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### RESEARCH ARTICLE

#### REVIEW OF FISCAL RESOURCES IN INDIA FOR CLIMATE REFORM.

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#### Abstract

Most developing countries, including India, continue to face the crisis of Climate change. World leaders understand that we are past the point where we can do very much with individual action and took moral cognizance of the issue when Paris Agreement was negotiated by representatives of 195 countries at the 21st Conference of the Parties of the UNFCCC. India ratified the Paris Agreement on 2<sup>nd</sup> October 2016 to become the 62<sup>nd</sup> nation to join the initiative. Prime Minister Narendra Modi has committed that by 2030 at least 40% of country's electricity will be generated from non-fossil fuels. In numbers, this implies that by 2025, India will need a 175 gigawatt-power production capacity from non-fossil fuel sources. Such an ambitious project for a country like India, whose 80% of energy demands are met by fossil fuels requires oversight and commitment by Government and more importantly revenue for these projects. Keeping in mind these agenda, Finance Minister Arun Jaitley doubled the Clean Energy Cess to ₹400 per tons of coal from ₹200 per tons during Budget Presentation 2016-2017. While this solves only one of the many problems for the climate reform, a comprehensive model that encourages strategic shift to renewable sources for energy demands needs more fiscal resources and a coherent Monitoring and Evaluation (M&E) Framework.

This paper reviews the principle sources of fiscal resources in India for climate reform and discusses suggestion as to how the Government can increase the monetary budget introducing more policies and introduce awareness to bring behavioral changes.

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#### Introduction:-

##### Concept of Externalities:-

In 1920, Arthur C. Pigou developed the concept of Externalities and introduced the idea that externality problems could be corrected by the imposition of a Pigovian tax in his book 'The Economics of Welfare'. Both these concepts remain crucial in the field of Economics, particularly Welfare Economics and Environmental Economics. Carbon Tax or Pollution tax can be considered the most common example of Pigovian tax. The argument here is as mentioned: An industry creates negative externalities (pollution, GHG emissions) while generating production units which can be compensated by imposing Pigovian tax where the establishment has to pay per unit tax for polluting activity thus forcing it to move to carbon neutral practices. Economists have proposed two schemes: Quantity-based and Price-based restitution. However there has been continued debate on both these options. Contrary to his senior

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counterpart Pigovian, Nobel Prize winner for Economics Ronald Coase in his famous work of 1960s 'The Problem of Social Cost' argued that these externalities could be reduced by 'market based' instruments (Quantity based) instead of Government control (Price based) taxation.

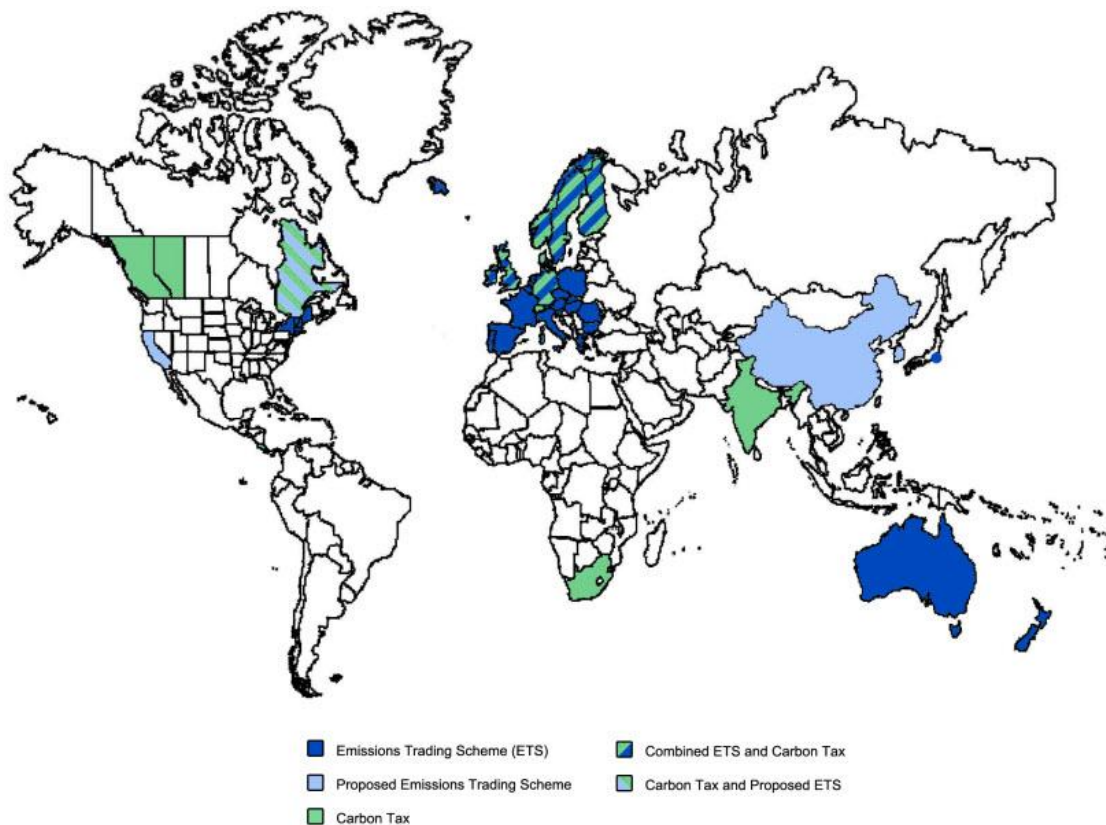
#### Schemes introduced for Climate Reform:-

Climate change is a global negative externality of the radical industrialization and increased anthropogenic interference. Countries recognize that either pricing or regulating these externalities as the core element to their long term strategy towards climate reform.

**'Cap and Trade':**- In 1990s, George W Bush government passed the Clean Air Act to combat air pollution on National level. It is a regulatory scheme designed to limit, or cap, the emissions level of specific harmful components and imposes a fine for exceeding that limit. Principally designed by his administration attorney, C. Boyden Gray, the act regulates the air emissions from stationary and mobile sources and is one of the first and most influential laws in the history of climate reform. Initially referred to as 'Emission Trading' or as it is colloquially referred to as 'Cap and Trade' the success of this policy served as the catalyst for the historic 1997 Kyoto Protocol. In December 1997, 193 participating countries differentiated their responsibilities with the common objective of reducing GHG gasses. Further in 2005, in the European Union, 31-member participation was seen in a carbon dioxide reduction programme. The European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced which is the largest multi-country and multi-sector collaboration with respect to a greenhouse gas ETS.

#### Taxation:-

A carbon tax puts the price on GHG emissions motivating citizens, Industries and Governments to reduce their levels. Finland enacted a carbon tax in 1990; the first country to do so. Conventionally, the burden of taxing GHGs would disturb the carbon intensive industries and lower income households. Policy maker should device such model of framework that the tariffs are distributed evenly with revenue creation to offset GHGs impact and invest towards climate control.



**Figure 1:-** Emission Reduction Schemes proposed/practiced by countries either in the past or present (from Fact Sheet: Carbon Pricing around the World, Environmental and Energy Study Institute, 2012).

## Review of Literature:-

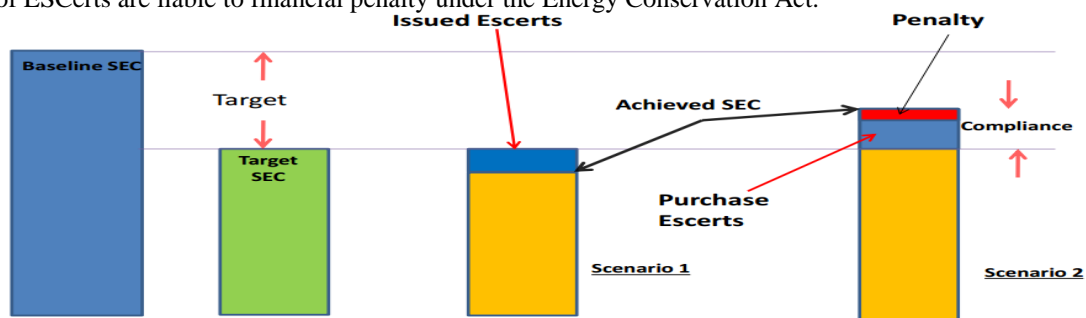
In compliance with the UNFCCC, India released the much needed National Plan on Climate Change (NAPCC) to address climate change on June 30, 2008, almost a year after it was announced.

Within the framework lie seven sectoral responsibilities for Indian Government Ministries to realize and accomplish: National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a “Green India”, National Mission for Sustainable Agriculture, National Mission on Strategic Knowledge for Climate Change. Ministries with lead responsibility for each of the missions are directed to develop objectives, implementation strategies, timelines, and monitoring and evaluation criteria, to be submitted to the Prime Minister’s Council on Climate Change.

Under the National Mission for Enhanced Energy Efficiency, the ‘Perform, Achieve and Trade’ mechanism was formally launched by Bureau of Energy Efficiency (BEE) under the Ministry of Power on July 4<sup>th</sup>, 2012

The scheme, similar to ‘Cap and Trade’ practiced in United State of America, mandated 478 industrial units covering 8 sectors to reduce their specific energy consumption (SEC) i.e. energy used per unit of production.

Units that are able to achieve the target receive Energy Savings Certificates (ESCerts) for their excess savings. The ESCerts could be traded on the Power Exchanges and bought by other units under PAT who can use them to meet their compliance requirements. Units that are unable to meet the targets either through their own actions or through purchase of ESCerts are liable to financial penalty under the Energy Conservation Act.



**Figure 2.1:-** Concept of PAT (from PAT Scheme Overview, Bureau of Energy Efficiency, 2015).

- The efforts of PAT Phase I Cycle saved of about 8.67 Million TOE from verified 427 DCs (Designated Consumers) and mitigated about 31 million tons of CO<sub>2</sub>.
- The first phase was completed in 2015 and the second phase for 2016-2019 is in process with the objective of covering more units and more stringent norms and the target for Energy saving is set at 8.869 Million TOE.
- On July 1, 2010, the Government implemented an excise tax (“carbon tax”) on coal and its variant at the rate of Rs 50 per ton of coal. This coal tax applies to both domestically produced and imported coal, and revenues are used to finance the National Clean Energy Fund (NCEF) and research in clean energy technologies and environmental programmes. As of present this tax, officially known as ‘Clean Environment Cess’ is increased to Rs 400/tons.
- In the Union Budget 2010-2011, National Clean Energy Fund (NCEF), a corpus created out of ‘Clean Environment Cess’ was announced for the purpose of financing research and developing instruments for clean energy technologies.
- As per budget estimates during 2016-2017, an amount of Rs 26,148 will be collected as Coal Cess.

## Objectives:-

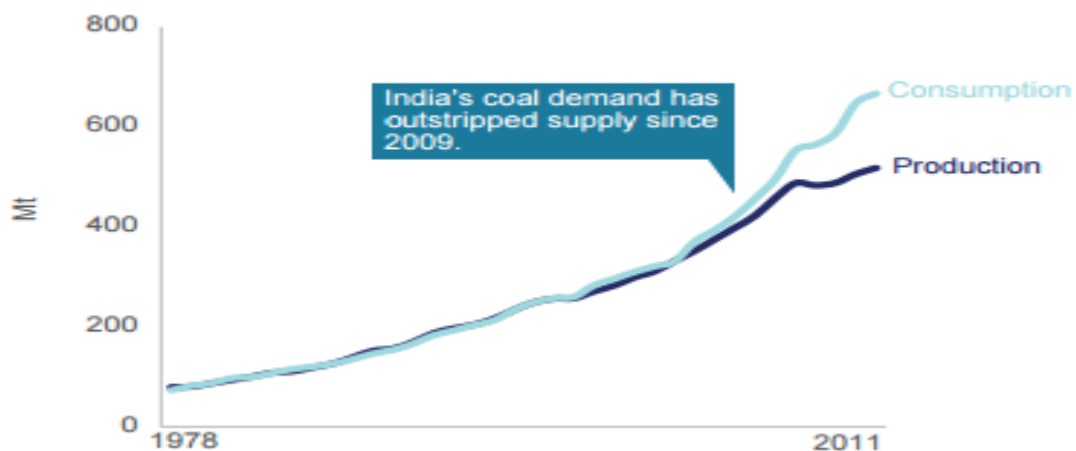
The paper uses an exploratory research practice based on past literature from respective journals, reports, newspapers and magazines covering wide collection of scholastic literature on Climate Reform policies in India. Available secondary data was extensively used for the study.

**The objectives of the paper are:-**

- To discuss about the initiatives of Indian Government towards climate reform and the fiscal resource generated for it.
- To discuss the major contributors of GHG emissions in India and their effect on policy making.
- To suggest measures to increase the revenue of government and promote change in citizen behavioral pattern.

**Sources of GHG Emissions and Their Impact:-****Coal Industries:-**

With an estimated coal reserve of about 306.6 billion metric tons, India has the fifth largest coal reserve in the world. This makes the mining and manufacturing of coal profitable for Industries and ensures affordable energy supply for households. It is expected that in upcoming 20 years, production will be around 2.5 times the current amount. Even after such high reserve and production value, India still requires importing high quality coal for steel plants.



**Figure 3.1:-** Coal in India, Department of Industry and Science, Australian government 2015.

**Cement Industries:-**

The Cement production has been on rise, growing annually at the rate of 2.5% annually. Currently India has a capacity to produce up to 390 million tons. It is estimated that by 2020 India will produce approximately 550 million tons. Perhaps this amount clearly states that India is second largest cement producer in world and it contributes roughly 6.7 per cent of total cement production in world. But it has a major drawback; it directly and indirectly produces Greenhouse Gases. In terms of processing, the CO<sub>2</sub> produced varies between 1.1 kg to 1.2 kg for per kg cement produced. Total estimated CO<sub>2</sub> emissions from cement plants included in the updated International Energy Agency's CO<sub>2</sub> sources database are 111.02 million tons from Indian cement industries.

**Cattle and Livestock:-**

Cattle and livestock is a major anthropogenic source of methane emissions affecting us worse than CO<sub>2</sub> emissions. In India, there are approximately 485 million cattle animals. Whenever these animals, eat or excrete they produce harmful gases which are in general more dangerous than the carbon dioxide. Unfortunately, the emission has been increasing since last 20 years. The Methane gas produced by the Cattle is sufficient enough to trap 4 times the heat trapped by Carbon dioxide. Overall India contributes to around one-sixth of total greenhouse emission by cattle. It has been estimated that a single cow produces around 25-30 litres of methane gas. Recent study shows that India emits around 14.32 million tons of the Greenhouse gases; surprisingly it is around 15 per cent of total emission of Greenhouse gases by cattle. If not controlled, in upcoming years the methane gas emission will swell up to roughly 19 million tons because to satisfy Indian consumers, one of the largest population nation on earth.

**Impact on Economy and Environment:-****Economy:-**

Economic modeling for clean energy future should be as such that the policy affects all the stakeholders

appropriately.

By raising the cost of carbon and its variant, the cost of producing Goods and Services will also increase thus a process of shift in choices will be introduced. As the prices will increase, consumers will demand either less of that commodity or will change their preferences and motivate industries to do the same. Also as the Industries have to pay a price for more carbon intensive produces, they will change to practices and products that reduce the cost thus giving consumers more choices. All these developments will force India to explore and invest heavily in renewables sources of Energy and these turn of events in the long term will also observe geopolitical independence for India from OPEC countries.

It is estimated that pricing carbon and its variant at \$15 per tons would still ensure that large scale coal power plants continue to break even and yet bring down India's emissions by 358 million tons a year.

Also both these schemes have distinctive impact on GDP growth rate. A paper published on Indian Environmental Portal titled 'The Impact of Carbon Taxes on Growth Emissions and Welfare in India: A CGE analysis' by Basanta K. Pradhan and Joydeep Ghosh predicts that the growth rate of GDP is compromised more when 'cap and trade' is practiced as compared to carbon taxing regime.

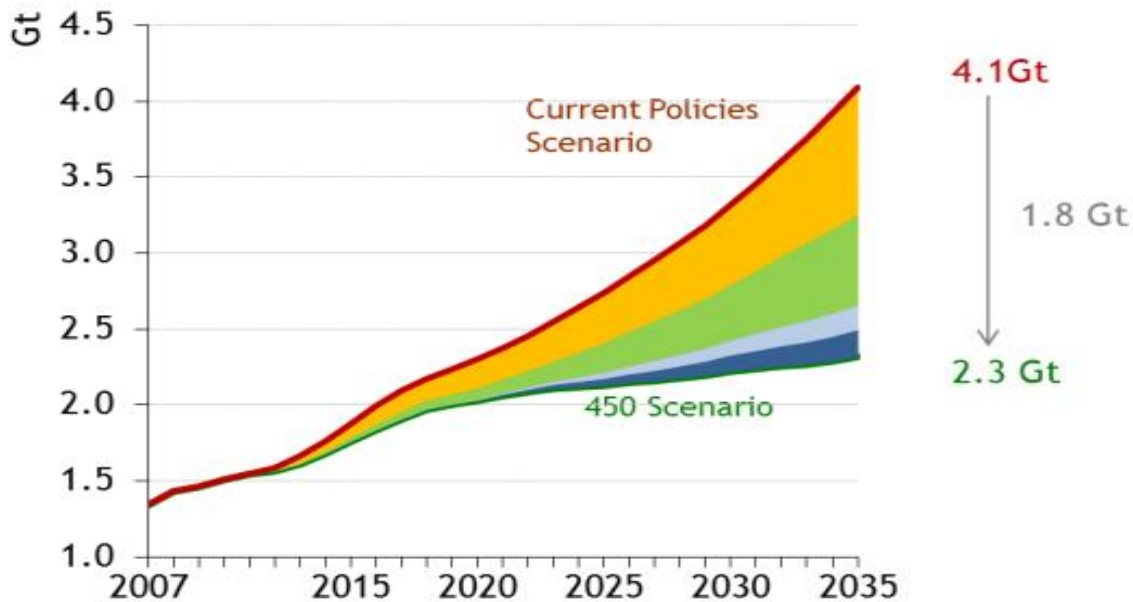
In the table given below, two policy regimes are compared for growth rate of Indian Economy under OECD Scenario. The GDP growth rate slows down under both the policy regime. The relatively larger impact on GDP growth in the long run for CDC (emission trading scheme) regime could be attributed to the higher carbon prices (tax rates) in the CDC regime relative to Carbon taxes regime.

**Table 1:-** CAGR of GDP (OECD Scenario) from The Impact of Carbon Taxes on Growth Emissions and Welfare in India: A CGE analyses by Basanta K. Pradhan, Joydeep Ghosh, 2012

Period	BAU (%)	CT (%)	CDC (%)
2005–10	8.5	8.5	8.5
2010–15	7.6	7.6	7.6
2015–20	8.2	8.2	8.2
2020–25	7.4	7.3	7.3
2025–30	6.8	6.7	6.7
2030–35	6.5	6.4	6.4
2035–40	6.3	6.2	6.2
2040–45	4.6	4.4	4.3
2045–50	4.3	3.2	3.0

An argument against such projects is that the social cost of both 'Carbon Tax' and 'Cap and Trade scheme' is not evenly distributed across industries and households. As small- scale industries and low income households are more invested in carbon intensive goods since it is cheaper, it is expected that they are more likely to bear the burden as the economy adjusted to such taxes.

Fuel is less price elastic and more income elastic in India. This implies increasing carbon taxes alone will be insufficient to reduce emissions as income levels rise. The price inelasticity is mainly due to the absence of alternative energy sources and, in the past, fuel subsidies. Thus, for an effective outcome, government needs to ensure a simultaneous process of pricing fuels relatively higher and investing more toward renewables directing consumers towards them.

**Environment:-**

**Figure 2.2:-** Indian GHG Scenario (from PAT Scheme Overview, Bureau of Energy Efficiency, 2015)

Imposition of climate reform policies is a significant factor for bringing significant improvement for reducing the emissions to a safe level. According to the calculations of Bureau of Energy Efficiency, the GHG emissions will come down from 4.1 gigatons (Gt) to 2.3 Gt when compared with Current Policies Scenario to 450 Scenario. The 450 Scenario sets out an energy pathway consistent with the goal of limiting increase in average temperature to 2°C.

**Suggestions:-****Fiscal Proposal:-**

As mentioned, above one of the most damaging emission source are cement plants. Government should identify these unconventional sources too as a resource for generating fiscal benefits. Putting a price on these plants may portend uncomfortable discussions and criticism for the government during short run but much appreciation when looked through larger scheme of things.

Another primary source of GHG is livestock population. Putting a price to these emissions will be difficult for government but will also serve as a major source of revenue. As much as the risk of losing Dairy giants is involved, but since India is one of the biggest consumers of dairy products and cattle food, one can assume that the companies will be willing to compromise. Government should device such policies that should tax after the carbon footprint is over a specific value thus protecting low-income farmers and small scale industries. Just as pricing externalities of Industries encourages them to move to carbon-neutral practices, this scheme would force the stakeholders to focus on increasing the productivity and health of cattle.

**Technological Intervention:-**

- Explore and experiment the Geo-engineering prospect of Iron Fertilization and Biochar.
- Further research in the field of Imaging Spectrometry to aid space based measurement of levels of pollution. ISRO developed AVIRIS NG, an airborne hyperspectral mission, in collaboration with Jet Propulsion Laboratory (JPL), NASA that aims to carry out scientific research data from the flights conducted by the technology. Develop low cost effective sensor based system to maintain a more stringent control over industrial pollution level.

**Citizen Behavioral Amendment:-**

- Focusing change in consumer behavior will observe shift in investment by industries to more carbon neutral technology and nonrenewable sources.

- Awareness Programmes should be initiated by the Government to help citizens make more informed choices. Success of 'Swachh Bharat Abhiyaan' proves that people are willing to change their habits and adopt for a better India. Focus on change in consumer behavior to guide people for depending less on beef and meat.
- Recently government has started inviting citizens to conceptualize ideas and schemes for issues dealing with affairs of State as well as Center on government website. Such competition should include topics for sustainable growth as well.
- Establish Climate Reform Centers (CRC) in cities inviting and assisting citizens to know more about the issue and encourage individual action and the contributions that can be sought on their part. This will ensure that the government actions are understood and supported by the common man
- Promote Environmental Engineering and Climate Economics research as multidisciplinary subjects for higher education to aid Research and Development (R&D) for the cause.

### Conclusion:-

The narrative of climate reform needs to start from the top and should be evaluated by the outcome of increased share of renewables resulting in affordable, reliable and sustainable modern energy available for common citizens. The aim should be to reduce GHG content from both production and consumption. Such a project requires efforts from all stakeholders and an astronomically high budget for implementation of a model. Indian policymakers should amend legislation to introduce changes at a grass root level and discover unconventional strategy to raise fiscal resources. Government needs to intervene in the current political and economic system to ensure that India compromises now rather than sacrifice later.

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