

Sustainable Development : Energy and Environment convergence

- Energy
 - World is running out of fossil fuel
 - The last two years has seen highest cost
 - Demand for energy is outstripping the growth in generation capacity

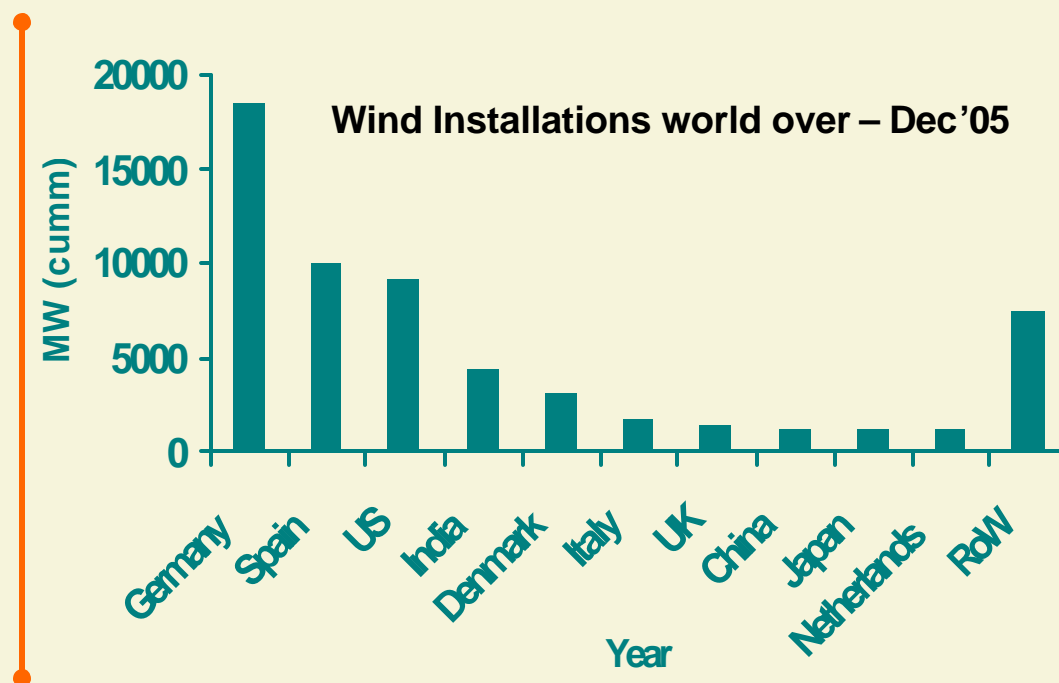
- Environmental problems
 - Air – Emissions (SO_x, NO_x, CO, SPM), ozone depletion & **global warming**
 - Water-Acid precipitation, degradation, loss of bio-diversity

- Sustainable development of **“Energy + Ecology + Economy”**

- Solution lies in harnessing renewable energy

Renewable Energy: Global Scenario

- 3,850,000 MW worldwide
 - 190,000 MW is grid connected RE
 - 59,000 MW of wind energy installations , i.e. 0.7% in energy terms
- 25,000 MW added last calendar year
 - About 48 % through wind energy alone
 - 11,407 MW in 2005








RE no longer a fringe player

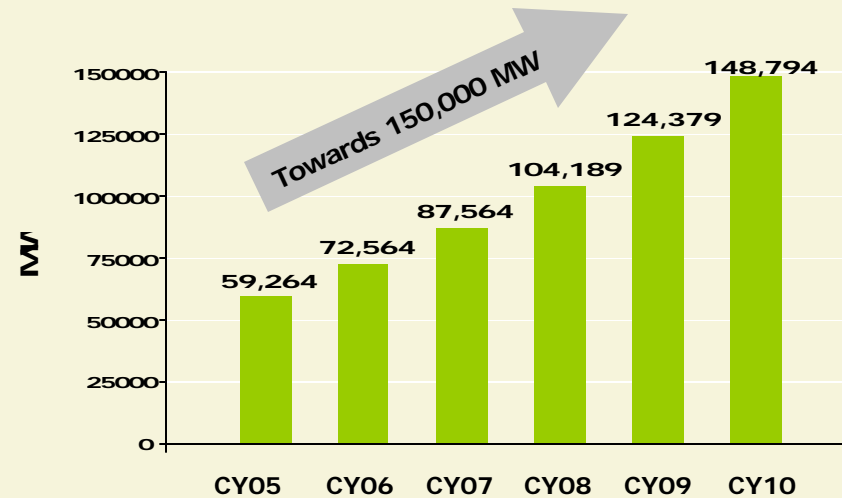
- Global RE market was valued more than US \$25 billion in the 2005 calendar year
 - Approximately 45% attributed to wind energy alone
- Several estimates put the Global RE market to grow to US\$100 billion by the year 2010
- Growth in the last 5 years was about 30%, the same is likely to continue in the coming years
- India : Generation from renewable energy surpassed 17,000 million units in '05-'06 , which is more than generation from nuclear energy

Global Wind Energy: Robust growth

Emerging key markets 2005 vs. 2010E

Country	Cumulative installation (MW)		CAGR (%)
	2005	2010 E	
 France	775	5,575	48
 China	1,264	7,764	44
 Portugal	1,087	4,687	34
 India	4,253	12,253	24
 USA	9,181	22,381	20

Forecast (2005-10) : Cumulative installations



Source : BTM Consult ApS World Market Update 2005

Key Growth Drivers for Wind Energy

Cost Competitiveness

- Cost per Kwh of wind generation decreased from US\$ 0.38 in early 80s to present US\$ 0.03-0.06, at excellent wind sites ⁽¹⁾
- Rising Oil & Gas prices makes Wind Energy cost competitive

Environmental Awareness/ Government Initiatives

- Kyoto Protocol Implementation - Carbon-dioxide emission to reduce by 5.2% of 1990s levels, by 2012
- Implementation of Renewable Portfolio Standard requires minimum percentage of power generation from Renewable Energy

Energy Security

- Price volatility of Oil & Gas have increased focus on Renewable Energy

Increased Electricity Demand

- Global Electricity Consumption expected to double between 2002 & 2030⁽²⁾
 - higher growth in India and China
- Wind Energy's contribution expected to increase from 0.2% in 2002 to 3% in 2030 ⁽³⁾

Source :

(1) American Wind Energy Association

(2) World Energy Outlook 2004, IEA

(3) World Energy Outlook 2004, IEA

Renewable targets & policies



- Renewables require support
- Many governments through public policy have fixed targets/goals
 - EU – 20% by 2020
 - India – 10% by 2012
 - China – 10% by 2020
- Various governments have implemented incentive schemes to stimulate the market to achieve these targets
 - Feed-in tariffs
 - Simplistic, transparent, popular & most successful*
 - Fiscal incentives including Production Tax Credit
 - Investment subsidies
 - Tendering & procurement
 - Market based mechanisms

Indian Energy Environment

Potential for Growth in Energy Consumption

- **India has been characterized by energy shortages**
 - Installed capacity of 124,287 MW, as of March 2006
 - Demand exceeded supply by 8.3% with peak shortage at 12.3% ⁽¹⁾
- **Strong growth potential for electricity consumption in India**
 - One of the lowest electricity consumption levels globally
 - Per capita electricity consumption of 355 kWh compared to 827 kWh in China, 1,878 kWh in Brazil and 12,331 kWh in the United States ⁽²⁾
- **“Power for All by 2012” vision by Indian Government to increase installed capacity to 200,000 MW**
 - Electricity Act 2003 stipulates minimum percentage of power generation from renewable energy
 - Government of India expects alternative energy sources such as wind energy to play an important role in bridging electricity deficit

Source

(1) *CEA*

(2) *United Nations*

Wind energy in India: Contributing to Economic Growth



- Steady annual growth in the past five years
 - Average growth rate of 24% on the manufacturing side from past 5 years can continue to grow subject to government support
 - Clearly an out-performer in the manufacturing & power sector : contributing to GDP growth rate
 - Major potential of further growth
 - Domestic market
 - Overseas (export) market
- Leading to energy security in the current parlance
- Indian companies started bagging substantial export orders from past few years from developed countries like US

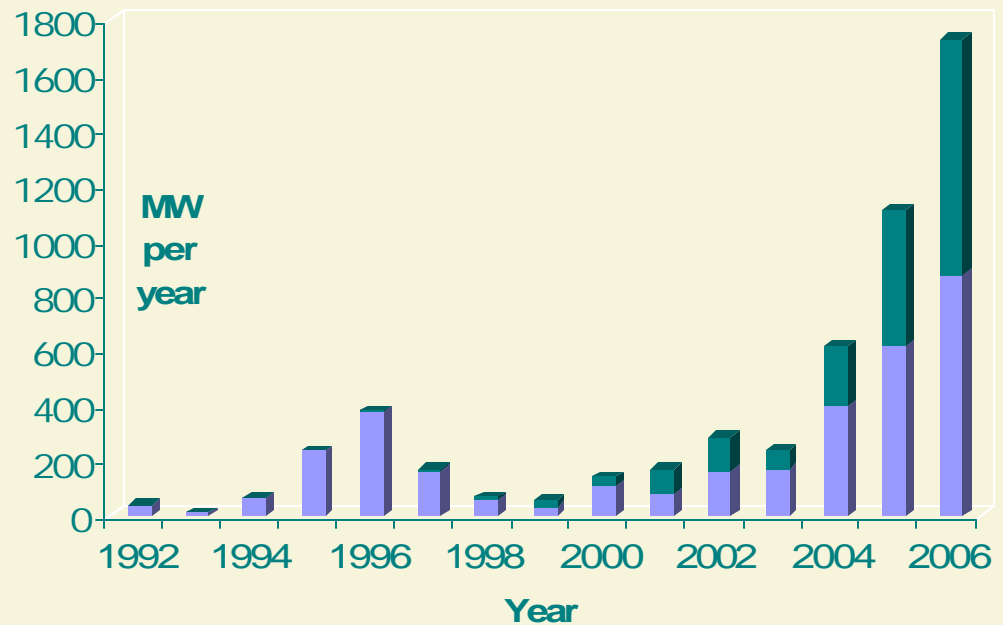
Status of section 86(i)e in India

- Mandates RPS framework by SERC

State	Status of RPS Regulation	Minimum Quantum
MP	Final Regulation	0.5% Wind
Karnataka	Final Regulation	5-10%
Orissa	Final Regulation	3% (Wind+Hydro)
Gujarat	Final Regulation	2%
Rajasthan	Order issued	6%
UP	Order issued	7.5%
AP	Final Regulation	5%
Tamil Nadu	Order issued	10%
Kerala	Final Regulation	5%
Maharashtra	Final Regulation	3-6%
West Bengal	Final Regulation	3.8%

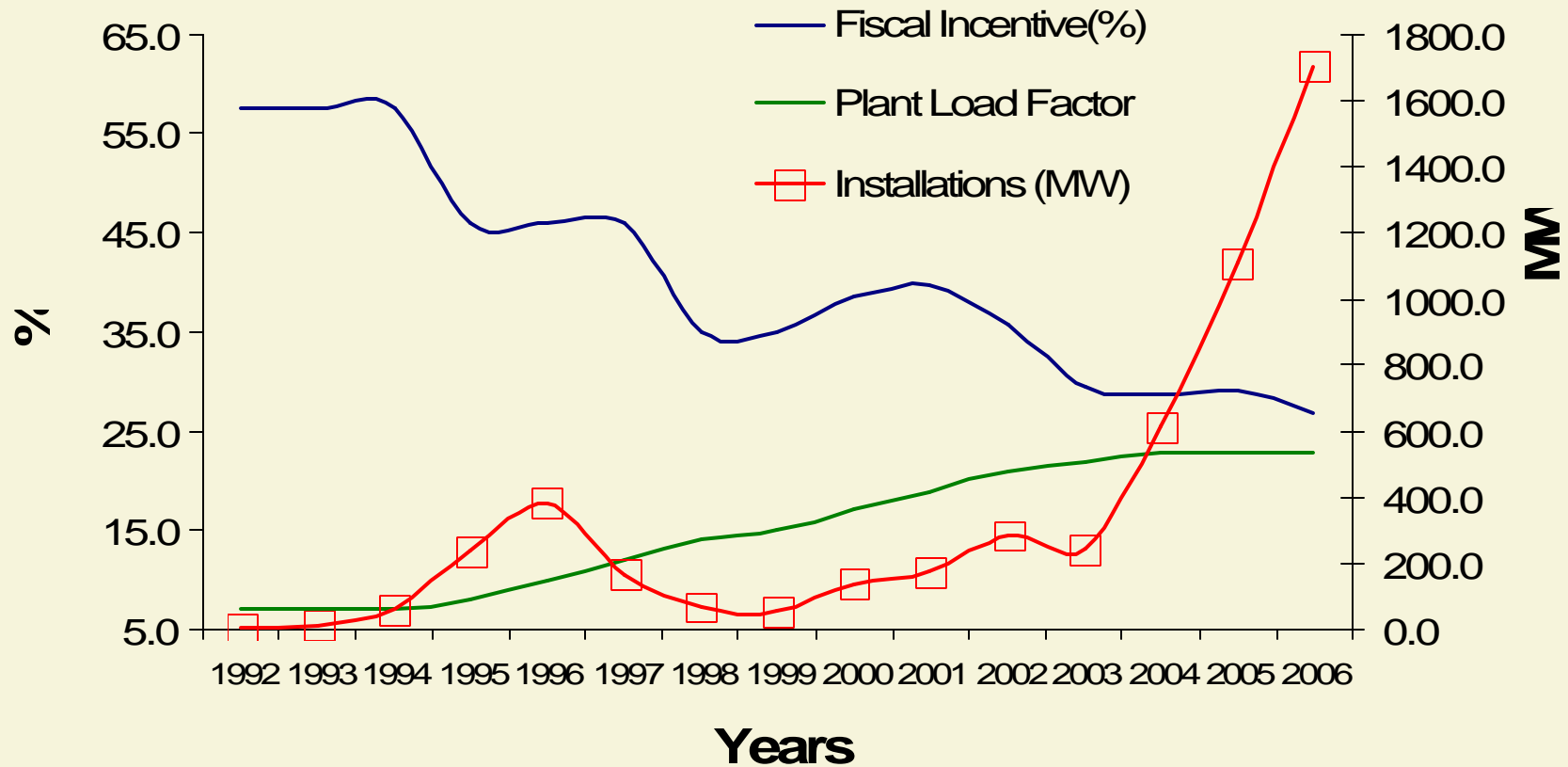
Wind energy in India : Perspective

- **Initiated by Government of India in mid-80's**
 - Private sector investments started in early '90s
 - Resource potential of 65,000 MW +
- **Installation >5,200 MW by March, 2006**
 - Fourth in the world
 - 1700 MW + in the FY 2006
 - High growth in the past 5 years



Impact of fiscal benefits

- There is a gradual move from “tax driven” market to “energy driven” market in India



Need for PTC

- The current policy framework is not amenable for direct FDI in wind energy investments
 - Requirement of Production Tax Credit (PTC) type of framework in India
- Planning Commission, in their document on “Integrated Energy Policy”, talks about ‘Transferrable Tax Credits’, for renewable energy projects

Sum-up



- Wind energy can go a long way to establish the energy security in India
 - More than 1,700 MW added in the last financial year – 98% by private sector
- Wind energy can easily meet 5% of total energy generation in India on the shorter run
 - Countries like Germany & Denmark have increased this share to as high as 20%
- Instruments like production tax credit and implementation of RPS would commercialise this source of energy in the near future



Thank you