Access to European Sustainable Transport Solutions

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June 20, 2012

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Agenda

- About EBTC
- Overview of Clean Technologies & Solutions in Transport
- Issues in India’s Transport Subsectors
- State of Karnataka Activities
- EU Initiatives & Strengths - Projects
- EU Legislations
- EBTC Activities
- EU - India: Technology and Market Mapping
About EBTC

The European Business and Technology Centre (EBTC) supports EU cleantech companies and researchers on their market entry to India and offers hands-on support in the early stages of expansion.

With pan-India presence, offering complete end-to-end solutions to EU clean technology companies who want to enter and be successful in the Indian market.

Tapping into a high growth market, in key sectors all offering enormous scope for closer EU-India collaboration – be it in business, science or technology.

Your partner for India
About EBTC – Brief overview

4 locations across India
- New Delhi (HQ), Mumbai, Bengaluru, and Kolkata

4 focus Sectors with Specialists and teams
- Biotech, Energy, Environment and Transport

4 steps from Visibility to Incubation
- Promoting Europe in India and India in Europe
- Providing Information and Intelligence
- Supporting the market entry process from scratch
- Providing full service incubation support for businesses and R&D

High growth market, dynamic sectors
Guiding European Businesses to India

**Step 1**

**Market Insight**
- Guidance on doing business in India
- Information on regulatory framework
- Information on market access barriers
- Intellectual Property Rights (IPR)- Help desk
- Focused market reports

**Step 2**

**Market Access Roadmap**
- Screening of projects in India at national or state level
- Identification of potential business partners
- Design of market entry strategy
- Customised market intelligence

**Step 3**

**Market Strategy Implementation**
- Proactive incubation services to acclimatise with minimum risk and costs
- Hands-on-support in bidding for projects
- Assistance in finalising pilot projects
- Liaising with government and financial institutions

**EBTC services: taking European companies from the point of considering the Indian market to implementing their projects**
Overview of Clean Technologies & Solutions in Transport

- **Clean technologies in transport**
  - Vehicle technologies
    - EV, Hybrids, Plug-in Hybrids
  - Fuel technologies
    - Bio-fuels, Ethanol, CNG
  - Vehicle + Fuel Technologies
    - Hydrogen, Fuel Cell
  - Intelligent Transport Systems (ITS)
  - Others
    - Carpooling, Vanpooling, Non-motorised transport (NMT)

- **Application of above technologies in all forms of transport**
  - Roads
  - Public transport
  - Freight
  - Waterborne transport
  - Aviation
Issues in India’s transport subsectors

Public Transport
- Inadequate and inefficient public transport infrastructure.
- Very few cities have organised public transport.
- Increasing rates of motorisation.
- Road fatalities very high and increasing.

Transport Emissions & Air Quality
- Transport one of the largest sources of greenhouse gas (GHG) emissions.
- Motor vehicle technology to reduce emissions include electric, plug-in and hybrid engines.
- Fuel technologies include natural gas/CNG, biofuels, hydrogen-based fuel cells and low sulphur fuels.

Logistics/ Freight/ Rail
- Large freight network in India that is supported by poor infrastructure.
- Third largest railways network in the world – one of the largest employers (~1.4million).
- E-ticketing covers only 40% of network.
State of Karnataka Activities

- **Karnataka State Road Transport Corporation (KSRTC)**
  - Online ticketing – Smart Card
  - Road Safety rules and regulations
  - Emissions testing norms and testing centres

- **Bruhat Bengaluru Mahanagara Palike (BBMP)**
  - Automated Tracking and Control of Green Assets (ATCAG) - India's 1st Automated Bicycle Sharing System. 3 pilot ATCAGs at
    - the park on FM Cariappa road
    - Utility Building complex in front of Fame Shankar Nag theatre and
    - Anil Kumble Circle with six bicycles in each of the stands.
  - Automated Car Parking - plan to install thirteen Automated Verticular Car Parking Towers throughout the city.

- **Karnataka State Pollution Control Board (KSPCB)**
  - installed and commissioned two Continuous Ambient Air Quality monitoring stations in Bangalore
State of Karnataka Activities (cont’d)

- **Directorate of Urban Land Transport (DULT)**
  - Comprehensive Traffic and Transportation Plan (CTTP) for 6 city corporations (Bellary, Belgaum, Gulbarga, Hubli-Dharwad, Mysore, Mangalore)
  - Comprehensive Mobility Plans (CMP) for 9 city corporations (Shimoga, Udupi, Tumkur, Davengere, Bidar, Bijapur, Chitradurga, Hospet and Raichur)
  - Car Sharing Portal called “Samoohayana”

- **Bangalore Metropolitan Transport Corporation (BMTC)**
  - Passenger Information system (PIS)
  - Eco-friendly Parisara Vahini buses
  - Construct 45 Traffic & Transit Management Centers (TTMCs) as a part of Comprehensive Traffic & Transportation Plan (CTTP) for Bangalore and vision plan under JnNURM
  - Driver Training Institute
State of Karnataka Activities (cont’d)

- **State Planning Board**
  - Urban mapping through aerial photography of 27 large urban areas

- **Center for Infrastructure, Sustainable Transport and Urban Planning (CiSTUP)**
  - Collate and publish the research literature across all transportation sectors and modes for better inter-modal understanding
  - Research in ITS, Urban Infrastructure and Planning and Climate Change

- **Center for Study of Science, Technology and Policy (CSTEP)**
  - Research is in the areas of energy, infrastructure, materials and national security
EU Initiatives & Strengths - Projects

- **Clean transport and decarbonising transport is a core theme of the EU 2020 strategy**

- **Euro 6 standards have become de-facto standards for emissions**
  - reduction of pollutant emissions from light vehicles
  - tax incentives and implementation

- **Green Cars Initiative**
  - Public Private Partnerships (PPP) project and part of European Economic Recovery Plan
  - support R&D on technologies and infrastructures essential for achieving breakthroughs in use of renewable/non-polluting energy sources
  - Biofuels, Hydrogen, Fuel cells, Battery, Electric vehicles with plug-in
EU Initiatives & Strengths - Projects (cont’d)

- **Clean Urban Transport for Europe (CUTE) project**
  - Develop/demonstrate an emission-free and low-noise transport system,
  - Develop hydrogen production and refuelling infrastructure,
  - Over a period of 2 years,
    - 27 buses travelled ~865,000 km in 9 cities,
    - operated for over 64,000 hours,
    - demonstrating their reliability, collected information and experiences on fuel cell buses.

- **STARBUS project (under Intelligent Energy-Europe (IEE) Programme)**
  - facilitate market introduction of new technologies or fuels for urban buses
  - developed a system to calculate fuel consumption, CO2 emissions and pollutant emissions of different vehicles
    - under real road operating conditions
  - an Internet assessment tool
    - enables direct use of the data previously measured
    - determination of the corresponding operational costs.
- **Renewable Transport Fuel Obligation (RTFO) in U.K.**
  - Principle legislation for the regulation of biofuels used for transport
  - Requires all fossil fuel suppliers produce a percentage of fuels for road transport from renewable sources, or
  - A substitute amount of money is paid

- **Clean Transport Systems (CTS)**
  - Comprehensive long-term strategy for alternative fuels for EU in transport sector

- **European Expert Group on Future Transport Fuels**
  - Assesses Europe's options for substituting oil in the transport sector
  - Associations, NGOs and Commission officials provide advice on developing political strategies for alternative fuels

- **Other Directives:**
  - Action Plan on urban mobility
  - Directive on the Promotion of Clean and Energy Efficient Road Transport Vehicle
EBTC’s Activities

- **Transport Flagship Mission Dec 2012**
  - Technical sessions on transport noise mitigation and alternative fuel technologies
  - Round table session on Sustainable Transport strategies

- **R2B - Transport connecting Energy Use and Environment**
  - Study, workshop and high-level paper

- **Research**
  - EV charging infrastructure and mass transit

- **Market Access**
  - Clean technologies in Transport
Transport Cluster Development Activity

- **Transport Cluster Development activity**
  - Initiate cluster in sustainable transport by sharing experiences from EU

- **Phase 1 - Fact finding mission in late April**
  - Meet key stakeholders to determine key issues in Karnataka
  - Determine opportunities/gaps in technology implementation where pilot deployment would be possible
## Technology Comparison: EU and India

<table>
<thead>
<tr>
<th>Technology</th>
<th>EU</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery technology</td>
<td>▪ Maturing market but a lot of R&amp;D is being carried out to improve the efficiency of the batteries</td>
<td>▪ Lead Acid is Mature technology and runs on most of the EVs in India &amp; Li-Ion battery is in the introductory stage</td>
</tr>
</tbody>
</table>
| Electric motor technology | ▪ Strong presence in electric motor technology  
▪ Advent of hybrid and induction motors with low cost | ▪ PMM is likely dominate the HEV and EV motor market, though a weak presence overall |
| High speed rail     | ▪ Most markets under growth stage, with France, Italy and Germany being most mature markets | ▪ At the nascent stage of operations |
| Intelligent Transport Systems | ▪ Most of the ITS technologies have strong presence in EU | ▪ Road safety control and Electronic toll control have been partially implemented in India but other ITS technologies are yet to commercialize in Indian market |
| Collision avoidance | ▪ CAS is in developing stage, with few projects under implementation | ▪ At the nascent stage, however technology has the potential, especially in logistics |
## Opportunities in Intelligent Transportation Systems (ITS)

<table>
<thead>
<tr>
<th>ITS Area</th>
<th>Insights</th>
<th>Technology Deployed</th>
<th>Presence EU</th>
<th>Presence in India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Signal Control</td>
<td>Manage Traffic Speeds, Vehicle merging &amp; corridor crossings</td>
<td>• Updated traffic signal control equipment used in conjunction with signal timing</td>
<td>![Full Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adaptive signal systems (Sensors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ramp Metering</td>
<td>Safely space vehicles merging onto a highway, while minimizing speed disruption to existing flows</td>
<td>• Ramp metering Signal &amp; Controller</td>
<td>![Zero Presence]</td>
<td>![Insignificant Presence]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check-In Detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check-out Detector</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Merge Detector</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Queue Detector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated Speed Enforcement</td>
<td>Photographs of vehicles and/or drivers taken at the time of the violation, along with data from the radar device</td>
<td>• Speed Detecting radar</td>
<td>![Significant Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Light detection &amp; ranging (LIDAR) units with image capturing technologies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Management</td>
<td>Addresses 3 key areas: traffic surveillance, clearance &amp; traveler information</td>
<td>Video Image Processing System</td>
<td>![Zero Presence]</td>
<td>![Insignificant Presence]</td>
</tr>
<tr>
<td>Electronic Toll Collection</td>
<td>Electronic payment of highway &amp; bridge tolls as vehicles pass through a toll station</td>
<td>Vehicle-to-roadside communication technologies include roadside antennas &amp; pocket-sized tags containing radio transponders</td>
<td>![Full Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td>Traveler Information</td>
<td>Providing the public with information regarding available modes, optimal routes, and costs in real time either pre-trip or on-route via in-vehicle information</td>
<td>In-vehicle guidance, CMSs and PDAs to distribute user information</td>
<td>![Zero Presence]</td>
<td>![Insignificant Presence]</td>
</tr>
<tr>
<td>Bus Rapid Transit</td>
<td>Encompasses the use of a series of ITS technologies, resulting in increase in bus ridership</td>
<td>• Route planning</td>
<td>![Significant Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rights-of-ways</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weigh-in-motion technologies</td>
<td>Enable the weighing and cataloging of trucks without causing vehicles to stop and queue in line</td>
<td>WIM scale imbedded in the pavement triggering the camera</td>
<td>![Significant Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td>Vehicle control technologies</td>
<td>Aim to improve vehicle safety, efficiency, and comfort</td>
<td>• Intelligent cruise control</td>
<td>![Significant Presence]</td>
<td>![Partial Presence]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Speed alert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Anti-lock brakes</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Electronic system malfunction indicators</td>
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Classification of Indian Opportunities

Key Focus Segments

- Battery Technology
  - Lead acid battery holds a major share in electric vehicles battery technology, PMM is likely to decline.
  - India has launched the National Mission for Electric Mobility 2020 which is aimed at promoting electric and hybrid vehicles by July, 2012

- Electric Motor Technology

- High Speed Rail

- ITS - Traffic Signal Control

- ITS - Automated Speed Enforcement

- ITS - Vehicle Control Technologies

- Collision Avoidance Systems

- Key focus segments - Battery, Motor and High Speed Rail

Attractiveness

- High
- Mid
- Low

Chance of success

- Low
- Mid
- High

Battery technology

Intelligent Transport Systems

- Embedded Center of Excellence on ITS is to be created in Kerala, India focusing on wireless traffic control systems, advanced traveler information systems, real time traffic counting & monitoring
<table>
<thead>
<tr>
<th>Technology</th>
<th>Short Term Growth Potential</th>
<th>Long Term Growth Potential</th>
<th>Opportunities for EU companies &amp; Go to Market Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV- Battery technology</td>
<td></td>
<td></td>
<td>- Technology transfer and R&amp;D collaboration JV with Indian companies or projects on energy storage, solutions related to Li-ion replacing the Pb-Acid batteries and technologies to reduce charging time</td>
</tr>
<tr>
<td>EV- Electric motor technology</td>
<td></td>
<td></td>
<td>- Technology transfer &amp; research collaboration - equipment manufacturing and infrastructure development</td>
</tr>
<tr>
<td>Urban mobility - High speed rail</td>
<td></td>
<td></td>
<td>- Technology transfer &amp; research collaboration for component or equipment manufacturing, especially in rolling stock technology and infrastructure development</td>
</tr>
<tr>
<td>Urban mobility - Intelligence transportation systems</td>
<td></td>
<td></td>
<td>- Technology Transfer for assessment in the areas of advanced signaling system, automated fare collection system, network surveillance, data archiving and infrastructure development</td>
</tr>
<tr>
<td>Urban mobility - Road congestion</td>
<td></td>
<td></td>
<td>- Technology Transfer for assessment and components manufacturing</td>
</tr>
<tr>
<td>Road safety - Collision avoidance</td>
<td></td>
<td></td>
<td>- Technology Transfer &amp; research collaboration on assessment of road safety, logistics and component manufacturing</td>
</tr>
</tbody>
</table>

Short term = less than 3 years; medium term = 4 - 10 years

- Opportunities across the value chain of the technologies: (R&D/ Tech transfer, infrastructure development, energy storage & supply, charging infrastructure, connectivity, mobility services provision and logistics
- Significant Technology transfer opportunity across all sectors
- Specific opportunities for companies in OEM and component manufacturing sectors - positive Indian government policies for infrastructure development and specific subsidies & incentives for promotion of electric vehicles
EBTC Events 2012

- High-level Workshop on Public Procurement for best practices from Europe, New Delhi, Date TBA.
- IPR Sessions at EBTC Events, Pan India, May-Dec 2012
- Urban Mobility Session at Asia Competitiveness Forum, New Delhi, 27 April, 2012
- Biotech Business and Research Delegation - Virtual matchmaking, 28 May-1 June 2012, Bengaluru
- Water, Waste-treatment and Green Building Mission, Kolkata, 6-7 June 2012
- Workshop on funding facilitation of projects with relevant and demanded EU technologies in India, Mumbai, September 2012
- Seminar on utilisation of mini-grids, off grid energy solutions, New Delhi, September 2012
- EBTC Smart Grid Event, Location TBD, October.
- Biotechnology Business & Research Delegation, Bengaluru, 5-9 November 2012
- Energy Business & Research Delegation to Renewable Energy World Conference and Expo, New Delhi, 7-9 November 2012
- Environment Business & Research Delegation, Mumbai, 5-9 November 2012
- Transport Business & Research Delegation to the Urban Mobility Conference cum Exhibition, New Delhi, 5-8 December 2012
- Workshop and Roundtables joining energy and climate change issues with sustainable transport strategies, New Delhi, 5-8 December 2012
- Seminar on Sustainable Solutions for Jatropha-based Biofuels in India, New Delhi, 11-12 December 2012
- Final workshop on IPR issues in 2012, Location TBD, January 2013
Promoting European clean technologies in India & tackling climate change