CHALLENGES & OPPORTUNITIES IN AEROSPACE AND GREEN LAND TRANSPORT SECTORS

Indian needs assessment













India and its Market: Facts and Figures



India – Facts and Figures 1

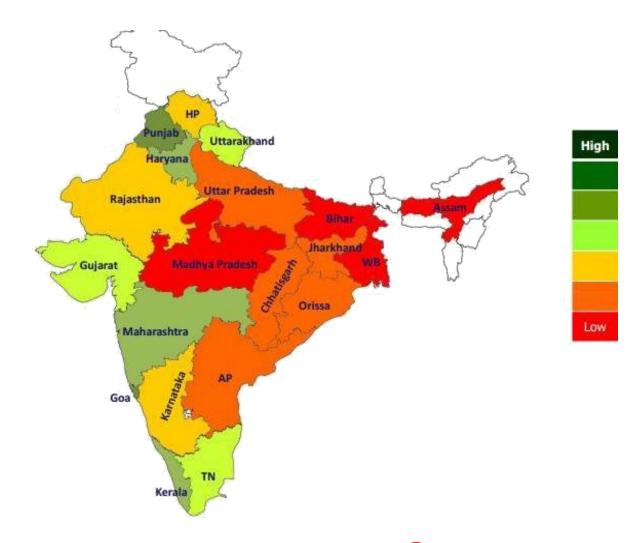
- +1.3 billion inhabitants 30% living in urban centers
- Average Age: 25,9 (China 36.7, Japan 46, Russia 38,9)
- Federal Republic, 29 States, 7 Union Territories
- Religions: Hindus (82%), Islam (12%),
 Christians (2%), Sikhi (2%), Buddhists (1%),
 Jains (0.5%)
- Languages: official Hindi and English; + 22 registered local languages
- Alphabetiziation: **74,4%** (censimento 2011, 65% in quello del 2001)
- Education: 250 universities, 3.000 colleges, 2.1 million graduates each year (300.000 engineers
 and 150.000 software developers)







India – Facts and Figures 2 | Wealth Distribution







India – Facts and Figures 3 | Macro Economic Data

Indian Government has adopted an aggressive promotional campaign "Make in India", aimed at increasing the investments in the country and improving its manufactiving capacity.

HIGHLIGHTS

- Average GDP 2012/2015: 6,9%
- FDI in 2015: +30% VS previous years
- Average growth of industrial production in the period 2012-15: +3,5%

CHALLENGES

Increase country's attractiveness and productivity by acting on:

- Complexity Management: harmonization of India's fiscal and taxation system (Goods and Service Tax Reform)
- 2. Proceed with the **upgrading of its infrastructures** (Land Acquisition Act)
- 3. **Skills development**: support the training of skilled labourers

Settore	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
PIL	6.7%	7.4%	8.6%	6.5%	4.5%	4.7%	6.9%
Agricoltura	1.6%	0.2%	5.4%	3.6%	1.4%	4.6%	3.7%
Industria	3.9%	9.2%	8.1%	1.8%	2.6%	3.9%	5.3%
Servizi	9.8%	8.6%	9.6%	8.9%	7.0%	7.4%	8.1%













Aerospace Market in India An Overview



India Macro Indicators – Aerospace Sector_1

- Compound annual growth rate (CAGR) of aircraft and passengers
 movement: from +3.3% in FY11 to +5.6% in FY14
- Passengers and freight expected growth in next 5 years through all Indian airports: +4.2% (Passengers), +5.3% (freight) and 5% (Indian airports).
- Maintenance, Repair and Operations (MRO) business currently worth US\$ 800 million, estimated to grow over US\$ 1.5 billion by 2020.
- Development of 100 low cost airports in tier II cities by 2020

India has the world's **9**th largest civil aviation market and ranks **4**th in domestic passenger volume

By 2020, the civil aviation market in India is expected to be the **3rd largest aviation market globally** with passenger traffic at Indian airports anticipated to increase to 450 million from 160 million in 2012-2013



India Macro Indicators – Aerospace Sector 2

International and Domestic Freight Traffic in FY2015



Source: Airports Authority of India, TechSci Research











Some Recent Investments and Developments India's aviation industry

- FDI inflows in air transport and air freight between April 2000 and June 2015: US\$ 600 million
- The Ministry of Civil Aviation has signed Memorandum of Understanding (MoU) with Finland, Kazakhstan, Kenya, Sweden, Norway, Denmark, Oman and Ethiopia for sharing airlines codes, increased frequencies and additional points of call, during the International Civil Aviation Negotiations (ICAN),2015 held in Antalya, Turkey.
- Tata Advanced Systems (TASL) has signed a joint venture with American aircraft manufacturing major, Boeing, to establish a manufacturing centre of aero structures for Apache helicopter.
- **Airbus SAS** plans to open aircraft maintenance and repair overhaul (MRO) facility in India as it expects India's aviation industry to grow at over 10% annually in the next decade, almost double the average growth rate of the global aviation industry.
- Eyeing large orders from Indian airlines, Airbus has committed to source products worth US\$ 2
 billion cumulatively over the next five years from India.
- French drone-maker *LH Aviation* signed a Memorandum of Understanding (MoU) with India's *OIS Advanced Technologies* to *manufacture tactical drones* in India through an industrial license.
- **Mahindra Group** expanded its partnership with **GE Aviation** by signing an agreement to manufacture aero structures at the Group's new aerospace facility in Bengaluru.

Source: http://www.ibef.org/industry/indian-aviation.aspx











Aerospace Companies in India

North

Bharat forge

Applied Electro Samtel India Ltd Magnetics Pvt Tata Power Material Ltd Precision Laxmi Precision Electronics Screws Rajasthan South Alpha Design HCL Recaero Hindustan Aeronautics Sundaram Ananth Technologies West Tata Advanced ASTRA Ltd(HAL) Andhra Pradesh **BAeHAL** Materials Ltd Infosvs TAAL Hindalco Almex BFL Infotech **TCS** ırnataka Capgemini **Big Conglomerates CADES** Titan ISRO (Antrix) Incat Kirloskar Group CIM tools MachAero Triveni **Amphenol** L&T Group Data Pattern Mahindra Satyam Tyco Puducherry Eaton Mahindra Group Tamil Nadu **VEM Technology Detusch connectors** Maini Godrej Tata Group





Mishra Dhatu Nigam Ltd. (MIDHANI) Pranitha Quest

Wipro



HBL

Focus Areas for Green Aviation

With the increase in Air Traffic and the continuous growth of the Civil Aviation industry in India the focus sectors could be summarized as follows:

- 1. Use of Bio-fuels / Alternate Fuels
- 2. Efficient Aircraft Design and operational efficiency
- 3. Optimized Navigation and Air Traffic Management
- 4. Green Propellent / Advanced Propulsion Technology
- 5. Optimized flight planning systems with efficient route profile
- 6. Reduce fuel usage at the airport
- 7. Lowering Carbon Emissions
- 8. Green Aviation Manufacturing



India Space Program – Beginning and story so far

- Space activities in the country were initiated with the setting up of the Indian National Committee for Space Research (INCOSPAR) and Indian Space Research Organization in 1962.
- The Government of India constituted the Space Commission and established the Department of Space (DOS) in June 1972 and brought ISRO under DOS in September 1972.
- ISRO currently has a constellation of 9 communication satellites, 1 meteorological satellite, 10 earth observation satellites and one scientific satellite.
- India's space programme is one of the most cost-effective worldwide: latest being Mars Orbiter Mission's cost was approximately USD 73 million, making it the least-expensive Mars mission to date.
- Until now India has launched 51 satellites for 20 countries and has the potential to serve as the world's launch-pad.
- 33 countries and three multinational bodies have formal co-operative arrangements in place with the Indian Space Research Organisation (ISRO). 30 spacecraft in differing orbital paths.
- The technologies licensed to industries for commercialization and know- how transfer include Multi-Layer Printed Antenna Technology and DDV 100 Resin system, Dual Polarization LIDAR, Solid State Power Amplifier, Precision Tapping Attachment and EPY 1061 coating compound, various types of adhesives and polymers, silica fiber and granule material, ceramics, pressure transducers, liquid level detectors, temperature sensors, silver plating and thermal control coating techniques, ground penetration radar, elastic Raman Lidar, Lower Atmospheric Wind Profiling radar etc.
- Foreign Direct Investment (FDI) up to 100% is allowed in satellites-establishment and operation, subject to the sector guidelines of the Department of Space/ISRO, under the government route.







India Macro Indicators – Aerospace Sector

Carbon Foot Print of Indian Aviation Sector

- The total emissions of 15,630,000 tons of CO2 in 2013 represent less than 1% of India's anthropogenic emissions; which is significantly lower than the corresponding global average, which is on the order of 2%-3%.
- In the absence of reduction measures, CO2 emissions may reach 28,000,000 tons by 2020.
- Although CO2 emissions (in kgs) per Revenue Tonne Kilometers (RTK) for Indian airlines in 2013 (i.e. 0.96) remains above the 2011 global average of 0.95, it shows a declining trend.
- Some Indian airlines are below the global average, while others are above, suggesting there is room for further improvements in efficiency.
- In 2013, Indian airports emitted around 780,000 tons of CO2









Aerospace & Aviation Authorities Regulations and Laws Landscape - 1

Regulatory and administrative bodies

- The Ministry of Aviation (MOWR)
- The Bureau of Civil Aviation Security (BCAS)
- The Directorate General of Civil Aviation (DGCA)
- The Airports Authority of India (AAI)
- Research institutes: Hindustan Aeronautics Limited (HAL), Defence Research and Development Organization (DRDO), National Aerospace Laboratories (NAL), ISRO,
- Aviation Environment Unit

Regulations and laws

- The Aircraft Act, 1934
- The Aircraft Rules, 1937
- The Aircraft Rules, 1994 (Demolition Of Obstructions Caused By Buildings And Trees Etc.)
- The Aircraft (Carriage of Dangerous Goods) Rules, 2003
- Civil Aviation Requirements
- Aeronautical Information Circulars



Government Initiatives

Government agencies project that around 100 brownfield and greenfield airports would be required by 2020 and they are encouraging initiatives through PPP models. The major ones are:

- Second international airport at Dholera, Gujarat;
- Air India's maintenance, repair and overhaul (MRO) unit;
- Award airports in Kolkata, Chennai, Jaipur and Ahmedabad on management contract;
- Creation of a committee comprising bankers, aviation experts and technocrats to help turn around and privatize the national airline, Air India;
- Second airport in the National Capital Region;
- Finalization of the new aviation policy and review of international flying norms for domestic carriers











Green Land Transport in India An Overview



Background of Urban Transport

- 30% of India's population lives in urban areas, and is expected to increase to 40% by 2021
- Motor vehicles in India: from 52 million in 2000 to 180 million in 2014, i.e. an average growth rate of 9 % per year.
- Very few Indian cities currently, have organized, registered and regulated public transport systems.
 More and more urban residents are relying on personal vehicles and traffic congestion, air pollution, accidents, and fuel use are on the rise as a result.
- Providing road capacity to cater for that demand is unsustainable both in environmental and economic terms
- India ranks 4th for Green House Gas (GHG) emissions, with 2,4 MTCo2 (after China with 9,7 MT, the US with 6,7 and the EU-15 with 3,7) and accounts approx for 6% of global GHG emissions.
- India is currently the world's second largest two-wheeler manufacturer: projection from 18.5 million in FY15 to 34 million by FY20.
 - Private vehicles: +9% in April-October 2015 VS same period last year.
 - Commercial vehicles: +8% in April-October 2015 VS same period last year.
 - Medium & heavy commercial vehicles: +32% in April-October 2015 VS same period last year.

The answer is to provide greater public transport capacity, which is of a higher quality and more efficient; as well as high quality Non-Motorised Transport Networks







India Macro Indicators – Growth Railways Sector

- From the first train journey in 1853 covering a distance of 34 km, today the Indian railways is the third largest railway network in the world
- Some indicators of the enormous network could be summarized as: 7,500 railway stations,
 9,500 locomotives, 55,000 passenger coaches, 240,000 freight cars and 65,000 route km
- Indian Railways operates 12,000 passenger trains every day and 7,000 freight trains.
- Indian Railways transports 2.8 MT of freight traffic and 25 million passengers every day.



India Macro Indicators – Land Transport Sector

Effect on Energy and Environment

- The transport sector accounts for nearly 18% of the total energy consumed in India, second only to the industrial sector.
- Nearly 98% of the energy needs of transportation are met through petroleum products, and almost half of the total consumption of petroleum products in India occurs on account of transport activities. This demand for energy is expected to grow.
- Of the 142 MT Co2 emissions released by the transport sector in 2007, 87% were on account of road-based vehicular activities. if no action is taken, overall transport Co2 emissions can come close to 1000 MT by 2030, a fourfold increase from 260 MT in 2010.
- A study supported by the WHO estimated about 154,000 people died in India in 2005 as a result of ambient fine particulate matter (PM2.5) alone.



Analysis and actions to undertake_1

In the face of India's growth, it is critical to improve urban transport and ensure high quality of life in Indian cities

Avoid-Shift-Improve sustainable approach:

Avoid → integrating land use and transport planning in cities to avoid unnecessary trips and reduce (trip) lengths.

Shift \rightarrow enabling a move from unsustainable to sustainable transport modes (or prevent the reverse shift) through a two-pronged strategy. This involves managing private motorisation growth and providing attractive sustainable alternatives, including non-motorised and public transport.

Improve → improving vehicles, fuel technology and engine efficiency in all modes to increase safety and reduce environmental impacts of transport.



Analysis and actions to undertake_2

What needs to be done:

- a collaborative approach by all stakeholders: The city government, urban planners and the private sector have to take commercial bets on providing viable green solutions;
- look at examples from cleaner and more developed countries that are proactively trying to achieve sustainable solutions in the transport sector;
- put innovative design and technological solutions ahead of conventional options;
- large and long-term capital investments must be made considering the enabling role of the transport sector in nation building;
- reach out to private vehicle manufacturers for meeting targets on low carbon emission.







Land Transport Authorities & Policy and Regulation Landscape_1

Regulatory and administrative bodies

- The Ministry of Urban Development;
- The Ministry of Road Transport and Highways;
- Border Roads Organization (BRO);
- Integrated Financial Advisor, Border Roads;
- Association of State Road Transport Undertakings (ASRTU), New Delhi;
- Indian Academy of Highway Engineers (Formerly NITHE);
- National Highways Authority of India (NHAI);
- Automotive Tyre Manufacturers' Association (ATMA);
- Indian Tyre Technical Advisory Committee (ITTAC)



Land Transport Authorities & Policy and Regulation Landscape_2

Regulations and Laws

- National Highways Authority of India (Amendment) Act, 2013
- Motor Vehicles Act 1988
- Central Motor Vehicles Rules 1989
- Notifications under Motor Vehicle Legislation
- Carriage by Road Act and Rules
- Central Road Fund Act and Rules
- Control of National Highways (Land and Traffic) Act 2002
- National Highways Fee (Determination of Rates and Collection) Rules

- National Highways Act 1956
- National Highways Rules 1957
- Notifications on National Highways
- National Highways Tribunal Rules
- National Highways Authority of India Act 1998
- Road Transport Corporations Act 1950
- Notifications regarding Automotive Industry Standards













Indian Needs Assessment

Aviation and Aerospace

Green Land Transportation



Project's Objectives, Organization and Output

OBJECTIVE

A demand-driven approach aimed at identifying the specific needs of the Indian market in the focus sectors (aviation, aerospace and green land transportation) and at selecting the most suitable solutions provided by European companies.

Subjects involved: European Business and Technology Centre (**EBTC**) | The Indo-Italian Chamber of Commerce and Industry (**IICCI**) | Piedmont Agency for Investments, Export and Tourism (**CEIP**)

The way ahead

- Highlight Indian needs of cleantech solutions in aerospace and land transport sectors;
- Map, assess and select European offer to meet the needs of Indian market;
- Encourage and support the implementation of commercial, industrial and technological cooperation projects between EU and India players through the organization of an ongoing mission from 14th to 18th December, 2015, in the Indian cities of Pune and Bangalore.

Approach

- Survey through circulation and collection of a questionnaire among sector related companies;
- **Direct contact** with the relevant stakeholders: Private companies, Associations, Public Institutions, Research Institutes, Universities.

Indian Regions: North, North-East, West, South-East, South-West

Output: 25 Business Leads, 12 in aviation/aerospace and 13 in green land transport







Code	Business Lead
GA-001	A hardware and software system integrator and producer of Electric aircraft equipment, with a in-house team of designers and engineers and has worked with several public companies engaged in the field of Aeronautics. They are seeking advanced European technology in the field of communication, navigation and radar systems for ground, ship, air and also UAV
GA-002	Incorporated in 2007, the company is a <i>manufacturer of cable assembly, wiring harness and integrator of Electronic Panels, Cabinets and Racks</i> . Current customers are in commercial aviation in the US like HEICO Inc, Flight Specialties and Aero Design. In India they work for PSUs like BEL, ECIL and other Aerospace and Industrial customers like Alpha Design. They also represent test and measurement companies in the US and Europe to the Indian scientific community including educational institutes and NITs, Defense Research and Development Organization (DRDO) labs like ADE, RCI, IRDE and CSIR labs.
	They would like to get technologies in high frequency RF and fiber-optic cable assemblies to expand and complement their current capabilities. They are looking to partner or form a joint venture with a company that can bring Automated Test Equipment design , Electronics Systems and other related areas. They can satisfy offset obligation of multinational companies like Airbus, Thales, Boeing, etc to the Indian Defense.



Code	Business Lead		
GA-003	The group is a <i>certified AS 9100 C & SO 9001;2008 with a 50 years experience in precision machining</i> , with capabilities in precision turning, machining, screw machined components, machined ferrous & non-ferrous casting, jigs, fixtures & special purpose machines, providing a single source supply right from components level to sub-assemblies & mass production as well as batch production for automotive, aerospace, machine-tool, heavy electrical, pumps, valves, and innovative engineering. They have wide spectrum of customer in Europe, USA, Canada, Australia etc SACS, GE Energy, ACD, Bullwell, CBD, NOV, Novatek, NEIDA AG, REFLEX Communication. The company is now looking for a JV Partner who can provide latest technology in CNC machining of an end product for light aircrafts.		
GA-004	An Indian distributor providing end-to-end solutions to Indian aviation industry is interested in importing/distributing aerospace/aviation products in India. They are also interested in having a manufacturing JV and license agreement with Italian company producing airborne equipments and test equipments for aerospace industry.		



Code	Business Lead		
GA-005	A aerospace precision engineering enterprise established in 1972, it originally started to design and manufacture tools, assembly jigs, fixtures, machined and sheet metal parts and aircraft assemblies for aerospace industry requirements. Today, the company is approved by all divisions of Hindustan Aviation Limited, Mahindra Aerospace and NAL. The company is now looking for technologies and JV in: 1. Advanced CNC Machining 2. Automatic Riveting 3. Aircraft Painting 4. Composites Manufacturing 5. Product Life Cycle Management		
	A company operating in several fields such as industrial labs, technology and engineering Centers. It is a		
GA-006	DRDO, Govt. of India approved Supplier, Manufacturer, Fabricator & Service Contractor. The company is also a General Electric approved lab in Asia and a SNECMA, France approved lab in India.		
	The company is looking for new testing technologies in the Aerospace Sector and also for a Tie - up with European testing and engineering centers.		



Code	Business Lead
GA-007	An Engineering Service Provider to OEMs, has been providing services to the Aerospace industry for the past 14+ years. Their major focus has been avionics testing and providing Concept to Manufacturing services for products such as Media Player Unit, Night Vision Camera etc. Over the years while sustaining the existing services, the company has been in the process of developing capabilities in Composites and Application Test Factory (ATF), Electronic Device Automation Testing (eDAT), Intelligent Sustenance Engineering (ISE), Intelligent Tech Support (ITS), Interactive Electronic Technical Manuals (IETM), Platform Acceleration Suite (PAS), Product Intelligence (PI), Value Analysis/Value Engineering (VAVE). The company is now investing and looking for partners in newer technologies and looking for partners such IoT, Mobility, Analytics, Cloud & Platform Services Connectivity etc. and labs to decrease cost and time to market for customers and composites.
GA-008	A manufacturer of advanced composite materials and products for Space, Aerospace, Defense, Marine, Petro Chemicals, effluent treatment, and various other fields is looking for technology from Italian companies which can save time, raw materials and consumables.



Code	Business Lead
GA-009	An Indian company providing engineering service is interested in having manufacturing JV and also looking for technology transfer for turnkey projects with European companies in integrated modular avionics and ATE technologies.
GA-010	The company is a leading logistics provider and is looking for technologies to be used in the field of inspection of cargo at airport terminals which could reduce human intervention
GA-011	The company deals in hi-tech sophisticated equipment in the fields of avionics, aerospace electronics, tele-communications, security equipment. They are looking for tie-ups with European companies offering latest technology in similar fields and products.
GA-012	A manufacturer of cable assembly, wiring harness and integrator of electronic panels, cabinets and racks is looking for technology partners in Europe for high frequency RF and fiber optic cable assemblies. They are also looking for JV partners for automated test equipment design, Electronics Systems and other related areas.



GREEN LAND TRANSPORT— Business Opportunities

Code	Business Lead
GLT-001	A leading service provider of technologies on simulation modeling on climate change studies & research, laboratory and process equipments is looking for Italian companies who are into BIO PROCESS ENGINEERING, instruments related to chromatography (GC and HPLC) etc.
GLT-002	An Indian manufacturer of rubber & silicone hoses is looking for technology from Italy for hose building.
GLT-003	An Indian manufacturer in the field of flexible packaging & folding carton in the automotive industry is looking for technology partner in the field of flexible packaging, folding board cartons, labels and ancillary materials.
GLT-004	An Indian company who are specialized in Cold Roll Formed Profiles and are manufacturer of custom designed machines and sheet metal. Interested in having a technology partner for manufacturing of stainless steel products by pressure die casting machine for Automotive industry.
GLT-005	A company operating in the field of last mile transport application is looking for Brush-less hub motors or equivalent assisted power source (other than fossil fuel based)



GREEN LAND TRANSPORT—Business Opportunities

Code	Business Lead
GLT-006	They are an international logistics solution provider company. Interested in working with Italian companies that can provide technologies in the field of ITS and fleet management to increase fuel efficiency and optimized delivery schedules.
GLT-007	An Indian company who are manufacture of sheet metal components, assemblies, sub- assemblies, tools, dies and moulds. Looking for technology from European companies for Electric & Hybrid Buses, Charging infrastructure including on-board pantographs and chargers. They are also interested in having manufacturing JV with European companies.
GLT-008	They are already established in India through JV with their Italian partners. They are interested to collaborate with European companies for development of light weight Chassis Components.
GLT-009	An Indian company who are into manufacturing, designing and installing of interiors, seats and electronic devices for Railway and Metro. Interested in doing turnkey projects with European companies to present latest technological solutions in India to the public funded projects.



GREEN LAND TRANSPORT—Business Opportunities

Code	Business Lead
GLT-011	An Indian company in the rolling stock industry is looking to tie-up with European companies to bring sustainable and eco friendly technologies to India.
GLT-012	An Indian company who is 5th largest truck manufacturer and second largest bus manufacturer in the world. Looking for European companies who are into Portable air quality assessment equipments; Portable measuring equipments for Volatile Organic Compounds (VOCs) inside passenger Vehicles; Range measurements for electric Vehicles through Simulation & Laboratory assessments; Facility for assessing emissions from Air-Conditioning systems of Passenger Vehicles
GLT-013	A company involved in the sector of CNC Machining for Automotive sector is looking for an European company to set-up a manufacturing JV in India to capitalize on the know-how of the foreign company in manufacturing components involving precision machining.



Thank You

For more information on the project and business opportunities, please contact fundraising@centroestero.org (CEIP) or p.hate@indiaitaly.com (IICCI)









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