

POWER STRUGGLE

ACTIONABLE MEASURES FOR INCREASED ACCESS TO POWER

Presented at:
Rubber National Conference 2012



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November 02, 2012

Topics Covered

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Energy Demand & Consumption

Power Generation Status: Nationwide, fuel sources

Power Pricing: Nation and region wise

Actionable Measures: 5 point program

Solar Power: Overview & economics

Wind Power: Overview & economics

Rubber Recycling: Overview & value chain

Clustering: Concept & Approach

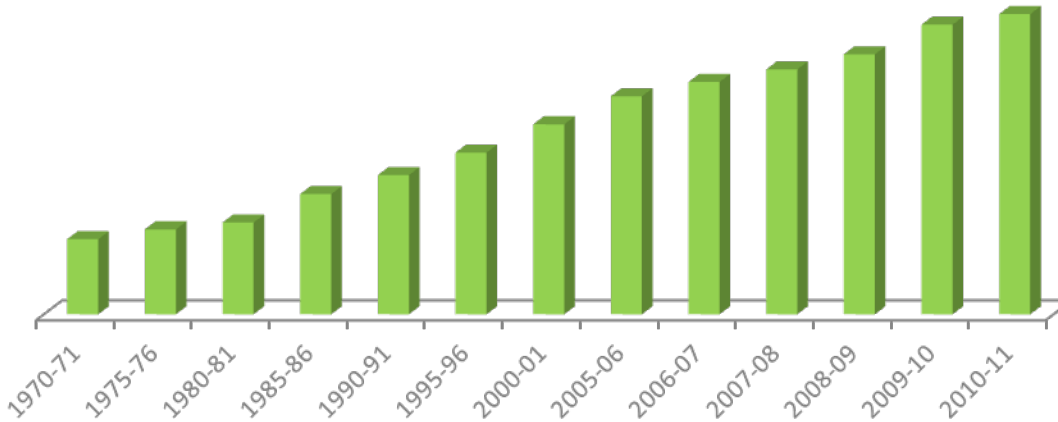
Energy Efficiency: Tips & recommendations

Summary

Per Capita Energy Consumption

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Trend in Per Capita Energy Consumption



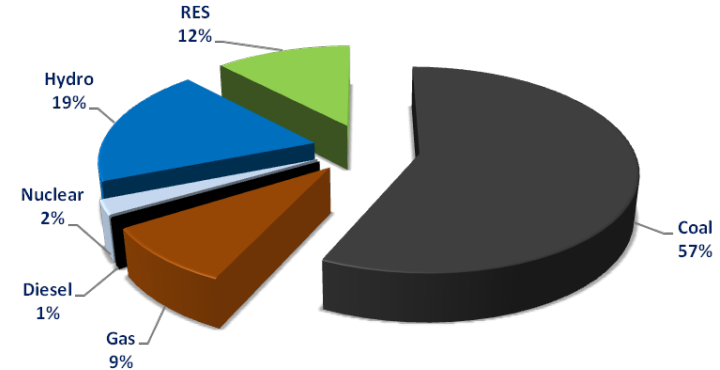
- ✓ 40 year CAGR = 4%
- ✓ 10 year CAGR = 4.7%
- ✓ 3 year CAGR = 4.9%

Our consumption of energy & the rate of consumption are both increasing ...
but per capita consumption is still very low hence growth is expected to increase
further between 5% to 7.5% per annum

Power Generation by Fuel Source

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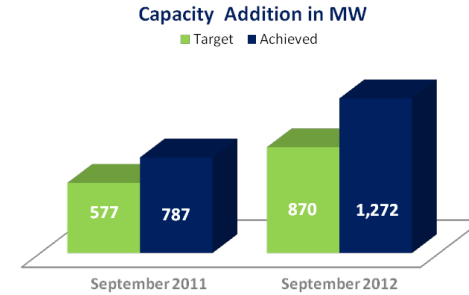
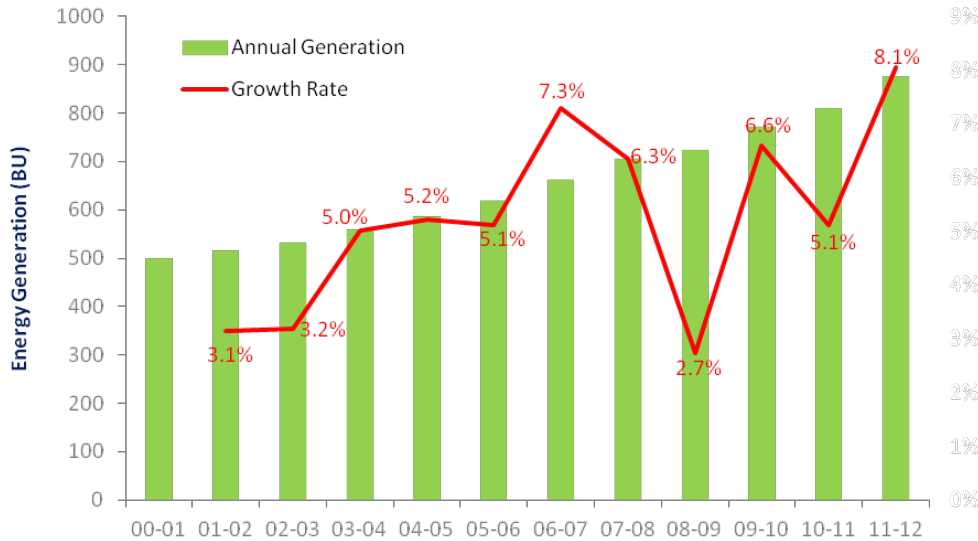
Coal	Abundant, cheapest	Polluting
Hydro	Abundant, cheap	Environmental Issues Project delays
Renewables	Clean, low COO Govt support	High Capex
Gas	Cleaner than coal Affordable	Visibility into availability
Diesel	Subsidized Suitable for backup	Polluting
Nuclear	Clean, lower cost	High capex, safety issues



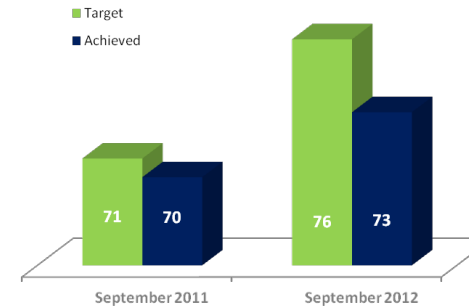
Total Generation Capacity
207 GW

Power Generation Status

Generation & Generation Growth Increasing ...

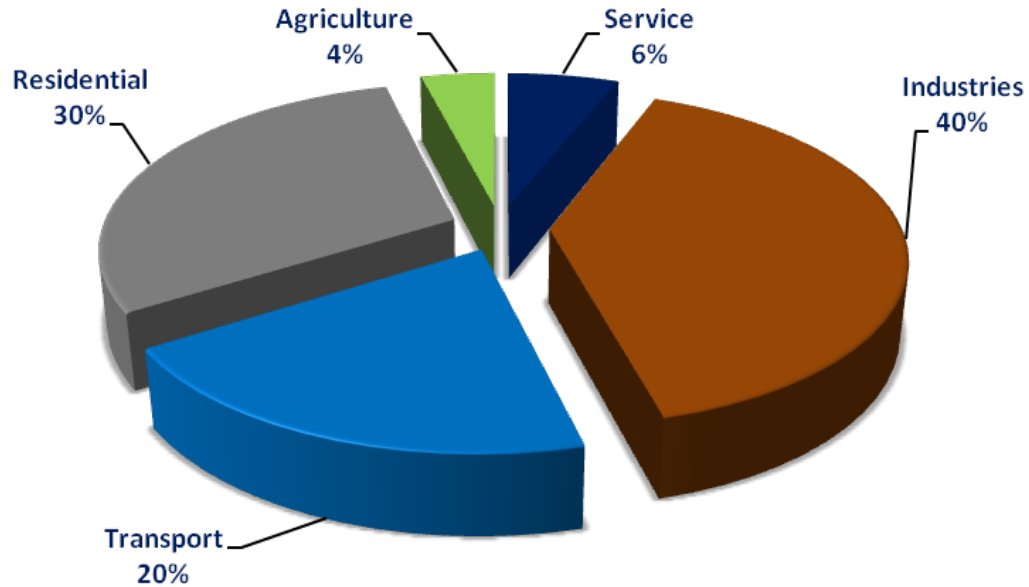


But so are shortfalls ...



Energy Utilization

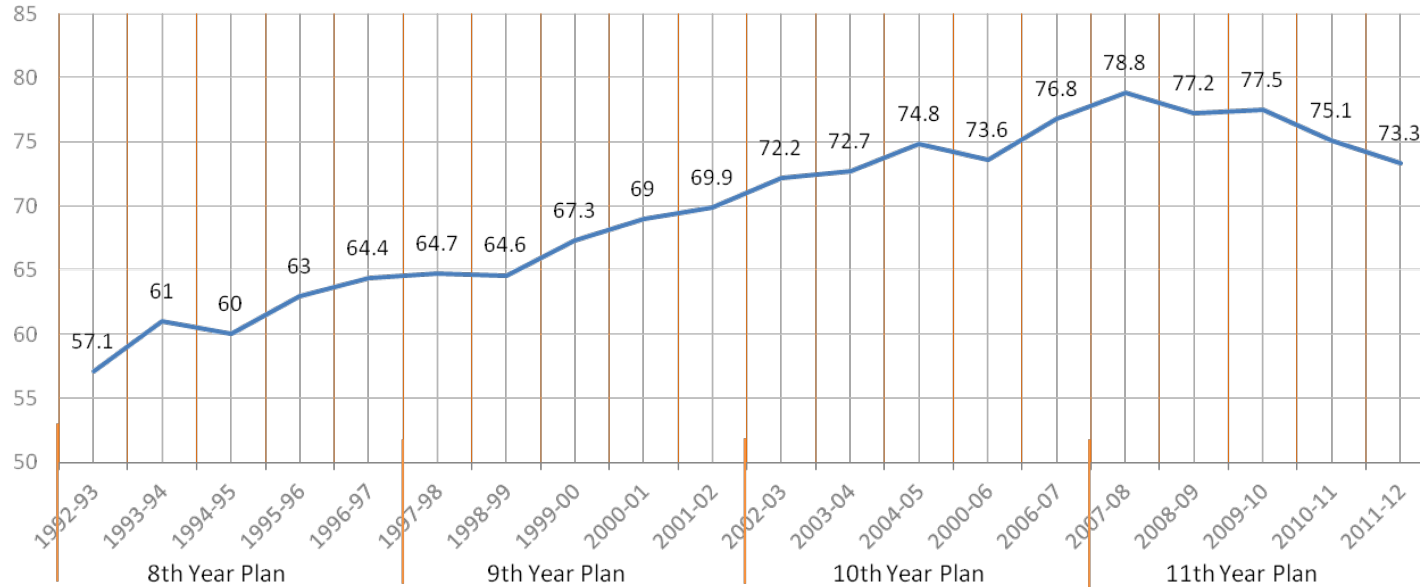
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Are Power Plants Generating @ Full Capacity?

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Trend of National Average PLF of Thermal Stations

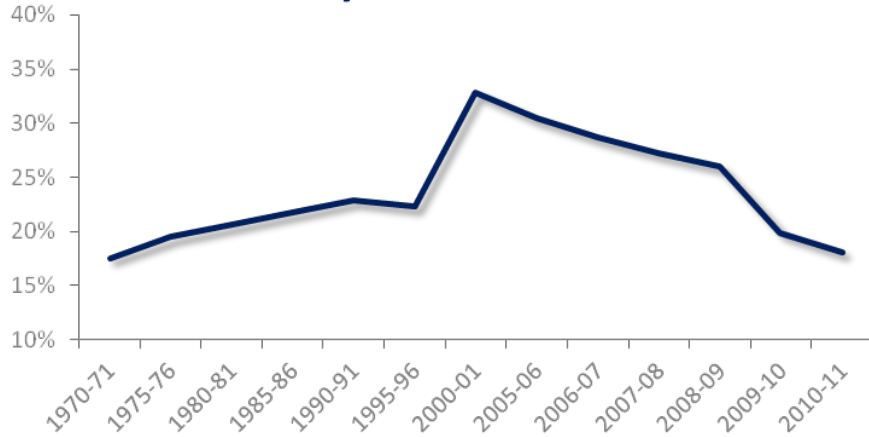


Fuel shortages are one key reason for reducing PLF

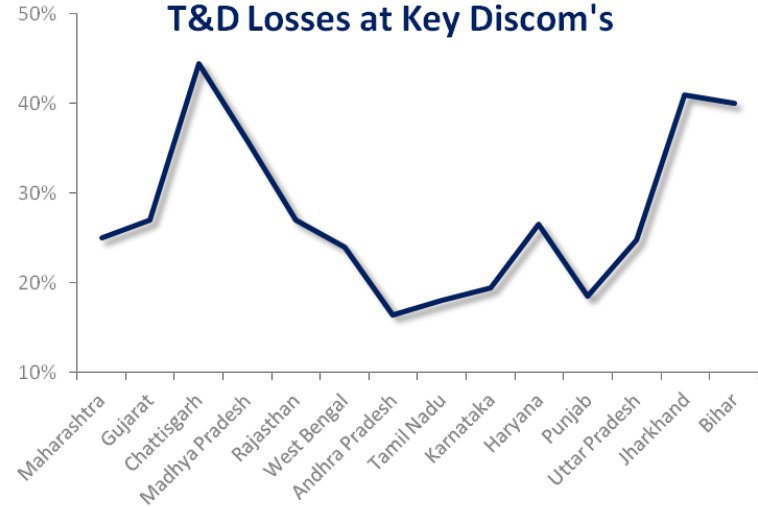
% of Generated Energy Reaching Customers

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Country-wide T&D Losses



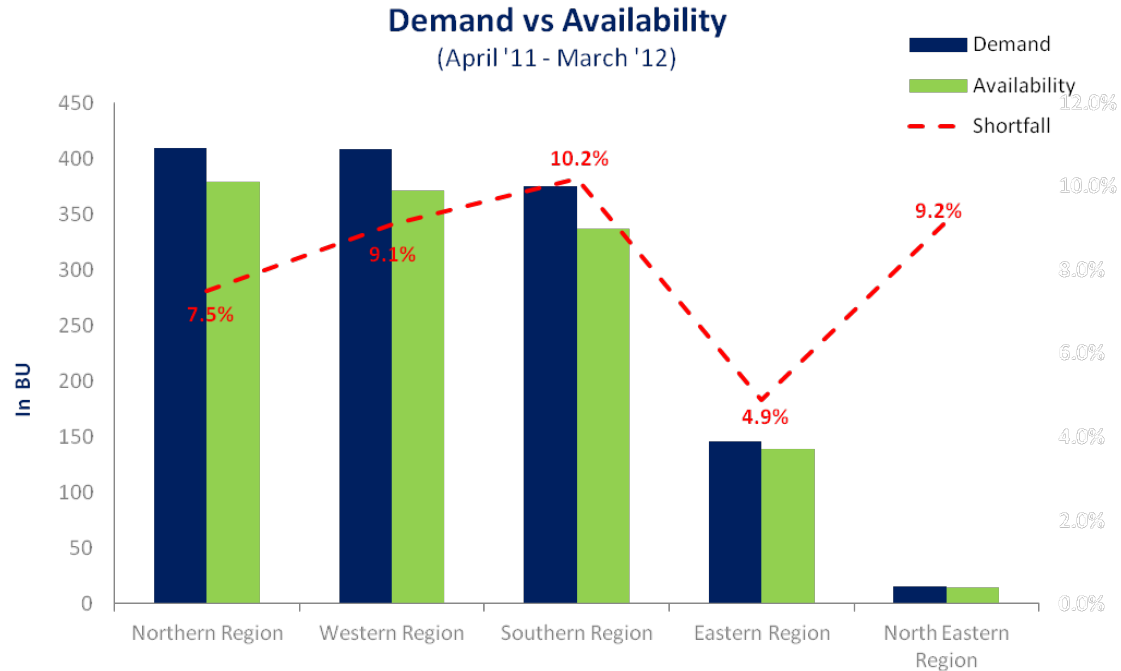
T&D Losses at Key Discom's



Transmission & Distribution losses are reducing ...
But even today on average 18% generated electricity is lost in the grid.

Regional Demand vs Availability Scenario

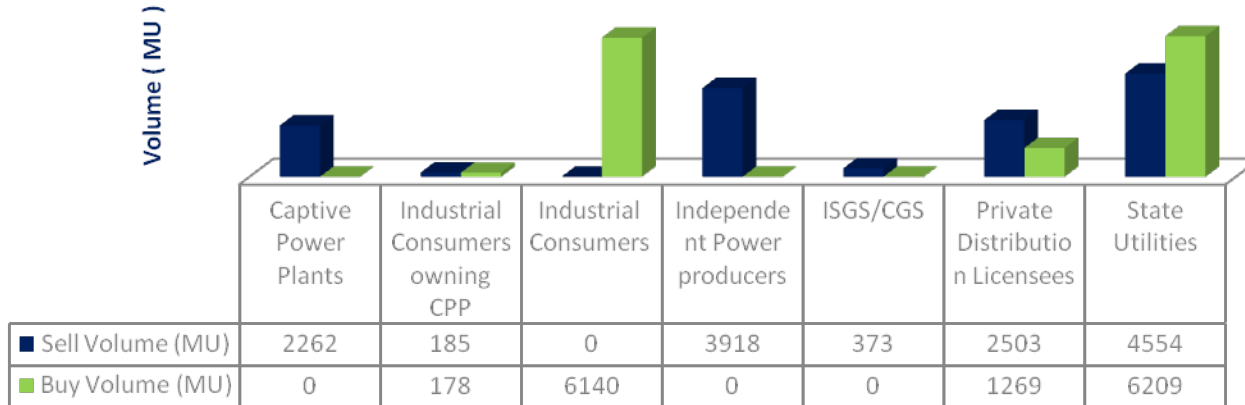
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Industrial Customers are Net Purchasers of Power

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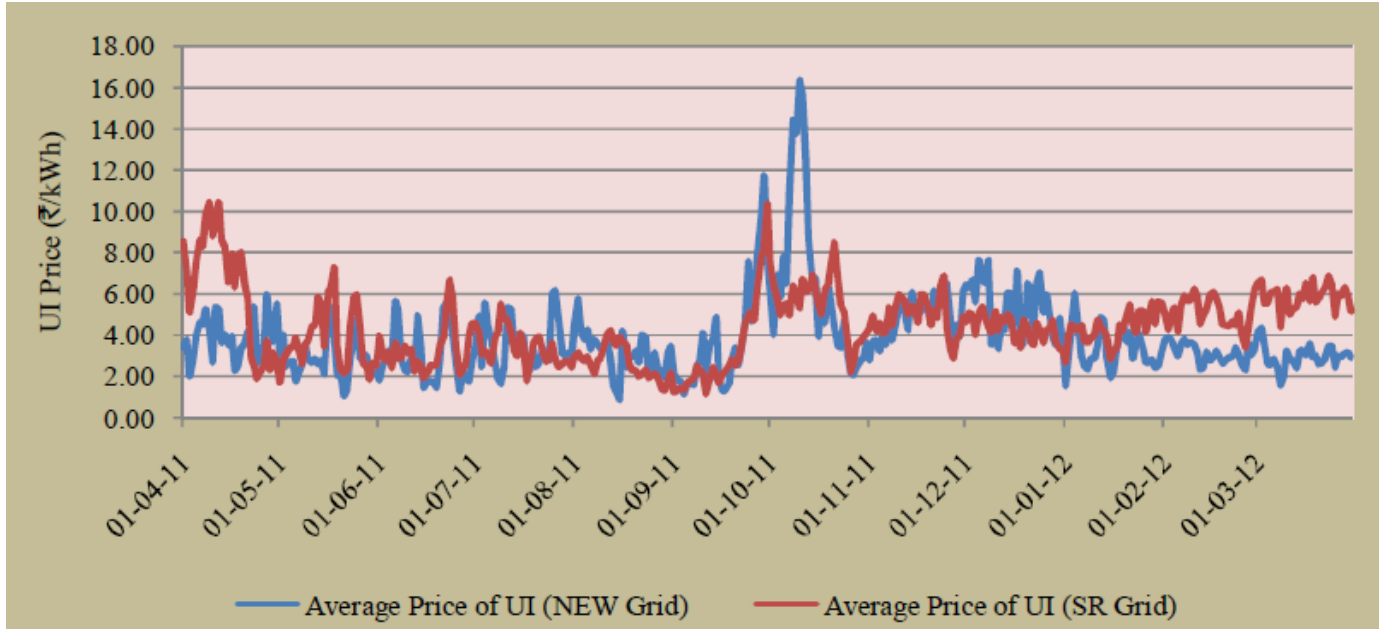
Sell and Buy Volume in IEX
2011-12



Industrial Consumers Have an Opportunity to Transform from being just buyers to self sufficiency

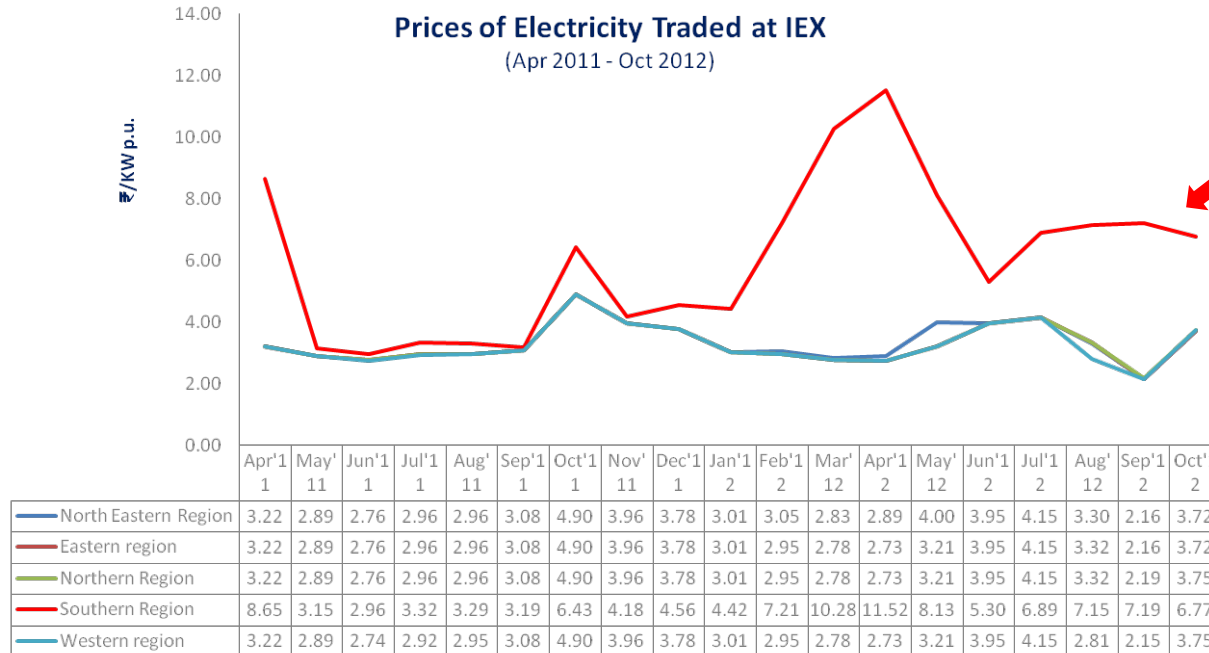
National Price of Electricity Traded in FY12

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Regional Prices of Traded Power

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Southern Region facing high power prices & price volatility

Latest News ...

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Rs2 arbitrage to drive captive power rush

Published: Thursday, Nov 1, 2012, 6:21 IST

By [Rajiv Ranjan Singh](#) | Place: Mumbai | Agency: DNA

Unnikrishnan said the rate of commercial power in the heavily industrialised states such as Tamil Nadu, Maharashtra, Gujarat, Andhra Pradesh and Karnataka is in the range of Rs6.5-7 per unit, while power from any captive unit can cost Rs4-4.25.

"A substantial arbitrage available between the commercial rate of electricity and the captive power may lead to more industrial houses to opt for captive power units," M S Unnikrishnan, managing director, Thermax, said on an earnings call on Wednesday.

Goodyear researchers at the company's Innovation Center here have found in their tests that using soybean oil in tires can potentially increase tread life by 10% and reduce the tiremaker's use of petroleum-based oil by up to seven million gallons each year.

In addition, testing at Goodyear's tire plant in Lawton, Okla., showed improved mixing capabilities in the manufacturing process. The company found that rubber compounds made with soybean oil blend more easily with the silica used in building tires. This can improve plant efficiency and reduce energy consumption and greenhouse gas emissions.

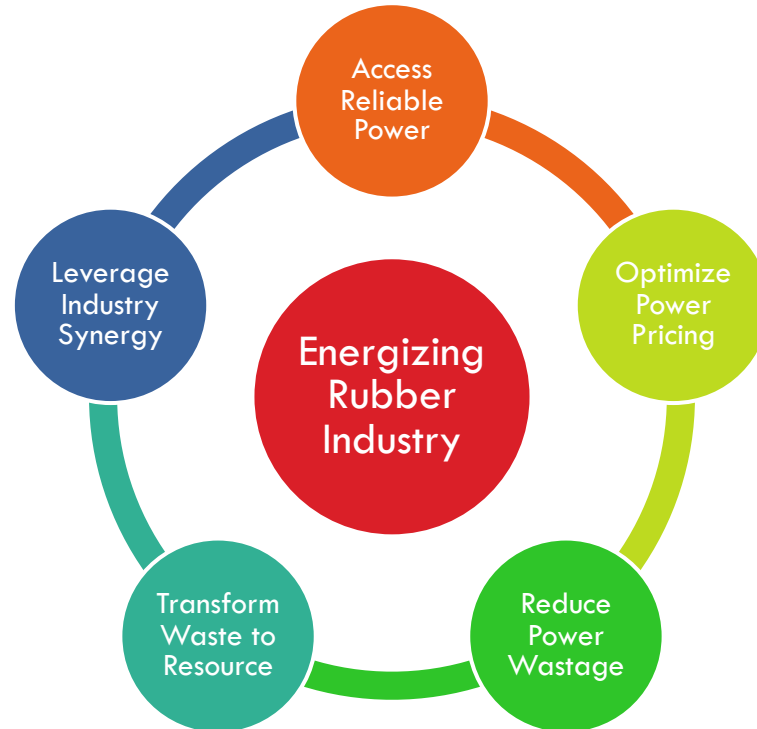
Aspects to Factor into Industrial Power Planning ...

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- ❑ Investment into power generation will continue to increase
- ❑ Due to increased consumption, power shortages will also continue to increase
- ❑ Consider power price escalation at ~5% annually
- ❑ Power price volatility will impact short term power cost
- ❑ Use of fossil fuels for power generation, or backup, harm the environment

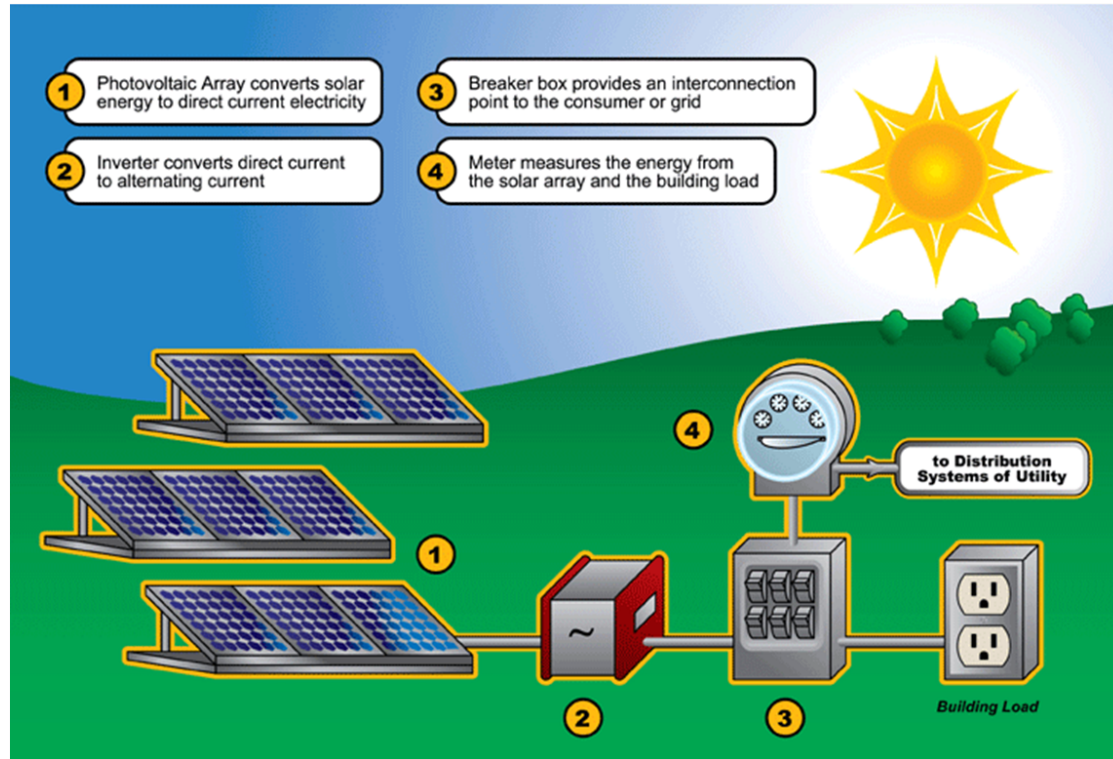
Actionable Measures – 5 point program

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Solar Energy – Overview

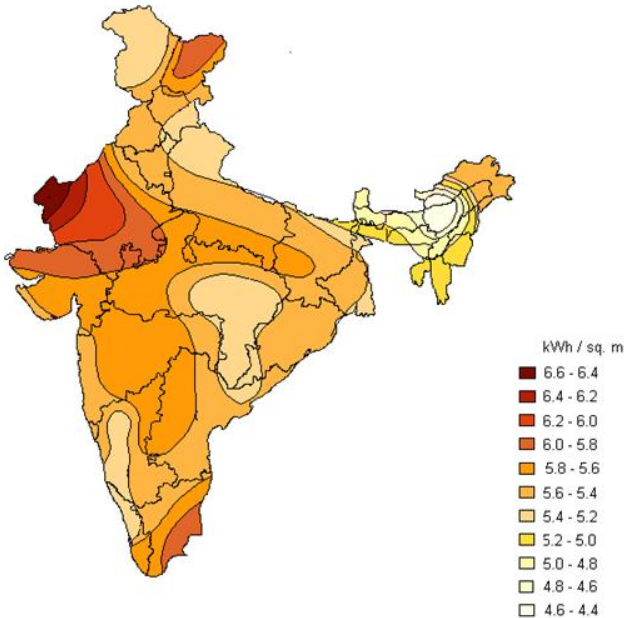
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Solar Power Economics

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Location Map for Ideal Solar Power Generation



Power Plant Economics

Size	1 MW+
Capex	₹ 7.5 cr – ₹ 9 cr / MW
Return	15 – 20%
Benefits	Acc Dep or preferential tariff, REC

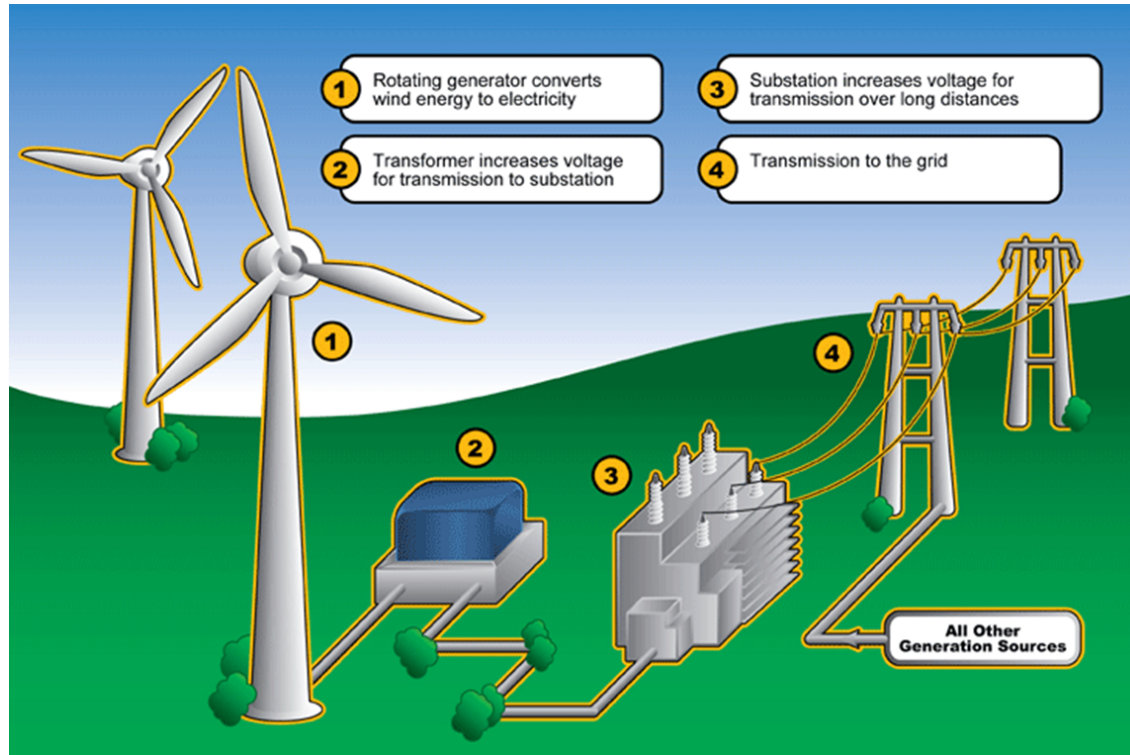
Rooftop Solar Economics

Size	50 KW+
Capex	₹ 75 – 100 / W
Return	15 – 20%
Benefits	30% MNRE subsidy, Depreciation

Industrial rooftops in India can generate ~7 GW of solar power

Wind Energy – Overview

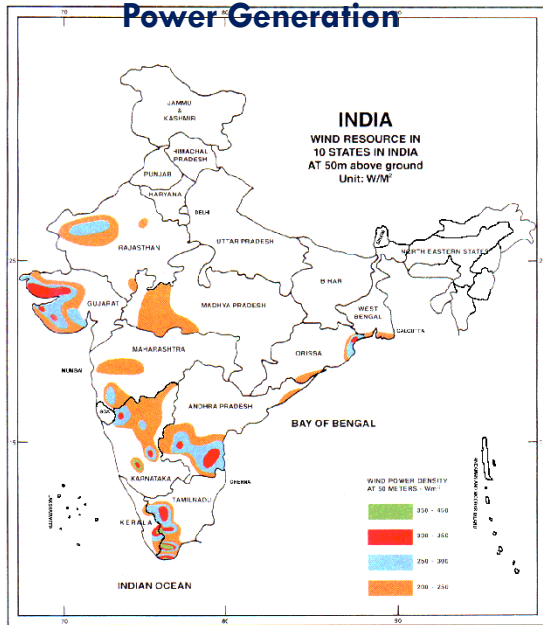
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Wind Power Economics

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Location Map for Ideal Wind



Map not strictly according to scale

Wind Power Capacity

Tamil Nadu	4900 MW
Maharashtra	2077 MW
Gujarat	1863 MW
Rajasthan	1088 MW
Karnataka	1472 MW
Madhya Pradesh	230 MW

**India's wind potential is
~65 GW**

Power Plant Economics

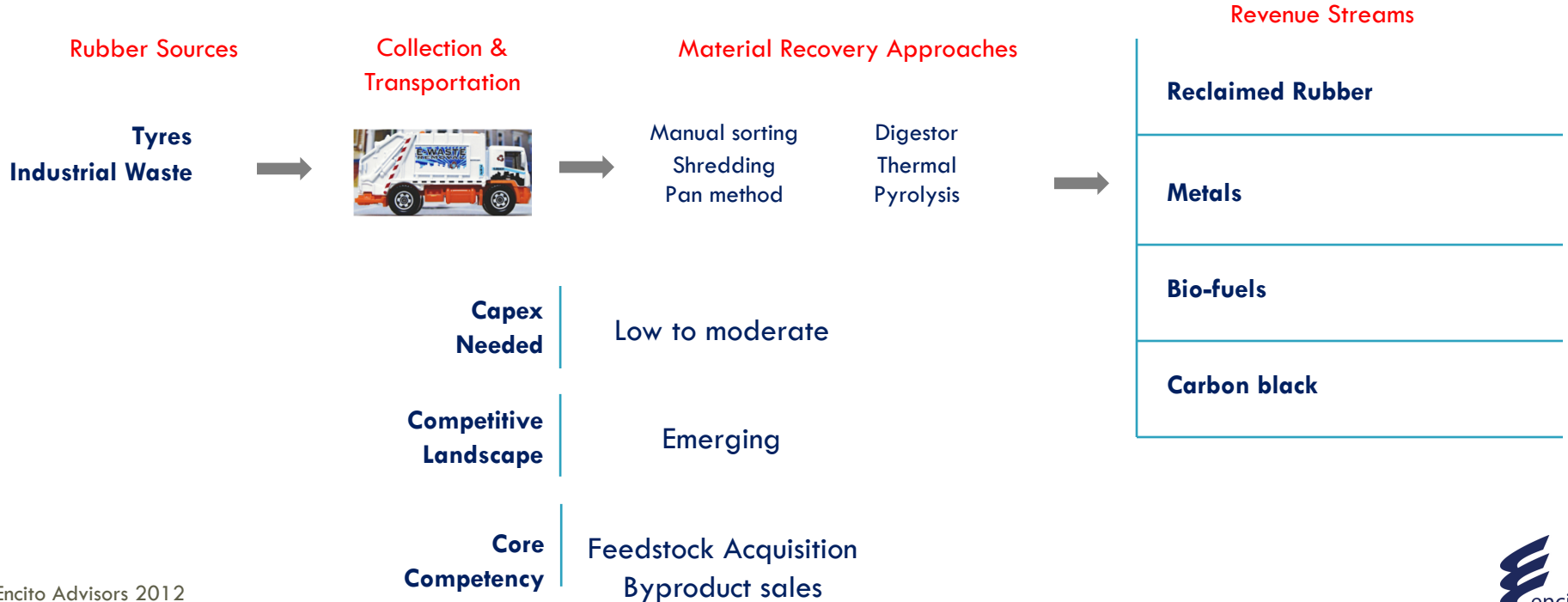
Size	100 MW+
Capex	₹ 4.5 cr – ₹ 6.5 cr / MW
Return	15 – 20%
Benefits	Acc Dep or GBI, REC

Small Wind Economics

Size	10 KW+
Capex	₹ 100 - 125 / W
Return	TBD
Benefits	MNRE Subsidy

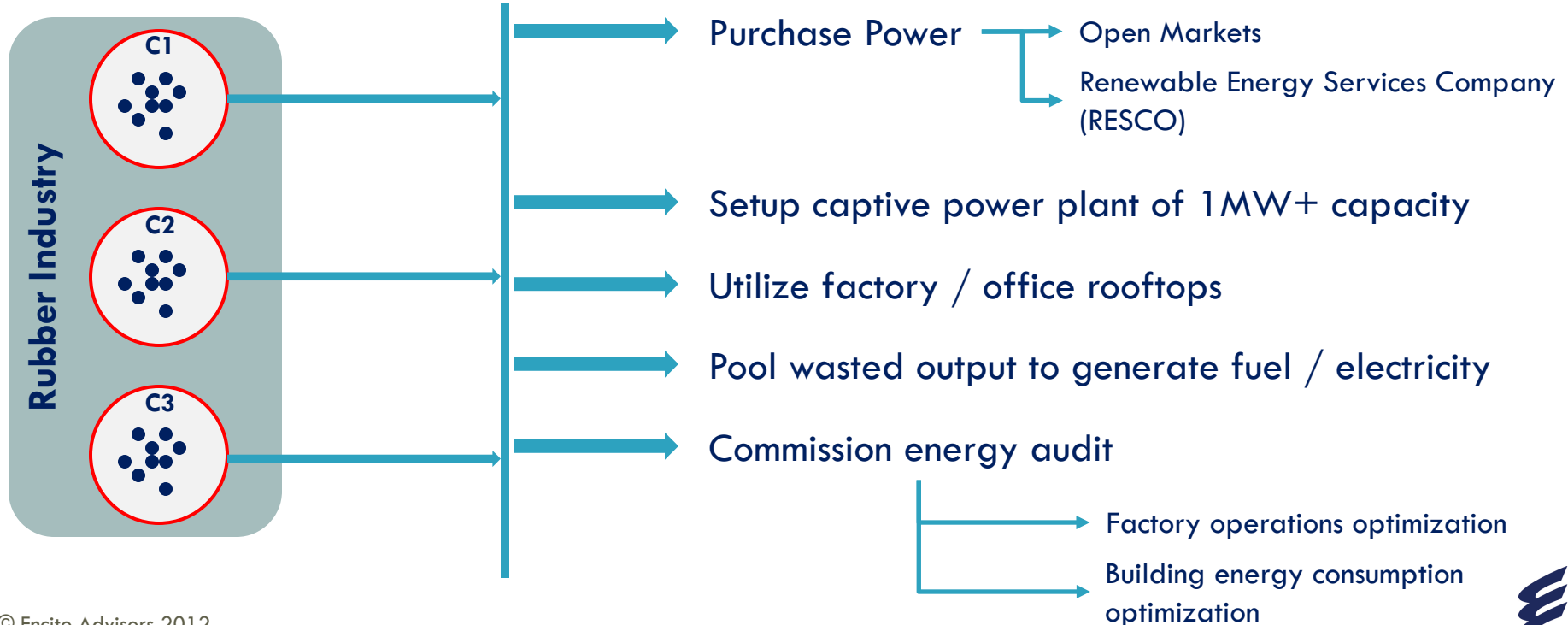
Rubber Recycling Value Chain

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Leveraging Industry Synergies - Clustering

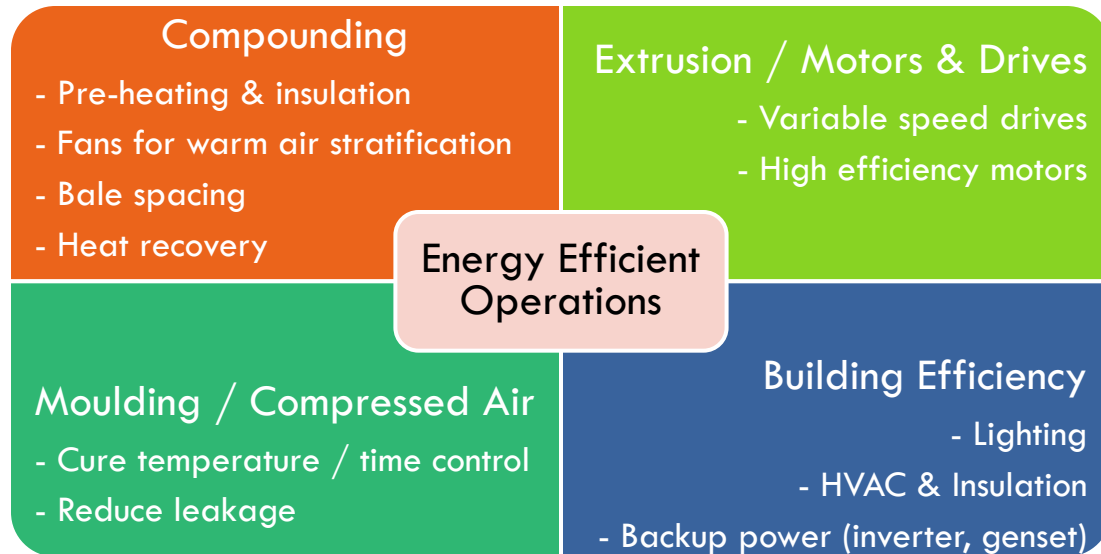
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Energy Efficiency – Tips & Recommendations

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“A watt saved is way more than a watt generated”



Summary of Actionable Measures

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	Solar	Wind	Recycling	Clustering	Energy Efficiency
Access to reliable power	✓	✓		✓	
Optimize Power Pricing	✓	✓		✓	
Reduce power wastage				✓	✓
Waste to energy			✓	✓	
Leverage synergies				✓	

References

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- ❑ Central Electricity Authority
- ❑ Central Statistics Office
- ❑ Central Electricity Regulatory Commission
- ❑ ICRA Limited
- ❑ Tangram Technology
- ❑ Ministry of New & Renewable Energy
- ❑ Encito Advisors Research
- ❑ DNA & Economic Times Newspapers

About Encito Advisors

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Encito Advisors

Strategic & Financial Advisory Services

Services

Mergers & Acquisitions, Private Equity Syndication,
Joint Ventures, and Strategic Advisory

Focus

Renewable Energy, Environment & Enabling Technologies

Expertise

Domain knowledge, international reach, process innovation

Location

Mumbai, India

Thank you ...



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