Climate Change Technology Transfer and Capacity Building for adaptation and mitigation under the Paris Agreement: Experience of India

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SCIENCE POLICY DIALOGUE

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BANGKOK, THAILAND

APN ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

LoCARNet

Climate Change Asia

Global Scenario

- CO_2 in atmosphere: 401 ppm in 2014 from 298 ppm in 1901
- Global mean surface temp. increased by 0.89°C between 1901 & 2012
- Global mean sea level increased by 0.19 m between 1901 and 2010

Key Findings 5th Assessment Report (2014)

- Most of the growth from middle income countries like China and India
- Per capita emissions still low in most developing countries; lot more growth in emissions expected under business as usual
- To limit **increase in temperature to 2° C** relative to preindustrial level, GHG emissions at global level to be reduced by **40-70%** compared with 2010 by 2050 and near zero by 2100

Historical Emissions & Carbon Space

- Historical emissions since 1750s resulted in global temp. rise by 0.85° C

- **Cumulative historical emissions** in 2009 (1850 as base year):

USA	**29%**
Other Developed countries	**45%**
China	**10%**
Other Emerging Economies	**9%**
India	**3%**

- Limiting future climate change require substantial and sustained reductions in emissions

India: National Circumstances

- Extreme weather events and variation in rainfall patterns posing risks to agriculture
- Forest cover has increased steadily over time
- About 70% of rural households depend on fuelwood for cooking
- 29.5% of population below poverty line
- 33% households have no access to electricity
- 55% households with *kuccha* and *semi-pucca* houses
- Low per capita energy consumption

Projected impacts on India

- Increase in extreme rainfall events, mean and extreme precipitation during monsoon
- Changes in more than 1/3rd of forest area by 2100, mostly from one forest type to another
- Reduction in monsoon sorghum yield by 2 to 14% by 2020, with worsening yields by 2050 and 2080
- Reduction in wheat yields in Indo-Gangetic Plains
- Estimated countrywide agricultural loss (more than US$7 billion) in 2030; severely affect income of 10% population
- Extreme events are expected to be more catastrophic for east coast.

India's GHG profile over time

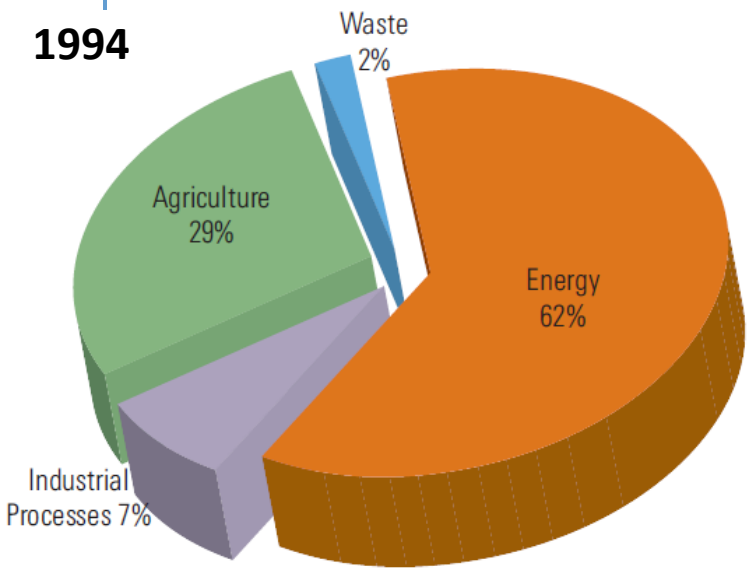
YEAR	1994		2000		2005*		2010	
SECTOR	Emission	Share	Emission	Share	Emission	Share	Emission	Share
ENERGY	7,43,820	62%	10,27,016	67%	12,10,384	69%	1,510,121	71%
INDUSTRIAL PROCESSES & PRODUCT USE	1,02,710	7%	88,608	6%	1,24,017	7%	171,503	8%
AGRICULTURE	3,44,485	29%	3,55,600	23%	3,60,313	21%	390,165	18%
LULUCF	14,292	-	-2,22,567	-	-2,78,721	-	-252,532	-
WASTE	23,233	2%	52,552	4%	62,638	4%	65,052	3%
TOTAL (Without LULUCF)	12,14,248		15,23,777		17,57,352		2,136,841	
TOTAL (Net emissions)	12,28,540		13,01,209		14,78,632		1,884,309	

Values in Gg CO2e; 1 Gg= 10^9g = 1000 t

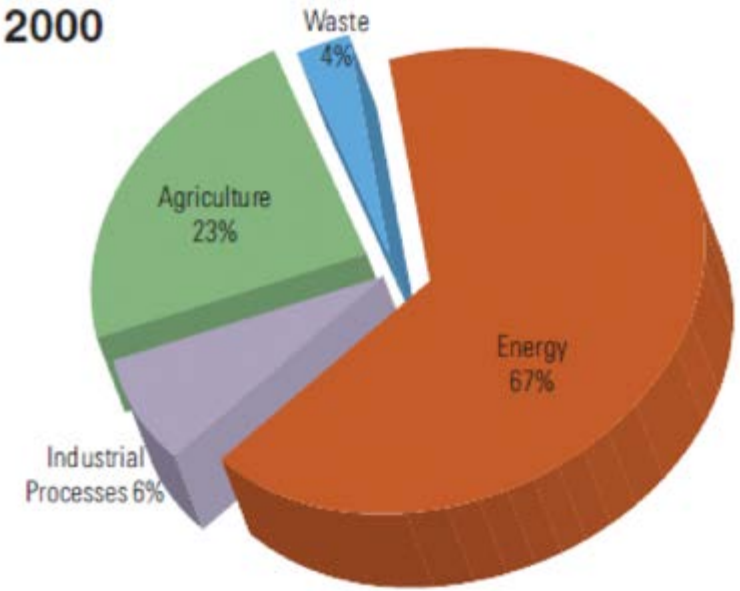
*projected figures

India's GHG Emissions Sector-Wise

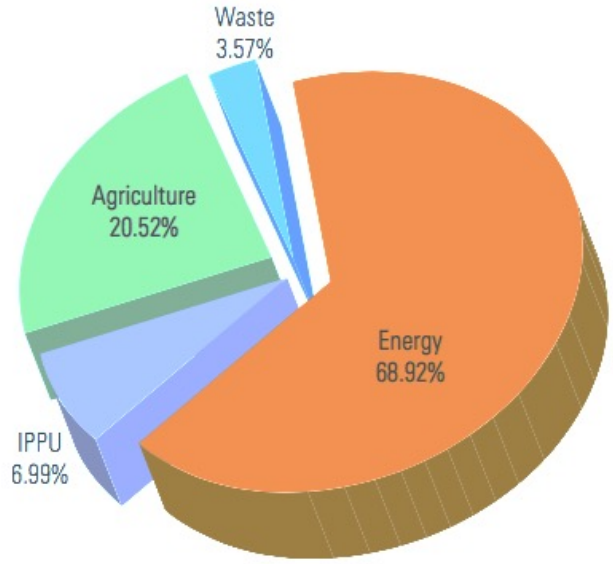
1994



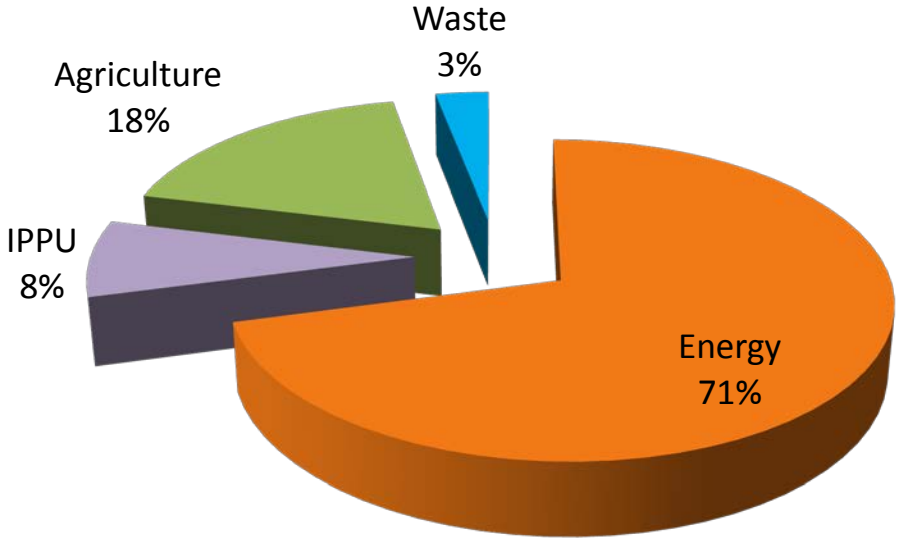
2000



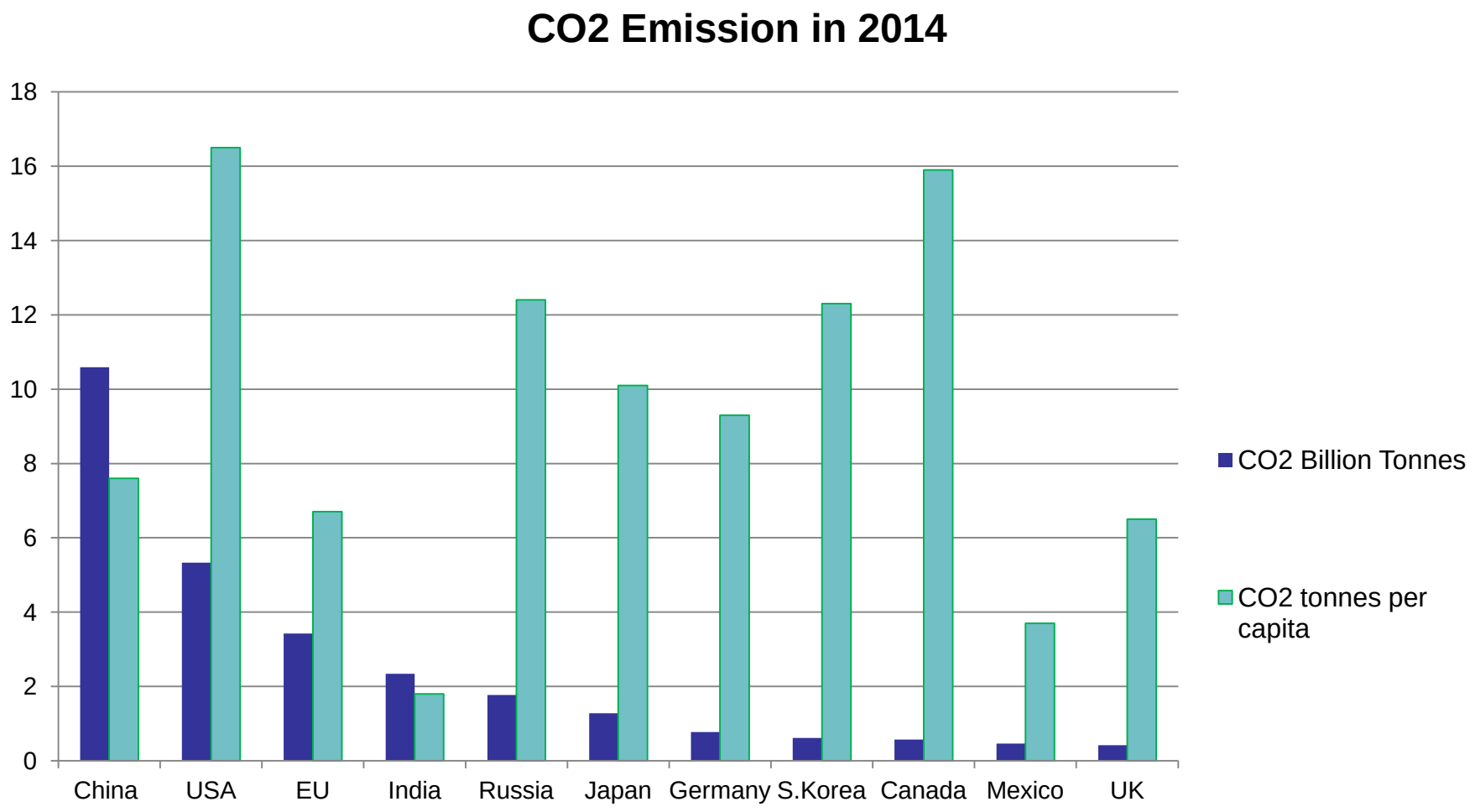
2005



2010



Emissions of Some Major Economies



Data Source: Trends in Global CO2 Emissions 2015 Report. PBL Netherlands Environmental Assessment Agency

Per capita GHG emissions (tonnes CO_2e)

	1994	2000	2010
US	21.43	22.54	18.92
Brazil	9.53	11.96	7.10
Russia	14.83	11.24	11.53
China	2.91	4.32	9.35
India	1.31	1.25	1.56
South Africa	8.91	9.48	10.07

Mitigation Actions

Voluntary pledge-

India will endeavor to reduce the emissions intensity of its GDP by 20-25% by 2020 compared with the 2005 level; emissions from the agriculture sector would not form part of the assessment of emissions intensity.

INDC-

To reduce the emissions intensity of GDP by 33-35% by 2030 from 2005 level.

12% reduction in emission intensity has been achieved between 2005 and 2010.

India's INDCs

- Comprehensive, includes Adaptation, Mitigation, Finance requirement, Technology transfer, Capacity Building
- Considers rapid growth till 2030
- 1.5 billion population, with 40% living in urban areas
- Incorporates development priorities such as:
  - Electricity for all
  - Housing for all
  - Poverty eradication
  - Infrastructure for Education & Health for all
  - Make in India
  - Infrastructure development

Reduce Emission Intensity of GDP

- Goal: ***To Reduce the emissions intensity of its GDP***

  By 33 - 35% by 2030 from 2005 level.

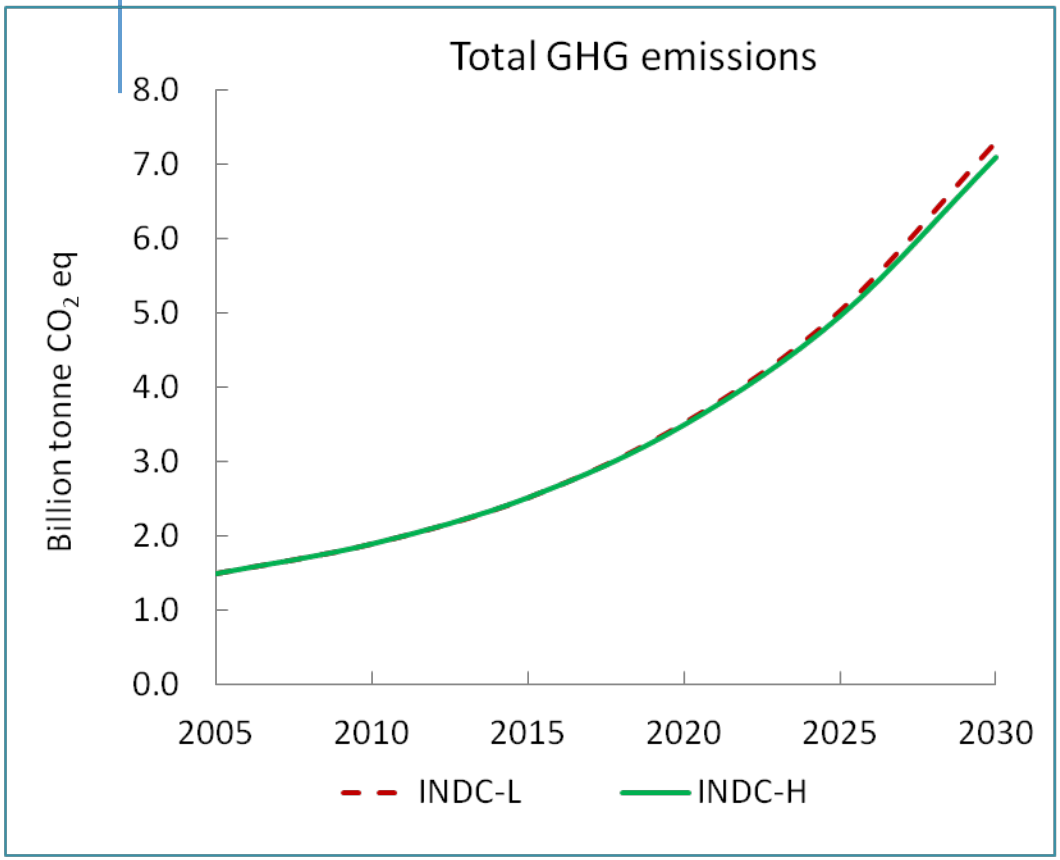
  75% jump in ambition over 2020

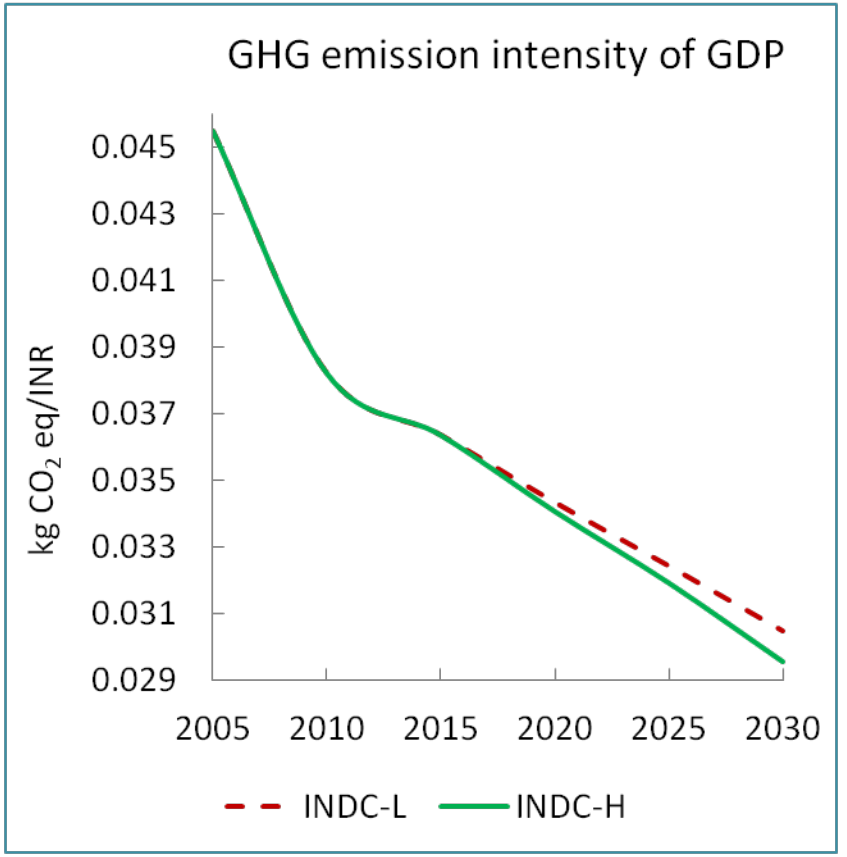
- **Avoided emissions:**

  3.59 billion tonne of CO_2 equivalent over BAU

  - Thrust on Renewable Energy and Promotion of Clean Energy; Enhancing Energy Efficiency
  - Climate Resilient Urban Centres and Sustainable Green transportation Network
  - Swachh Bharat Mission, Cleaning of rivers, Zero Effect Zero Defect, Make in India

Total GHG Emission and GHG Emission Intensity





	Total GHG emissions (Billion Tonne CO_2 eq)		GHG Emission Intensity reduction in 2030 from 2005 level
	2005	2030	
INDC-L	1.48	7.30	33%
INDC-H	1.48	7.08	35%

Adaptation

- Goal:

To better adapt to climate change by enhancing investments in development programme in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management

- High vulnerability of India to climate change impacts due to poverty & dependence of a large population on climate sensitive sectors for livelihood

Adaptation

- Strategies and initiatives include actions in agriculture, water, health, coastal region & islands, disaster management, protecting biodiversity and Himalayan ecosystem and securing rural livelihood

- New missions on Health and Coastal Areas

- National Adaptation Fund set up [INR 350 Crores] (USD 55.6 million)

Mobilizing Finance

- Goal:

To Mobilize Domestic and New & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.

- USD 2.5 trillion (at 2014-15 prices) required for meeting India's climate change actions between now and 2030 as per preliminary estimates

- Ratio of emission avoided per dollar invested & economic growth attained would be relatively more favourable in case of investments made in India

Financial needs

- Adaptation related public spending was of the order of 12% of budget in 2013-14 (~2% of GDP)

- Around USD 90 billion will be needed for solar capacity addition to meet enhanced targets in renewable energy

- About USD 21 billion will be required to upgrade the grid infrastructure to support absorption of increased renewables up to 2022.

Technology Development &Transfer

- Goal:

To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

- Critical technologies need to be facilitated via GCF
- Global collaboration in R&D
- Preliminary and illustrative list of select technologies given in India's INDC

Government's Initiatives

- National Action Plan on Climate Change- 8 missions
- State Action Plan on Climate Change

Energy sector:

- Increased target of renewable energy capacity to 175,000 MW till 2022
- Renewable Energy Certificate (REC) to promote renewable energy and facilitate Renewable Purchase Obligations (RPOs)
- National Clean Energy Fund by imposing a cess on coal (Rs. 400/ metric tonne)
- Perform Achieve Trade (PAT)
- Clean Coal Technology Initiatives
- Super Efficient Equipment Programme

Government's Initiatives…..contd.

- Promotion of Supercritical coal technology and Advanced USC Technology
- Renovation, Modernization and Life Extension of old power stations
- Civil nuclear power programme

Building, Transport and Waste Sectors

- Energy Conservation Building Code (ECBC)
- National Programme for LED based home and street lighting
- National Mission on Electric Mobility
- Corporate Average Fuel Consumption (CAFE) standards for cars
- New Metro rail networks
- Swachh Bharat (Clean India) Mission

Initiatives

Adaptation Strategies

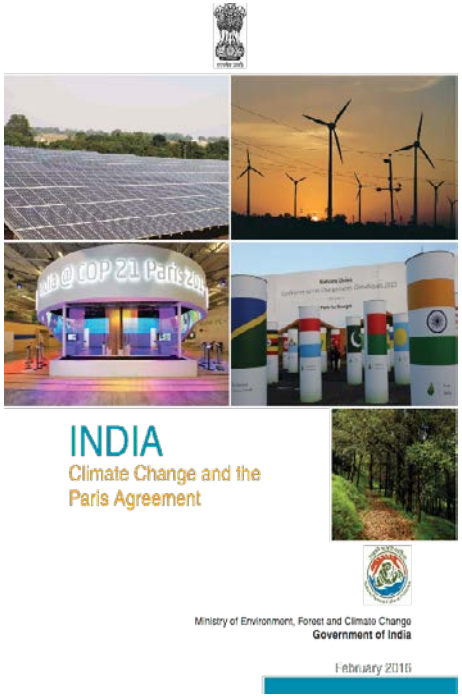
- Paramparagat Krishi Vikas Yojana - organic farming
- Pradhan Mantri Krishi Sinchayee Yojana - efficient irrigation
- Neeranchal - watershed development
- Namami Gange
- National Initiative on Climate Resilient Agriculture (NICRA)
- Bureau for Water Use Efficiency
- Lifestyle & culture of sustainability

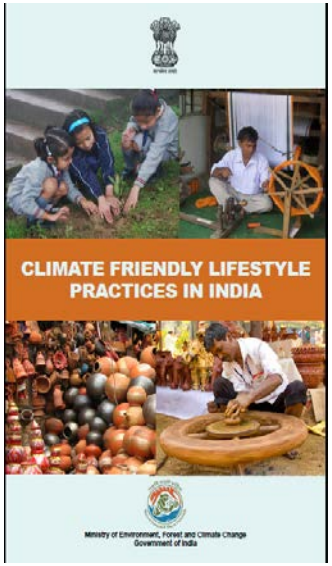
Initiatives

Climate Finance Policies

- National Adaptation Fund
- Reduction in fossil fuel subsidies
- Coal Cess increased from Rs 50 to Rs 400 per ton
- Tax free infrastructure bonds for renewable energy

Other initiatives





Books on 'Parampara' (COP21) and **'Low Carbon Lifestyle- Right Choices for our Planet' (COP22) released**

Do not let the lifestyles of the rich world deny the dreams of the rest

OPINION

Narendra Modi

In the next few days in Paris, the world will decide the fate of our planet. I hope the climate conference that begins there today will produce an agreement that restores the balance between ecology and economy – between our inheritance and our obligations to the future.

The conference will also, I hope, reflect a collective global commitment balancing responsibilities and capabilities on one hand with aspirations and needs on the other. It should recognise that, while some face a choice between lifestyles and technologies, others stand between deprivation and hope.

Paris should recognise that some face a choice between technologies but others stand between deprivation and hope

Conclusion

- Technology development transfer: slow progress
- Affordable cost, private entities, IPR issues
- Dual use, international regulations
- Obsolete tech
- Technology needs assessment
- Key Category analysis
- India : Technology Vision 2035
- Clean coal technologies, renewable energy, transport, energy efficiency in industries
- International Solar Alliance

Conclusion

- Capacity Building : Continuous process
- Proper training and upgrading skills across sectors
- National and States level programs needed
- International mechanisms should support thematic knowledge networks, training in different aspects of RE, etc
- Estimated 2.5% of the Govt’s salary budget reqd

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