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# **Innovation in Renewable Energy Financing and R&D**

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# India: Already a hub of Innovation

# Matrix of Innovation

Examples	Market Development	capital Intensity	New Capability	B.thru Tech.	Leverage constraints	Work Processes	New Infra structure
Airtel	+	++	+		+	+	+
Tata Nano	++	+	+	+	+	+	+
Suzlon	++	+	++		++		++
EMRI	++	+	+		+	+	++
Param		+	+	++	++	+	+
Tuberculosis	+	+	++	++	+	+	
Reliance Fresh	+		+		+	+	++

# India already a front-runner in renewable energy

Source	Estimated Potential (in MW eq)	Achievements as on 30.9.09	Aim for 2017	Aim for 2022
Wind Power	48,500	10,528	35,000	45,000
Small Hydro Power (up to 25MW)	14,000	2,467	6,500	9,300
Biomass Power	16,700	797	1,500	2,500
Bagasse Cogeneration	5,000	1,165	3,400	4,100
Waste to Energy	3,800	63	600	1,100
Solar Energy	*	3	4,000	20,000
<b>Total</b>	<b>88,000 (excl. Solar)</b>	<b>15,023</b>	<b>51,000</b>	<b>82,000</b>

\* ~ 6,00,000 MW

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# Renewable Energy Financing Issues

- Renewable energy projects generally capital intensive and in most cases require cheaper capital to ensure project viability
- Long-term capital need to be secured for renewable energy IPPs
- Risks – Returns factors place limitations on the ability access funding at reasonable costs
  - Volatile stock of renewable energy companies in Indian stock exchange require high equity risk premium
  - Technology risk for new renewable energy technologies such as thin-film solar, geothermal etc is very high
  - Link between credit risk and policy risk
  - Foreign currency risk for overseas investors

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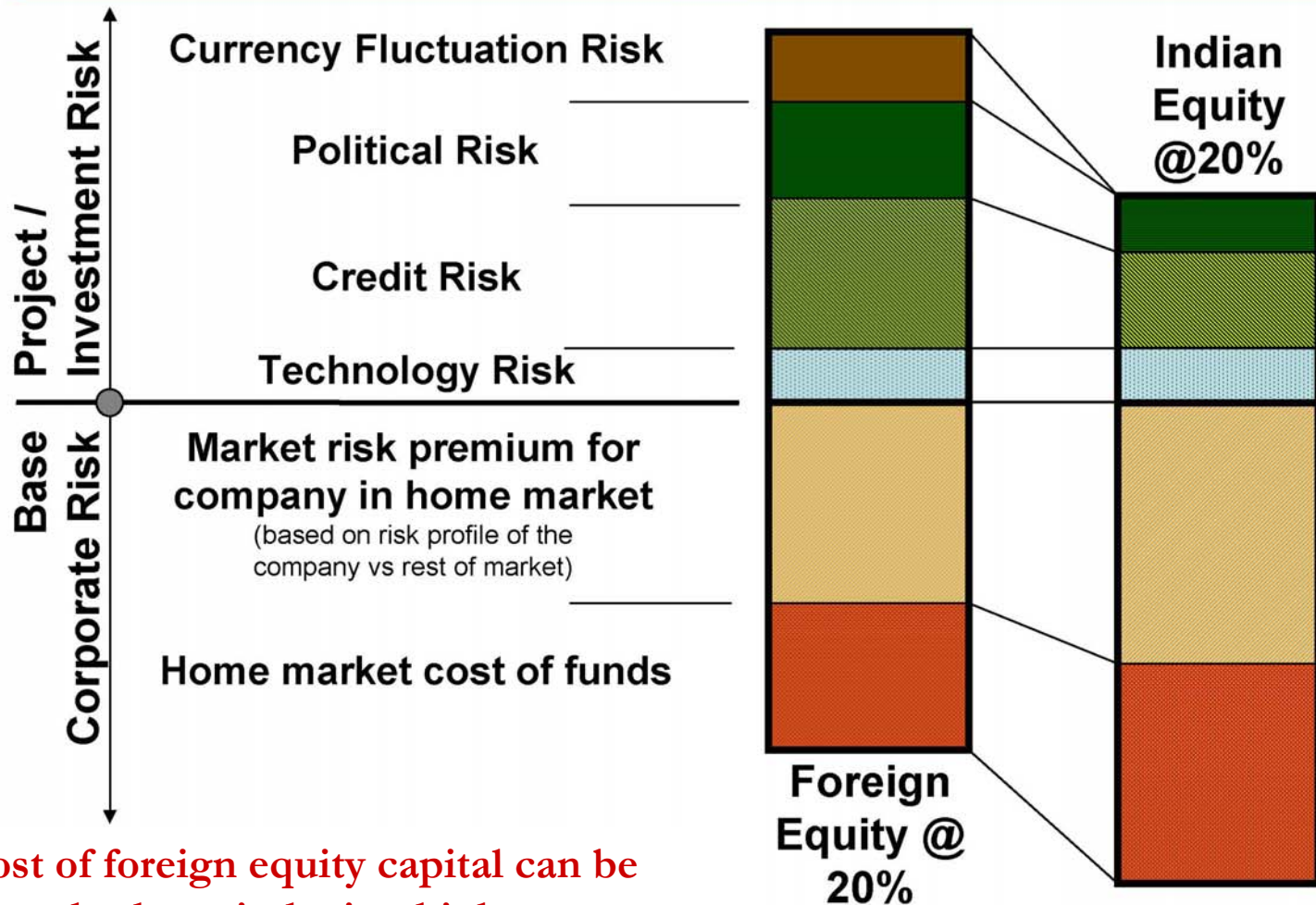
## Renewable Energy Financing Issues...conti

- Limited willingness of banks/FI to go for non-recourse financing
- For smaller renewable energy companies difficult to secure even full recourse funding
- Huge venture capital, angel investment needed for renewable energy start-ups
- Extremely difficult to help fund renewable energy projects through CERs cash flow due to uncertainty in global climate change negotiations

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# Innovative Financing

# Equity cost of capital – not created equal



Cost of foreign equity capital can be brought down inducing higher foreign investment, which will also reduce domestic cost of capital



# Innovative Financing Approaches

- Long-term investors need to be identified for renewable energy IPP projects e.g. Pension Funds, Infrastructure Funds
  - Strong pension fund sector in Australia could be a potential partner
- Strong escrow account structure need to be created that could secure revenue from Generation based Incentives, renewable energy certificates, CERs for cash-flow based financing
- Revenue generated through CERs/carbon credit can be kept in separate pool for foreign currency loan repayment
  - Upcoming Australian ETS can leverage Australian funding
- Government funding may need to be combined with various commercial funding for riskier projects (high technology risk)
  - Government fund can assume lower priority in repayment and assume risk

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# Research and Development



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## Priority R&D Areas

- 2<sup>nd</sup> generation and 3<sup>rd</sup> generation bio-fuels
- Thin-film solar cell
- Solar thermal
- Storage solutions
- Off-shore wind
- Hydrogen/Fuel cell
- Geothermal
- Tidal

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## R&D Approach

- Emphasis on consortia R&D projects rather than stand-alone R&D
  - These consortia R&D projects should involve strengths of both developed and developing countries
  - Should involve both private and public sector
  - Possible IPR conflict issues should be sorted out in advance
- Topic specific R&D and Technology Platform should be created as a network of relevant stakeholders to facilitate sharing of research ideas, information and latest technological development. E.g. European Wind Energy Technology Platform
- Private sector funding should be mobilised to the extent possible particularly for application oriented research. This will ensure commercial usability of products.

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**Thank you.**

