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Compensating for the Fiscal Loss in India's Energy Transition

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Abstract

India has committed to ambitious targets, aiming to achieve net-zero emissions by 2070; however, this transition away from fossil fuels presents significant fiscal and institutional challenges, that warrant careful examination. This study primarily explores the dynamics of tax revenues and the fiscal implications of India's transition. As fossil fuel consumption declines over time, government revenues generated from fossil fuels are also expected to decrease relative to GDP. The research delves into the institutional challenges related to enhancing existing tax systems, and considers the viability of implementing a carbon tax as an alternative revenue source to replace fossil fuel taxes. The study assesses various tax revenue options, evaluating their effectiveness in revenue generation, long-term sustainability required institutional changes, and the preservation of state autonomy. Allocating revenue between the union and individual states can be an intricate task. The study highlights the potential of carbon taxes as a valuable medium-term solution to address revenue loss. However, it also underscores the challenges associated with their implementation, including institutional barriers and political-economic complexities, particularly within India's fiscal-federal structure. Active engagement from institutions like the Finance Commission and the GST Council is emphasised, recognising their critical roles in managing this transition and mitigating its impact on state-level fiscal autonomy.

Keywords: Energy Transition, Tax Restructuring, Fossil Fuel Revenue, Carbon Tax, Goods and Services Tax

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1. Introduction

The global energy landscape is undergoing a significant transformation, as countries strive to transition from fossil fuel-based systems to more sustainable and renewable energy sources. This shift, commonly referred to as the energy transition, is driven by the pressing need to address climate change by reducing greenhouse gas (GHG) emissions created by conventional fuels such as coal, petroleum, and natural gas.

India is in the midst of a transformative energy transition as it seeks to move away from fossil fuels and embrace clean, sustainable energy sources. India has committed to achieving its goal of reaching net-zero emissions by 2070. This shift poses significant fiscal and institutional challenges that require careful consideration. In this study, we will explore a crucial question: how to effectively handle the fiscal transition accompanying the move away from fossil fuels.

Fossil fuels have long served as a significant source of revenue for both the Union and state governments in India. These revenues primarily stem from the consumption of petroleum products, with coal contributing to a lesser extent, while income generated from production (extraction) is relatively lower. Laan and Maino (2022) estimate that about 87% of total revenues are generated from consumption. The key issue, however, lies in the magnitude of these revenues. Bhandari and Dwivedi (2022a, 2022b) estimated that the total revenues from fossil fuels in 2019-2020 accounted for 3.2% of India's GDP, which respectively translated into 15.0% and 6.2% of total Union and aggregate State government budgetary expenditures.

As India moves away from fossil fuels, a significant part of its revenue will reduce. So, both the Union and State governments will need to find alternative methods of revenue collection. This paper focuses on identifying these sources of additional revenue. The objective is not to identify a single solution, but rather to consider the range of possible solutions.

The issue is not simply of tax revenue collection, but also of what is feasible under India's federal structure, which divides various powers of taxation between Union and State governments. Moreover, some states are more dependent on fossil fuel revenues, such as Jharkhand, Orissa, and Chhattisgarh, the key coal-producing states. This fact poses another challenge: income generated from any new sources would either need to be allocated more to States that stand to lose more, or States should be granted autonomy to choose their own tax rates. While the Constitution of India provided significant tax collection powers to State governments, the introduction of a nationwide Goods and Services Tax (GST) regime has reduced it, and individual States are not free to change GST rates for items that are covered under it.

Some may argue that allowing differential rates across States is an avoidable measure. In this paper, our objective is not to advocate for a specific viewpoint, but rather to comprehensively outline the array of available options and examine their implications.

There is also a growing discussion in India about introducing taxes based on carbon emissions. However, it is not clear how these might be instituted under its federal structure. That is, it is unclear who would levy these taxes, who would collect them, and how they would be distributed.

Therefore, to ensure the long-term sustainability of the energy transition and support India's economic growth, new revenue sources as well as institutional frameworks for managing such revenues must be identified and developed. This necessitates modifications in the existing institutional setup. It warrants a thorough review of the roles played by bodies such as the Union and state government departments, Finance Commissions, the GST Council, etc.

The fact that the role, structure, and operations of such institutions are mandated constitutionally implies that any solutions will either have to fit within these constitutional boundaries, or that the Constitution of India itself might need to be changed. While the latter isn't implausible, it should be avoided if possible, because it would involve lengthy discussions and negotiations between many parties at the national level and in each of India's 28 states.

The discussion above makes it evident that a key step that precedes India's energy transition is a better understanding of the resultant fiscal challenge and compensatory options available to the country. This is precisely the aim of this paper, and it proceeds as follows.

Section two seeks to better understand how revenues from fossil fuels will fall over time. To achieve this, a time path of India's transition is necessary, and we rely on figures from the International Energy Agency for India (IEA 2021) up to 2040, with the goal of reducing the use of fossil fuels to insignificance by 2070. Under fairly plausible assumptions, it identifies the key challenge for India within the 2020-2040 period.

After 2040, the annual loss in fossil fuel revenues would be relatively low. Tax reforms should thus be evaluated in the context of (a) a medium-term strategy of making up for the shortfall, and (b) a long-term strategy of identifying other revenue possibilities for both state and Union governments.

Section three examines aggregate tax revenues in India, comparing them over time and with those of other countries. It finds that tax revenue growth in India has been accompanied both by economic growth as well as tax reforms or changes. It suggests that the Indian experience should align with global experience over an extended time frame, albeit with some qualifiers. While there may be divergences from the global trend and experience for some time, India can achieve higher tax-revenue-to-GDP ratios with the right kind of taxation and economic policies.

However, achieving an adequate increase in general tax revenues might take some time, and carbon emission taxes could play a medium-term role, both in terms of revenue generation and in accelerating the transition to more sustainable and renewable energy sources. It is apparent that carbon taxes can, at best, serve as a medium-term measure. As fossil fuel consumption falls with India's march towards net zero, so will the capacity of carbon taxes to generate adequate revenues. Therefore, India will need to explore alternative sources of tax revenue in the long run.

Section four examines various possible avenues for the implementation of carbon taxes in India and the challenges they might face. The section evaluates the possibility of carbon taxes substituting fossil fuel tax revenues, and underscores the importance of monitoring emissions as the foundation for such taxation. Furthermore, it highlights the contrast between existing fossil fuel taxes in India and a potential carbon tax, which would be predicated on emissions-related criteria. It discusses the issues involved with various forms of carbon taxes, including whether they can work in tandem with the GST, and explores their potential ramifications.

Section five concludes with a brief discussion of the various options available to India. It refrains from singling out the best option, as each would have differing impacts on the economy. The section ends by calling for a more comprehensive study and understanding of the potential environmental, equity, and growth impacts of taxation options. This information can contribute to the debate on superior taxation alternatives for India.

2. Falling Fossil Fuel Revenues

The (IEA 2021) studied different factors impacting India's future energy requirements and proposed three potential scenarios.[1] Among these, the base case (STEPS) was considered a scenario where India gradually reduced its dependence on fossil fuels. Based on this assumption, the IEA estimated the quantity of different fuels required. The IEA's horizon extended until 2040, predating India's commitment to achieve net-zero status by 2070, and the target of 500GW capacity from renewable energy by 2030, among other goals.[2]

Bhandari and Dwivedi (2022a) adopted scenarios from the IEA and projected the current revenues generated by both the Union and State governments from fossil fuels, as well as how these revenues would change over time. Using the base case scenario from IEA, Bhandari and Dwivedi (2022a) estimated that as of 2019, fossil fuel revenues for both Union and State governments accounted for 3.2% of India's GDP. They projected that this figure would decline to 1% by 2040. Under ceteris paribus assumptions from 2019 to 2040, they estimated a reduction from 15% to 4.5% of Union government fossil revenues as a proportion of total budgetary expenditure, and from 6.2% to 2% for the combined State governments (refer to Table 1).

Table 1: Revenues from Fossil Fuels

Year	In Rs. 000 Crores	Share of GDP (%)	Share of Government Expenditure (%)
	Union Government Fossil Fuel Revenue		
2019	404.75	2.0	15.0
2030	703.03	1.1	10.8
2040	995.37	0.6	4.5
	State Government Fossil Fuel Revenue		
2019	242.71	1.2	6.2
2030	434.75	0.7	5.4
2040	625.38	0.4	2.0
	General Government Fossil Fuel Revenue		
2019	647.46	3.2	9.8
2030	1,137.78	1.8	7.8
2040	1.620.75	1.0	3.0

Note: Overall government budget figures have been projected at a nominal GDP real growth rate of 10%; the same levels of taxation on fossil fuels. Future budgetary expenditures are also projected at a 10% nominal growth rate in the table above.

Source: Bhandari and Dwivedi (2022a).

For both the Union and State governments, the majority of the decline in revenue shares would occur during the first two decades. During this period, even though aggregate revenues from fossil fuels may increase, the rate of increase in fossil fuel usage and the resulting revenues would be significantly lower than the rise in GDP and the expected budgetary expenditures.[3]

What this also indicates is that fossil fuel revenues, equivalent to 1% of the GDP in 2040, would then fall to zero by 2070, the net zero date. In other words, the key challenge for Indian State and Union governments is to address the rapidly-reducing fossil fuel revenue shares until the year 2040. After 2040, if India can manage a steady improvement in overall tax revenues through other means, it should be relatively easy to compensate for the loss of fossil fuel tax revenues.

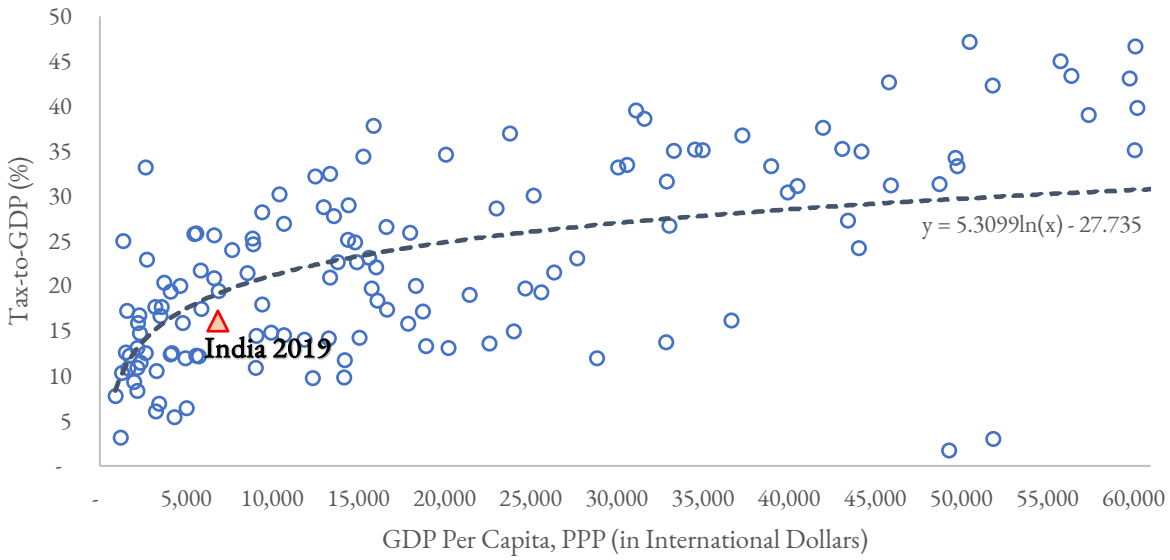
Another related issue that is not understood very well is the major differences between states. On the revenue side, different states are differently dependent on revenues from fossil fuels. Bhandari and Dwivedi (2022b) examines this aspect and finds that state-level energy transition would also impact each state differently and fairly significantly.

It is therefore apparent that adequate flexibility will be required to address the variations in scale and scope of challenges at the state level. An important criterion in addressing this issue has to do with flexibility, which could be addressed through state autonomy in designing the tax solution, or flexibilities built into the solutions designed at the Union government level.

3. Tax Revenues in India

To better understand how aggregate tax revenues in India may change over time, let's first consider the global scenario. Figure 1 shows data on the general government (national plus sub-national) tax-to-GDP ratio (on the vertical axis), charted against per capita GDP (on the horizontal axis).

Figure 1: Tax Revenue to GDP and GDP Per Capita in 2019



Source: UNU-WIDER (2022) & World Bank (n.d.)

The chart reveals a few well-known relationships.

- First, taxes as a share of GDP are positively correlated with incomes, as reflected in per capita GDP.
- Second, India's tax-to-GDP ratio is lower than what one might expect for its income levels.
- Third, while the link between tax revenues to GDP and per capita GDP is robust, there is still significant variation. This variation is attributed to various factors, including the efficiency of tax collection, the structure of the economy, and path dependence, among others.

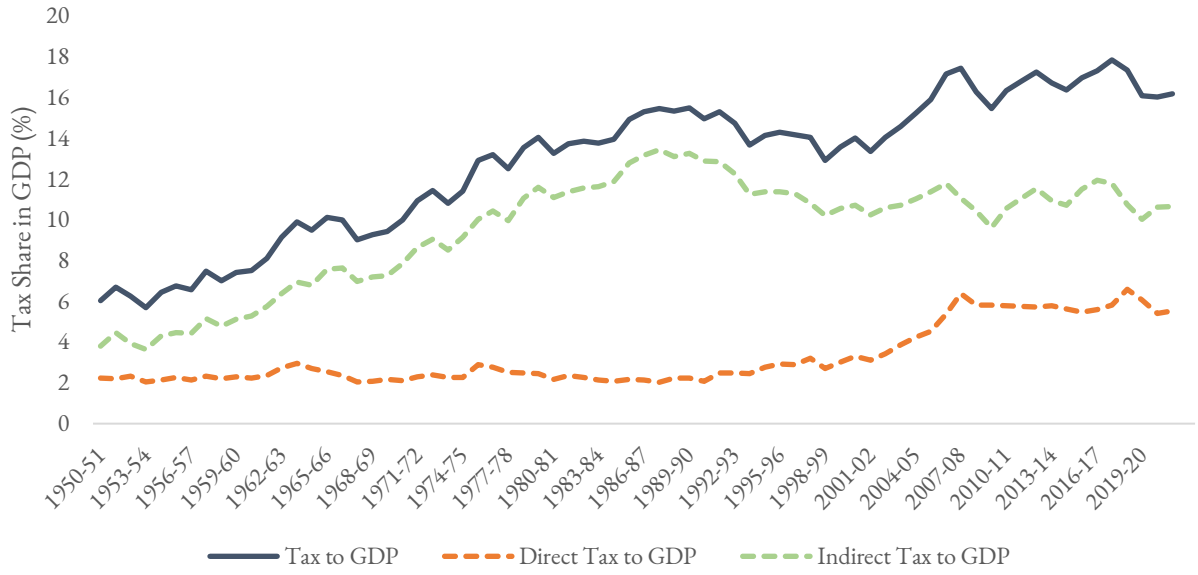
These factors suggest that while India has the potential to significantly increase its tax revenues over time, especially with rapid economic growth, the growth is not guaranteed. It is not the focus of this work to look at these issues in detail. However, we can straightforwardly deduce that for India to ensure greater revenue collection that outpaces GDP growth, it requires broader tax coverage, improved efficiency in tax collection, tax rates aligned with the nature of the economy, and the ability to collect taxes.

Figure 1 graphically represents the tax-to-GDP ratio in PPP terms for the year 2019. India's value for the year 2019 is denoted by a triangle. The graph indicates that India has a lower tax-to-GDP ratio

than one might expect. However, it is also evident that as India's GDP grows, the tax-to-GDP ratio can be expected to increase.

Historically, the tax-to-GDP ratio in India has increased. To illustrate this point, Figure 2 maps the tax-to-GDP ratio for direct, indirect, and total taxes for India, encompassing both Union and State tax revenues. The figure shows that India's aggregate tax revenues have been growing since independence, albeit not always in a smooth or linear fashion and have been stable between 16-18 per cent in the last 15 years.

Figure 2: Share of Direct and Indirect Tax Revenue in GDP for General Government



Note: The share of tax revenue in GDP for 2022-23 is based on budget estimates and has been taken from the Economic Survey (2022-23).

Source: Ministry of Finance (2019, 2023) & RBI (2022)

Consider the period from Independence to 1990, which saw modest economic growth, interventionist indirect taxation policies, and high levels of direct taxation. High tax rates are known to contribute to tax evasion and avoidance. While the proportion of direct taxes as a share of GDP remained relatively stable during the 40 years from 1950 to 1990, hovering between 2% to 3%, the share of indirect taxes rose from about 4% to more than 12% as a share of GDP. This shift also drove the aggregate Tax-to-GDP ratio to more than 15%.

Next, let's consider the period from 1991 to 2008. The economic reforms during this period aimed to enhance efficiency and release resources for investment and growth. One of the intended outcomes was to improve efficiency, making the increased role of direct taxes a desirable result. The Chelliah Committee Report was submitted in 1992-93, and a sequence of direct tax reforms were subsequently introduced. These reforms included, among other things, (a) the rationalisation of tax rates, including a reduction in some, (b) fewer direct taxation slabs, and (c) an improved coverage of the TDS mechanism (Singh 2019).

In later years, customs tariffs and excise duties were reduced as a part of India's tax reform program. While this may have initially contributed to the decrease in overall tax revenue shares, the 2000s saw a significant increase in the proportion of direct taxes in total tax revenues. Since the aforementioned reforms preceded the surging economic growth rates in the 2000s, direct taxes as a share of GDP increased from a historically stable 2% to about 6% by 2008.

After 2008, there has been a period of stagnation, extending into the early 2020s, with some fluctuations. The tax-to-GDP ratio is estimated at 17.6% in 2022-23. Stagnating growth has been identified as the primary cause of this medium-term trend; see, for instance, Rao (2016) and Singh (2019). However, this remains one of the major unanswered questions, despite significant tax reforms, including the introduction of VAT, GST, digitization, etc.

Nevertheless, it is evident that if we consider global experience, an increase in the aggregate tax-to-GDP ratio is plausible. As tax revenues from sources like fossil fuels, decline, other measures will be required. The trends and fluctuations in the tax revenue-GDP ratio also shed light on the importance of tax policies, economic conditions, and structural reforms over time.

We can conclude the following from the discussion above.

- International and recent experience suggests that the tax-to-GDP ratio may increase; however, it is uncertain how this increase will play out in terms of its time path and quantum.
- Historical evidence suggests that there is a significant time gap between cause and effect; that is, reforms, whether structural or tax-related, take some time to manifest in terms of tax revenue generation. Therefore, economic growth may not automatically lead to tax revenue growth, especially at a rate high enough to cover the loss of revenues from reduced usage of fossil fuels.

For illustrative purposes, let's conduct the following exercise. We estimated the trend growth rate of tax-to-GDP ratio for India and found that there may have been a stagnation in recent years, even though over a longer-term horizon, there has been an increase in the ratio. This is in line with global experience, as discussed above (Refer to Table 2). Our question is, for what time horizon would fossil fuel revenues be a significant part of the total revenue?

We find that by 2040, fossil fuel tax revenues would be about 0.9% of the GDP, and fossil fuel non-tax revenues would be 0.1%. Under standard growth assumptions, the overall tax-to-GDP ratio is expected to be about 23% by 2040. In other words, after 2040, fossil fuel revenues are not likely to be a significant part of the total revenue, as the share of fossil fuels in the menu of energy sources would have also reduced. By 2070, fossil fuel revenues would be insignificant given India's net-zero commitments.

Table 2: Projection of Tax Revenues As % of GDP (2019-70)

Year	Total Tax Revenue	Non-Fossil Tax Revenues	Fossil Fuel Tax Revenue	Fossil Non-Tax Revenues
	I=II+III	II	III	IV
2019	16.1	13.2	2.9	0.3
2030	21.2	19.5	1.7	0.1
2040	23.0	22.1	0.9	0.1
2070	28.5	28.5	0.0	0.0

Source: Authors' Calculations for I and II, (B&D 2022a) for III and IV. Tax revenues have been estimated by using the information in Figure 1.

To summarise this section, as fossil fuel use reduces over time, the bulk of the relative fall in fossil fuel revenues will occur between 2019 to 2030 and 2030 to 2040. Natural growth in tax revenues may not be rapid or certain enough to compensate for this decline. Therefore, India faces two revenue challenges.

- In the long term, overall tax revenue growth is feasible, but it will require proactive efforts. However, these efforts may take time to yield results, as international and national experience have shown.
- During the intervening period – between the fossil fuel transition and increased revenues through growth and reform – there will be a revenue gap.

The question concerning how effective carbon taxes can be to address the medium-term gap motivates the discussion below.

4. Taxation Alternatives

The previous sections provide three key elements for further discussion. First, the revenue challenge is more pronounced for the period spanning the next two decades, the period 2019-2040. Second, carbon taxes have a limited effective lifespan, and beyond a certain point, their ability to compensate for the fossil fuel revenue loss is limited. And finally, tax revenues rise over time with incomes and improved economic and taxation policies.

There has been significant discussion in the literature on potential avenues for increasing tax revenues. The topics include expanding the tax base, improving tax efficiency, rationalising tax rates, reducing deductions, and more. These issues have been addressed for both for direct and indirect taxes.

In addition, there is a growing momentum towards imposing greater user taxes, such as electricity duties and tax on distance travelled. This is a rich discussion, with significant revenue generation possibilities in the long run. However, these are all long-term and uncertain possibilities[4].

Table 3 provides a brief overview of the discussion. In the table, we consider four aspects to evaluate potential tax revenues:

1. The likely capacity to generate significant revenues in the future (revenue potential).
2. Whether the potential for tax revenue generation is of a long-term nature (labelled for our purposes as 'continuity').
3. Whether a significant institutional change would be required, such as a constitutional amendment.
4. Whether potential taxation solutions provide the flexibility and control to the State governments of generating funds (state autonomy).

Each of these are important for different reasons.

- Some possible options may not provide significant-enough revenues to cover the gap caused by the reduced share of fossil fuels.
- It is essential to determine whether these revenues can increase in the long term for tax sustainability.
- Deep institutional changes, such as constitutional amendments or requiring broad consensus, are difficult and time-consuming; for instance, the implementation and conceptualisation of GST took a decade-and-a-half.
- India's ongoing concern is the need to reduce its reliance on indirect taxes due to the consistency of the direct tax-to-GDP ratio.
- Finally, state autonomy will be an important criterion to consider in achieving a timely consensus and response to the revenue challenge facing India.

Table 3: Tax Revenue Options for India

Taxation Heads	Potential Options Available	Significant Additional Revenue Generation	Long-Term Revenue Potential - Continuity	Institutional Change Required	State Autonomy over Additional Resources	Miscellaneous
Personal Income Tax	Increase tax rate at higher income levels	Low to moderate	Yes	No	Low	Revenues less sensitive to higher tax rates
Personal Income Tax	Reduce minimum threshold	Low	Yes	No	Low	Generally believed to be costly to implement, with little returns[5]
Personal Income Tax	Include agricultural income	Moderate to high	Yes	Yes	Low	Constitutional amendment required
Corporate Income Tax	Increase tax rate	Low	No	No	Low	Globally comparable rates currently, foreign investment sensitive to tax rates

Taxation Heads	Potential Options Available	Significant Additional Revenue Generation	Long-Term Revenue Potential - Continuity	Institutional Change Required	State Autonomy over Additional Resources	Miscellaneous
Goods and Services Tax	Rate Rationalization	Moderate	Yes	No	Low	Difficult to get a common agreement with the GST Council
Goods and Services Tax	Inclusion of more goods and services ex. electricity, liquor	Moderate to high	Yes	Yes	Low	Moving from state VAT/sales tax to GST reduces state autonomy
User Taxes	Distance Travelled Tax	High	Yes	Perhaps	Low	Requires monitoring distance travelled by vehicles. If Union Government only – No amendment needed (Article 248 applies). For Union and State Governments together – Constitutional amendment needed.
User Taxes	Electricity Duties	High	Yes	Perhaps	High	For State Governments only – No amendment needed (as electricity duties are in the state list.) For Union and State Governments together –Constitutional amendment needed.
Carbon Tax	Single national carbon tax (all fuel taxes subsumed)	High	No*	Yes (Constitutional Amendment)	Low#	*Carbon taxes will eventually become negligible. #States will lose autonomy over fuel taxes.
Carbon Tax	Dual carbon tax - separate for centre	High	No*	Yes (Constitution	High#	# States have autonomy, but a double taxation

Taxation Heads	Potential Options Available	Significant Additional Revenue Generation	Long-Term Revenue Potential - Continuity	Institutional Change Required	State Autonomy over Additional Resources	Miscellaneous
	and states (all fuel taxes subsumed)			al Amendment)		regime will be inefficient
Carbon Tax	Implemented by the centre under Article 248 (state-level fuel taxes continue)	High	No*	No	Moderate	States retain some autonomy as fuel taxes are retained, but a double taxation regime will be inefficient
Carbon Tax	Subsumed under GST (on the basis of emissions by fossil fuel users)	High	No	Not clear	Low	Emissions monitoring + mapping of emissions to notional output value required.
Carbon Tax	Subsumed under GST (on the basis of potential emissions of fossil fuel seller)	High	No	Not clear	Low	Mechanism to monitor and map potential emissions to tax rate

In broad terms, there are limited avenues for rapidly increasing revenues from direct taxes, and they are unlikely to yield the desired results. On the indirect taxes front, due to India's federal nature and related mechanisms, the rationalisation of rates and the inclusion of additional items do not appear likely either. User Taxes (such as Electricity Duties and Distance Travelled tax) have some potential, but they come with numerous implementation challenges.[6]

In this context, carbon taxes can yield relatively high returns. However, they are not a long-term solution, as the revenue from these taxes will reduce as fossil fuel dependence decreases. What seems to be a more significant issue is that unlike fuel taxes, which provide a high level of autonomy to State governments, carbon taxes typically do not. Therefore, obtaining buy-in from State governments would be a challenge unless special measures are undertaken to protect state government autonomy.

4.1 New Mechanism for Emission or Carbon Taxes

One possible approach to increase revenue is implementing an emissions-based tax on polluting sectors. The tax increases the production costs of undesirable by-products (pollution, carbon dioxide emissions, etc.), and therefore can accelerate the shift towards greener technologies. The primary objective of such taxes is not revenue generation but correcting negative externalities. If successful in enabling the shift towards greener technologies, they are in fact aimed at generating fewer revenues over time.

Pollution/emission-based taxes can be imposed on specific sectors or the entire economy. They can target carbon emissions and/or other emissions or effluents as well. Moreover, like any tax, these taxes increase costs for businesses, reduce output, and have a consequent negative impact on growth. Therefore, it is not possible to introduce such taxes without a serious impact on output and growth (Verma 2021; Bohringer et al. 2018).

The discussion in this section focuses on the question of how well carbon taxes revenues could help cover the fossil fuel tax revenues gap. The Union and State governments tax different fossil fuels under distinct laws and Constitutional arrangements.7 Carbon taxes can potentially take many forms, but the key underlying factor is that these taxes are quantified on the basis of harmful emissions. Therefore, carbon taxes (as well as other similar pollution-related taxes) require appropriate monitoring of emissions.8

Currently, India taxes both coal and petroleum differently. However, these taxes cannot be labelled as carbon taxes because their taxation criteria are not based on emissions. The discussion in the following section presupposes that a carbon tax is imposed separately from the GST. The possibility of imposing GST on GHG-generating activities will be discussed in a later section on GST.

Revenue Generation

Consider the three key fossil fuels: Coal, Oil and Natural Gas. IEA (2021) estimated the use of these fuels under various scenarios and reported their CO2 emissions. Table 4[9] shows that the growth rates of the consumption of various fossil fuels decline over the periods of 2019-2030 and 2030-2040. Beyond 2040 to 2070, however, there will be a decline in total consumption, implying negative growth.

Table 4: Growth of Fossil Fuels and CO_2 Emissions from 2019-40

Fossil Fuel	Primary Demand (PJ)			CO2 Emissions (Mt)			Annualized Growth Rates of Primary Demand	
	2019	2030	2040	2019	2030	2040	2019-30	2030-40
Coal	17,292	20,851	22,652	1,622	1,951	2,108	1.87%	0.86%
Oil	10,133	14,026	17,209	612	842	1,030	3.49%	2.27%
Natural Gas	2,303	4,731	7,244	84	156	220	9.59%	5.31%

Source: IEA (2021) & Authors' Calculations.

Table 5: Carbon Tax Rate

Scenarios	2019	2030	2040
Case 1 – Revenue gap if fossil fuels taxes are replaced by carbon tax (% of GDP)	3.2	3.2	3.2
CTR – Rs. per tonne of CO_2	2,793	4,029	5,633
In current USD	34.1	49.1	68.7
Case 2 – Revenue gap if carbon tax is on top of current fossil taxes (% of GDP)	–	1.5	2.2
CTR – Rs per tonne of CO_2	–	2,053	4,046
In current USD	–	25.0	49.3

Note: The Carbon Tax Revenues (CTR) are in real terms assuming a 5% inflation rate from 2019.

Source: IEA (2021) & author calculations

Using these figures and the corresponding carbon emissions for each fuel, we can estimate potential revenues from carbon taxes under different emission-based tax rate assumptions. Table 5 shows the revenue target for each of the years. In Case 1, all fuel taxes currently imposed on fuels are removed and replaced with a carbon tax on CO2 and GHGs, respectively. In Case 2, current fuel taxes are retained, and carbon taxes are imposed on top of them.

We find that in Case 1, where fuel taxes are replaced by carbon taxes, a tax rate of Rs. 2,793 per tonne of CO2 needed to be levied in 2019 to cover the revenue gap. Over time, this rate will grow and reach Rs. 5,633 (in real terms) by 2040 to match the decline in fossil fuel revenue share. In Case 2, where existing fuel taxes are not removed, and carbon taxes are imposed on top of them, the initial tax rates would be lower. However, they would become significant by 2030 and subsequently, rising from Rs 0 to 2,053 per tonne of CO2 from 2019 to 2030 to Rs 4,046 by 2040.

As discussed earlier, beyond 2040, carbon tax revenues will start to decline due to the reduced use of fossil fuels. This paper does not estimate when that will occur, as it would require us to make assumptions about the time path and divert from the main objective of this story: to better understand the various fiscal possibilities for India. What is clear is that carbon taxes can be a significant revenue source, but their rates will need to rise significantly to bridge the expected revenue gap.

It's important to note that carbon taxes will need to be consistently increased over time, both to increase the incentive to shift to greener technologies and from a revenue equalisation perspective. Another significant aspect is that these taxes will involve much higher taxation of coal and a much lower taxation of petroleum and natural gas compared to the current situation in India.

In other words, depending on their imposition, carbon taxes may result in reduced tax revenues from petroleum products in India, and increased taxes and subsequent revenues from coal (see Table 6).

- Column V shows that in Case 1, where carbon taxes are imposed and all other fuel taxes removed, overall revenues for oil and natural gas would have fallen from 5.5 lakh crore to 1.9

lakh crore in 2019, while that for coal would have risen from 0.9 lakh crore to 4.5 lakh crore. This difference narrows by 2030, as petroleum consumption would have risen.

- Column VI shows the case for when carbon taxes are imposed on top of the existing the fuel taxes. The difference between coal and petroleum is less for the year 2030 than in the previous scenario, but still substantial.

Table 6: Estimation of Carbon Tax Revenue

Fossil Fuel	Quantity (PJ)	Emissions (Mt CO_2 Emissions)	Current Tax Revenues (Rs. Crores)	Carbon Tax Revenue – In Rs. Crores and as Share of GDP (%)	
				Case 1	Case 2
I	II	III	IV	V	VI
2019					
Coal	17,292	1,622	91,935 (0.5%)	4,53,057 (2.2%)	–
Oil and Natural Gas	12,435	696	5,55,528 (2.7%)	1,94,406 (1.0%)	–
2030					
Coal	20,851	1,951	63,959 (0.2%)	7,86,009 (2.1%)	4,00,618 (1.1%)
Oil and Natural Gas	18,758	998	5,18,572 (1.4%)	4,02,069 (1.1%)	2,04,929 (0.5%)
2040					
Coal	22,652	2,108	29,861 (0.1%)	11,87,596 (2.0%)	8,52,939 (1.4%)
Oil and Natural Gas	24,452	1,250	5,33,234 (0.9%)	7,04,220 (1.2%)	5,05,775 (0.9%)

Note: The tax revenues are in real terms, assuming a 5% inflation rate from 2019. The numbers in parentheses represent corresponding tax revenues as a proportion of GDP at 2019 prices.

Source: IEA (2021) for Columns II and III, Bhandari and Dwivedi (2022a) for Column IV & Authors' Calculations for Columns V and VI.

Continuity and Constitutionality

Currently, there is no legal mandate for a comprehensive or partial carbon taxation regime. However, Article 248 of the Constitution of India allows the Union government to impose taxes on any item not mentioned in the state or the concurrent list. Therefore, the Union government could impose a carbon emissions tax, but it does not enable it to stop State governments from taxing fuels.

There are two potential alternatives for implementing a tax on carbon emissions in India.

1. Mandate the removal of all fuel taxes and empower both the Union and the State governments to levy a carbon tax, which could be economy-wide or to specific sectors or items. This would require introducing a Constitutional (Amendment) Bill in both houses of the Parliament and obtaining ratification from at least half of the state legislatures. After the amendment, new legislation for the tax would need to be drafted and passed by the Union and each of the states. While this may be more acceptable to the States, it could lead to another source of inter-state differences that the introduction of GST sought to undo.
2. Alternatively, only the Union government can levy a tax. It can utilise Article 248 of the Constitution for framing a new legislation for the proposed tax on polluting sectors. The latter option can empower the Union government to unilaterally impose the tax, in addition to the fuel taxes that are already in place at the Union and state government levels.

Both these possibilities, whether a constitutional amendment or the utilisation of Article 248, would no doubt be a significant break from past practices.

Sharing, Flexibility and Autonomy

In the case of empowering both Union and State governments to levy a tax through a Constitutional amendment, we must consider three alternatives.

- The Union and State governments can levy carbon taxes separately, similar to how states have their respective VATs on petroleum products, along with excise duty levied by the Union. Each government can independently set its own tax rates and collect revenue from carbon taxes. This approach ensures complete autonomy for the States to determine the tax rates and utilise the generated revenue as per their specific needs and priorities. This could result in significant variations in carbon tax rates among different states.
- Alternatively, the carbon tax could be included within the ambit of Goods and Services Tax (GST), an option we will discuss later.
- Finally, the Union government may use its fiscal powers, as defined by Article 248, to unilaterally levy a carbon tax. In this route, only the Union government will have the authority to levy the carbon tax. The revenue generated from this tax would go into the divisible pool, through which the funds may be allocated to the Union and State governments based on the tax devolution formula recommended by the Finance Commission. In this case, the Union government would have absolute control over the tax rate and its base. However, fuel taxes at the state level will continue, and therefore it would reduce state autonomy but not eliminate it.

4.2 GST and Carbon Taxes

There are many forms of indirect taxes, including excise duties imposed and collected by the Union government, VAT collected by State governments, and taxes on specific products and activities such as intoxicants, among others. Some of these taxes persist for certain items despite the co-existence of

GST for most goods and services. Additionally, the Union government imposes and collects import tariffs. Among the indirect taxes, excise duties, VAT, import tariffs, and GST constitute the major components.

At present, crude oil and petroleum products such as diesel, petrol, aviation turbine fuel, and natural gas are not subject to GST. Instead, the Union government levies excise duty, while the states impose VAT on these items. Petroleum-related products significantly contribute to state government revenues, as discussed in Section two. For example, Mukherjee (2020) found that between 2010 and 2017, the petroleum sector accounted for an average of 45% of the total Union taxes collected. During the same period, an average of 26% of the state taxes collected from sales tax or VAT was attributed to the petroleum sector.

In the discussions between the Union government and the States that preceded the levying of GST, they had agreed that taxes on petroleum and alcohol for human consumption be left out of the GST fold. States may not have been willing to include these for fear of losing independent authority and autonomy over these revenue collections, as well as uncertainty over the adequacy and continuity of compensation mechanisms (Dutta 2020).

While GST is not a carbon tax, since it is already well implemented, we examine how and whether the current GST mechanism can be adjusted to include some form of carbon taxes. Carbon taxes are imposed on emissions and are not levied on inputs, outputs, or the technology utilised. The GST, however, is levied on an *ad valorem* basis. For instance, the GST on coal is currently imposed at the rate of 5% of the sale value of coal. Therefore, the current GST cannot be classified as a carbon tax.

We consider two possibilities, using coal as an example. The first case involves levying a charge on the coal producer, while the second involves levying a charge on the coal user.

1. Where the coal seller is taxed on its potential emissions (Case A).
    - Since coal is predominantly used in thermal power plants and industrial furnaces, we can estimate the average emissions per unit of coal used.
    - The GST rate on coal paid by the coal producer can be made proportional to the per-unit emissions of the users. Applying this principle, we estimate that the current GST on coal can be equated with Rs. 1,392 per tonne of coal for it to be equivalent to a carbon tax of USD 25 per tonne of CO2.
    - In this scheme, some authority would need to regularly monitor users' emissions and impose a GST rate on the seller based on the users' emission parameters.
    - Moreover, in this scheme, the GST would be a tax on a bundled product: the sales value of coal plus the value of the potential harm caused by its buyer.
    - However, please note that the above is not an *ad valorem* tax, and therefore, does not fit well in the GST scheme. Furthermore, it would require a high degree of credibility to frequently monitor and update the tax rates.

- Finally, the GST mechanism is not designed to support rapidly varying rates, so it is not clear how and whether this can be implemented.

2. Where a charge is levied on the coal user for its emissions (Case B), such as in a thermal power plant.

- Since GST is an *ad valorem* tax, it is imposed on the output value. Carbon emissions are a form of output, albeit a 'bad' and not a 'good.' This type of carbon-tax regime under the GST scheme would therefore need to take a form where the tax is imposed on a notional value, that is either proportional to the emissions, or proportional to the amount of 'bad' being caused by the emissions.
- That is, the carbon tax revenue, Ct, is the function of a tax rate, k, imposed on the notional value n(.), levied on the CO2 or GHG emission (e), or Ct = k*n(e). In this scheme, the greater the emission, the greater the notional value and greater the Ct paid, though the rate k may remain the same.
- Since it is based on a regular and firm-specific monitoring process, the notional value may differ across firms and over time. Therefore, an authority will have to be assigned the responsibility with built-in accountability for high- quality monitoring and valuation capacities.
- In this case, as well, the system would rely on high- quality monitoring. A standardised mechanism where, for instance, specific technology and inputs are mapped against different notional values may work.
- Moreover, in this case as well, the GST would be a tax on a bundled product; in the case of a thermal power plant, it would be based on the value of electricity produced plus the notional value of emissions.
- However, it is not clear whether a GST based on a notional value is feasible within the current legal framework.

In other words, while it may be feasible, conceptually, to incorporate a carbon tax mechanism under the current GST, there will be significant implementation and institutional challenges that will need to be overcome. Moreover, as earlier discussion shows, an efficient carbon tax regime will tend to reduce state autonomy over fossil fuel revenues unless other corrective mechanisms are designed.

5. Way Forward

In any tax reform, it is evident that the Union and State governments will need to arrive at a common agreement on design, implementation, and sharing. Such a consensus would be easier to achieve if the instrument under consideration is (a) placed under a currently operational mechanism such as the FC or GST council, or (b) centralised under the Union government with a good compensation scheme built in for States with a greater dependence on fossil fuels.

This study has examined the dynamics of tax revenues and fiscal implications of energy transition in the context of the advancement of developing economies towards developed status. The analysis of tax revenue-GDP ratios has highlighted the potential for higher ratios for developing economies as they transition towards development.

The role of non-conventional taxes such as carbon tax has shed light on alternative revenue sources that can reduce India's reliance on fossil fuel taxes. A carbon tax is a potential source of revenue generation that can either be levied on the CO2 emissions under two distinct scenarios – over and above the existing taxation on fossil fuels, or by removing these existing taxes – however, there will be significant implementation and political-economic challenges in either case.

The implementation and institutional challenges associated with both conventional (existing taxes such as personal income tax, corporate income taxes and GST) and non-conventional taxes emphasised the need for institutional changes to effectively raise revenues through these sources in the long run.

India needs to develop a comprehensive revenue strategy for the immediate future. This strategy should consider the unique context of India and focus on enhancing revenue collection through measures such as expanding the tax base, increasing tax rates, and introducing new taxes while also incorporating the key objectives of equity sustainability and growth. Furthermore, strengthening tax administration systems, enhancing taxpayer compliance, and establishing effective governance mechanisms are crucial steps in ensuring the successful adoption and execution of these fiscal measures.

Overall, the transition from developing to developed status requires a strategic and proactive approach to revenue generation. By embracing alternative revenue sources, addressing institutional challenges, and adopting innovative fiscal policies, India can navigate the challenges posed by declining fossil fuel revenues, and establish a sustainable and resilient fiscal framework for long-term growth and development.

However, there will be significant implementation, institutional, and political-economic challenges, given state autonomy considerations. Since the bulk of the fall in fossil revenue shares is frontloaded (over the next two decades), it is imperative that additional revenue generation options be identified and implemented urgently.

Further work needs to focus on some such possibilities that include the analysis of dearth of property tax revenues, whether electricity duties can become the main component of government revenues from energy etc. Other smaller revenue potential items but important revenue sources, nevertheless, include vehicle registration, parking fees etc.

Another possibility are taxes based on the distance travelled, the rate for this can be varied depending upon the type of vehicle (and its emissions and/ or energy efficiency). Here, as well, a mechanism for monitoring would be required. Therefore, fossil fuel-based vehicles could be taxed at a significantly higher rate than other. The greatest advantage of this mechanism is that it would be technology agnostic, and therefore, revenue need not reduce as fossil fuel use goes down.

This paper focused on various possibilities related to carbon taxes, which were found to be fairly challenging for India to implement smoothly and in a short span of time. However, some possibilities exist, even though it is unclear whether that would be most feasible and effective options. Another possible source of revenues is that of a cap-and-trade mechanism for GHGs / carbon emissions; as is the case with carbon taxes, these would be difficult to implement, given the lack of emission monitoring capacity and nascent emission trading mechanisms. But if we focus on the larger emitters initially, it may be a more feasible option to implement.

Finally, further study is required to better understand the revenue, equity, environmental, and efficiency implications of the range of possible solutions available to India. A comparison of the efficacy of carbon pricing approaches to that of subsidising renewables is also an important area for further research.

In addition, the experiences of the countries that have effectively designed carbon taxes within their existing structures of VAT can provide pragmatic ways of designing these taxes for India. This requires careful examination. The possibility of utilising these revenues to lower the tax rates from other distortionary taxes such as CIT, PIT, and indirect taxes is yet another possibility that needs to be explored. Since it creates an additional burden on the exchequer, curbing expenditures on non-merit goods also requires a closer examination.

We propose to undertake further study on some of these issues in future work. More specifically, what could be the possible path for India, which would depend on how each option measures against the multidimensional objectives of equity, employment, growth, and emissions reduction. Without a better understanding of these aspects, it would be difficult to ascertain what the superior taxation options are for India.

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Notes

[1] The IEAs are not the only such estimates, others such as (BP 2023) different estimates which (Bhandari and Dwivedi 2022a)) did not consider, however, the broad trends and deductions remain the same.

[2] *Prime Minister's Panchamrit commitments at COP26 include: First - India will reach its non-fossil energy capacity to 500 GW by 2030; Second - India will meet 50% of its energy requirements from renewable energy by 2030; Third - India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030; Fourth - By 2030, India will reduce the carbon intensity of its economy by less than 45%; And fifth - by the year 2070, India will achieve the target of Net Zero. The Panchamrit will be an unprecedented contribution of India to climate action.* (PIB 2021a)

[3] In a subsequent study, (Bhandari and Dwivedi 2022b) estimated the impact on individual states, and found large differences between them, as different states have different energy consumption and energy source profiles.

[4] There are other revenue generation possibilities as well, such as generating revenue from property taxes. However, these are under the purview of local governments, which we do not consider.

[5] Normally, the union budgets tend to increase the minimum threshold limits to provide tax relief to the low-income taxpayers, which is also the case with the latest budget proposals. However, lowering the minimum threshold is an option for generating continuous stream of revenue.

[6] It is sometimes argued that a cess can be levied over the existing GST. However, there are limits to what amount can be generated from them, moreover, state government may not have the same level of autonomy as fuel taxes.

[7] Union levies excise duty and CGST on fossil fuels. Excise consists of cess, special additional excise duty, and road and infrastructure cess (which depends on the type of fuel). While the states charge varying rates, they largely generate their revenues from VAT. The other revenue sources are SGST/IGST, Octroi, duties, entry tax etc. For a detailed description, please refer to Bhandari and Dwivedi (2022a and 2022b).

[8] Arguably, we could also envisage carbon taxes as based on output, if credible emission-to-output parameters are monitored and updated regularly.

[9] We haven't identified the exact period for this potential decline in total consumption, as Table 4 focuses on the next two decades. To reiterate, we recognise that by 2070, consumption will eventually become insignificant, but that horizon is not pertinent for this analysis.