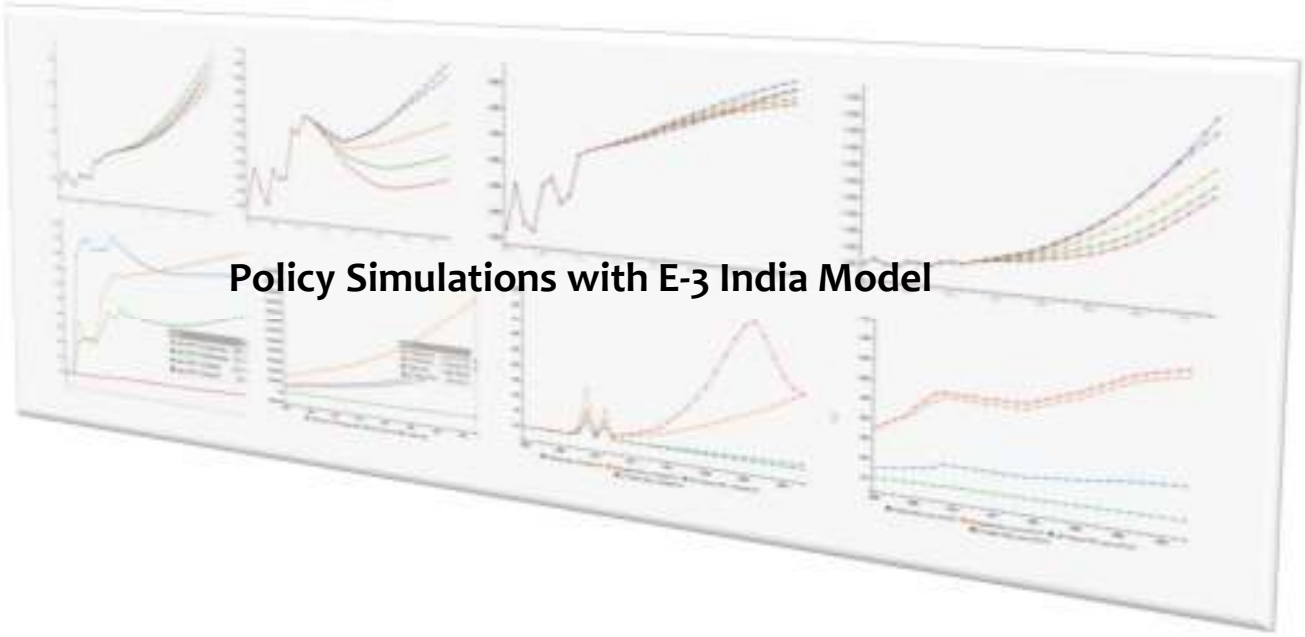
25th IIOC, Atlantic City, USA

Double dividend strategy for clean development: Allocating consumption based environmental responsibility of coal production amongst Indian states



Presenter

Surabhi Joshi

RAP® | Energy solutions for a changing world

Indian Energy Scenario

- India needs to carter growing energy needs of more than 1.3 billion sustainably
- Power generation in India is predominantly coal based (60.1 %)
- Ratification to UNFCCC's Paris Agreement has been done relying on emerging decrease in renewable energy technology costs
- India targets to add 175 GW grid connected renewables by 2022
- National Energy Policy (NEP, 2016) proposes an initiative towards greater contributions of renewables in the Indian energy mix 58.4 % by 2027

The Indian Predicament

- Coal is expected to remain a major sector in Indian economy as it shares strong linkages with other major sectors in the economy
- The existing coal reserves overlap dense forest reserves and opening coal blocks has greater environmental impacts
- Major coal bearing states of India are characterized by low economic growth and poor development trajectory.
- Quality of life of the population in the states is compromised due to huge environmental burden of coal mining process.
- The coal phase out needs to be coupled with systematic incentives for structural change into coal bearing states
- Overall efficiency improvement in production processes across states would need to critically hem in for moving towards clean developmental pathway

Allocating Consumption based Environmental responsibility

High GDP High Emission States

- Gujarat
- Haryana
- Madhya Pradesh
- Rajasthan
- Uttar Pradesh

(estimated in terms of Carbon emission (Th Ton) / capita consumption (M INR))

Coal Bearing States

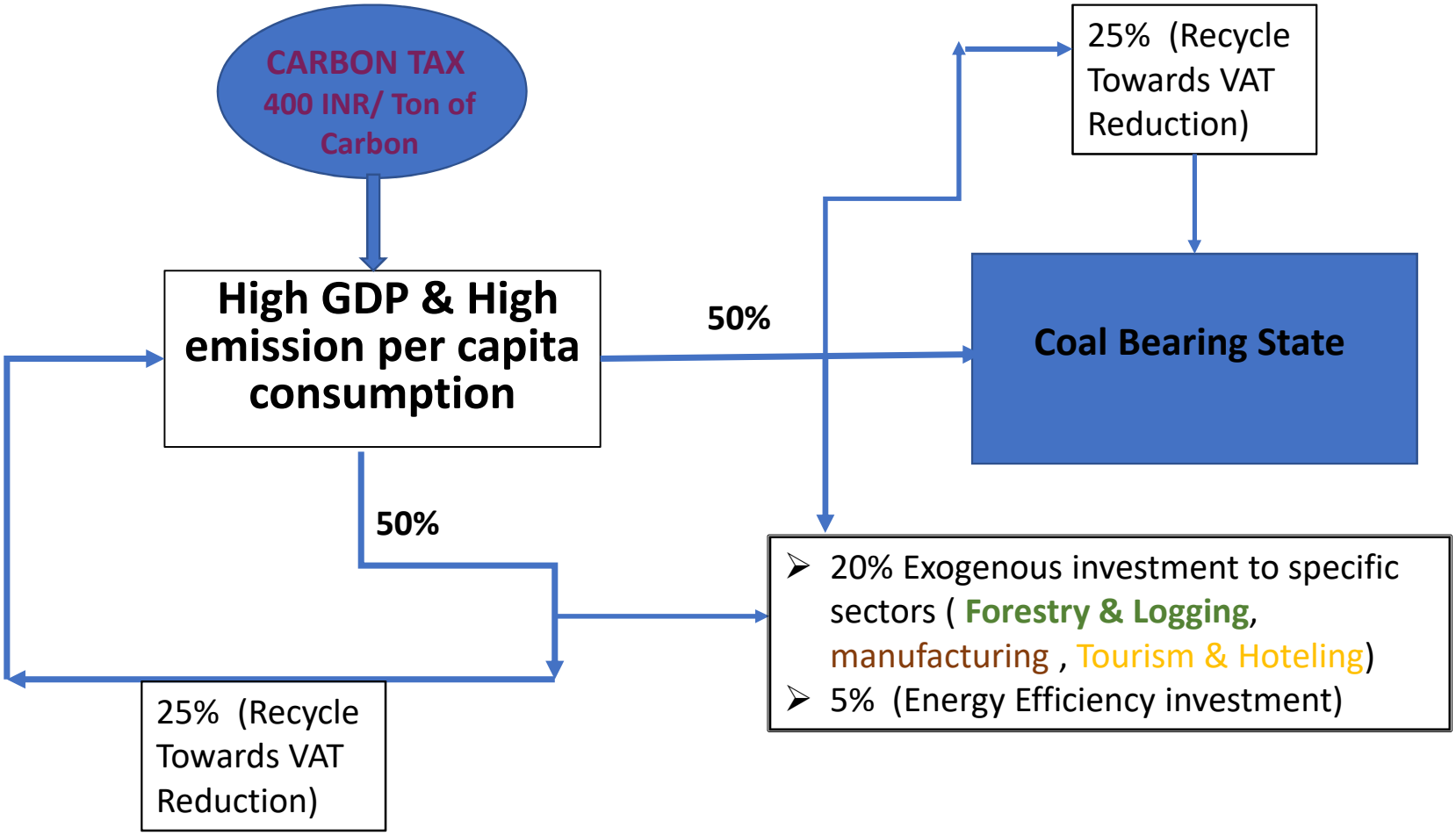
- Chhattisgarh
- Jharkhand
- Madhya Pradesh
- Orissa
- West Bengal

(88.8% of total coal reserve)

Coal Bearing States

High GDP High Emission States

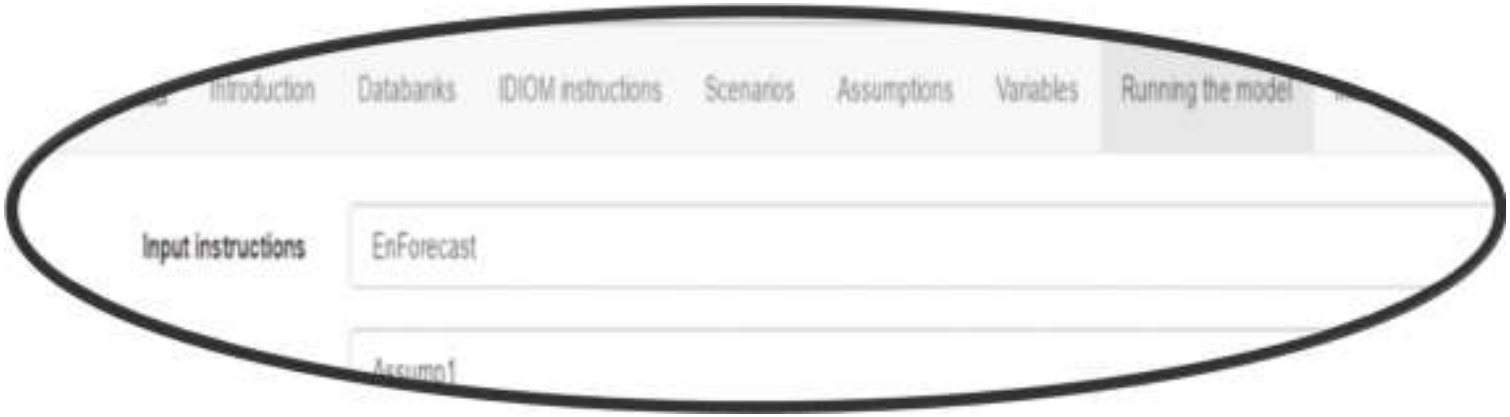
Designing an intervention



SCENARIO SUMMARY

	Carbon Tax of INR 400 on HGHE	CBS Coal/Energy Efficiency	CBS VAT HH	CBS Exogenous Investment in sector	HGHE Coal/Energy Efficiency	CBS VAT	HGHE Exogenous Investment
Scenario1		5%	25%	20% (Forestry)	5%	25%	20% (Forestry)
Scenario2		5%	25%	20% (Manufacturing)	5%	25%	20% (Manufacturing)
Scenario3		5%	25%	20% (Trade & Hotels)	5%	25%	20% (Trade & Hotels)

E3 India Model :Tool Components



IDIOM Instructions	Scenarios	Assumptions	Variables (over 140)
Model Text File Inputs	Model Policy Inputs	Model Exogenous Assumptions	Output Variables
Editable .idiom text files			preloaded

Impact Simulation
New Policy Interventions

Designing a balanced Policy which reduces the carbon intensity across the growth path but also leads to better developmental outcome

Output Variable : RGDP, REMP, RCO_2, RFU, RSC

Scenario Edited Inputs :

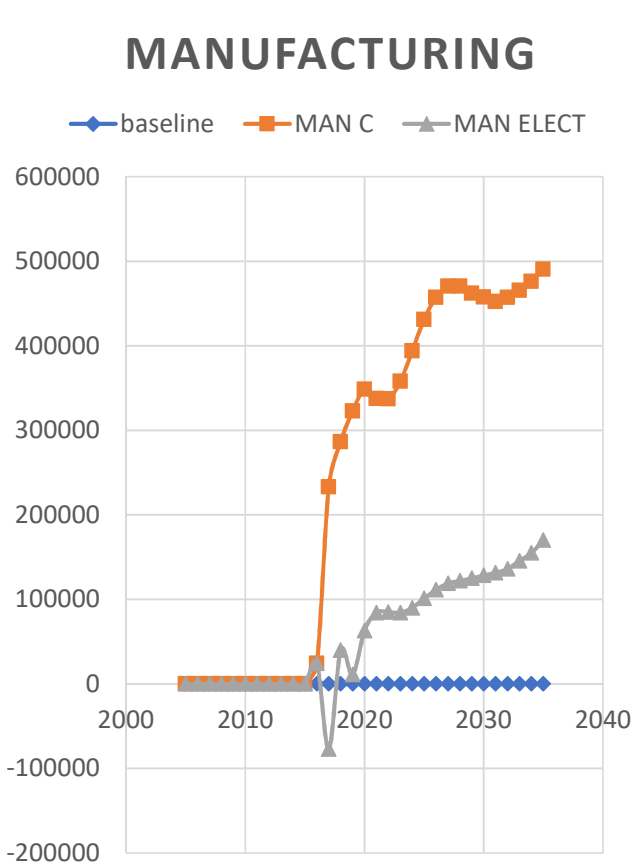
- Introduction of 400 Rs / Kton Carbon Tax on High GDP , High emission states (HGHE)

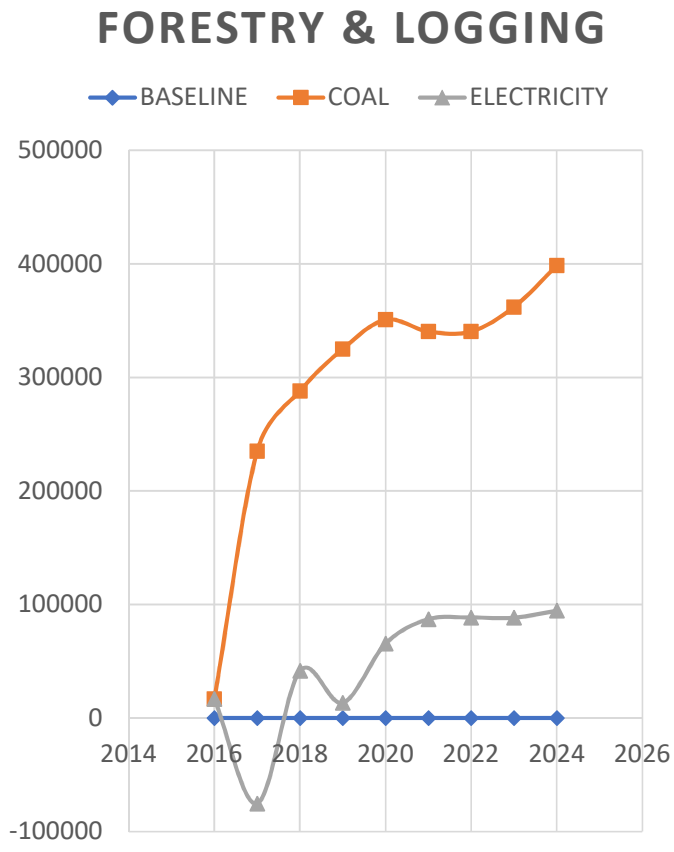
I. Recycle 25 % to HGHE states for VAT reduction
II. Add 25% to VAT reduction in coal bearing states

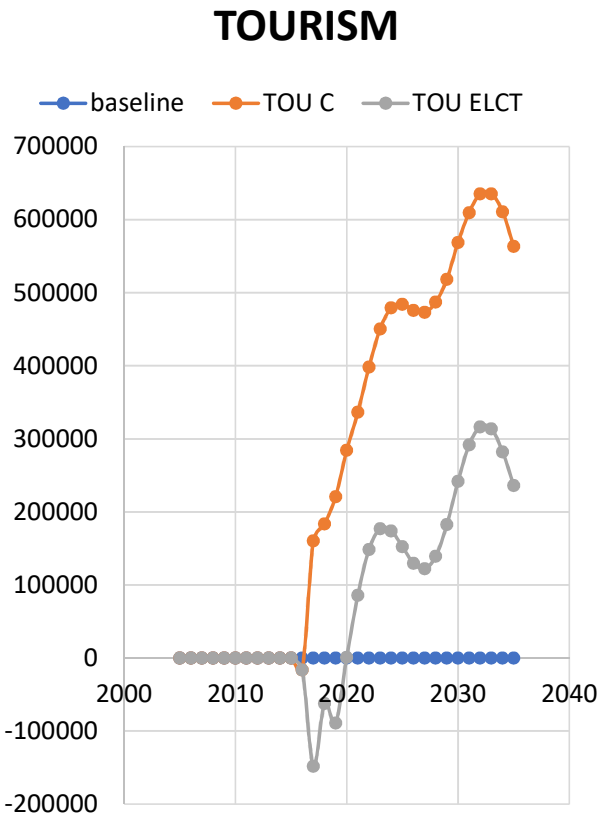
Idiom Edited Scenarios :

I. 20% recycled into exogenous investment into three representative sectors (Manufacturing , Tourism & Hotel & Forest & Logging)
II. 5% recycle into efficiency improvement for coal / Electricity inputs

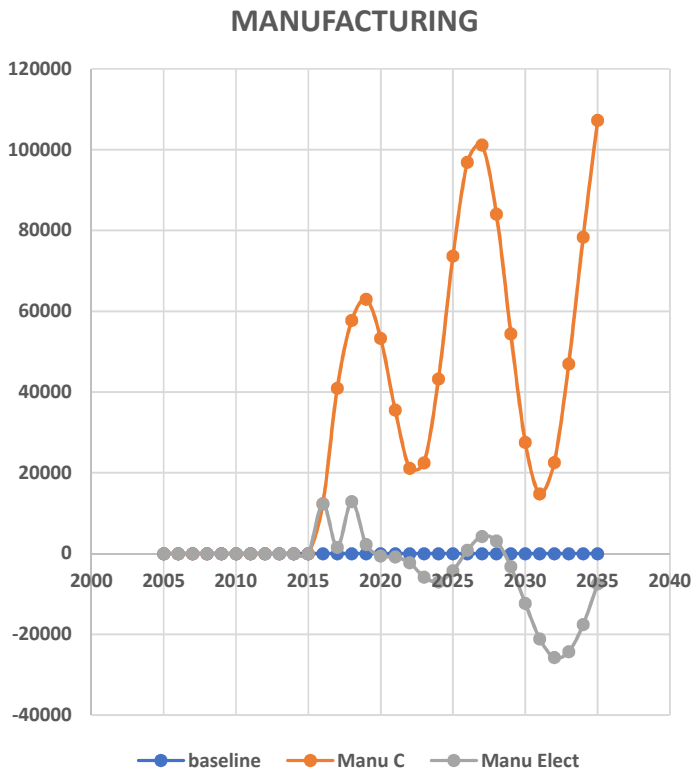
GDP Impacts (Million Rs (2010) price)

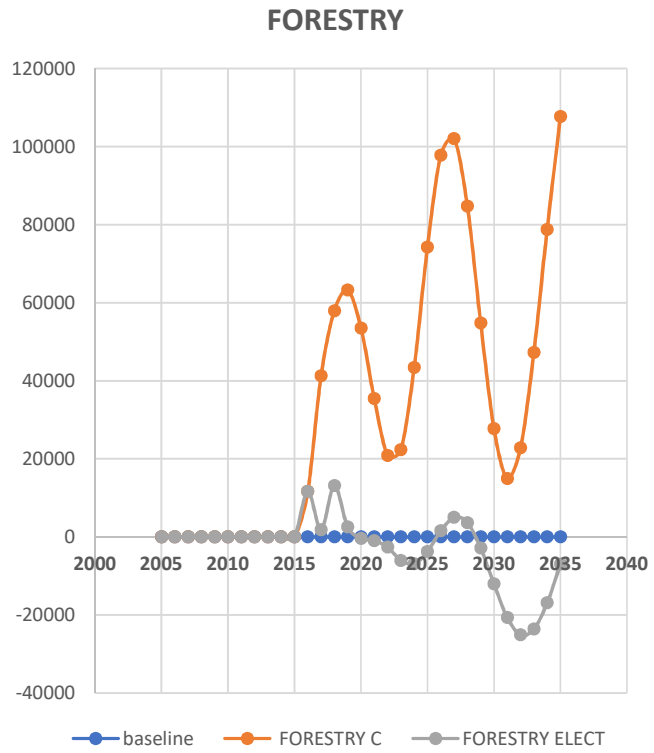


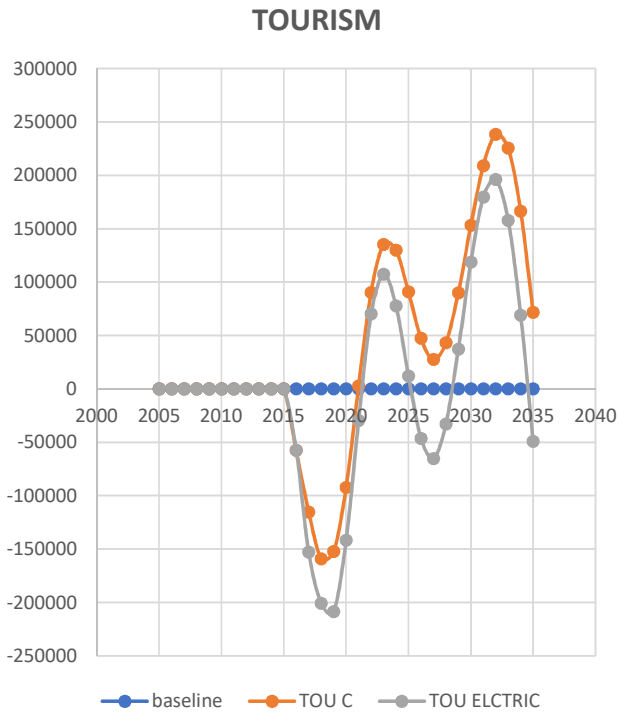




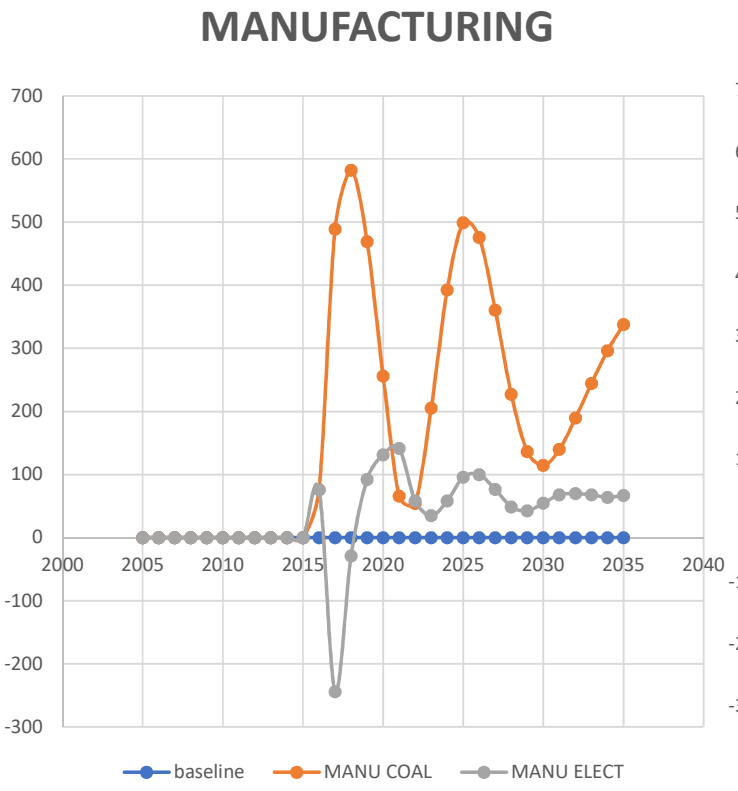
Regional Total Consumption Expenditure (M INR 2010 price)

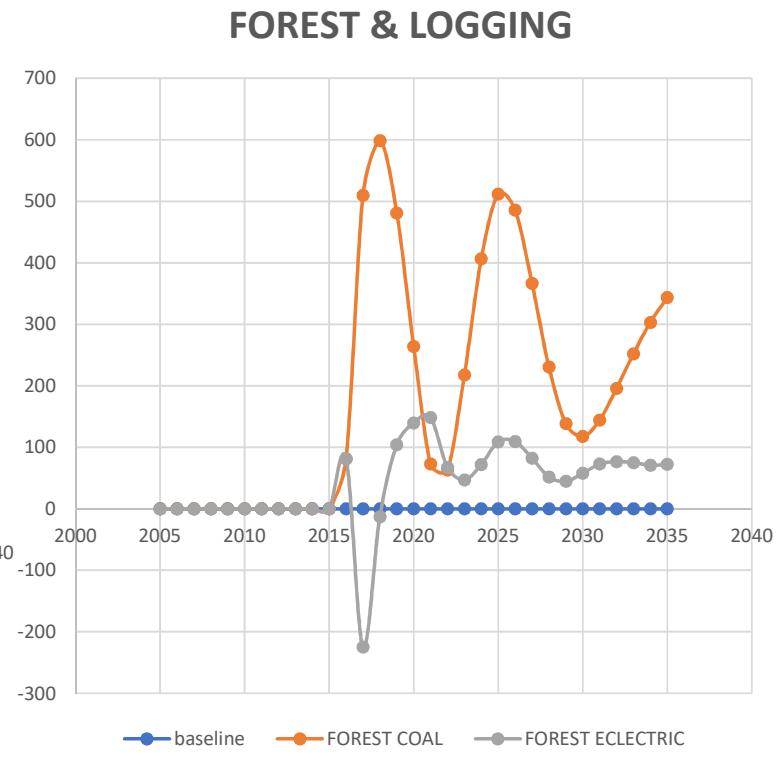


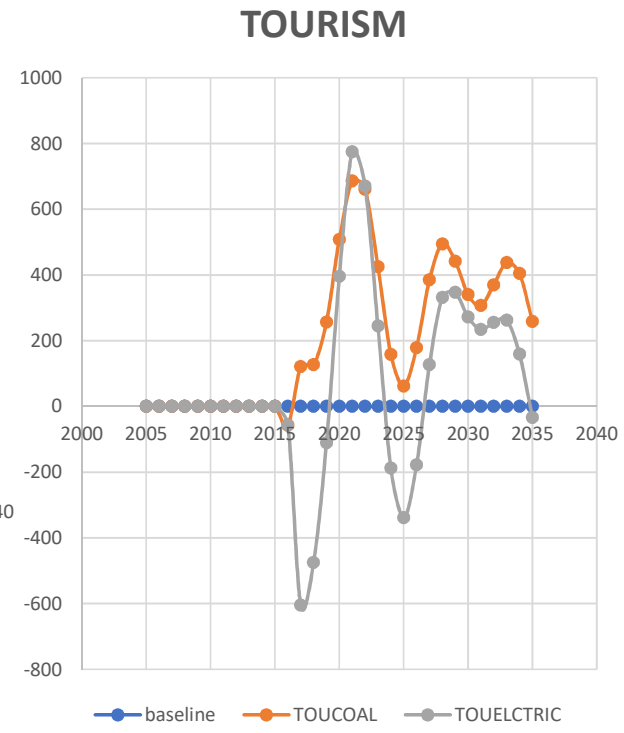




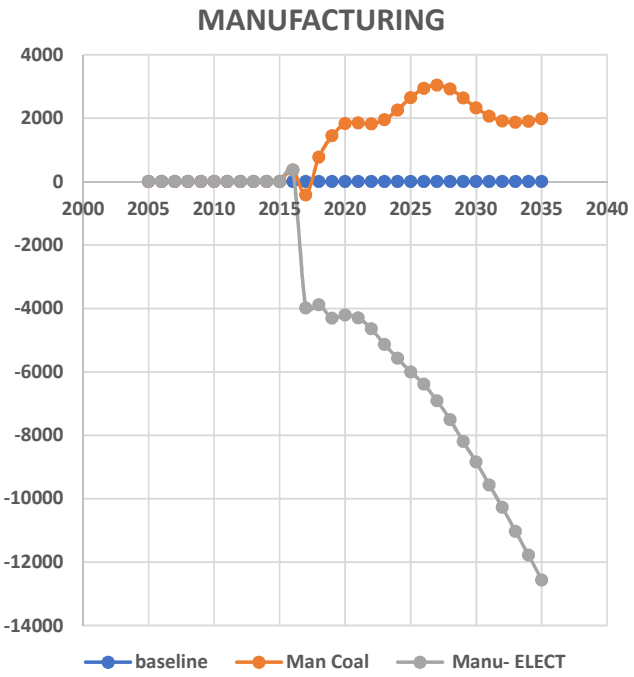
Employment Impacts (Thousands)

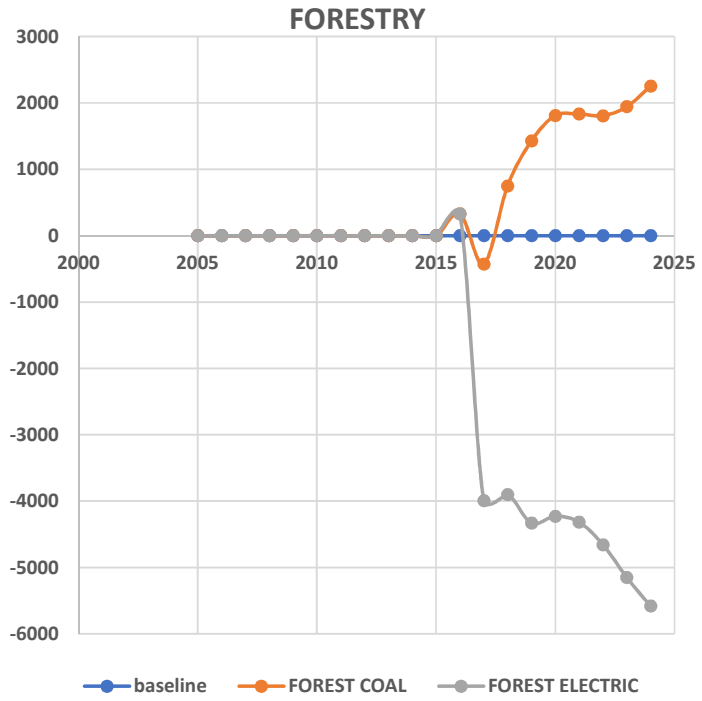


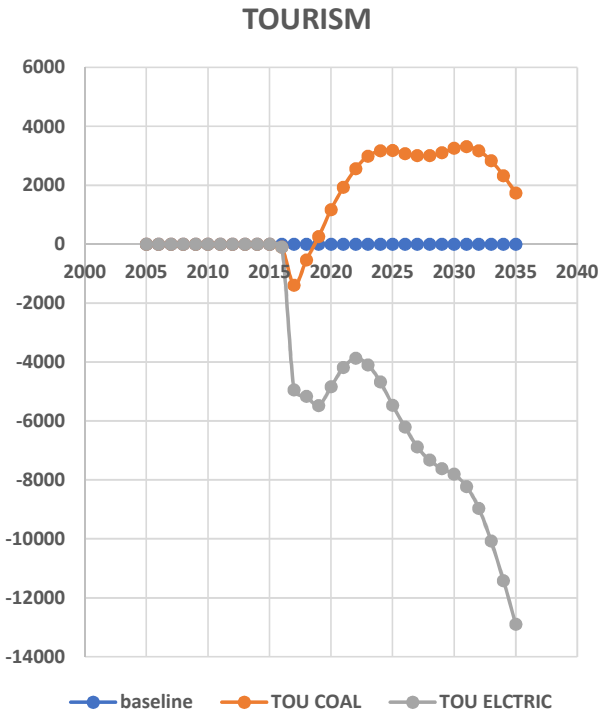




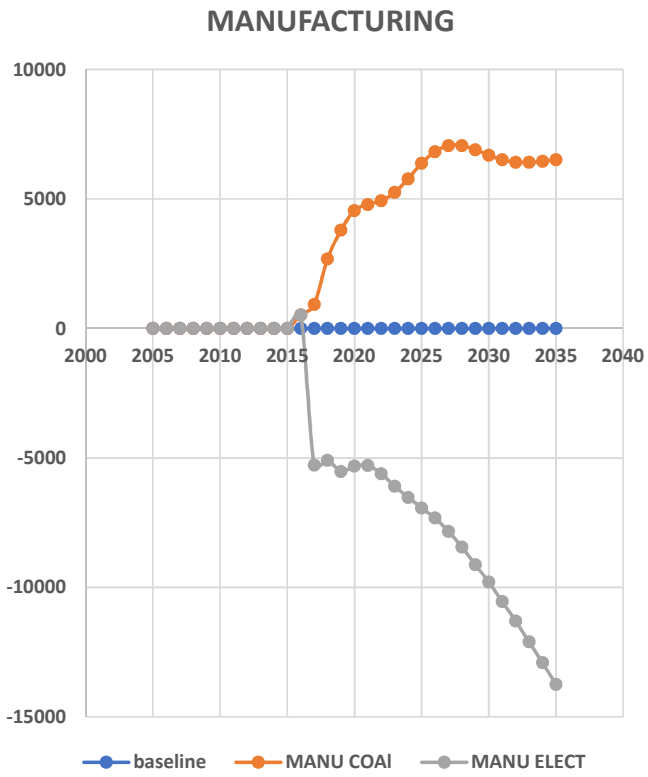
Emission for CO_2 in Thousand Ton of Carbon

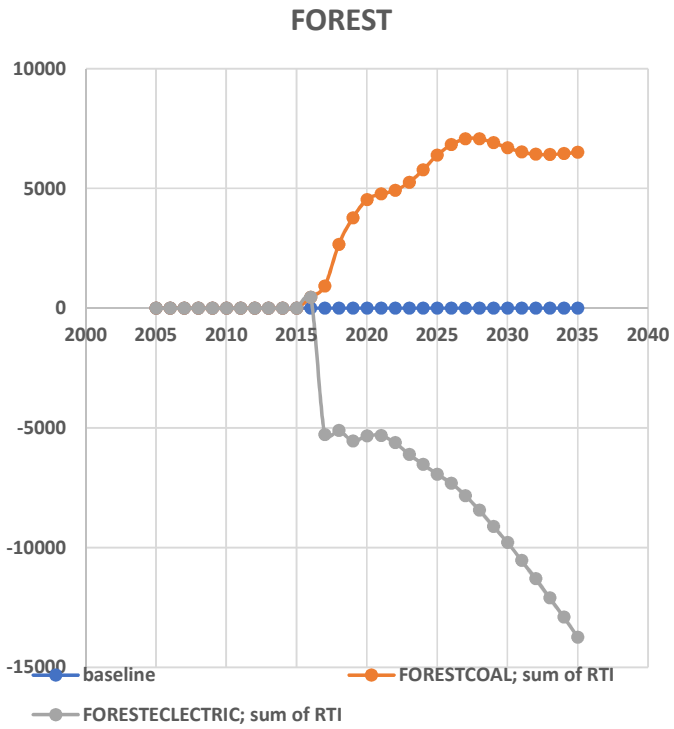


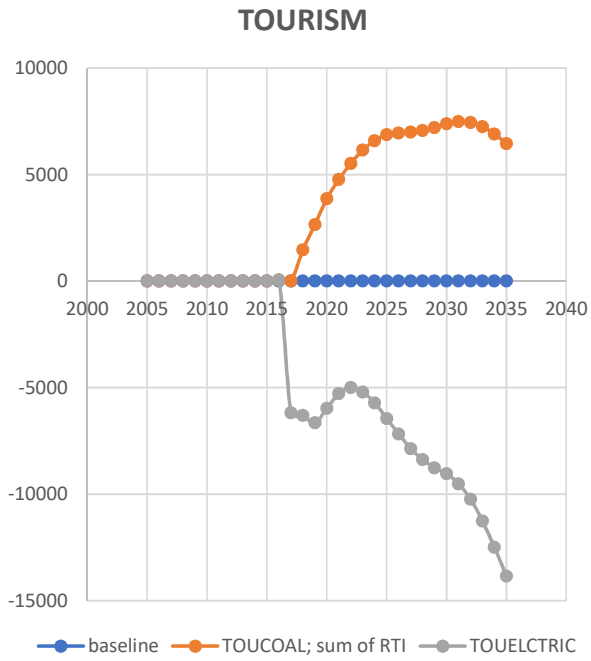




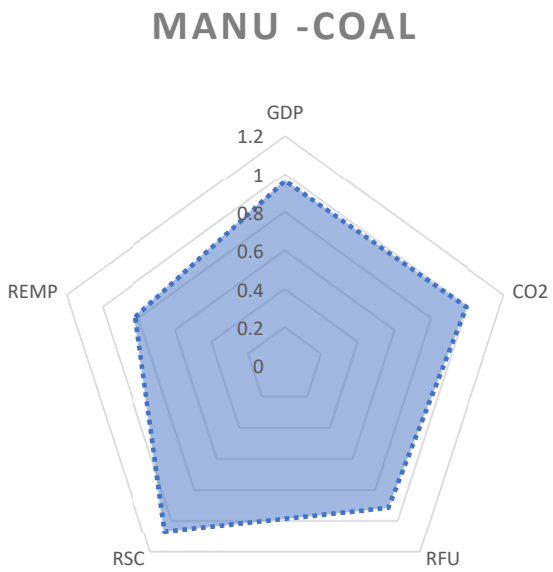
Regional Total Fuel Use (Th Toe)

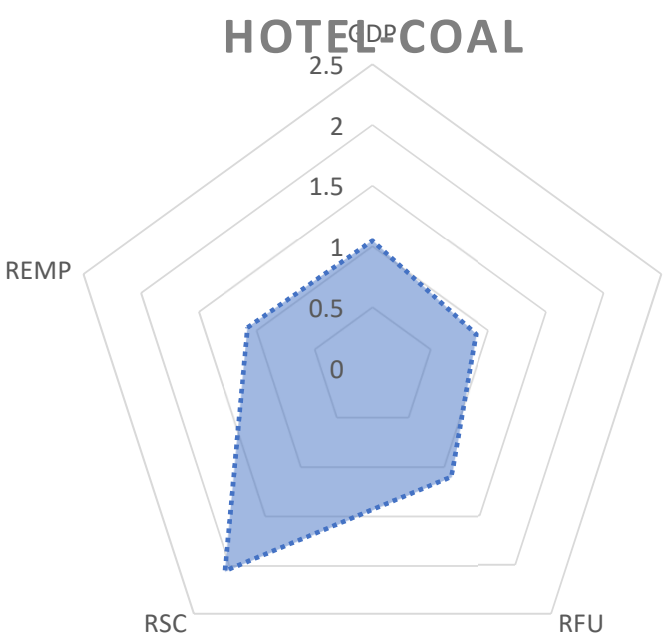


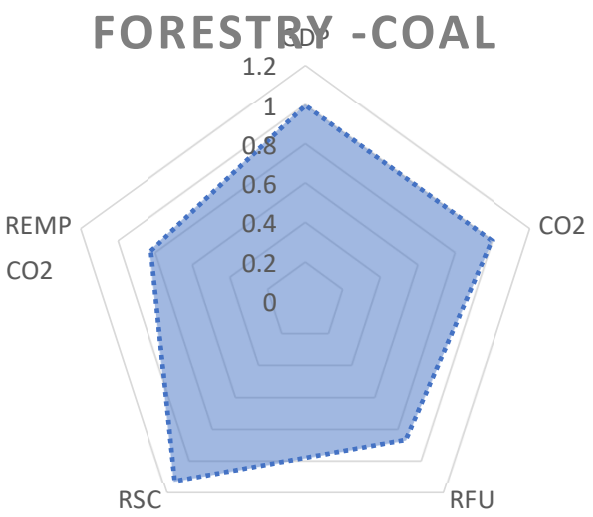




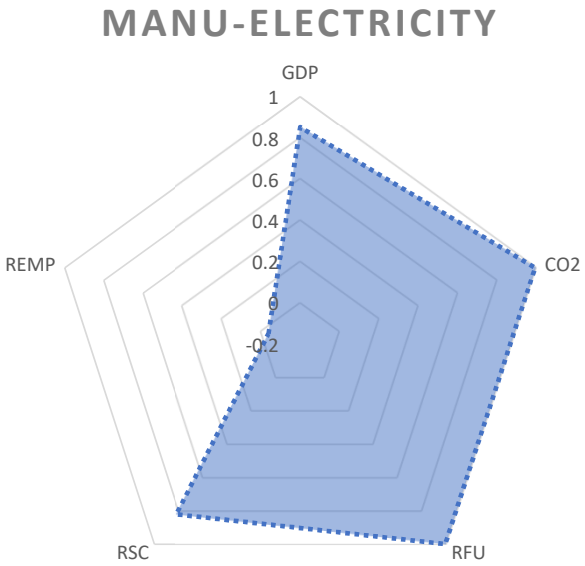
Efficiency in Coal Scenario

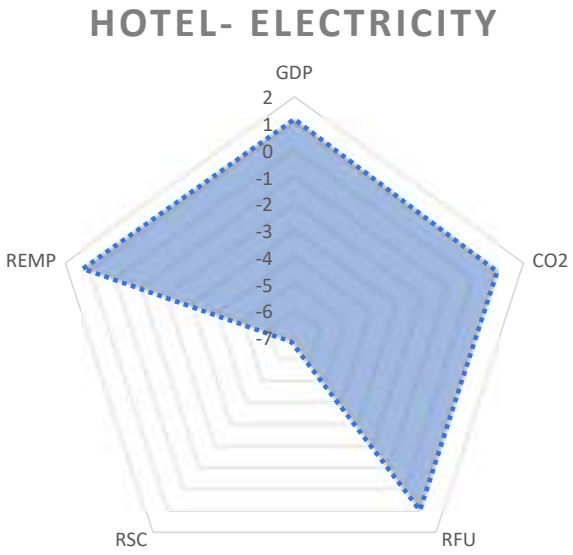


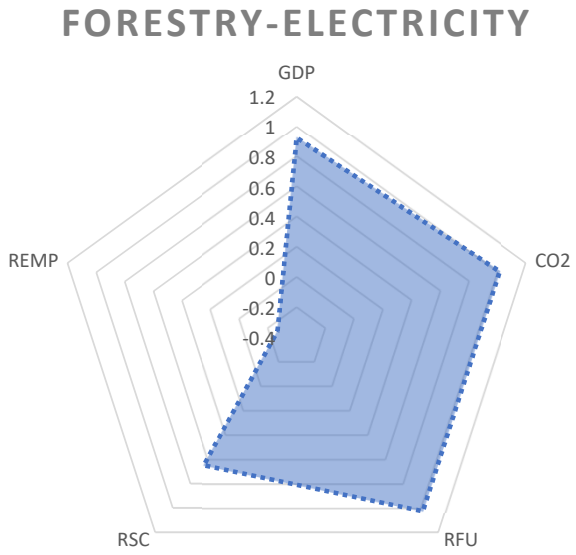




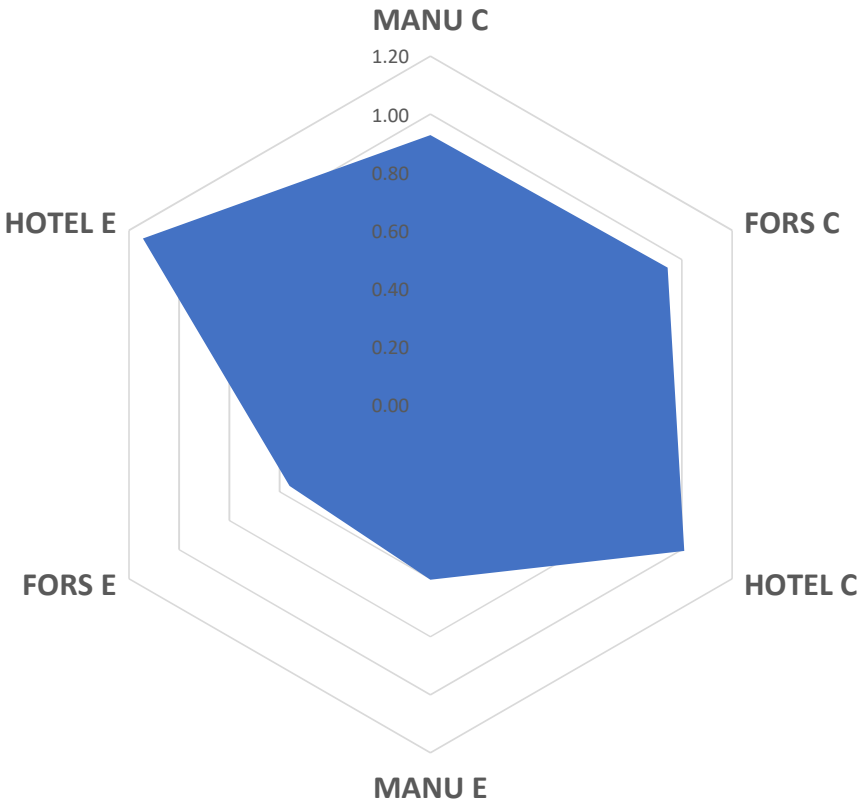
Efficiency in Electricity Scenario







Development Impacts
Composite Economic, Social & Environmental Score



Conclusions

- The exogenous investment in service based industry i.e. Tourism and Hotels lead to better developmental outcome under both coal and electricity efficiency scenario
- Electricity efficiency scenario indicates reduction in employment and regional consumption expenditure
- The efficiency in coal sector prolongs the coal centric growth trajectory for India
- A balanced policy intervention would be needed to ensure that costly lock ins of capital and natural resources along the developmental path is effectively avoided

Thankyou !