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Resource Efficiency & Clean Technologies

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Report on

"Trends and Opportunities for EU-India Cluster Cooperation"

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An EU initiative of Directorate-General Enterprise and Industry promoting international cluster cooperation for SMEs

EBTC is a programme co-funded by the European Union and coordinated by EUROCHAMBRES

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Part 2	Modern and Cleantech Clusters in India
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Part 1: Market trends in Cleantech

1.1 Smartgrid and Green Building

The Smart Grid faces important needs in the Transmission/Distribution sector « The immediate prospect lies in addressing the challenge in the transmission and distribution losses, estimated to be close to 30% due to sub-standard grid infrastructure and pilferage as in the Home Application Sector and metering sector: 130 million Smart Meters by 2021

Green Building is very dynamic vwith 1.2 billion square feet of green buildings being built or ready, and pre-certified by Leadership in Energy and Environmental Design (LEED)

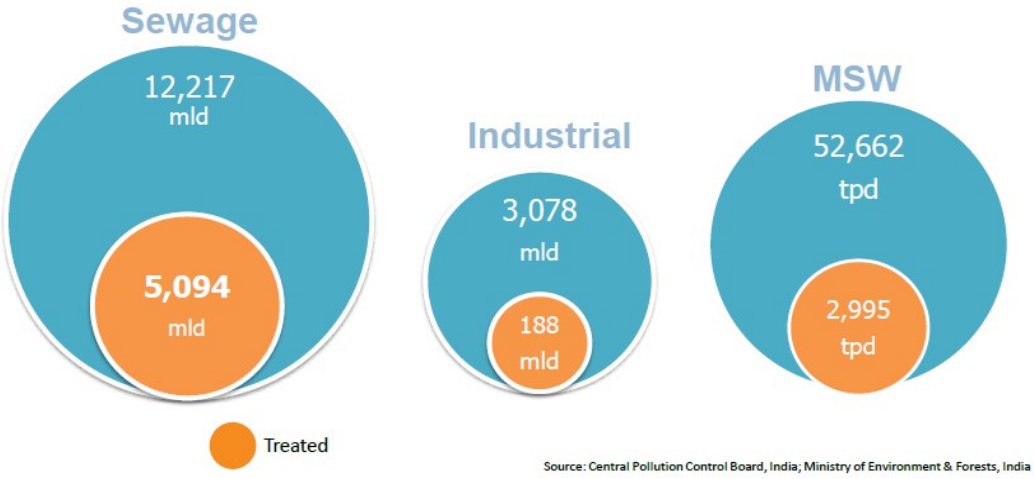
2 Water technologies are required

12bn litres of sewage and 3bn litres of industrial effluent flows into Ganga every day. Market opportunities estimated over €20bn in the next 5 years only in the Ganga Rive bassin.

Large cities treat about 29% of their wastewater

India can only store 30 days of rainfall – developed world average is 900 days. 80% of India's domestic supply comes from ground water

50% of water is lost in transit



Share of large players in water treatment business in India (FY08)		
Large Players*	Sales in FY08 (USD Mn)	% of Sales
Ion Exchange	115	19%
VA tech Wabag	80	13%
Thermax	65	11%
Doshi Ion	80	13%
HDO/IVRCL	60	10%
Degremont	50	8%
Driplex	50	8%
Paramount	25-30	4 To 5 %
Aquatech (Pune)		
KPC		
Triveni		
Aquadesign		
GE		
Aquatech(Wipro)		
Siemens		
Total	~600	100%

Example of on-going water projects:

- Tannery Cluster 400 tanners, 50 MLD of discharge
- 15 Small sewage treatment plants in Southern India : Residential and commercial buildings. New technologies to be adopted
- Aquifer recharging in Western India : Excessive ground water evacuation from Northern India : Transport large amounts of water through a canal network
- Treating temple waste water discharge (80 MLD) in Northern India : Lake rejuvenation in Eastern India
- Off network drinking water solutions in Western India

1.3 Waste and biomass

Pollution and other environmental degradation costs India €50 billion a year. 70% of the country's population depends upon biomass.

Bengaluru generates 3,500 tons of mixed solid waste per day, Mumbai 6,200 tons and Delhi close to 7,500 tons. Waste collect is close to 70% in large cities and under 50% in middle ones. Almost all these waste directly finished in large landfills without any kind of sortage.

Market size for recycling is estimated to 2B$ (ERAI)

But "there is nothing like waste, it is all a resource"

The administrative context for for waste technologies is constraining:

Management and treatment of household waste is officially distributed to municipalities or the Federated States jurisdiction. However, the lack of financial resources and their human resources limit their involvement in the matter.

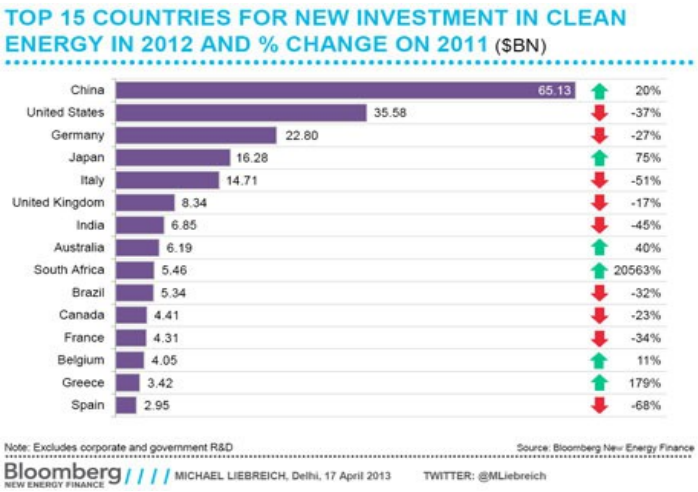
Given the scale of infrastructure needs, the government had launched in December 2005 the Jawaharlal Nehru National Urban Renewal Mission for the development of urban infrastructure (water treatment,

waste management, urban transport) in 63 Indian cities on a period of 7 years. Aware of the need to import specific technologies, the government has also exempted from customs duty equipment sector waste management.
The most advanced countries in the field of waste treatment are Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat and Maharashtra.

1.4 India is a hot spot for solar energy

Renewables : « India's government has invited bids to build 750 MW of solar plants. the government is offering $303 million in grants to the project » (september 2013)

Potential market for decentralized renewable energy estimated at €1.45 billion annually.



1.5 Cleantech Venture Capital

World Bank (IFC) investments in 2013 include $70 million in 10 green technology start-ups including Azure Power and Applied Solar Technology in solar power, e-waste recycling firm Attero Recycling and smart grid technology firm Ecolibrium.

Infuse Ventures, an India-centric venture capital fund that will invest in cleantech and renewable energy start-ups had its first fund closing at $14 million lin May 2013

Part 2: Clusters in India

Estimation of more than 2000 clusters involving more than 1.5 million SMEs !

But only a few are « modern industrial clusters ». The word “Cluster” does not necessarly cover the same concept of organisations in Europe, more focuse on Innovation and RD (french Poles de Compétitivité) and in India (Local scale industrial organisations).

Clusters	Regions				
	North	South	East	West	All India
Animal products, vegetables, horticulture, forest products, tobacco, pan masala and non-edible water/spirit and alcohol, chiefly used in industry	13	16	10	23	62
Ores, minerals, mineral fuels, lubricants, gas and electricity	4	5	0	10	19
Chemical and allied products	5	3	1	16	25
Rubber, plastic, leather and products	10	6	1	6	23
Wood, cork, thermocol, paper and articles	10	2	2	7	21
Textile and textile articles	17	28	6	22	73
Base metals, products thereof and machinery equipment and parts thereof, excluding transport equipments	45	22	15	36	118
Railways, airways, ships, road surface transport and related equipment and parts	5	1	1	5	12
Other manufactured articles and services, not elsewhere classified	14	5	2	14	35
Total	123	88	38	139	388
Percentage to total	32	23	10	36	100

Part 3: Guiding concept for cooperation

EU Cleantechnologies are well appreciated in India but gaps persist with the key question on suitability of EU products in Indian conditions in terms of technology / solutions and costs

Addressing these gaps require to improve the suitability of European cleantechnologies to Indian market conditions to promote localizing technologies that suit local conditions

3.1 Pilots

In the Indian market, technology demonstration is imperative. Pilots shall :

- Matching funds : Identify, access, manage
- Navigate pilot across the regulatory mesh
- Identify location to disseminating impact
- Streamline implementation
- Support ecosystem for problem-solving
- Gauge impact – Assess, tabulate, standardise and disseminate

But too often pilots projects fail because :

- Subsidy-driven, unfortunately
- Location, often not ideal
- Impact, limited
- Matching funds, not fungible
- Take-off, without engines

3.2 "Technology-For-India Market" : frugal innovation strategies

"Technology-For-India Market" (swapping technology) is a possible strategy for market access to India. But it must takes into acount local constraints and particularly cost issues. Therefore « frugal innovation » can be the key strategy with a global philosophy: “More with less for more”

« Frugal innovation » implies :

- absolute subcontracting,
- new business models : the startup First Energy in India has invented a fire that burns less wood than regular homes. It accepts not to make money on the product, but wins on the sale of fuel, "pellets" produced from agricultural waste in the villages "
- reuse of existing amortized technologies
- search for economies of scale in areas that were not used: low margins on huge volumes

« Frugal innovation » requires to mix technologies : Some global players segment their work between projects of radical innovations for all markets, and projects targeting China and India. The centers based in India will be able to mix older highly advanced technological bricks taken from the global centers and others to reduce costs without sacrificing innovation.

Frugal innovation can lead to great successes:

- Godrej & Boyce Manufacturing, one of the oldest Indian industrial groups, developed the fridge "little cool" to $ 70 battery operated
- Tata Consulting Services markets a water purifier based rice shoots - the most common waste in India - $ 24

3.2 "Partnerships-For-India Market" : knowing the customers

"Partnerships-For-India Market" is a requirement in order adapt its business model and know the indian customer; Companies can no longer settle for simplified or older versions of the products. They have to adapt their business model:

- For these "new customers" P & G sends employees to live with the peasants for months to see how the products they offer are used.
- General Electric sells equipment to rural health centers and examines the use made of it,
- Unilever has partnered with many NGOs to learn to 130 million people the importance of certain aspects of hygiene such as washing hands

3.3 "Partnerships-For-world-class- Markets" : reverse innovation

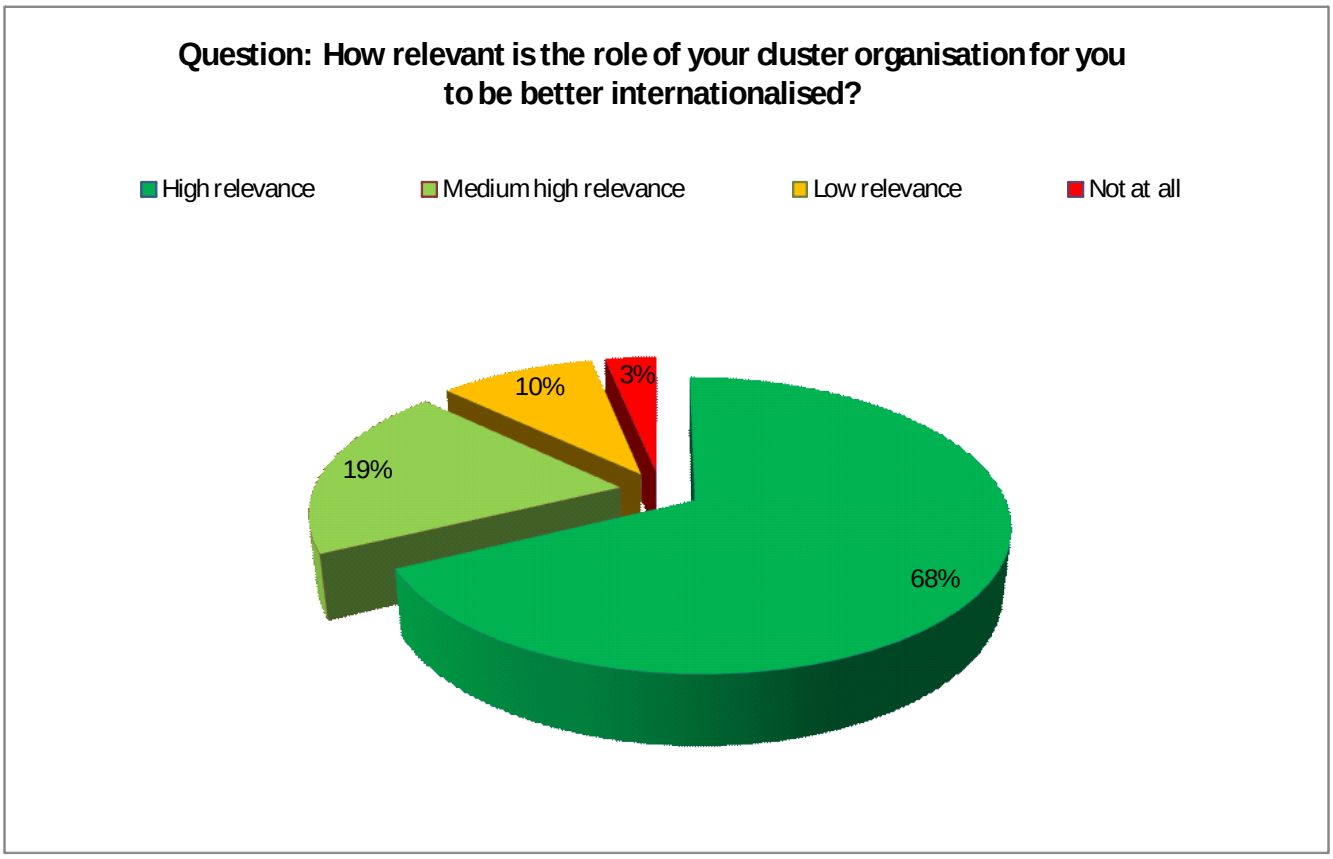
« Partnerships-For-world-class- Markets" means that Business relationship must be bilateral : European Cleantech for India and Indian Cleantech for Europe.

But adaptation is not so always easy as shown in this example : Hanjer Ltd treats recycled products (composted soil, methane, furnace oil, plastic ingots) at the end of the process. The segregation of the mixed waste represents the key problem and Hanjer's technological advantage over the competition. But the set of challenges in Indian waste management is fundamentally different from the situation in Europe. In particular, the nitrogen content (5%) in the fertiliser obtained from municipal waste is too low for the European market. The plastic ingots contain too many different compounds to be competitive with European Markets

Part 4: Main drivers for Cleantech cluster cooperation with India

Clusters are a key vector for international development of Cleantech SMEs. But cluster managers who want involve their SMEs in indian collaborative projects must:

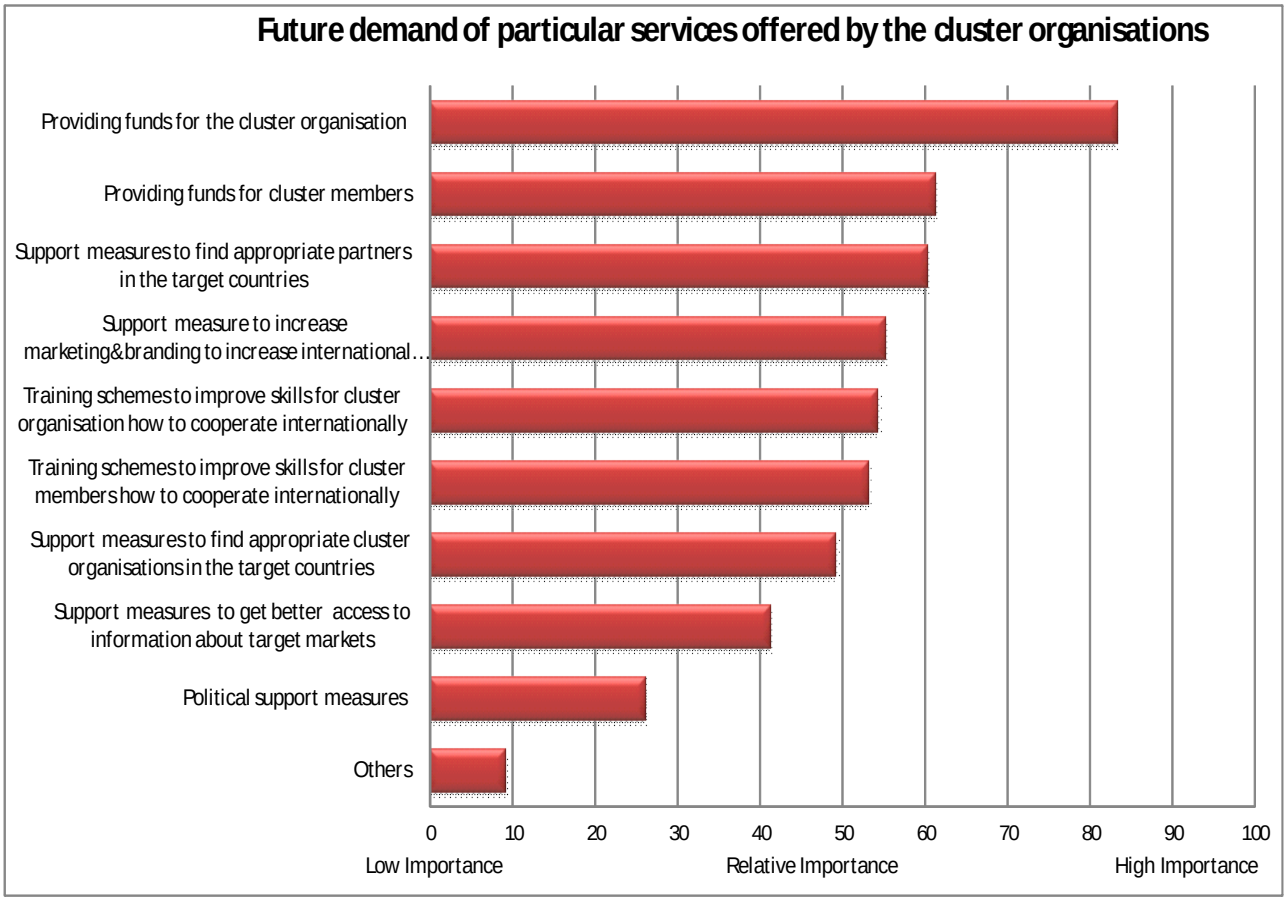
- Define an internationalisation strategy
- Focus on fund raising
- Monitor the success and the impact of internationalisation
- Brand their cluster
- Be present and patient : « European entrepreneurs who want to become active in the Indian market need to spend more time with understanding the Indian needs and building closer relationships. Personal presence and patience are key requirements for success » (EBTC)



Studies have confirmed a higher success rate for initiating international businesses, when it was based on a corresponding internationalisation strategy

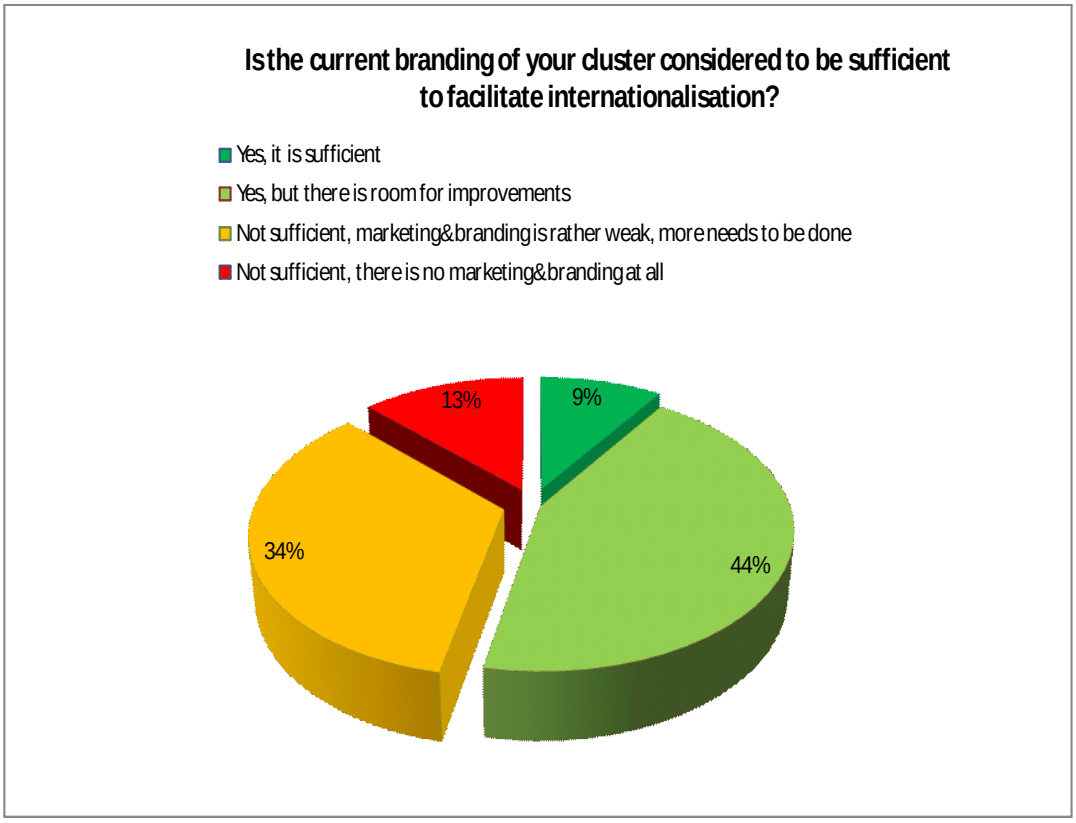
Although most cluster organisations consider internationalisation of significant importance, only 22 % report of having an internationalisation strategy developed and implemented.

As a consequence, majority of cluster organisations is lacking of having designated staff for internationalisation support



The "wish list" from SMEs for internationalisation support services includes:

- Providing funds
- Finding appropriate partnersupport in developing
- Internationalisation strategies for the SME themselves
- Direct advertising of products and services of the cluster members
- Monitoring the success and the impact of internationalisation
- Cluster branding facilitates international cooperation


Is the current branding of your cluster considered to be sufficient to facilitate internationalisation?
Yes, it is sufficient
Yes, but there is room for improvements
Not sufficient, marketing&branding is rather weak, more needs to be done
Not sufficient, there is no marketing&branding at all
13%
9%
34%
44%

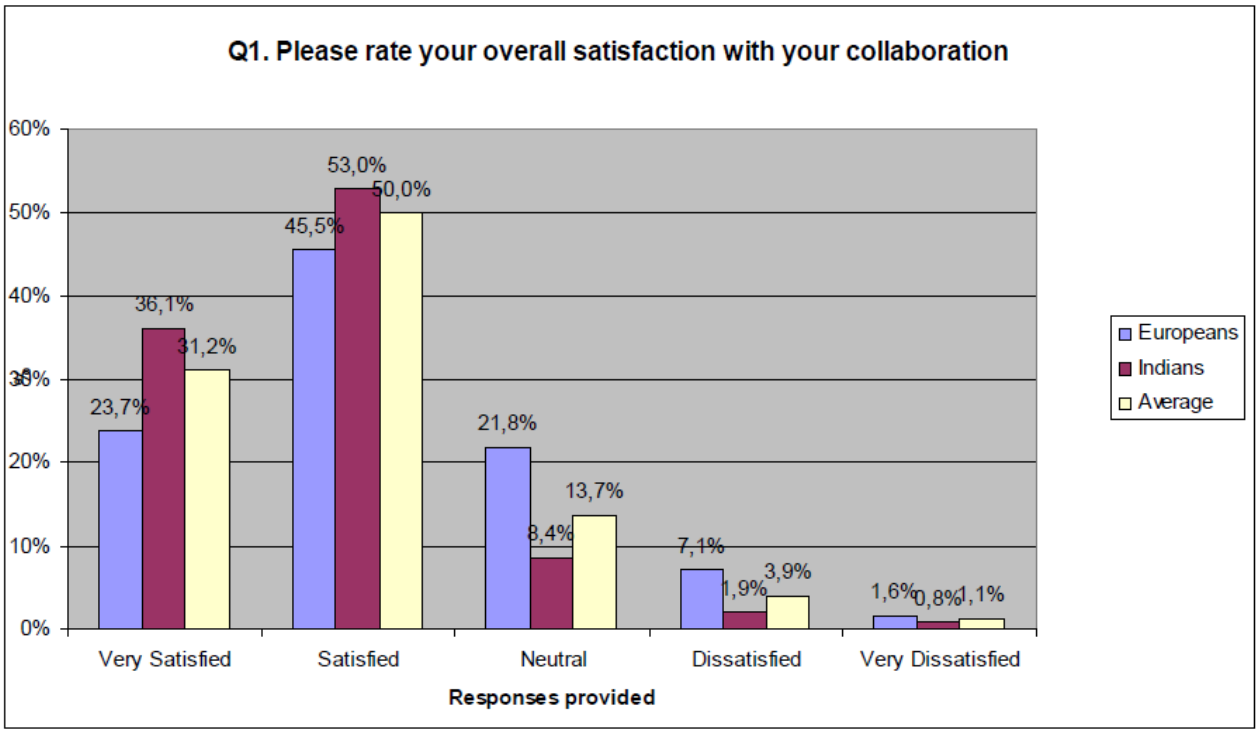
Part 5: Main obstacle for cluster cooperation with India
Feedbacks of FP7

Given the low number of current Cleantech clusters cooperation between India and Europe, it seems interesting to turn to a parallel experience: FP7.
Currently, over 225 Indian partners are involved in 150 projects in the seventh Framework Programme (FP7) : Environment (37), ICT (30) and Food, Agriculture and Fisheries, and Biotechnology (30).

From studies conducted amongst the participants to these projects, the obstacles faced by EU researchers to participate in EU-India collaboration are:

- lack of knowledge of funding opportunities,
- difficulty finding partners,
- cultural difference in working style,
- administrative requirements from donors,
- difficulty obtaining a VISA,
- official documents and intellectual property rights issues,
- getting bio-materials from India,
- bureaucratic difficulties linked to the management of FP projects and quality and dedication of Indian partners.

But the the global feeling is satisfaction



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Part 6: Examples of success story

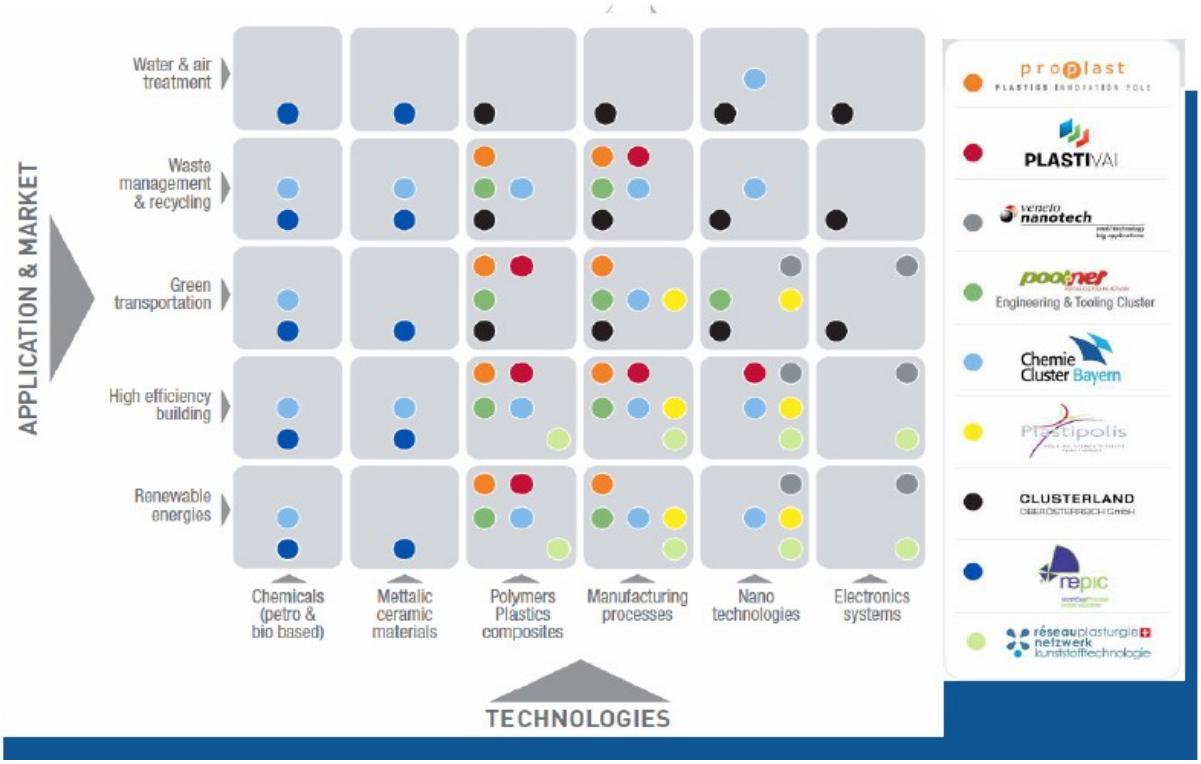
6.1 Durapole

Durapole is a french cluster for Cleantech startups and SMEs around Paris (about 50 companies)

The Commonwealth Games in Delhi in October 2010 have showcased an innovative system for monitoring and forecasting of air quality developed jointly by Leosphere (lidar) and Aria Technologies (computer simulation) of Durapole cluster. The program financed by funds FASEP-Studies French Government was conducted in collaboration with the Indian Agency to monitor the air quality (Central Pollution Control Board).

Innovations focused on a regional scale, the optimization of the detection of massive inflows of desert dust. A network of four lidar deployed in Rajasthan, several hundred kilometers from Delhi, has better constrain this information as input to the model, resulting in an optimized forecast pollution levels in the Indian capital

6.2 Wiintech "Worldwide Intercluster Initiative for New materials and processes focused on clean TECHnologies"



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