Fossil fuel prices and inflation in India

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The analysis presented in this report was conducted in October 2022 with the most recent data available at that time, and the report considers policy announcements until end of September 2022.

Key findings

- **Between January 2021 and August 2022, fuel and power prices rose nearly five times faster than overall consumer prices in India.** Between January 2021 and August 2022, India's Fuel and Power price index has risen by 57%, while the overall price level has increased by 12% over the same period. Fossil fuels in particular are likely to be a key driver of recent consumer price inflation in India. In April and May 2022, fossil-fuel related items (transport and household energy) contributed around 20% to India's annual rate of inflation, which now stands at around 6%.
- **As a result of rising energy prices, households in the Delhi region are estimated to spend 25% more on fuels and electricity this year than in 2021, and nearly 50% more than in 2020.**
- **We estimate that the increase in household energy prices make urban households in the Delhi area at least 4,100 rupees ($50) worse off in 2022 compared to 2021.** For both urban and rural households, spending on energy has risen significantly, but as rural households spend a greater share of living expenditure on energy, they are disproportionately affected by rising energy prices.
- **The Indian government uses substantial fossil fuel subsidies and price control measures worth close to 0.5% of GDP which have shielded households from the full impact of global fossil fuel price hikes.** Support for fossil fuels is currently four times higher than public spending on renewables, and while the measures help households in the short term, they also alter price signals and reduce incentives for accelerating the energy transition and uptake of greener technologies in households and businesses.
- **Renewables are now much cheaper than fossil fuel-based electricity production in India, and their cost is forecast to fall further.** In fact, India is among the cheapest locations in the world for new renewable energy projects, but for now remains highly dependent on coal-fired electricity generation. Research from India's central bank has shown that the rising share of renewables in the electricity grid has already led to falling wholesale prices.
- **A further expansion of renewables therefore appears the right policy choice to increase India's dependency on energy imports, reduce the exposure of domestic consumers to global market prices, and bring down retail electricity prices in the long run.** The rapid deployment of renewables is particularly important to diversify India's power mix away from coal. Increasing the electrification of transport and household energy consumption, coupled with an expansion of renewables, can further reduce household and business consumers' exposure to volatile fossil fuel prices and limit the need for costly government intervention during times of high fossil fuel prices in India.

Energy prices and inflation in India

The world is experiencing a surge in the cost of living and corresponding inflation levels, mostly attributed to supply-side factors. Soaring prices of fossil fuel-based energy preceded and accompanied this return to inflation in countries across the world. Many renewable energy sources are now cheaper than fossil fuels in electricity generation, especially for newly-built capacity (IRENA, 2022). However, many of these advantages are new and not fully understood across policy and investment landscapes.

This paper sets out to explore the role of energy prices in inflation in India, with a view to understanding the potential for faster energy transition measures to ease inflationary pressures and risks.

India faces rising coal and oil import dependence

Energy demand in India has grown dramatically over the past two decades. India is one of the world's largest and fastest growing energy markets: it is the source of more than 10% of the increase in total global energy demand. Total energy use has more than doubled since 2000, driven by a growing population and strong economic development. By 2019, most households had access to electricity, which meant 900 million people gained energy access in two decades, but energy use on a per capita basis is about half the global average. There also remain large differences in energy consumption and in access to reliable energy across different parts of the country as well as across socio-economic groups (IEA, 2021).

India's overall energy supply is currently dominated by coal and imported crude. The use of renewable energy sources and gas has also grown steadily but they still account for only a relatively small fraction of total energy demand. As of 2020, 80% of India's primary energy demand was met by three fuels: coal (44%), oil (22%) and solid biomass (13%) (IEA, 2021). Coal still forms the backbone of the country's energy economy: India is the world's second largest coal producer with rich domestic reserves, but also the second largest coal importer to meet its energy demand (the first being China in both cases) (OECD, 2020).

India's domestic production of fossil fuels has not been able to keep pace with rising energy demand, which has increased import dependence over the past two decades. In 2019/20, around 25% of India's coal demand was met through imports, and 20% in 2020/21 (Government of India – Ministry of Coal, 2021). Likewise, in 2019, 85% of India's crude oil and 55% of natural gas demand were met through imports (IEA, 2021). Crude oil is brought in by tanker to Indian refineries from the Middle East, Latin America and Africa. To address the risks that could arise from growing oil import dependence, the Indian government has recently expanded its strategic petroleum reserve and is also planning to set up a strategic gas reserve (IEA, 2021).

The Indian government controls retail energy prices

Retail electricity tariffs are tightly regulated by government authorities, and many taxes subsidies are fixed at the state level and enforced through distribution companies, many of which are state-owned. The Indian government has sought to liberalise power distribution in the country, but this is not yet fully implemented.

Since 2017, retail prices for petrol and diesel are set daily through state-controlled Oil Marketing Companies under a dynamic pricing mechanism. Despite effective government control, retail prices now reflect global market prices for crude oil much more than in the past. The retail costs also include central- and state taxes, constituting up to 50% of the cost-to-consumer (Government of India – Ministry of Petroleum & Natural Gas, 2022a). Over time, the Indian government has gradually removed regulated prices and subsidies of transport fuels, and has progressively increased excise duties on these fuels during periods of lower crude oil prices (IEA, 2021).

India's updated NDC and other measures demonstrate an increasing ambition to reach climate goals

India is starting to boost investment in renewables and develop green industries, to support its 2070 Net Zero target. India's government announced a target to reach Net Zero emissions by 2070 at COP26, and has recently published its long-term strategy for decarbonisation at COP27. India's plans are supported by a range of industrial and energy policies.

India's recently approved update to its existing NDC (Nationally Determined Contribution) includes targets of having 50% of cumulative installed electric power capacity from non-fossil energy sources by 2030, and to reduce the emissions intensity of GDP by 45% by 2030, compared to 2005 levels (Government of India, 2022).

Bills passed in December 2022 seek to boost the deployment of renewable energy sources, in particular in energy intensive sectors, lay the groundwork for introducing an emissions trading system, and modernise the power distribution network (PRS India, 2022a; PRS India, 2022b). In 2016, the government also introduced a scheme to promote the use of LPG (Liquefied Petroleum Gas) as a clean cooking fuel for poor households in rural areas, with the aim to reduce the use of fire wood and other biomass (Government of India - Ministry of Petroleum & Natural Gas, 2022b).

More generally, India's key climate-relevant policy interventions have lately centred around production-linked incentives in various sectors, such as indigenising various value chains and creating champions for various greenfield sectors. India has undertaken several measures to promote local manufacturing of solar panels (see, e.g. Government of India – Ministry of New and Renewable Energy, 2021), ACC battery manufacturing and hydrogen among a set of other sectors. In the transport sector, India does not have clear targets for the electrification of road transport, but considerable subsidies are available for electric vehicle manufacturers in line with the recently announced New Electric Vehicle Manufacturing and Mobility Policy (The Economic Times, 2022b).

Fossil fuel subsidies in India remains far higher than support for renewables

Despite significant progress in the deployment of renewables, subsidies for fossil fuel industries remain far higher than support for green alternatives. This means that India's energy policy is currently still prioritising access to affordable fossil fuels over an acceleration of renewables and deployment of green technologies. Subsidies for renewable energy were around $1.5bn in 2022, almost double than 2021, which is mainly a result of a big increase in new solar PV installations (IISD, 2022). EV subsidies increased by 160% year-on-year to $0.3bn (ibid.), and support for renewables as a share of overall support to the energy sector is higher than in previous years.

However, oil, gas and coal subsidies were around four times higher than support for renewables. On top of that, the Government froze retail petrol and diesel prices, and cut VAT and excise duties on diesel and petrol to mitigate

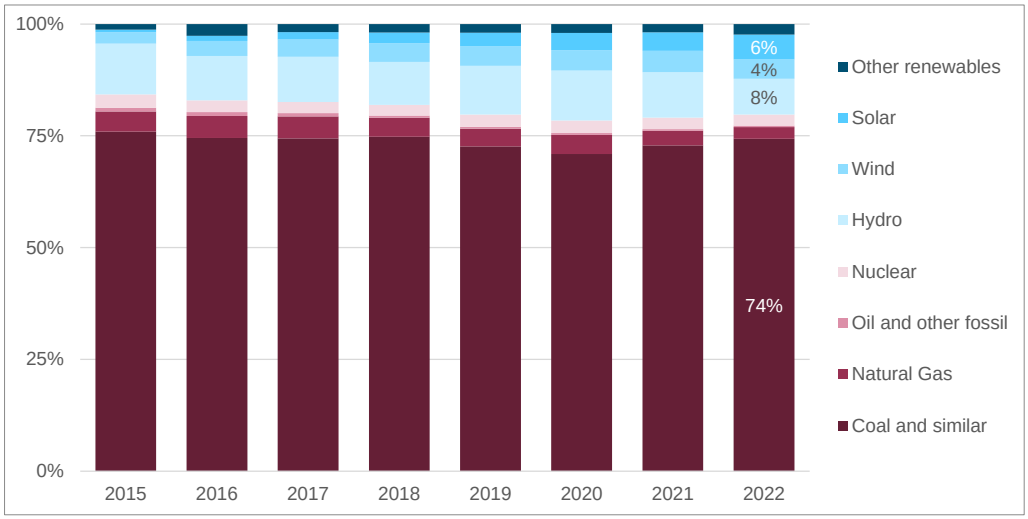
the risk of excessive losses for distribution companies as a result of the price freeze (ibid.). Another downside to the deployment of renewables are new import duties on solar cells (25%) and modules (40%) from 1 April 2022, which aim to protect the domestic industry from foreign competition but are likely to increase the cost of new domestic solar PV projects (S&P Global, 2022).

Coal is the dominant energy source of electricity generation in India.

Despite increasing policy support for decarbonisation, India's electricity generation remains largely reliant on coal. India has been facing a rapid increase in electricity demand in recent years, with total demand growing by 35% between 2015 and 2021 (from 1,200 to 1,600 TWh) as a result of an accelerating electrification of households and increasing living standards. Despite the expansion of renewable electricity generation in absolute terms (primary wind, up nearly 60% since 2015, and solar PV, now seven times more than in 2015), its share in the electricity mix has barely changed over the past four years, and actually slightly declined in 2021 and the first half of 2022. Currently it stands at around 20% of electricity production (Figure 1).

Coal continues to play an large role in meeting India's fast rising energy demand: coal-fired energy production increased by 30% in absolute terms between 2015 and 2021, while its share in electricity production remained unchanged at roughly 75%. In the autumn of 2021, as a result of rapidly rising electricity demand after the lifting of Covid-19 restrictions, India experienced severe coal shortages, with 80% of coal plants reporting critically low levels of reserves (IEA, 2022a). Some plants had to be shut down due to a lack of coal, missing deliveries to electricity distributors which then turned to the short-term wholesale market. As a result, wholesale prices peaked in October 2021. To reduce the risk of future shortages, the central government introduced mandates for coal-fired power generators to import 10% of their feedstock for several months in 2022, and re-introduced a 6% import requirement in early 2023 (Ministry of Power, 2023). This could have significant cost implications with the country's electricity regulator Central Electricity Regulatory Commission (CERC) in early January ordering commensurate compensation for power plants made to run on imported coal in 2022 (CERC, 2023).

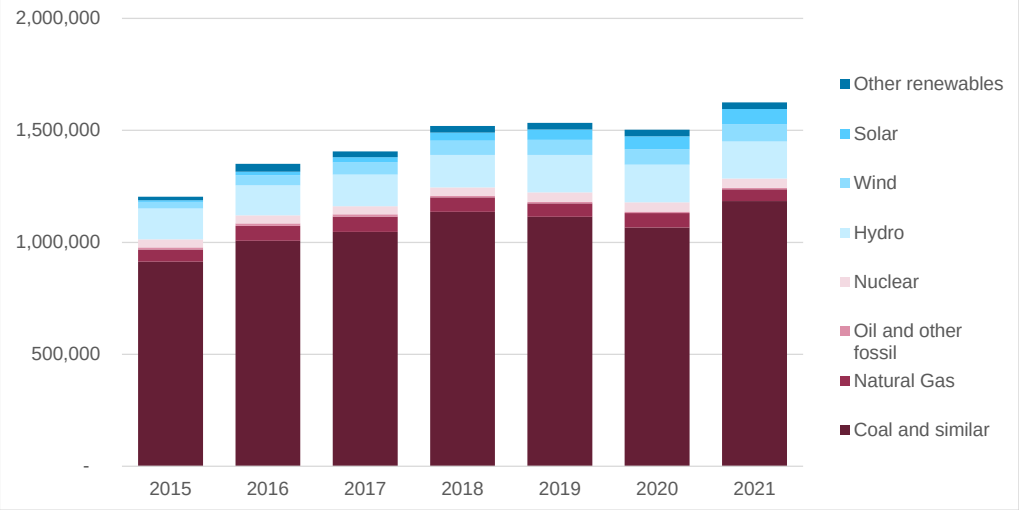
Figure 1 Electricity generation mix, India, from 2015 to 2022 (Jan-May)



Source: IEA (MES_0522)

Figure 2 shows India's growing electricity demand over time and the expansion of coal, as well as renewables-based production. The demand-dip in 2020 is likely a result of the Covid-19 pandemic, and led to a higher share of renewables in total electricity production as less coal-fired electricity was needed.

Figure 2 Electricity production in India, 2015-2021, in GWh

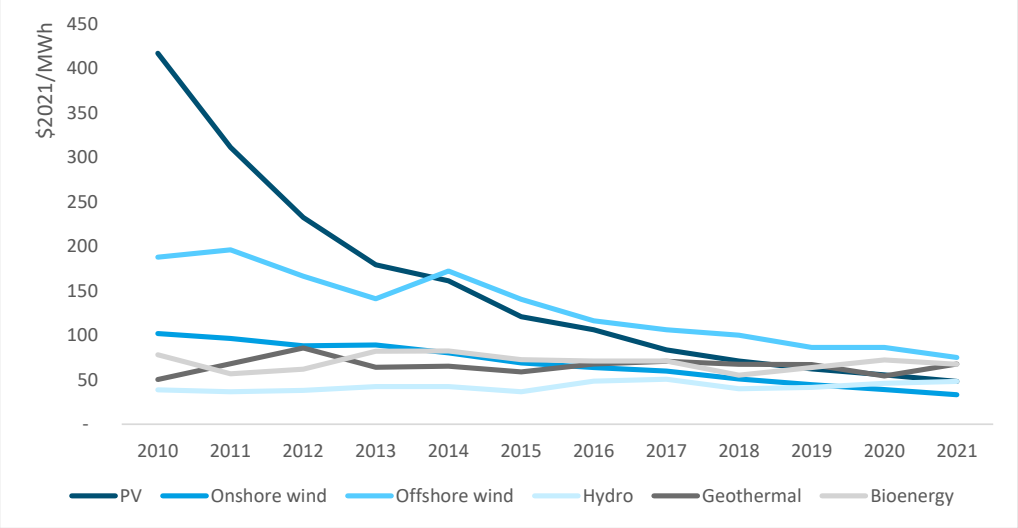


Source: IEA (MES_0522)

The cost of renewables has consistently gone down

The global average lifetime cost of renewables is now below that of fossil fuel-based power generation. The levelized cost of electricity (LCOE) of renewable energy technologies has been decreasing globally, as shown in Figure 4. The largest drop has been observed in the lifetime cost of solar photovoltaic power generation, which has fallen 88%, from $417 to $48 per MWh (2021 prices). Similarly, the lifetime cost per MWh of new offshore and onshore wind projects have reduced by 60% and 68%, respectively. At the same time, the LCOE of fossil-fuel based electricity generation has remained largely unchanged (IRENA, 2022).

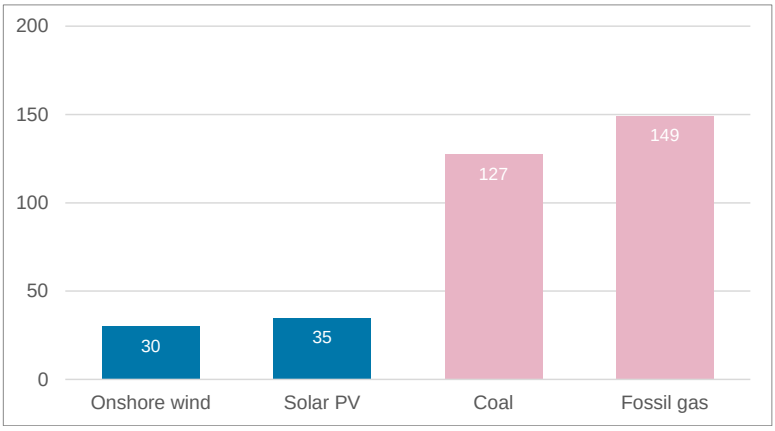
Figure 4 LCOE of renewable energy sources globally, 2010-2021 (in constant $2021/MWh)



Source: IRENA, 2022
Note: Global weighted average of commissioned projects

The levelized cost of electricity from new renewable energy projects is at a historical low and only a fraction of that of fossil fuels. In 2021, new renewable energy projects in India had one of the lowest costs globally. IRENA (2022) figures show that new onshore wind projects had a lifetime cost of 30 USD per MWh in 2021, lower than in any major economy except China. Utility scale solar PV projects in India had a lifetime cost of 35 USD per MWh, which is the lowest among major economies included in the analysis, and also below the global weighted average ($33 per MWh for wind and $48 for solar PV). As of 2022, fuel-only costs of gas- and coal-fired electricity generation stood at $149 and $127 per MWh in India – roughly four times higher than the cost of renewables.

Figure 3 Lifetime cost (LCOE) per MWh of new onshore wind and solar PV projects commissioned in India in 2021; fuel-only cost of gas- and coal-fired power plants in India in 2022; in 2021 USD.



Source: IRENA, 2022

Data from India's power exchange shows that renewables can reduce wholesale prices

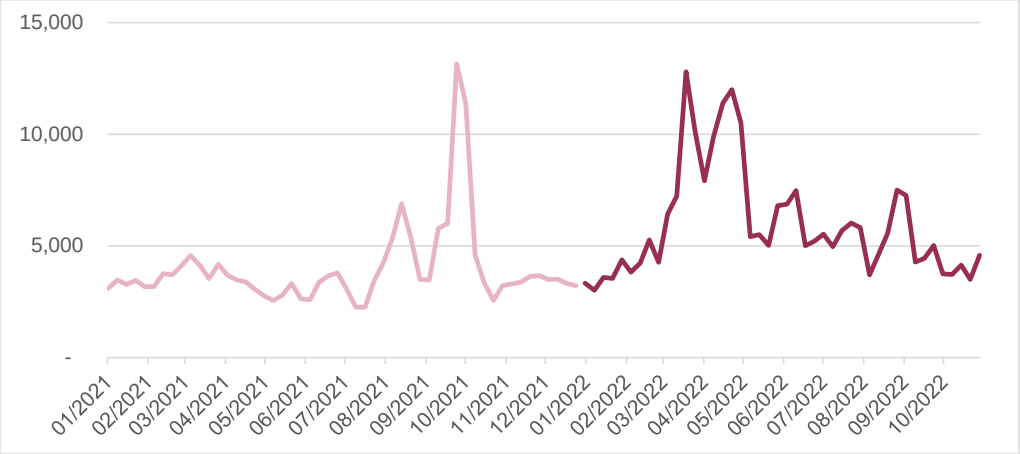
By boosting investment in renewables, India could benefit from the falling lifetime cost of renewable energy sources through lower production costs. The cost of electricity generation from utility scale solar PVs and onshore wind farms has fallen significantly over the past decade. The lifetime cost of solar PV dropped by 90% between 2010 to 2021 (from 352 to 35 USD per MWh), and that of onshore wind power dropped by around 66% over the same period, and is now 87% lower than in 1990. This trend is almost identical to the global one in both cases (IRENA, 2022).

Analysis by the Reserve Bank of India found that the increasing share of renewables in India's electricity generation mix has led to lower spot prices on India's power exchange (IEX). Econometric analysis of daily power exchange price data between October 2017 and December 2018 suggests that a doubling in the volume of renewable electricity generation reduces the average daily market clearing price by up to 10%. A further deployment of renewables is expected to lead to short-term power prices falling further (Agarwal et al., 2019). Greater renewables production should ultimately moderate retail electricity prices too, but this will happen over a longer time period given that tariffs are regulated and the cost base of electricity distribution companies is mostly determined by long-term power purchase agreements (see Box 1).

India has experienced volatile energy prices over the past 12 months

Indian wholesale electricity prices have been volatile over the past twelve months. Figure 5 shows wholesale day-ahead electricity prices in India between January 2021 and October 2022. There are two significant price hikes in this period. The first price hike occurred in October 2021 and is linked to demand upticks after the lifting of Covid restrictions which coincided with a severe shortage of coal, but prices have come to normal levels of 3,000 – 4,000 Rs per MWh. The second price hike began in late February 2022 is related to Russia's invasion of Ukraine, which pushed up global coal and natural gas prices. Despite India increasing imports of discounted Russian coal, the price of which was only marginally higher in summer 2022 than in summer 2021 (IEA, 2022), wholesale Indian electricity prices remained above 2021 levels, at roughly 5,000 Rs per MWh.

Figure 5 Wholesale electricity prices (day ahead) in India, in Rs per MWh



Source: IEX Market data, average market clearing price across regions

Considering purchasing power, Indian households face relatively high energy costs. Nominal electricity prices are comparatively low, with electricity costing roughly $0.70 per kWh in India in 2018, compared to a mean of $1.80 in OECD countries. However, adjusting for purchasing power parity (PPP)

India's electricity prices are significantly higher than the OECD average ($0.25 in India per kWh compared to $0.19) (IEA, 2021, p. 131). This is despite of the fact that commercial and industrial users are charged higher tariffs in order to offer cheaper prices to residential and agricultural consumers, as mentioned in Box 1. In September 2022, it was announced that the regulated price of domestically produced gas would be increased by 30-40% for the period from October 2022 to March 2023, depending on the type of gas field. (Reuters, 2022b), which is likely to feed through to retail gas prices over the coming months.

Box 1 The structure of India's electricity market

The wholesale electricity market in India is dominated by long-term contracts where distribution companies ('discoms') buy electricity from power generators well in advance through power purchasing agreements (PPAs). Contracts can be for as long as 25 to 50 years. These bilateral long-term contracts accounted for 90% of the traded electricity volume in 2019, and the delivery of electricity volumes is mostly managed bilaterally between generation companies and 'discoms' (IEA, 2021; CEF 2020). The remaining demand is met by medium (1-5 years) and short-term contracts, and only small volumes are traded on power exchanges (CEF, 2019).

In recent years, capacity additions have outpaced demand growth, and the IEA estimates there is now 40-50 GW of financially unviable capacity which causes problems for both power generators as well as distributors, as tariffs are tightly regulated. Also, because the vast majority of transactions are bilateral trades between generation companies and 'discoms', cheap excess power sometimes can't easily be sold in the little developed short term market, leading to inefficient resource use (IEA, 2021; CEF, 2020). The Indian government has therefore sought to develop the short-term market by introducing more products, such as futures contracts. Moving to a market-based short-term trading system based on marginal cost of supply, like in the EU, has reportedly also been discussed (CEF, 2020).

Indian electricity consumers are served by retail power distribution companies. But due to control of retail tariffs, which take into account producer costs and are set on a cost-plus basis, the retail electricity market faced by consumers is essentially a state-controlled monopoly (Reserve Bank of India, 2021). However, there are also large regional differences in electricity tax and subsidy systems, which lead to five times higher end-user prices in the most expensive states compared to the states with the cheapest electricity tariffs (IEA, 2021).

The tariffs set by regulators for households and agricultural users are generally lower and can be considered to be subsidised, while tariffs faced by industrial users are higher. In fact, industrial users account for roughly one third of electricity consumption in India, but around 55% of all electricity bill charges (Reserve Bank of India, 2021).

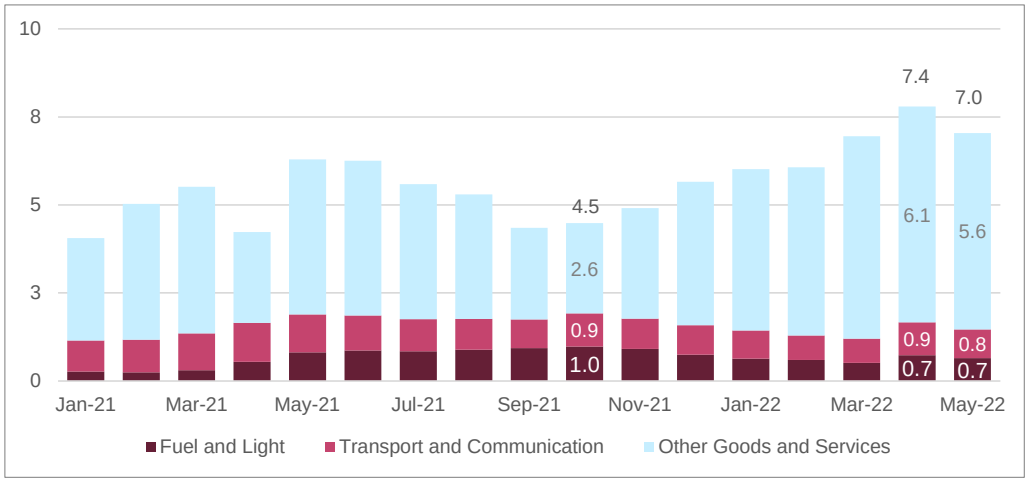
Fossil fuels are likely to contribute dis-proportionately to India's recent inflation

Fossil-fuel related items contributed just over a fifth to India's annual rate of inflation in the spring 2022. Fossil fuel-related items have a weight of roughly 15% in India's consumer price index, but contributed around 21% of India's annual rate of inflation in April and May 2022. In April, 'Fuel and Light' and 'Transport and Communication' contributed 1.7 percentage points of the 7.4% annual rate of inflation, and 1.5 percentage points of the 7.0% annual inflation rate recorded in May.

India's Reserve Bank does not provide more detailed figures, and the two categories identified as being related to fossil fuels also include non-related goods and services (such as electricity prices and prices of mobile phone and internet use). It is not possible to disentangle the impacts of fossil fuel prices from other prices included, but the figures for 'Transport and Communication' and 'Fuel and Light' suggest that fossil fuels currently make a disproportionate contribution to consumer price inflation in India. However, government control of retail fuel prices and lower import prices due to ramped up imports of discounted Russian crude oil (Reuters, 2022d) has meant the inflationary impact of fossil fuels has been much smaller in India than in other fossil fuel importing countries. In France and Germany, for example, fossil fuels alone were responsible for 30-40% of consumer price inflation in the summer of 2022.

Note that these figures only refer to the direct contribution of fossil fuel prices to the consumer price index. Across the economy, producers are also affected by higher fuel prices, and this in turn leads to rising prices in other goods when producers start passing through higher costs to buyers. Recent simulation with US data shows that these indirect inflationary pressure on the consumer price index is particularly high when prices change in the oil and gas extraction sector, and the petroleum and coal products sector (Weber et al. 2022).

Figure 6 Contribution of fossil fuel-related items to consumer price inflation in India (showing the contribution to the annual rate of change in each month)

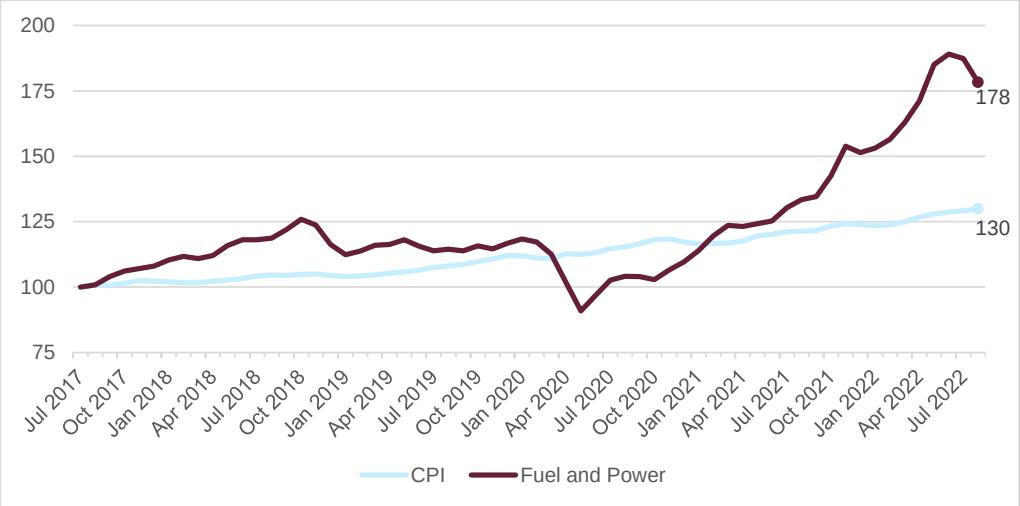


Source: Reserve Bank of India, CPI All India

Between January 2021 and August 2022, retail energy prices rose nearly five times as fast as overall consumer prices.

Since 2021, fuel and power prices have significantly outpaced overall consumer price inflation in India. The Indian central bank also published a 'Fuel and Power' price index alongside the overall CPI in a more timely publication (Figure 7) than its detailed consumer price inflation data shown in Figure 6. The 'Fuel and Power' price index provides a good indication of energy costs, although the proportion of electricity, fossil fuels, and other energy sources are unclear. Figure 7 compares the evolution of overall consumer prices to 'Fuel and Power' prices in India. Between January 2021 and August 2022, fuel and power costs have risen by 57%, while the overall price level has increased by 12%. In other words, household energy costs have risen nearly five times as fast as consumer prices overall over the past year and a half.

Figure 7 CPI inflation and 'Fuel and Power' price index, monthly, January 2021 = 100



Source: Reserve Bank of India, Weekly Statistical Supplement, Time Series

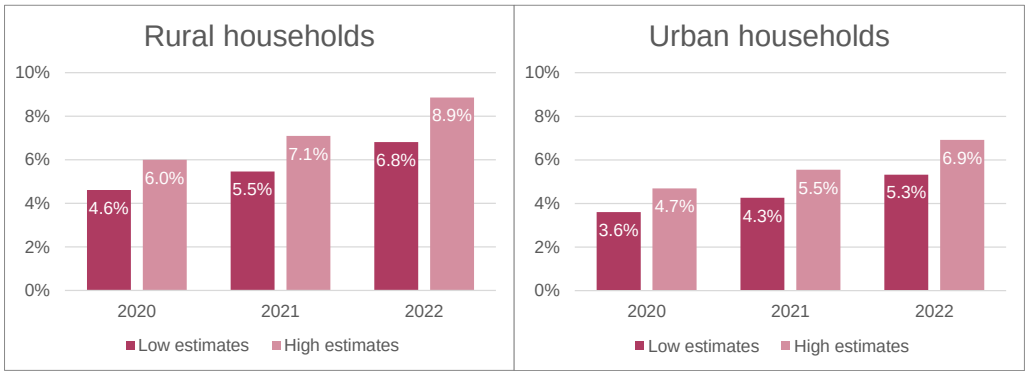
Household expenditure one energy has increased by an estimated 50% since 2020.

As a result of recent increases in fuel and electricity prices, Indian households now spend a greater share of their incomes on energy than in previous years. Based on consumer price indices published by the Reserve Bank of India and extrapolating household expenditure data from the latest identified data from India's Household Consumption Survey (2011/2012), we calculate indicative estimates for the share of household expenditure on energy in recent years in the Delhi area, which are shown in Figure 8. Given the limited data availability, Figure 8 shows both low and high estimates.[1]

[1] Because the extrapolated estimates from official sources are rooted in 2011/12 data for energy consumption (latest available), we think these are likely to be underestimates and therefore represent the 'low estimates' in Figure 8, considering that per capita energy use is likely to have increased since 2011/12. These figures are low estimates for various reasons: figures from CEEW (2021) suggest that in 2020, typical rural households spent 6.7% of total monthly expenditure on cooking fuels alone, although this is a nationwide figure. Moreover, household access to electricity in India has increased significantly since the early 2010 years: in rural areas, it has increased from 55% in 2010 (CEEW, 2020) of households to 97% nowadays (IFC, 2022). As a result, households are likely to be using more electricity consuming devices such as air conditioning and fridges, which is reflected in a 60% increase in per capita energy demand in India since 2000 (IEA, 2021). Therefore, we complement these extrapolated estimates with 30% augmented figures as indicative upper bounds, based on a crude assumption that roughly half of the 60% increase in

We estimate that households in the Delhi area now spend at least 25% more on fuel and electricity than in 2021, and at least 48% more than in 2020 (lower bounds). For rural households, energy and fuels are estimated to account for between 7% and 9% of total consumption expenditure this year, or at least 3,400 Rs ($41) more per year compared to 2021. For urban households, our estimates suggest that energy and fuels now account for between 5% and 7% of total consumption expenditure, or at least 4,100 Rs ($49) more per year than in 2021 (Figure 8). Note that due to limited data availability, these figures are uncertain and should be seen as indicative only.

Figure 8 Estimated expenditure on fuels and electricity as a share of total consumption spending of rural and urban households in the Delhi region



Source: CE analysis based on Reserve Bank of India consumer price data (WSS), and Household Consumption data published by the Government of Delhi

There are significant differences in the type of energy consumed by rural and urban Indian households, as well as significant regional differences (IFC, 2022). While almost all urban (99%) and rural (97%) households nowadays have access to electricity, there remain big differences in fuels used for cooking, for example (ibid.). In the 2019-2021 National Family Health Survey, only 43% of households in rural areas reported access to relatively clean cooking fuels (electricity, piped gas, or liquefied gas in cylinders).[2] In urban areas, this figure is 90%, which means that 10% of urban households still rely on fuels such as wood or charcoal (ibid.). This means that urban and rural households are also differently affected by changes in prices of different fuels.

The Indian government is intervening to limit the impact of fuel price hikes on consumers

The Indian government has announced interventions worth 0.5% of GDP to shield households and industry from rising energy prices. While the impact of rising energy prices on overall consumer price inflation has been less severe than, for example, in European countries, the impact of higher fuel and electricity prices on Indian household budgets are significant as shown above. The Indian government has therefore taken measures to shield households from further price increases.

In late 2021, however, the Indian government froze petrol prices at state-owned retailers until mid-March 2022. In early April, the government froze

per capita energy consumption in India between 2000 and 2020 can be attributed to the period between 2011/12 and 2020.

[2] Natural gas and LPG aren't universally considered clean fuels due to the harmful emissions these technologies can cause. However, WHO guidelines for indoor air quality define electricity, biogas, natural gas, LPG, solar and alcohol fuels as clean fuels and technologies in a cooking context. See, for example: https://www.who.int/data/gho/data/themes/air-pollution

prices again until now, and is poised to continue the price freeze. On October 12, the government approved a plan to compensate state-owned retailers for the losses incurred as a result of the price freeze, which is forecast to cost 200bn Rs ($2.7bn) (Bloomberg, 2022; The Economic Times, 2022a).

In May 2022, the Indian government also announced cuts to excise duty on petrol and diesel of 6 and 8 Rs per litre (roughly $0.10 and $0.07), respectively – this decision alone is forecast to cost one trillion Rs ($12.3bn). In addition, new subsidies for cooking gas cylinders were announced, available under a scheme for women in low-income households, with an expected fiscal cost 61bn Rs ($750m). Moreover, import duties for energy-related commodities were cut to reduce costs of energy producers and energy-intensive industries (Reuters, 2022c). Taken together, these recent measures are worth close to $16bn, which is approximately 0.5% of India's GDP.

India could draw multiple benefits from an accelerated expansion of renewables

India's increasing dependence on fossil fuel imports is a key energy security risk in the coming years, if the trend is not reversed. According to the IEA, domestic production of oil and gas will continue falling behind consumption trends, and net dependence on imported oil is expected to rise above 90% by 2040, up from 75% today (IEA, 2021).

Considering the volatility of global fossil fuel prices and the historically low prices for installing new solar PV and wind power plants, an accelerated installation of renewable capacity could help stabilise energy prices in India in the long run. Besides this, boosting the share of renewables in India's energy mix would reduce both India's energy import dependency and the exposure of Indian energy consumers to volatile global market prices.

The most recent IEA energy outlook report for India (IEA, 2021) investigated the implications of various possible pathways for the future of Indian and global energy system, with the India Vision Case (IVC) scenario assuming the full implementation of India's stated policy aims. This includes, for example, a longer-term focus on deep decarbonisation of the industrial sector, a substantial increase in the share of natural gas in India's primary energy mix by 2030, and 450 GW of non-hydro renewable capacity by 2030 (IEA, 2021, p.60). The IEA's analysis finds that decarbonisation objectives may be difficult to meet because they conflict with other targets, such the planned expansion of domestic coal production. To strengthen energy security and energy access for a growing population and economy, India will need to take on a systemic approach to energy policy making that accounts for the wider impacts of different policy choices.

Conclusions

Fossil fuels prices are linked to current cost of living pressures in India, making a disproportionate contribution to recent consumer price inflation. However, the impact of fossil fuel prices on inflation is less severe in India than in many European countries, which are also heavily exposed to global market prices for crude oil and natural gas. Nevertheless, Indian households face significant increases in the expenditure on energy which have prompted the government to respond with tax cuts, price freezes and subsidies worth 0.5% of GDP in total.

There are clear signs that decarbonising India's energy systems can moderate the contribution of energy prices to consumer price inflation and volatility in the long run. The lifetime cost per MWh of new solar PV and wind power plants in India are estimated to be far cheaper than that of new coal-fired plants and natural gas-based electricity production. Increasing the share of renewables in electricity production has been found to reduce spot prices in India's wholesale market, and India's central bank expects further reduction in prices if the deployment of renewables accelerates.

The Indian government is currently spending billions on direct and indirect fossil fuel subsidies – worth around 0.5% of GDP – to ensure affordable energy for consumers and businesses. While benefitting consumers in the short term, these interventions also alter price signals which could otherwise incentivise a faster transition towards cleaner technologies. Shifting public subsidies away from fossil fuels and prioritising funding for renewables and the electrification of transport and household energy use (for heating, cooling and cooking) would also reduce the populations' dependency on fossil fuels and reduce the need for government intervention to keep prices low. **Currently, the full benefits of renewable energy can be hard to identify in India.** Retail prices of fossil fuel-based energy carriers are heavily regulated through the use of tariffs, taxes, subsidies, and price caps. To a certain degree, this hides the true prices fossil fuel-based energy sources, making the case for fossil fuels less clear from a consumer perspective.

Considering India's rising dependence on energy imports, the energy security advantages of renewables are another key benefit that policy makers must consider. India's energy system is dominated by coal, 25% of which is imported and vulnerable to global price shocks – the price hikes in the autumn of 2021 have made clear the resulting vulnerability of India's energy system.

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