VIABLE DEVELOPMENT OF NEW AND RENEWABLE ENERGY GENERATION

TO CONTROL CARBON EMISSIONS FROM POWER PLANTS IN INDIA

PRESENTED BY,

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INTRODUCTION

- India – 12th largest (Economy) – 2nd largest (Population)
- 2nd fastest growing economy in the world.
- Exponential growth in electricity demand anticipated .

- Electricity production needs to satisfy the growing demands of this huge population.

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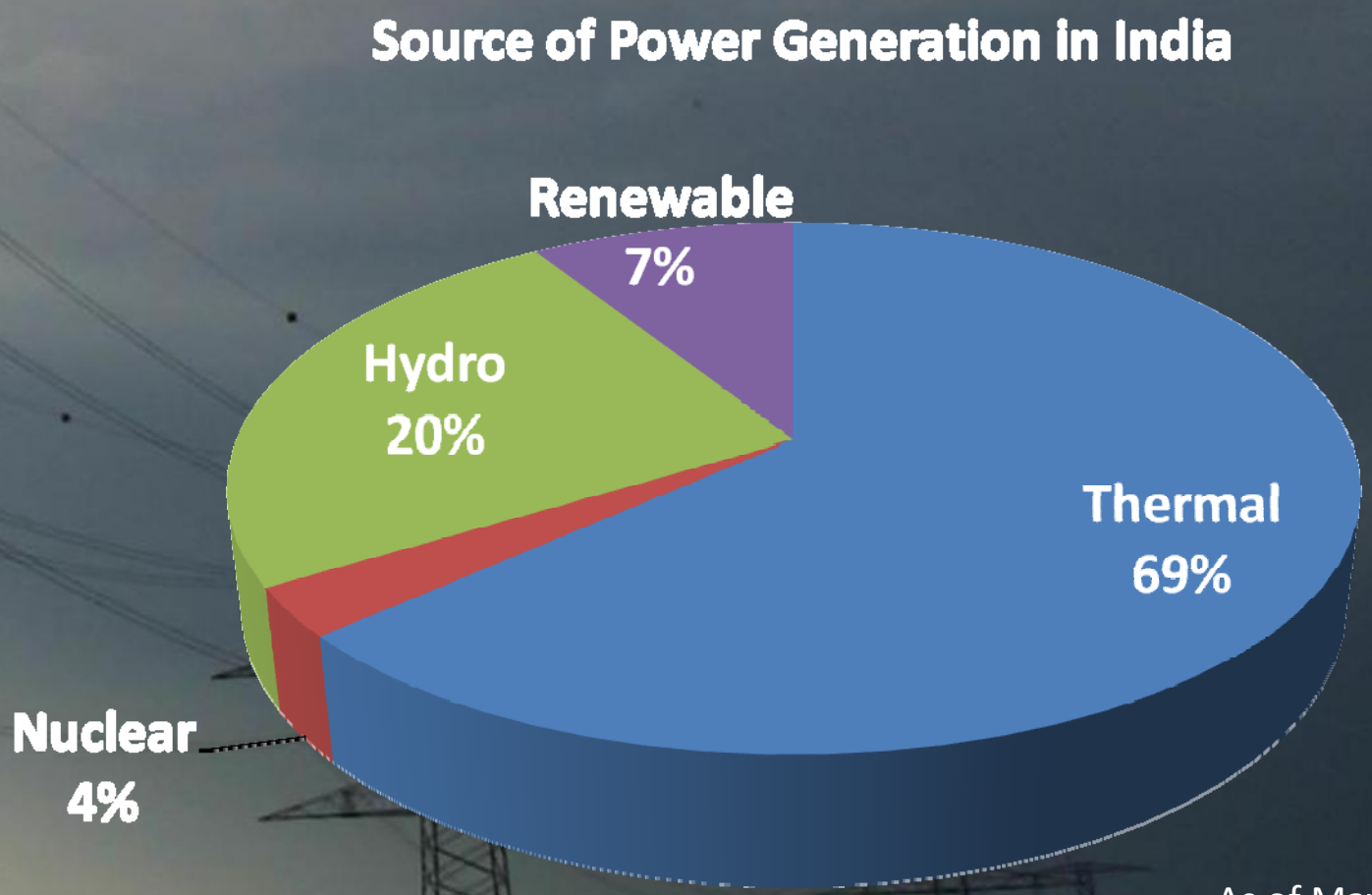
PRESENT SCENARIO



As of May, 2009

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PRESENT SCENARIO

- Carbon emissions from India is *1510* million tones (2009)
- Power sector contributes to *one-third* of these emissions
- Thermal Power plants ⟶ *500* million tones of CO_2 (>1.5% of world emissions)
- If present model of development adopted then by 2020,

  Indian Power Sector ⟶ *1.1* billion tones of CO_2

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ELECTRICITY SOURCE ALLOCATION MODEL (ESAM)

- ESAM – To determine means of meeting electricity demand in 2020
- To meet the requisite demand,15 energy sources were envisaged
- Linear programming technique used with Cost as minimization factor
- Constraints used were
  - ✓ Demand to be met (1)
  - ✓ Potential of the energy source (15)
  - ✓ Employment generation (2)
  - ✓ Carbon credit (1)

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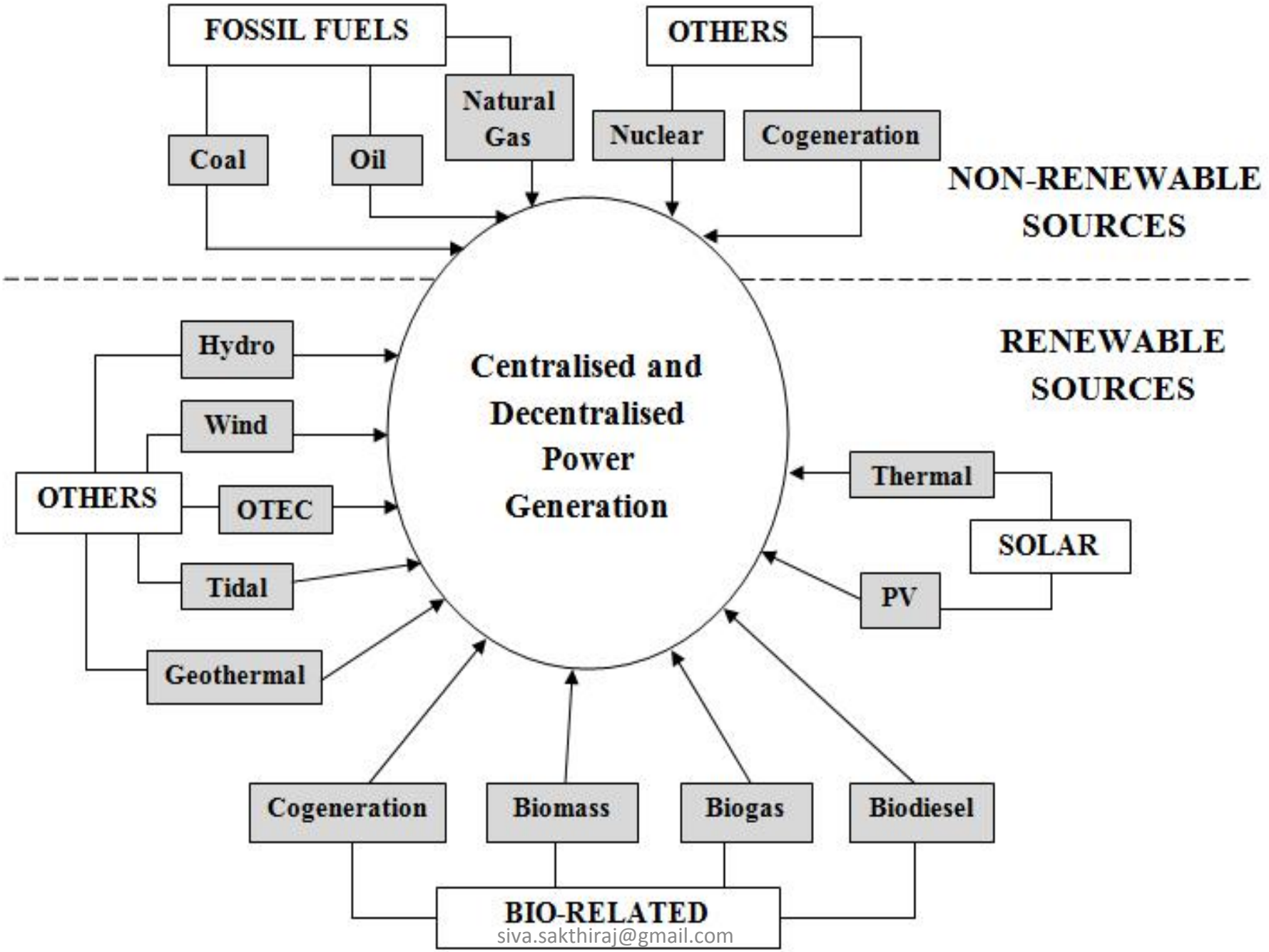

ESAM – Mathematical Representation

$$Minimize \quad Z = \sum_{i=1}^{l} C_i X_i$$

Subject to constraints

Demand $$\sum_{i=1}^{l} X_i \geq D$$

Potential $$X_i \leq P_i$$

Minimum Employment $$\sum_{i=1}^{l} E_i X_i \geq E_{\min}$$

Maximum Employment $$\sum_{i=1}^{l} E_i X_i \leq E_{\max}$$

Carbon Credit $$\sum_{i=1}^{l} F_i X_i \geq CC$$

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RESULTS FROM ESAM

SOURCE	CONTRIBUTION (billion kWh)	CONTRIBUTION (percentage)
NON – RENEWABLE SOURCES	376.19	46 %
Coal	164.62	20 %
Nuclear	211.57	26 %
RENEWABLE SOURCES	441.75	54 %
Hydro	215.04	26.5 %
Wind	22.40	3 %
Biodiesel	50.67	6 %
Biomass	45.52	5.5 %
Biogas	14.11	2 %
Cogeneration	33.60	4 %
Geothermal	51.07	6 %
Tidal	9.34	1 %

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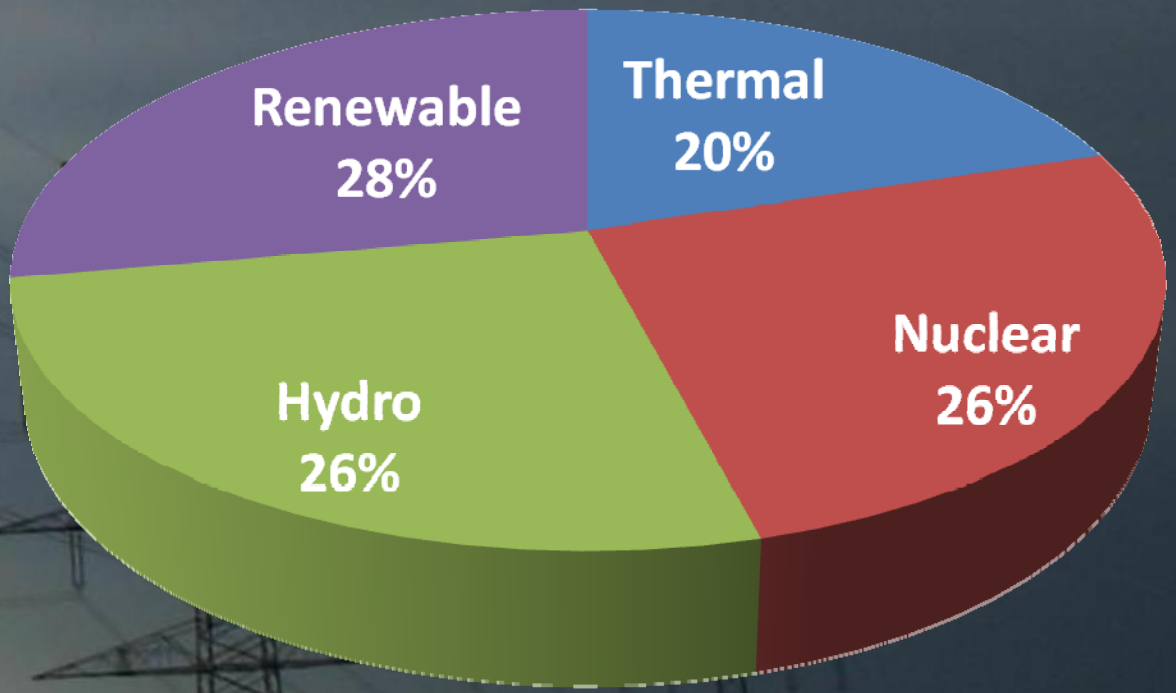
PREDICTED FIGURES



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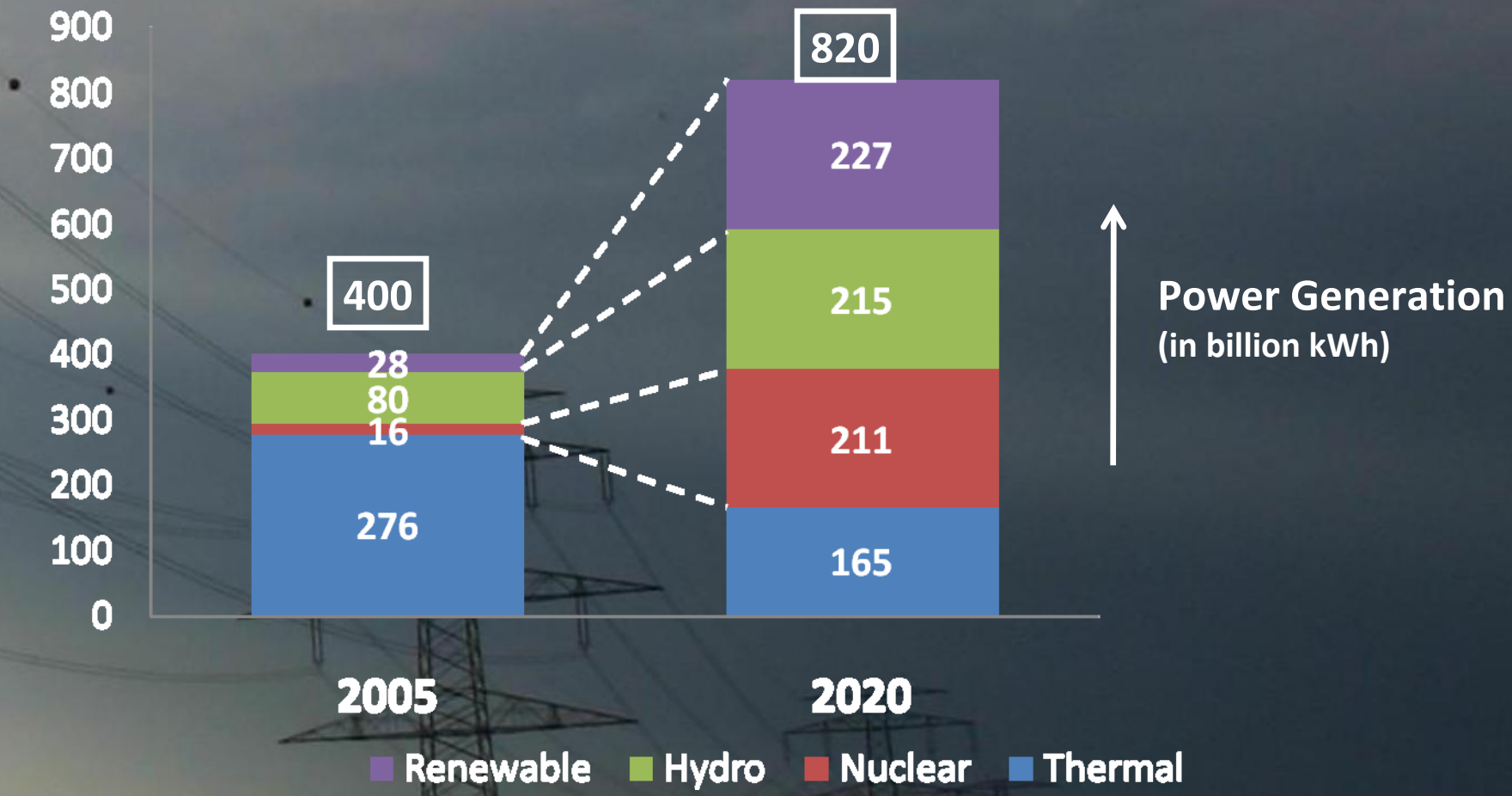
COMPARISON



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WAY FORWARD

- Expansion of thermal power plants can be controlled by adopting renewable energy systems.
- Use of clean coal technologies (CCT) need to be encouraged.
- Policy makers need to join together with technologists to promote renewable energy generation.
- Potential of Waste to energy projects need to be tapped.

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ENERGY FROM WASTE

Potential of power generation

Urban and Municipal Wastes	:	1700 MW
Industrial Wastes (Dairy, Distillery, Tannery, Pulp & Paper and Food Processing Industries)	:	1000 MW
TOTAL	:	2700 MW

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SECTOR-WISE POTENTIAL

- Municipal solid waste : 1457 MW
- Municipal liquid waste : 226 MW
- Dairy waste : 49 MW
- Distilleries : 402 MW
- Sugar industry : 290 MW
- Pulp & paper industry : 46 MW
- Starch industry : 103 MW
- Poultry forms : 52 MW
- Slaughter houses : 75 MW
- Tannery waste : 5 MW

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PROJECT FOR GENERATION OF 5 MW POWER FROM MUNICIPAL SOLID WASTE

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MUNICIPAL SOLID WASTE PELLETIZATION PLANT

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ANAEROBIC BIOREACTOR FOR BIOMETHANIZATION OF WET LIMED FLESHING AND CETP SLUDGE

3 Tons Fleshing, 2 Tons sludge , 100- 200 m^3Biogas / Day

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1.25 MW BIOMETHANIZATION PLANT FOR PAPER MILL EFFLUENT

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CONCLUSION

- Promotion of Renewable Energy Systems will minimize the GHG emissions
- Also, they will avail benefits of Clean Development Mechanism (CDM)
- Energy Policies need to be evaluated on the basis of Green Energy Generation & Sustainable Development
- Reduction in carbon emissions from power generation will help reduce India's carbon footprint

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THANK YOU

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