Kottayam, M/s Silcal Mettullurgic Limited, Coimbatore are few of the private players in Kerala in this sector.

# Conclusion

- SHPs have increasingly become an attractive investment destination since large power generating units face major challenges with respect to neighbouring flora and fauna
- The proposed projects of KSEB shall have grid connectivity from KSEB to evacuate power from the hydro-electric power station for which private investors can embark upon a Power Purchase Agreement (PPA) with respect to each project
- The proposed SHP projects in Kannur, Trivandrum, Idukki and Kollam are planned to be developed in PPP mode. Select projects have pre-feasibility, detailed engineering and detailed project feasibility reports prepared by KSEB which can provide deeper insights to prospective investors.

Source: http://www.kseb.in/index.php?option=com_content&view=article&id=74&Itemid=729&lang=en , Private players - http://www.kseboa.org/downloads/Study%20reports/private%20sector%20participation%20in%20power%20generation.pdf , http://kredlinfo.in/projdet_pdf_files/SH_Allotted%20Capaicty%20to%20be%20commissioned.pdf , http://corporateethos.com/corporate-domain/cumi-to-set-up-21-mw-hydro-power-unit-in-kerala/

# Thank you

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