

# Review Study on Price Fluctuation of Gas and Electricity in India from 2021-2023

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**Abstract—** Retail prices of gasoline, diesel, and liquefied petroleum gas (LPG) and other energy products in India are a combination of oil prices, taxes and subsidies imposed by the government and government. The Covid-19 crisis has further exacerbated the challenges faced by oil and gas exporters. To some extent, this is good for India, as lower prices ease oil import costs. But stretched balance sheets and uncertain demand are also affecting the outlook for housing and equipment investments. Last year, there was a crisis in the region and the region witnessed geoeconomic turmoil, which had many effects on the world economy. As the world recovers from the pandemic and the economy begins to recover, the ongoing conflicts in Russia and Ukraine have also affected oil and coal supplies. This study examines oil and electricity price changes and associated factors in India from 2021 to 2023.

**Keyword:** *Price Fluctuations, Gas, electricity*

## I. GAS MARKET IN INDIA

The first discovery of natural gas in India took place in 1889, when it was found in a well in northern Assam. For a long time since then, oil exploration and development has neither brown nor slowed down. In fact, people know very little about the use of oil. Most exploration is for oil, while natural gas is discovered from nature or natural gas. For this reason, the growth of natural gas has almost stopped in the last eight years. Natural gas can only be used in villages in different regions such as Assam, Tripura, Gujarat, KG Basin, and Cauvery Basin and is used only for heating purposes. Many small businesses also manufacture ceramics, glass, sponge iron and tea making etc. He also uses natural oil. In 1992, a new market for natural gas was created when the Hon'ble Supreme Court directed GAIL to develop the use of natural gas in transportation. This has led to the city's oil exports in the country serving four segments of oil applications: household appliances (those that use oil primarily for cooking), commercial establishments such as hotels and hospitals (those that primarily receive gas,

use it for heating, etc.). cooling and cooking etc.). The century-old history of natural gas exploitation in India has witnessed various gas pricing regimes. This trend continues today with oil prices in India mixed.

- GAS Pricing Stages in India
  - Pre – 1970 Scenario: Gas price fixed by the Government based on the
  - Recommendation of the Expert Committee nominated by the government.
  - Early Seventies; ONGC as producer set the gas price on negotiated basis. This resulted in different price to different customers, in different regions and at different time.
  - Mid seventies; Producers fixed uniform price on cost plus and pooled basis. These variations got addressed by the government from time to time and the industry saw the gas price variation on time basis as briefed below:
  - During 1976-1991: GOI fixed Gas price on cost plus basis on year to year basis

### A. Issues related to Gas Pricing

#### 1) Suppressed domestic gas price

The fact that the price of the product is lower than its equivalent causes it to exceed the market value for home use. It further suppresses domestic production and helps promote imports. In general, the country's self-sufficient labor price will vary between FOB and CIF limits since there is an import and export option. For example, India is a major oil importer and exporter of petroleum products. The simultaneous existence of different prices can distort the market and lead to competition. This also hinders the growth of new markets because oil prices in old markets are lower than in new markets.

#### 2) Gas Transportation

Another factor affecting the economy is transportation, and transportation costs are a separate problem for India.

The root cause of the problem was India's oil supply shortage before the rules were introduced to the market. According to the provisions of the PNGRB Act, 2006, oil industry infrastructure will be developed through competitive tendering. Therefore, it is a natural phenomenon that many players emerge. Fees may be determined through competition or by the board of directors, and different lines may have different fees. In addition, natural gas consumers have to pay more electricity bills for the pipelines used to transport natural gas from the entry point to the delivery point. Since the primary cost of electricity accounts for approximately 80% of electricity costs, gas users using more than one pipeline are at a disadvantage compared to water pipe users within the same distance. Additionally, customers who live further from the gas station pay more.

3) Tax structure

Natural tax issues are left to state governments. For this reason, many states apply different rates to sales and input taxes. As can be seen from the figures in Table 1.3 below, change reports range from 0% to 26%. These large differences make many businesses in these states uncompetitive.

Table 1 tax structure on natural gas

State	Sales Tax	Entry Tax	Service Tax	Excise Duty
Delhi	0	0	12.36	10
Maharashtra	13	0	12.36	10
Gujarat	15	0	12.36	10
UP	26	5	12.36	10
MP	13	2	12.36	10
Haryana	4	0	12.36	10
Rajasthan	13	0	12.36	10

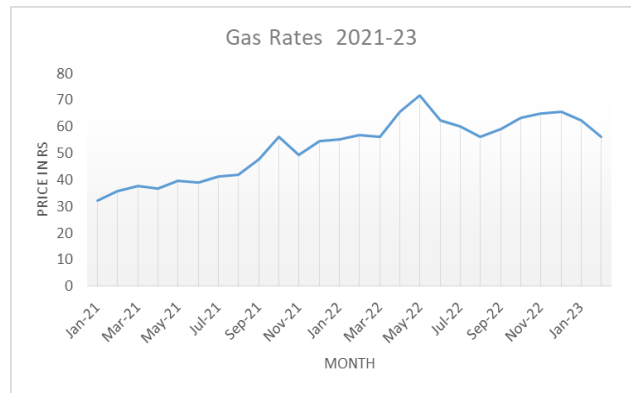
When transportation of fuel is stateside and the sale of the fuel is specified in the shipment, the sale of fuel is subject to 2% CST, otherwise tax services and state sales tax will be charged on piecemeal gas and transportation contracts.

B Gas Pricing 2021-23

Table 2 Gas Pricing 2021-23(Mahanagar Gas, Mumbai)

Gas Rates Datasheet		
Sr No	Month	Price/SCM(3%VAT)(In Rs)
1	Jan-21	32.14
2	Feb-21	35.88
3	Mar-21	37.60

4	Apr-21	36.60
5	May-21	39.63
6	Jun-21	39.10
7	Jul-21	41.33
8	Aug-21	41.75
9	Sep-21	47.61
10	Oct-21	56.24
11	Nov-21	49.39
12	Dec-21	54.65
13	Jan-22	55.36
14	Feb-22	56.72
15	Mar-22	56.3
16	Apr-22	65.63
17	May-22	71.78
18	Jun-22	62.24
19	Jul-22	59.92
20	Aug-22	56.22
21	Sep-22	59.08
22	Oct-22	63.45
23	Nov-22	65.03
24	Dec-22	65.60
25	Jan-23	62.21
26	Feb-23	56.12
27	Mar-23	48.06
28	Apr-23	52.32
29	May-23	47.00
30	Jun-23	45.00
31	Jul-23	43.27
32	Aug-23	44.11
33	Sept-23	51.00



Graph 1 Gas Pricing 2021-23

II. ELECTRICITY MARKET IN INDIA

Today, where electricity forms the basis of many lives, its role in transportation and heating will become more important than technologies such as electric cars and heat pumps. Energy production is currently the world's largest

source of carbon dioxide (CO<sub>2</sub>) emissions, but it is also the industry that is rapidly driving the transition to net zero emissions through growth through renewable energy sources such as solar and wind. At the same time, the current global crisis has brought energy security and affordability to the top of the political agenda of many countries.

India has made significant progress in the energy sector in the last five years. Statistics show that approximately 40 million households were connected to the grid under the National Rural Electrification Program between 2011 and 2016. 1 On the other hand, approximately 45 million 2 households are still waiting to connect to the grid or receive reliable electricity. and cheap electricity. Moreover, according to the latest data and regional surveys, electricity supply in most parts of India is not only inadequate but also of poor quality and Trust, i.e. poor information and good transmission. distribution is declining and they all need to expand and improve infrastructure. 3 Another important difference is that in many villages, three-phase connection is mandatory for small and small businesses that do not have the opportunity to expand or strengthen the grid, according to the national campaign. Rural Electric Service. The lack of reliable electrical equipment also forces consumers to invest in solutions, which will increase their overall debt.

In priority order, the central government should concentrate on each of the following tasks for the next five years,

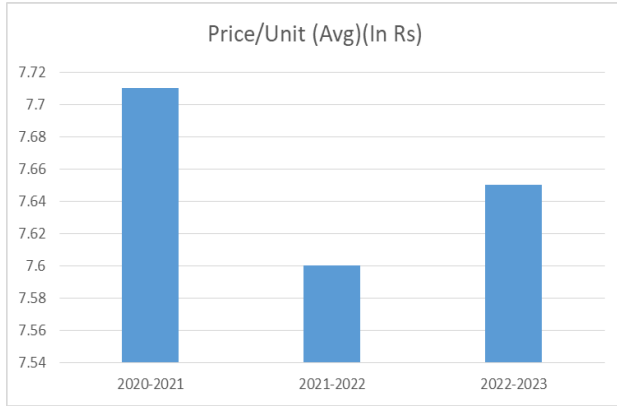
- Adopt a comprehensive reform plan for the electricity supply industry Introducing competition in electricity and improving overall performance, including targets for energy use, energy security, environmental protection and road economic growth.
- Make the states accountable for the performance of their public electricity system, By providing greater economic support to more successful countries. transparent process. Priority should be given to completing all refunds within the specified time frame. This is necessary because decline that is not mechanical—not paid for or stolen—usually results from political interference or neglect by the state government. State governments should be given incentives to enforce the law and get consumers to pay less, and punished if they don't. Countries will have to consider import and export (T&D) losses in

their budgets and set tariffs based on lower T&D losses, including piracy. This will strengthen the supervisor's responsibility to monitor transmission and distribution losses and distinguish between unemployment and non-technical losses. In addition to legislation to reduce tariffs and electricity theft, targets and incentives for states also need to be established. Progress will not be possible without increasing revenue for end customer power. Only those who are united can reap economic benefits through cooperation and collaboration at the joint level.

- Concentrate political accountability in a single energy ministry. Solar power will experience explosive growth in India, catching coal's share in India's power generation mix within two decades. STEPS in or before a sustainable mega scenario Currently.
- The Indian electricity sector is on the cusp of a solar-powered, solar power accounts for less than 4% of India's electricity generation, while coal accounts for about 70%. In STEPS, this rate drops below 30% by 2040, and in other scenarios this change is even faster. This major shift is driven by India's policy targets, particularly its target of 450 GW of renewable energy by 2030, and the varying cost competitiveness of solar power even with storage batteries. The rise in costs of energy-efficient renewable energy is supported by new regulatory frameworks that encourage the integration of solar energy with other technologies and storage products, providing “round-the-clock” service. Committing to renewable energy also means dealing with risks associated with delayed generator payments, land acquisition, and regulatory and contractual uncertainties. But the projections in STEPS do not come close to ensuring that solar power will meet India's energy needs, especially for other applications such as solar roofs, solar heating and water pumps.

Table 3 Electricity Rates (TATA Power, Mumbai)

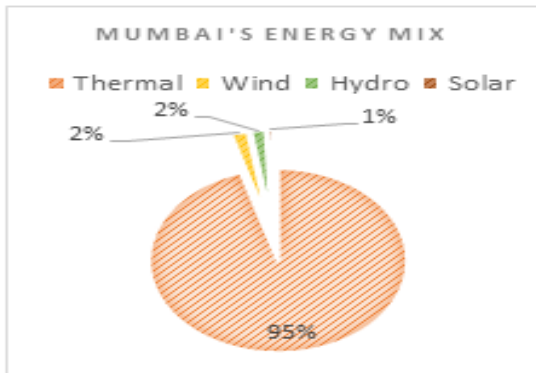
Electricity Rates (TATA Power, Mumbai)		
Sr No.	Year	Price/Unit (Avg)(In Rs)
1	2020-2021	7.71
2	2021-2022	7.60
3	2022-2023	7.65



Graph 2 Electricity Rates (TATA Power, Mumbai)

### III. ENERGY MI

Since the Industrial Revolution, the development of society has been achieved thanks to fossil fuels. Globally, the share of coal, oil and gas in the electricity mix was around 85% in 2018, while hydropower (6.8%), other renewable energy (4%) and nuclear power (4.4%) fell further. Most of this is from burning fossil fuels, which are responsible for nearly three-quarters of the world's greenhouse gas emissions. Not only is energy production the biggest driver of climate change, but the burning of fossil fuels and biomass will also harm human health: At least 5 million people die every year due to air pollution. Therefore, the world needs to move from fossil fuels to an energy model controlled by low-carbon energy sources, renewable technologies and nuclear energy. Energy and construction industries account for more than 60% of Mumbai's total carbon emissions. Energy use in residential, commercial and office spaces accounts for more than 45% of the city's total emissions, offering Mumbai its best opportunity to reduce emissions. For fixed electrical equipment in the office, see Figure 3..



Graph 3 Mumbai Energy Mix

Currently, electricity generation is dominated by coal, natural gas and fossil fuel thermal power generation, accounting for 95%, followed by hydropower, wind power and solar power generation electricity with a share of 5% (see Figure 3 for details). Mumbai's electricity demand rose to 3,400-3,600 MW last summer, accounting for 24% of Maharashtra's total electricity demand in 2020. The city's energy needs will only increase as electric cars grow and the need for air conditioning improves. According to the research conducted in 2017, the city has 1,724 megawatts of solar energy capacity on residential, educational, commercial and municipal buildings and roofs, which can meet half of the city's total energy needs. Rooftop solar installations of individual homes produce 1,300 MW. This is followed by commercial buildings with 223 MW and schools with 71 MW. Andheri West (N West Ward) and Borivali (R Central Ward) districts have the highest amount of sunshine in Mumbai. In 2021, the Maharashtra Electricity Regulatory Commission (MERC) allowed a "smart energy tariff" of Rs 0.66/kWh for consumers opting for 100% green energy. Thus, both Adani and Tata Power-owned DISCOMs offer their customers a choice of green electricity prices in Mumbai, including corporate, commercial, industrial, residential recreational, restaurant and customer accommodation. The purchase price of renewable energy is borne only by the specific customer who chooses the renewable energy option. Customers have the flexibility to determine the percentage of renewable energy in their total energy use or can choose 100% renewable energy.

#### A. Trigeneration

Trigeneration or combined cooling, heating and power (CCHP) refers to the simultaneous production of electricity, heating and cooling from a single source. Heat and electricity are produced by the traditional operation of combined heat and power (CHP), and water absorption chillers are a method of using fire electricity from CHP to save energy. An immersion chiller is an air conditioning system that uses heat to provide the energy needed to drive the cooling process. Since there are no moving parts in absorption chillers, there is technically no wear and tear, and operation and maintenance costs are very low. Additionally, whole life costs are lower due to the use of technology when viewed as part of a broader solution. This makes it attractive for solutions where the engine does not need to provide some or all of the heat.

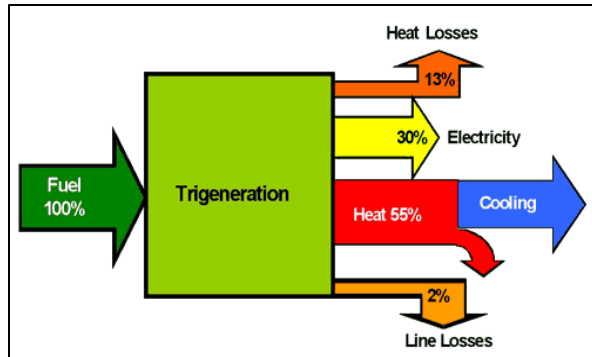


Fig 1 Trigeration

Trigeration is an attractive option where all three needs arise simultaneously, as does the need for cooling during the production process. Trigeration is best when scaled to fit a building or complex that constantly needs electricity, heating and cooling. Such facilities include, but are not limited to, data centers, manufacturing facilities, universities, hospitals, military installations, and education. Localized trigeration as defined by decentralized generation has additional benefits. Using renewable energy in an important application, reducing energy costs and being able to sell electricity back to local utilities are some of the important benefits. A large part of the electricity needs of many countries' economies are met by large central power plants with large electricity production capacity. These power plants have economies of scale, but they often distribute electricity over long distances, causing blackouts and negative environmental impacts.

#### IV. CONCLUSION

This review focuses on price changes in the electricity and gas markets and their effects. In addition to general policy issues, we examine the electricity industry in India and its various products or products, look at the electricity needs of the power industry, followed by distribution, exports and production. Rural electrification is considered on its own as it relates to specific industries. It is worth noting that India has experienced a long-term decline in subsidies for various fuels such as LPG, gasoline and diesel over the last decade. The only difference is how quickly the subsidy will be reduced and whether it will drop to zero. The highest increase was seen in gasoline, followed by diesel. In both cases the subsidy is reduced to zero. Liquefied oil has been the slowest, and subsidies have so far been reduced by only 50%. For electricity, the situation of relaxation is

completely different. Here agriculture is cross-subsidized by the industrial sector. Therefore, withdrawal of subsidy is out of the question here. Instead, the question is whether and to what extent the impact of the program should be reduced. Trigeration systems can play an important role in reducing energy needs in Middle Eastern countries. In addition to meeting cooling needs, these systems can also reduce the need for new power plants, reduce the need for fossil fuels, and reduce greenhouse gas emissions in the region.

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