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India’s clean cooking strategy: E-cooking as the next frontier

Electrification can help overcome challenges of LPG and PNG

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Key findings

Affordability concerns have resulted in a mismatch in the pace of LPG and PNG connections and actual consumption. While PNG connections have almost doubled over the past four years, gas consumption in the residential sector has increased by only 26% in the same period.

Import dependence has exposed the country to volatile global markets and geopolitical risks, with LPG and LNG import bill increasing by 50% over the past six years.

E-cooking in FY2024-25 proved cheaper than PNG and non-subsidised LPG, and competitive with the current LPG price with a universal subsidy available to all consumers, without imposing a fiscal burden.

Despite 100% electrification, uptake of e-cooking is slow due to high initial capital costs, limited device options, and lack of awareness. A structured push, including device subsidies, consumer awareness, manufacturer incentives, and state-led demonstration projects, is essential to unlock its full potential.

Executive summary

India stands at a pivotal moment in its energy transition journey with its aim to install 500 gigawatts (GW) of non-fossil fuel capacity by 2030. This rapid scaling of clean energy infrastructure presents a unique opportunity to reimagine the country's clean cooking strategy—one that has long been dominated by fossil fuels such as liquefied petroleum gas (LPG) and piped natural gas (PNG). While these fuels have played a crucial role in reducing dependence on polluting solid fuels, especially in urban and semi-urban areas, their continued expansion faces significant limitations.

Despite efforts by the government to expand access—including nearly universal LPG coverage and a five-fold increase in PNG connections over the past decade—fuel consumption has not kept pace with connections. Affordability remains a core concern, particularly for economically weak households covered under schemes like the Pradhan Mantri Ujjwala Yojana (PMUY), where average per capita LPG usage still falls short of the average consumption of non-PMUY consumers. Rising fuel prices, slow infrastructure buildout and a growing fiscal burden from subsidies present challenges in further adoption of LPG and PNG.

Moreover, both fuels are heavily import-dependent, leaving India vulnerable to external price shocks and supply disruptions. This was made evident amid recurring geopolitical tensions over the past five years. The combined LPG and liquefied natural gas (LNG) import bill touched a high of US$30.5 billion (INR2.53 lakh crore) in FY2022-23 following the onset of the Russia–Ukraine war, which disrupted global energy supplies. On average, India's import bill for these two fuels has risen by about 50% over six years—from US$17.7 billion (INR1.48 lakh crore) in FY2018-19 to US$26.4 billion (INR2.20 lakh crore) in FY2024-25—accounting for around 3% of India's total import bill for FY2024-25.

Such reliance not only undermines energy security but also places substantial pressure on the fiscal position of the country. The volatility of international energy markets, particularly for gas, further exacerbates this challenge. There is also the concern over increased greenhouse gas (GHG) emissions. India's emissions from residential sector increased by more than 40% between 2010 and 2015 due to the use of LPG, kerosene and other fuels for cooking and lighting.

With this in view, electricity-based cooking (e-cooking) emerges as a forward-looking, cost-effective, and future-aligned alternative, especially in urban areas where electricity access is near-universal and relatively stable. E-cooking offers multiple advantages: It is not highly import-dependent, has lower operating costs, and produces no indoor air pollution, significantly improving health outcomes for women and children in comparison to solid fuels like firewood, animal dung and charcoal. It is also highly energy efficient (up to 90%) compared to LPG and PNG, which suffer from heat losses at the time of use. It could also lower cooking-based residential GHG emissions as India progresses with greening of the grid.

Cost comparisons for FY2024-25 show that e-cooking is already cheaper than PNG and non-subsidised LPG, and competitive with the current LPG price with a universal subsidy available to all

consumers. With the rapidly greening grid through increased deployment of solar and wind energy, electricity-based cooking can also support India's decarbonisation commitments.

However, the uptake of e-cooking remains low due to key barriers: High upfront capital costs, limited availability of versatile and affordable induction cooktops, insufficient awareness, and lack of targeted policy incentives. Addressing these challenges will require a comprehensive and coordinated strategy. This includes government-supported subsidies for induction cooktop purchases (similar to the FAME scheme for electric vehicles), incentives for manufacturers to develop affordable and versatile devices, large-scale awareness campaigns, and state-led demonstration projects to build public confidence in reliability of e-cooking as a solution.

Ultimately, electrifying India's cooking needs, starting with urban areas, represents a transformative opportunity. It can free up limited fossil fuel resources for rural and hard-to-reach areas, reduce import dependence, alleviate fiscal stress from rising subsidies, and significantly improve public health and environmental outcomes. With the right interventions, e-cooking can become not just an alternative, but the future of clean cooking in India.

Introduction

Electricity-based cooking (e-cooking) could emerge as the ultimate clean cooking solution for India. After the government's massive push to promote clean cooking through liquified petroleum gas (LPG) and piped natural gas (PNG), the time seems right to advance towards e-cooking. Especially with strides being made in renewable energy deployment in the country. India plans to achieve 500 gigawatts (GW) of non-fossil capacity by 2030 and had already deployed a total of 256 GW of non-fossil power till September 2025. In addition, 148 GW of renewable energy projects are under-construction as of September 2025.[1,2]

This expansion of renewable energy capacity in the coming years makes it an ideal time for India to shift to electrification of cooking especially in urban areas. This would have multiple advantages, including reduced dependence on fossil fuels for clean cooking, lower fiscal subsidies, and enhanced energy security. LPG and PNG are carbon-intensive fuels that contribute to greenhouse gas (GHG) emissions. India's emissions from residential sector increased by more than 40% between 2010 and 2015 due to LPG, kerosene and other fuels used for cooking and lighting.[3] This would have likely increased further after 2015, with rising penetration and consumption of both LPG and PNG.[4]

Moreover, despite a country-wide coverage of LPG connections and ever-growing PNG connections, almost 40% of households still depend on polluting solid fuels like firewood, animal dung and

[1] Ministry of New and Renewable Energy. Physical Achievements. 30 September 2025.
[2] Central Electricity Authority. Quarterly Report on Under-construction Renewable Energy Projects. 15 October 2025.
[3] CSTEP. Decarbonising the cooking sector. December 2019.
[4] Updated data on GHG emissions is currently not available.

charcoal for their cooking needs, according to the National Family Health Survey (NFHS-5) 2019-21.[5] Using solid fuels not only takes away productive time but also poses serious health risks to women and children due to indoor pollution.

The widespread promotion of LPG over the decades has been done as a solution to the problem of using harmful solid fuels, especially among the poor in both urban and rural areas. However, there are households that still depend on solid fuels, indicating an urgent need to switch to e-cooking for at least urban areas as a starting point.

Providing clean fuels to the people is a priority for the government, as indicated by the wide coverage of LPG and PNG connection in the country. There is a focus on promoting electric cooking also, demonstrated by initiatives like the central government's "Go Electric" campaign launched in 2021 to create awareness on benefits of switching to electric mobility and electricity-based cooking (e-cooking). The main policy focus, however, continues to be on expansion of infrastructure and access to LPG and PNG, including providing subsidies when needed. But there are challenges in expanding these less polluting fossil-dependent cooking fuels.

The report explores the current scenario of LPG and PNG uptake in the country and barriers that have hindered uptake of the two fuels even though there has been a massive jump in the number of connections. It shows how LPG and PNG not only undermine energy security and fiscal prudence but are also more expensive than e-cooking. The report then outlines some of the challenges that are hindering progress for uptake of e-cooking and the solutions for enhancing adoption.

PMUY helps in LPG expansion

There has been a rapid increase in the coverage of LPG connection in India. LPG connections increased from 200 million in fiscal year (FY) 2015-16 to 330 million in FY2024-25, an increase of 65% over a decade.[6]

Majority of this increase is attributable to the Pradhan Mantri Ujjwala Yojana (PMUY), a flagship scheme introduced in 2016 to expand LPG access among below poverty line (BPL) households. Under the scheme, about 103 million new connections have been provided[7], offering deposit-free LPG connections to households, with one LPG cylinder refill to facilitate an easy transition for first-time users from solid fuels to LPG.

While the connections have increased rapidly, consumption patterns are not following the same trajectory due to affordability concerns. This is especially true for the PMUY customers, whose annual per capita consumption of 14.2 kg LPG cylinder refills has remained below 6.64 cylinder refills, the estimated average consumption by a non-PMUY household.[8] The recent provision of

[5] Ministry of Health and Family Welfare. National Family Health Survey NFHS-5) 2019-21. March 2022.
[6] PPAC. Oil and Gas Snapshot. Accessed for different years.
[7] PMUY. Total connections released under PMUY. Accessed on 20 August 2025.
[8] PPAC. Oil & Gas Final Ready Reckoner FY2024-25. 22 May 2025.

subsidies to the PMUY customers resulted in a remarkable improvement in the per capita consumption of LPG from 3 refills in FY2019-20 to 4.47 refills in FY2024-25, showing that the increase in connections and consumption of LPG will be subsidy-linked (more details in section on subsidies below).[9,10]

Ambitious PNG targets

Along with the expansion of LPG connections—achieving coverage of more than 100% of households[11,12]—the government has also been targeting increasing the penetration of PNG connections. There were a total of 15.5 million domestic PNG connections as on 31 July 2025[13], a four-fold increase from 3.75 million as on 31 July 2017. [14] There is a target to increase PNG connections to 126.4 million by 2032.[15]

PNG consumption, however, has not kept pace with this increase in connections, perhaps due to the high PNG prices witnessed in the past few years. If a comparison is done for FY2020-21 and FY2024-25, the number of domestic PNG connections has doubled from 7.8 million to 15 million but the gas consumption by the sector has only increased by 27%—from 2.63 million metric standard cubic meters per day (mmscmd) to 3.35 mmscmd.[16] This could be attributed to the high PNG prices, since in the same time period, PNG prices went up by 48% from INR33 per standard cubic meters (scm) to INR48.59 per scm.[17] This connection consumption mismatch could mean that, at present, many households with a PNG connection are using other fuel sources like LPG or electric cooking.

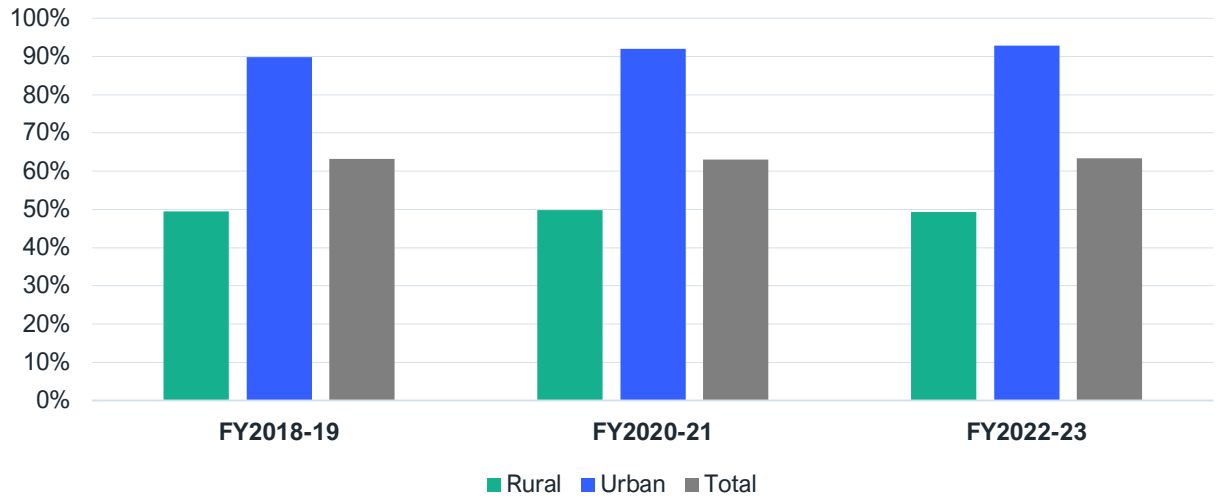
Urban areas drive consumption

LPG and PNG connections together have a coverage of 115% of households in the country as of FY2024-25.[18] The increase in consumption of clean cooking fuels, however, is being primarily driven by urban areas. According to the available data, use of clean cooking fuels in urban areas has increased from around 89% to 93% from FY2018-19 to FY2022-23.[19] In the same period, use of clean cooking fuels in rural areas has remained at around 50%. This could be due to the high fuel prices in 2022 and the limited LPG subsidy being provided by the government post the LPG price

[9] Open Government Data Platform India. Year-wise data on the average number of LPG Cylinder refill per beneficiary under Pradhan Mantri Ujjwala Yojana (PMUY) from 2019-20 to 2024-25. 31 December 2024.
[10] PPAC. Oil & Gas Final Ready Reckoner FY2024-25. 22 May 2025. Page 83.
[11] Assuming total households as 299.7 million based on data from World Population Review. Accessed on 24 September 2025.
[12] Latest government data does not include coverage. It notes that household data is projected on 2011 census which can vary from actual household numbers due to "factors like increasing nuclearisation of families, migration of individuals/families due to urbanisation and reduction in average size of households etc.
[13] PPAC. Snapshot of Oil and Gas Data. August 2025.
[14] PPAC. Snapshot of Oil and Gas Data. August 2017.
[15] PNGRB. Progress of PNG-D, CNG and Pipeline in the country. 31 March 2025.
[16] PPAC. India's Oil & Gas Ready Reckoner FY2024-25. 30 June 2025. Page 40.
[17] PNG prices vary as per cities. This is the price for Delhi which has been kept at Rs 48.59 scm since FY2022-23.
[18] Total LPG connections and PNG connections are 330 million and 15 million respectively in FY2024-25 as per PPAC. Total households as per World Population Review is 299.7 million.
[19] MOSPI. Biennial Comprehensive Annual Modular Survey 2022-23. October 2024.

crash during the pandemic.[20] There has been an increase in LPG subsidy since then which may have resulted in an increase in consumption of clean fuels in rural areas, but the latest data was not available at the time of publishing this report.

Figure 1: Clean cooking fuels consumption in urban and rural areas



Source: MOSPI's Biennial Comprehensive Annual Modular Survey

Shifting urban areas to e-cooking could be one solution to the problem of limited use of clean cooking fuels in rural areas. By reducing demand for LPG and PNG in urban areas, more of these limited resources could be redirected to rural areas. The report discusses the limited availability of LPG- and PNG-related resources such as bottling capacity, distributors, and base fuel like propane and natural gas which need to be freed up for rural areas. The government had intended to do this by providing PNG connections to urban areas and freeing up resources for rural areas, but considering the global volatility of gas prices it will be more feasible for India to leapfrog to electricity-based cooking.

Barriers to LPG and PNG adoption and expansion

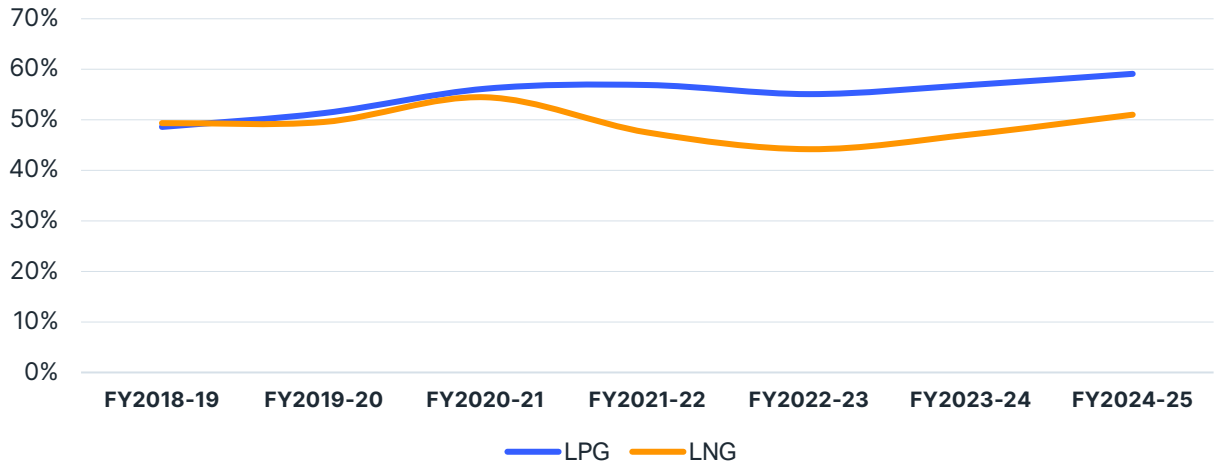
Limited LPG and PNG uptake, despite the increase in number of connections, can be attributed to several factors, like import dependence and related energy security concerns, infrastructure limitations, price volatility, and subsidy burden. Understanding these barriers is crucial, as they highlight the challenges in scaling up clean cooking access and show why there's a need for alternative solutions, like e-cooking.

[20] Non-subsidised LPG prices crossed INR1,000 in 2022 from a low of INR580 during the pandemic.

Import dependence

A major challenge in utilising both LPG and PNG for clean cooking is the import dependence of both the fuels. At the current consumption levels, India imports almost 60% of its LPG needs and 50% of its natural gas needs via liquefied natural gas (LNG) imports.[21]

Figure 2: Share of imports in total LPG and LNG consumption (FY2018-19 onwards)



Source: Author's calculations based on Petroleum Planning & Analysis Cell (PPAC) data.

Increase in consumption of these fuels could result in higher imports as domestic production of LPG and natural gas is not expected to increase substantially. LPG production has, in fact, remained at 12.8 million metric tonnes (MMT) since FY2018-19 (with a marginal dip during the pandemic). Similarly, there has been limited increase in domestic natural gas production and only a moderate growth of 8% is expected by 2030[22] compared to 2023 domestic gas production levels due to declining production from legacy fields. This has already resulted in higher share of imported gas in PNG consumption over the years, despite the sector having priority allocation of domestic gas.

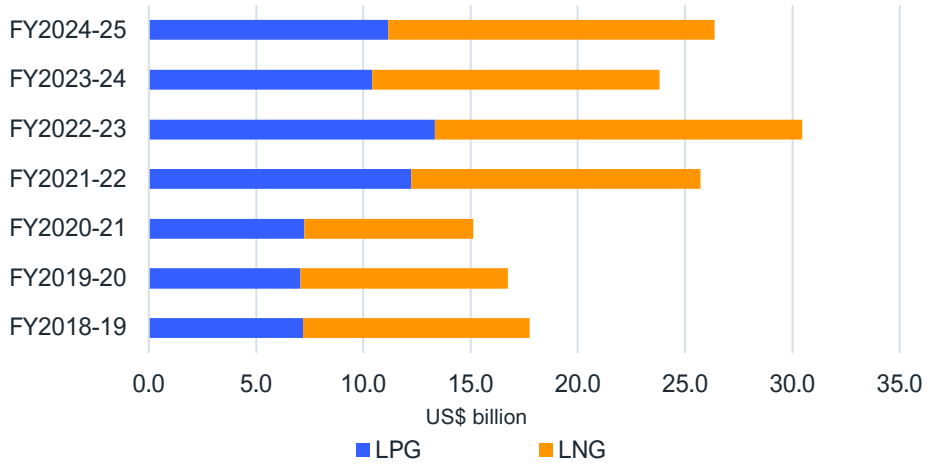
The high dependence on imports for both LPG and PNG poses energy security challenges for the country, especially in the current volatile geopolitical environment. Heightened geopolitical tensions in West Asia could impact imports as India depends on the region for most of its LPG imports and almost half of its LNG imports.

This also results in high import bills for the country. Figure 3 shows the growing import costs of LPG and LNG in recent years. Together, the import bill for LPG and LNG has increased by 50% over the past six years—from US$17.7 billion (INR1.47 lakh crore) in FY2018-19 to US$26.4 billion (INR2.19

[21] India does not import natural gas via pipeline, so all imports are referred to as liquefied natural gas (LNG) imports in the report.
[22] IEA. India Gas Market Report. February 2025. Page 7.

lakh crore) in FY2024-25[23,24]—accounting for around 3% of India's total import bill of US$915 billion (INR75.9 lakh crore) for FY2024-25.[25] It touched a high of US$30.5 billion (INR2.53 lakh crore) in FY2022-23 when the onset of Russia-Ukraine war led to supply disruptions. Such high import bills put massive pressure on the fiscal position of the government.

Figure 3: LPG and LNG import bills (FY2018-19 onwards)



Source: Author's calculation based on PPAC data

Price volatility

The increasing dependence on imports for LPG and natural gas has also exposed India to price volatility risks. LPG prices, without subsidy, are linked to international markets due to this high import dependence. LPG prices in India are based on the import parity price (IPP) mechanism using the world's largest producer Saudi Aramco's LPG prices. Thus, fluctuations in LPG prices in the international market massively impact the domestic cylinder prices. Figure 4 below shows this impact.

While the latest Saudi Aramco futures quotes are trending downwards, any escalation in geopolitical tensions, especially in West Asia, could reverse this trend.

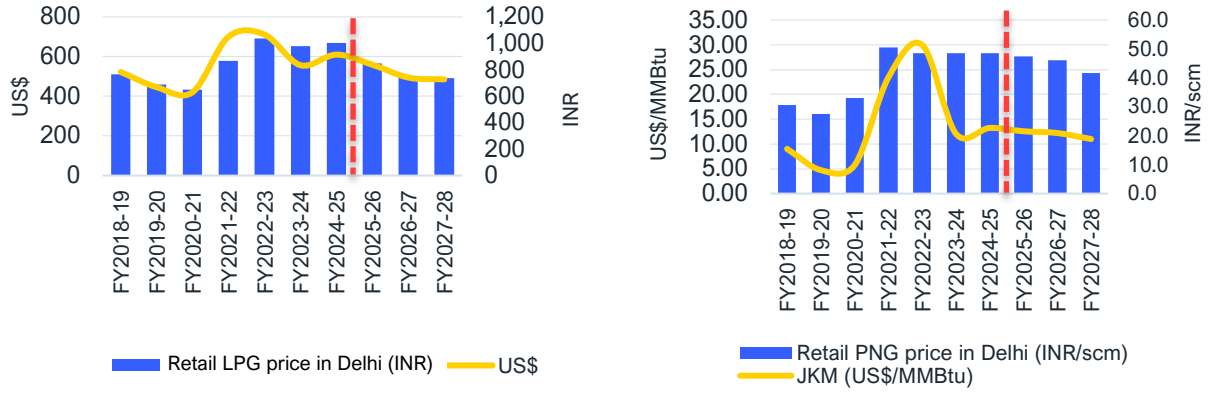
Similarly, the domestic gas prices are currently priced at 10% of the monthly average of Indian crude basket, which is linked to the international crude prices. In addition, there are short-term or spot LNG imports which are also directly impacted by any global market volatilities. The Japan Korea Marker

[23] PPAC. Oil and Gas Snapshot. April 2019.
[24] PPAC. Oil and Gas Snapshot. April 2025.
[25] PIB. Cumulative exports during FY2024-25. 16 April 2025.

(JKM), a benchmark for spot LNG prices in Asia, has shown volatility in the past few years and a clear correlation can be seen between its movement and retail PNG prices in India (Figure 4).

Figure 4 shows the increase or decrease in LPG and PNG prices, linked to Saudi Aramco Propane and JKM prices, respectively. In FY2022-23, when geopolitical tensions drove up commodity prices in the international markets, it led to an increase in LPG and PNG prices in India. Similarly, the decline in LPG and PNG prices were also seen during the pandemic-induced commodity price crash.

Figure 4: LPG domestic retail price vs Saudi Aramco Propane price (left) & domestic PNG retail price vs Japan Korea Marker price (right)



Source: CME Group, PPAC, Investing.com
Note: i) Retail Price for FY2024-25 for LPG is INR 803 after a INR 200 subsidy for all consumers offered by the government
ii) Annual average retail price for future years (FY2025-26 to FY2027-28) is calculated based on the average factor of domestic prices to imported price of previous years multiplied with the average annual future quotes of Saudi Aramco Propane and Japan Korea Marker (JKM).
iii) Saudi Aramco Propane prices (US$) and JKM futures quotes (US$/MMBtu) as taken on 4 July, 2025.

An IEEFA report notes that LNG prices have proven to be among the most volatile in comparison to other commodities in times of conflict and geopolitical tensions. The report notes that "LNG prices have fluctuated widely in months of relative stability for other commodities, such as oil and gold, highlighting the inherently volatile nature of gas markets".[26] While PNG prices are also dependent on domestic gas prices, which are currently regulated, they are not completely insulated from international price volatilities. Moreover, domestic gas prices are also proposed to be deregulated from 2027, which would expose them to more geopolitical volatilities.

Such high price volatility concerns put the affordability of LPG and PNG at risk for people and, in some cases, could encourage switching back to fossil fuels hindering clean cooking progress in the country.

[26] IEEFA. Conflict exposes natural gas to price volatility. 23 October 2024.

High fiscal subsidies

As a result of import dependence and price volatility, clean fuels can often become unaffordable, prompting the government to give massive subsidies to lower prices, increase affordability and encourage uptake. Table 1 below demonstrates the total subsidy burden borne by the government for LPG in the past few years, averaging around Rs 17 crore (US$1.5 billion) per year in the last seven years. For FY2025-26, Rs 12,100 crore (US$1.4 billion)[27] has been allocated for LPG subsidies.

The subsidies were lower when global prices plummeted during the pandemic and the government did not have to offer subsidies until the prices rose again sharply. In the meantime, while subsidies were not being provided, oil marketing companies (OMCs) maintained lower prices to ensure affordability. To account for this, an under-recovery payout of Rs 22,000 crore (US$2.6 billion) was made to the OMCs in FY2022-23[28], which is an indirect subsidy. An additional compensation of Rs 30,000 crore (US$3.5 billion) was given in August 2025 to further offset losses incurred by OMCs from selling domestic LPG at regulated prices.[29]

Table 1: Year-on-year PMUY & subsidy FY2019-20 to FY2024-25

Fiscal year	Cumulative PMUY connections (in millions)	Active LPG consumers (including PMUY) (in mn)	LPG refills for PMUY households (in mn)	Average annual refills per PMUY household	Govt subsidy (INR crore)		
					Direct benefit transfers for LPG	For LPG connections to poor households	Total
2019-20	80	279	228	3.01	29,628	3,724	34,086
2020-21	80	290	351	4.39	25,521	9,690	36,072
2021-22	89	305	313	3.68	177	1,568	3,421
2022-23	96	314	345	3.71	180	8,010	9,170
2023-24	103	324	394	3.95	1,460	8,500	12,240
2024-25	103	330	420	4.34	500	12,700	14,700

Source: Data.gov.in; Rajya Sabha Question, PIB, PPAC, Indian Budget documents, LPG Profile reports
Note: i) No PMUY connection was released in 2020-21.
ii) Total LPG subsidy includes other budget heads like project management expenditure, transfers to oil industry development fund (OIDF).

These LPG subsidy payments, while allowing affordability and accessibility, add to the country's fiscal burden. Similarly, domestic gas prices have been regulated since April 2023. Domestic gas price is linked to Indian crude basket and has been higher than the regulated price since April 2023.

[27] Rs to US$ exchange rate in the report is taken as an average of July 2025 exchange rate as 1 Rs = US$0.0117/1 US$ = Rs85.62
[28] NDTV Profit. OMCs to receive LPG compensation. 1 July 2025.
[29] Indian Express. Govt approves Rs 30,000-crore compensation to oil marketing companies for their losses on cooking gas sales. 8 August 2025.

While no subsidy is allocated to meet this gap for now, compensation may be considered in the future as done for OMCs at present.

Infrastructure limitations

Limited expansion of production and distribution infrastructure could also be barriers in meeting the demand expected from the increasing LPG and PNG coverage. The growth of LPG infrastructure, including bottling plants and number of distributors, has been moderate. As shown in Table 2 below, the year-on-year (Y-o-Y) increase in both bottling plants and distributors has fallen to below 1% over the past few years. The total bottling capacity has increased by 25% between FY2018-19 to FY2024-25, while the total number of distributors has increased by about 7% in the same time period.[30]

Table 2: Year-on-year increase in LPG infrastructure since FY2018-19

	Bottling plants	Y-o-Y increase (%)	Capacity (TMTPA)	Y-o-Y increase (%)	Distributors	Y-o-Y increase (%)
FY2018-19	192	1%	18,338	5%	23,757	17.5%
FY2019-20	196	2%	20,292	11%	24,672	3.9%
FY2020-21	200	2%	21,249	5%	25,097	1.7%
FY2021-22	202	1%	21,573	2%	25,282	0.7%
FY2022-23	208	3%	22,225	3%	25,384	0.4%
FY2023-24	210	1%	22,843	3%	25,489	0.4%
FY2024-25	211	0%	23,083	1%	25,566	0.3%

Source: Author's calculation based on PPAC data

This limited increase in infrastructure could be indicative of slow growing demand for LPG and may be scaled up if demand arises. A back of the envelope calculation reveals that if all households with LPG connections consume LPG as primary fuel, there will be a need to increase bottling capacity. The current bottling capacity, if considered for just 14.2 kg cylinders, can support about 1.6 billion cylinders annually, while the total requirement for 330 million households would be 2.6 billion cylinders in a year, assuming eight refills per household per year. This means the annual capacity will fall short by almost 38% for household needs, even before considering any consumption by industries.[31] This also indicates the shortfall in demand in LPG consumption in India despite connections due to affordability concerns, impacting expansion of infrastructure.

For PNG, while the infrastructure is increasing at a moderate pace, it is bogged by underutilisation, raising concerns about potential stranded asset risk. Even LNG import infrastructure runs the risk of

[30] Calculated from the Petroleum Planning & Analysis Cell (PPAC) data for the two fiscals.
[31] Total 14.2 kg cylinders possible at current bottling capacity is around 1.6 billion while requirement for 330 million households at 8 cylinders per annum would be 2.6 million.

being underutilised.[32,32] A recent IEEFA report notes that while six out of seven LNG terminals operational in FY2024-25 operated at below 50%, capacity-weighted average utilisation rate of major gas pipelines is also low at 41%.[33] Moreover, at 15 million in FY2024-25[34], PNG connections fall massively short of both the pro-rata target of 30 million by 2024-25[35], and of 126.4 million by 2032. This could be due to high prices limiting demand for PNG.

Limited LPG bottling and distribution capacity, along with underutilisation of PNG infrastructure points to potential gaps in meeting clean cooking needs with these fuels, especially in the future. However, infrastructure expansion also does not guarantee an uptake in consumption, as is evident from rapidly rising connections but moderately increasing consumption. This stems from high import dependency of the two fuels and related affordability concerns.

E-cooking as a potential solution

Looking at the challenges presented by both LPG and PNG as a cooking fuel, there is an urgent need to explore other viable clean cooking options in India. One such option, especially for urban areas, is e-cooking i.e. using electricity-based cooking appliances for meeting cooking needs. E-cooking has the potential to reduce carbon emissions and improve indoor air quality. With ongoing massive deployment of renewable energy, including solar rooftops in India and greening of the grid, e-cooking can be a completely green solution. Moving towards e-cooking is the logical step since almost 100% of Indian households have access to electricity[36], with a relatively stable supply in urban areas. Additionally, there is a massive drive for renewable energy deployment, including 24x7 supply using hybrid models, or storage.

The government launched the ‘Go Electric’ campaign in 2021 to make the public aware of the benefits of e-cooking devices. Energy Efficiency Services Limited (EESL), a joint venture of Public Sector Undertakings under Ministry of Power, launched the National Efficient Cooking Programme (NECP) in November 2023 to promote affordable and energy-efficient induction cookers. As part of the programme, EESL targeted to distribute 2 million energy-efficient induction cook stoves nationwide. These schemes have been initiated to lower the dependence on imported sources of energy.[37]

[32] Liquefied Natural Gas is the imported natural gas in India. It is sometimes used for PNG if the allocated domestic gas is not sufficient or available due to policy limitations. In FY2024-25, around 33% of the city gas distribution section (including PNG) used LNG for production.
[33] IEEFA. Can LNG displace coal demand in India?. June 2025.
[34] PPAC. Snapshot of Oil and Gas Data. April 2025.
[35] https://www.newindianexpress.com/business/2025/Jul/06/png-beyond-business-as-usual-2 PNGRB. Progress of PNG-D, CNG and Pipeline in the country. 31 March 2025.
[36] Saubhagya Scheme. All India Dashboard. Accessed on 7 October 2025.
[37] PIB. National Efficient Cooking Programme launched, to promote affordable and energy-efficient induction cookers. 2 November 2023.

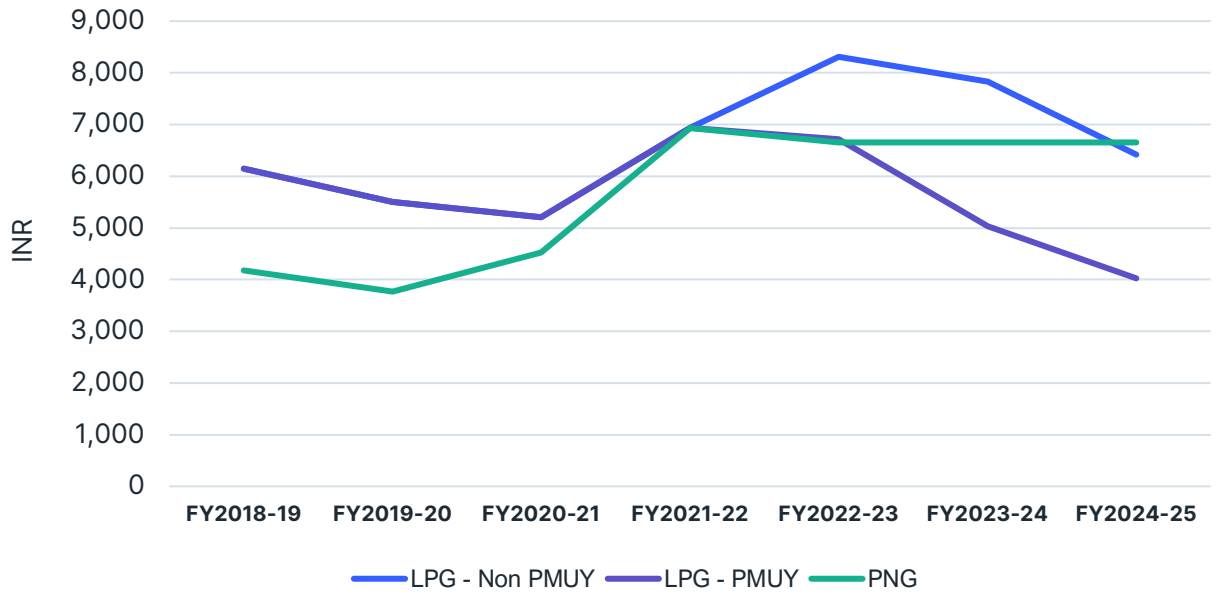
E-cooking cheaper than LPG and PNG

Affordability remains one of the biggest factors driving uptake of any new cooking fuels in India, and electricity-based cooking could mean cost savings compared to traditional fuels and modern fuels like LPG and PNG.

Both PNG and non-subsidised LPG are now expensive. Annual cost of cooking fuel for a family of four using PNG has increased by 47% in five years from INR4,522 (US$51) in FY2020-21 to INR6,657 (US$76) in FY2024-25. Using non-subsidised LPG has also become expensive with the annual cooking fuel expenditure for a family of four going up to INR6,424 (US$73) in FY2024-25, a 23% increase from FY2020-21. The annual cost for a family of four for non-subsidised LPG had risen to INR8,310 (US$95) in FY2022-23 due to global fuel price volatility, after which an INR200 (US$2) subsidy was given to all consumers. If LPG alone is used for cooking purposes (which could translate to consumption of about 8 LPG refills), the annual cost for a family of four under the PMUY scheme will come to INR4,024 (US$46) in FY2024-25 despite heavy subsidies.

Figure 5 below shows that PNG was a more affordable choice before FY2021-22 but has become expensive due to geopolitical disturbances and global gas price volatility. LPG is cheaper for PMUY beneficiaries but remains an expensive choice for non-PMUY families despite the subsidy being given to all consumers. Electricity-based cooking could help overcome this affordability concern.

Figure 5: Annual cooking cost for a family of four using LPG & PNG (FY2018-19 onwards)



Source: Author's calculations based on PPAC data.

According to IEEFA's calculations, in FY2024-25, e-cooking emerged as the cheapest option for a family of four if compared to PNG and non-subsidised LPG. The cost of electric-based cooking was comparable to the cost of cooking with subsidised-LPG provided to non-PMUY consumers, suggesting that shifting urban households to e-cooking could provide them with affordable and clean fuel, while potentially lowering overall subsidy burden for the country. Table 3 shows the cost of cooking for a family of four across different fuel options.

> **In FY2024-25, e-cooking emerged as the cheapest option for a family of four if compared to PNG and non-subsidised LPG.**

Table 3: Cost comparison of different cooking fuels for a family of four in Delhi (FY2024-25)

	Unit	Price per unit (INR)	Average yearly consumption (in unit)	Annual cost (INR)	% difference from e-cooking
E-cooking	kwh	6	974	5,844	NA
PNG	standard cubic metre (scm)	48.59	137	6,667	14%
LPG					
Non-PMUY (non-subsidised)	14.2 kg cylinder	1,003	8	8,024	37%
Non-PMUY (subsidised)	14.2 kg cylinder	803	8	6,424	10%
PMUY	14.2 kg cylinder	503	8	4,024	-31%

Source: Author's calculations; Delhi Tariff for FY2024-25, PNG prices in Delhi, LPG Price in Delhi

Note: i) Electricity tariff for Delhi for consumption block 400 to 800 units based on per capita consumption of 1,848 units extrapolated for a family of four and then calculated monthly as 616 units for the household. To that, average household consumption of 82 units for cooking needs is added. ii) Non-PMUY (Subsidised) LPG refers to the consumer category getting INR200 universal LPG subsidy PMUY LPG refers to the consumer category receiving additional INR300 subsidy. Non-PMUY (non-subsidised) prices mentioned in table are only for calculation purposes as the actual sale price was INR803 in FY2024-25 after a universal subsidy. iii) Average yearly consumption is based on CEEW's study on clean electric cooking transition in India.

Using PNG for cooking versus electricity-based devices can be 14% more expensive for households while non-subsidised LPG can be 37% more expensive. Subsidising LPG for all consumers has made LPG marginally more affordable to e-cooking and comparable to PNG based cooking. Only the heavily subsidised PMUY LPG pricing, more prevalent in rural areas, comes out to be cheaper than e-cooking. With the pricing, PMUY scheme can deliver on its objective of making LPG affordable for households below poverty line. The per-capita consumption of LPG cylinders by PMUY consumers has increased from 3 in FY2019-20 to 4.34 in FY2024-25 due to additional fiscal support provided by the government.[38] PMUY customers, though, still find LPG expensive, using only 65% of the

[38] Open Government Data Platform India. Year-wise data on the average number of LPG Cylinder refill per beneficiary under Pradhan Mantri Ujjwala Yojana (PMUY) from 2019-20 to 2024-25. 31 December 2024.

estimated annual consumption of non-PMUY households and 54% of the estimated annual requirement of 8 cylinders, potentially using firewood or biomass for the rest of their cooking needs.[39] However, since most of the PMUY beneficiary households are concentrated in rural areas, e-cooking will be a beneficial transition for urban India.

E-cooking as a better cooking alternative

Due to its lower import dependency, higher efficiency and lower indoor air pollution resulting in safer indoor environments, e-cooking is a superior alternative to fuel-based cooking. Table 4 below shows a comparative analysis of LPG, PNG and induction against different factors like safety, import dependence, efficiency and affordability.

Table 4: LPG vs PNG vs e-cooking: A comparative analysis

	LPG	PNG	Induction
Availability	Booking required	Readily available	Subject to power supply
Import dependence	High	High	Low
Safety^	Low	Medium	High
Use efficiency (time taken to reach boiling temperature)^^	8-9 min	8-9 min	4-5 min
Capital cost (refer Table 5)	Low	High	High
Monthly cost (refer Table 3)	Medium/affordable with subsidies	High	Affordable
Energy efficiency^^^	40-60% (much heat escapes around the pan)	40-60% (much heat escapes around the pan)	85-90% (direct transfer to cookware)
Indoor air pollution^^^^	Nitrogen dioxide, carbon monoxide, particulates and ultrafine particulates	Nitrogen dioxide, carbon monoxide, particulates and ultrafine particulates	Particulates and ultrafine particulates

Source: Author's analysis, ^ Indian Oil-Adani Gas, India Smart Grid Forum ^^ Prestige, Glen India, ^^^American Council for an Energy-Efficient Economy (ACEEE), ^^^^PubMed Central and CLASP

[39] 4.34 refills for PMUY customers against estimated average refill of 6.73.

Table 5: Average capital cost of a two-burner stove and a double-induction cooktop

			E-cooking	
	LPG	PNG	Two single induction cooktops	Double induction cooktop
Stove/cooktop	1,100	1,695	2,800	8,170
Utensils – 3L cooker, pan, saucepan and tawa (prestige)	2,544	2,544	3,580	3,580
Connection price	2,200	7,000	0	0
Total	**5,844**	**11,239**	**6,380**	**11,750**

Source: Amazon India (LPG, PNG, Single Induction and Double Induction); Prestige India (Kitchen Starter Pack, Induction Kitchen Set and Gas/Induction Cooker); Bankbazaar (LPG connection price), IGL (PNG connection). Last accessed on 21 August 2025.
Note: The author uses an average priced brand for calculating costs of stoves and utensils.

Table 4 demonstrates the advantages that electricity-based cooking has to offer versus fossil-based LPG and PNG fuels despite the high capital cost. E-commerce portals offer equated monthly instalments (EMIs) which can be used to overcome the capital cost challenges. Government financing support for e-cooking devices could be useful, too, as fireless cooking with no close-by fuel outlet is a much safer option and offers higher energy efficiency with better heat transfer.

Barriers to e-cooking adoption

In theory, transitioning to e-cooking seems the most logical choice, but various challenges exist. Uptake has been slow due to capital costs, limited device designs, unreliable electricity access despite 100% electrification, lack of awareness and limited regulatory support.

Table 6 shows the perceived challenges in adoption of e-cooking.

Table 6: Key barriers to e-cooking adoption

S. No.	Barriers to adoption	Description
1.	High capital cost	Transitioning from LPG or PNG to e-cooking requires changing stoves and utensils which could cost about INR 10,000 (US$117) (for double induction).[40]
2.	Limited device designs	The current line-up of electric cookstoves does not offer a wide variety and is mostly limited to single induction cooktops which may not be sufficient for most Indian households for complete cooking.
3.	Unreliable electricity access	Electricity access has improved dramatically over the years, but earlier experience of power cuts could create a lack of confidence in people considering e-cooking as a primary solution. Moreover, power cuts continue to be a concern in times of high peak demand and summer season which can be a deterrent.
4.	Lack of awareness and adoption concerns	Lack of awareness about the benefits and ease of e-cooking, similarity in flavour profile to conventional fuels and the possibility of cooking most Indian dishes using e-cooking devices have posed significant hurdles to increasing the adoption of e-cooking devices. Concerns around use and safety are also deterrents.
5.	Limited policy and financial support	At present, there is no exclusive e-cooking policy in the country apart from the National Efficient Cooking Programme (NECP) launched in 2023, and its impact is yet to be assessed. There has been another integrated campaign, 'Go Electric', to enhance awareness on benefits of e-cooking and e-mobility. In addition, there is no financial support in terms of subsidy or easy financing options for encouraging e-cooking adoption.

[40] Prestige. Double Induction Cooktop and Induction Compatible Utensils. Accessed on 29 July 2025.

Case study: How an urban household successfully transitioned to e-cooking

There are households in urban areas that have experimented and successfully transitioned to electricity-based cooking (e-cooking) as their primary cooking method. One such example is of a renowned energy professional who made the switch to e-cooking.

The household began experimenting with the idea about two years ago, initially replacing some cooking steps with an electric kettle and a portable single induction cooktop. This allowed them to gradually explore e-cooking, build familiarity, and become comfortable with the various functionalities of the devices. To ensure safety—specially to avoid electric shocks during this self-learning phase—they opted for a well-known, trusted brand.

This experiment proved valuable for the family, helping them assess their willingness to adopt, understand, and adapt to e-cooking. There were initial challenges, such as limited knowledge of e-cooking devices, particularly around temperature and time settings, which can affect food taste, and hesitations about whether e-cooking could handle diverse, culturally specific dishes. Concerns also included adjusting cooking routines and ensuring uninterrupted power supply during meal prep.

However, with a thoughtful approach, the household managed to transition successfully. They began with a small investment, switching only certain food items and pre-cooking steps to electric appliances, and, most importantly, actively educating themselves by watching real-life videos from other users of their cooktop brand. This helped build their confidence, and the family gradually discovered the value of fully transitioning to e-cooking. They learned how to match the quality of food prepared with conventional fuels by fine-tuning temperature and timing. Even dishes like chapatis were successfully prepared after some trial and error.

Some concerns remain—particularly around the low serviceability of devices and potential power outages. To address this, the family opted for fuel stacking, retaining their existing piped natural gas (PNG) connection as back-up. So far, they haven't needed to use it.

Importantly, during their transition, the family discovered several advantages of e-cooking over other conventional clean fuels. These included the ability to programme and schedule cooking tasks, like boiling milk or making dosas, which improved productivity in the kitchen. E-cooking also offered enhanced safety as there is no risk of gas leaks, and cooktops come with built-in thermostat sensors that automatically shut off the appliance to prevent overheating.

To monitor the financial impact, the household installed a smart plug to track electricity consumption specifically for cooking. The smart plug helped them to gauge their daily use and see trends in weekly and monthly consumption. With an average consumption of about 2 units of electricity per day, the family was adding around 60 units worth INR360 (assuming a tariff of INR6) to their electricity bill. This made using e-cooking way more cost-effective than both PNG and LPG where the monthly expense as primary fuel comes to about INR556 and INR535 (after INR200 subsidy per refill), respectively (refer to Table 3). This further encouraged the household to transition. E-cooking can match the quality of food prepared using conventional fuels and may even surpass them in terms of efficiency and cost-effectiveness. However, broader adoption still faces industry-level challenges, such as managing peak-hour loads and improving the serviceability of appliances.

The way forward

There are several strategies that can help overcome the barriers hindering the wider adoption of e-cooking

i) Support for capital cost

While the operating cost of e-cooking is lower than other fuels, the initial high capital cost can be a barrier to uptake. Support from government for purchasing induction cooktops and utensils, as has been done in the case of LPG connections under PMUY, could enable rapid uptake of e-cooking. The government could provide direct financial support for a double-induction cooktop and starter utensils to consumers as a demand incentive, like the FAME India Scheme (Faster Adoption and Manufacturing of Electric and Hybrid Vehicles). The FAME scheme provided financial incentives to buyers, boosted manufacturing incentives by creating demand and enabled the necessary charging and policy ecosystem.

In a similar manner, the government could introduce a scheme to incentivise both buyers and manufacturers. This would help in increasing the scale of manufacturing and set in economies of scale, making induction cooktops and induction-compatible utensils more affordable. Additionally, the government could provide rebates for replacing existing conventional cooking stoves with electric cooktops. For instance, the US provides “Home Electrification and Appliance Rebate” of up to US$840 (INR74,060) for an electric cooktop, range or oven in a newly constructed home or for replacing an existing gas-based unit.[41]

ii) Device improvement

For e-cooking to become a clean cooking solution in India, more versatility in induction cooktop options is needed since, currently, the most easily available option is the single induction cooktop, which is not ideal for Indian households cooking, on average, for a family of four or more. There is a need to expand the user base by improving the availability of affordable and versatile cooktops.

There is also a need to adapt appliance designs to address the challenges that emerge while switching from flame-based cooking to e-cooking. For instance, it is common in India to cook chapatis and certain vegetables directly on the flame, which would need design innovation and potential re-training. This could include modifications such using a griddle pan for roasting. It could also include adapting the pre-set menu function to suit Indian households’ needs.

Device manufacturers also need to work on providing after-sales service and maintenance support to prolong life and ensure better returns for the consumer.

[41] U.S. Department of Energy. Home Upgrades. Accessed on 29 July 2025.

Government support for research and development by manufacturers for bringing innovation and lowering costs could add value. For instance, the Kenyan government has initiated innovation platform for US$1.2 million (INR10.8 crore) to support design, manufacture and development of viable business models.[42]

Manufacturers can also apply for cookstove carbon credits, available with leading carbon standards such as Gold Standard and Verra, to fund discounts or invest in expanding operational and distribution aspects. For instance, Kenya-based EcoSafi issued carbon credits for its biomass pellet-based improved cookstove. The company used the credits to finance growth-related capital costs. It sold the credits at US$35 (INR3,085) and is planning to develop a multi-million carbon credit programme.[43] The same can be replicated for e-cooking as cookstove credits are provided for fuel efficiency and fuel switch. MicroEnergy Credits has issued its first carbon credits for induction cookstoves in India under the new Gold Standard Methodology for metered and measured energy cooking devices.[44]

iii) Ensuring reliable electricity access

Uptake of e-cooking is dependent on the availability of reliable electricity supply. While providing stable supply remains a work in progress, there has been a remarkable improvement in power distribution in the country. Average daily hours of power supply in urban areas was already at 23.4 hours in FY2023-24.[45] In rural areas the average daily hours of power supply was around 22 hours in the same fiscal.[46] States like Telangana, Tamil Nadu, Kerala and Gujarat have achieved 24x7 power supply in urban areas.

Despite this massive achievement, the slow uptake of e-cooking could be linked to the occurrence of uninformed outages, especially in the summer season, and the fear of earlier experiences of unreliable electricity supply. Power shortages at a national level have gone down to a mere 0.1% in FY2024-25 but were at 4.2% not so long ago in FY2013-14.[47] Along with ensuring reliability, there is a need to enhance awareness around the availability of stable supply.

To further overcome this barrier, stacking of fuels can be considered in the transition phases, where urban households could be encouraged to try e-cooking without giving up their existing cooking connection. This will enable familiarity and confidence with e-cooking. The ongoing implementation of the flagship initiative of solar rooftop deployment in India by the government, which aims to

[42] Kenya's Ministry of Energy and Petroleum. Kenya National electric Cooking Strategy (KNeCS). 2024.
[43] Clean Cooking Alliance. Buyer's guide to high quality cookstove carbon credits. February 2025.
[44] MicroEnergy Credits. MicroEnergy credits achieves milestone with first-of-their-kind induction cookstove carbon credits issuance under gold standard. 13 February 2024.
[45] PIB. Summary of Economic Survey 2024-25. 31 January 2025.
[46] Rajya Sabha Question. Power supply in rural areas. 24 March 2025.
[47] Ministry of Power. Year-End Review 2024-25. 1 January 2025.

provide about 300 units of solar energy every month to over 10 million households[48], can further help availability of power and manage any additional cost of transitioning to e-cooking.

iv) Urgent need for awareness and demonstration programmes

Rapid adoption of e-cooking would require widespread awareness campaigns to make consumers aware of the benefits of e-cooking versus other fuels, procuring and maintenance of devices, and managing power supply concerns, if any. Day-long awareness programmes, government's awareness web portal, citizen-led movements, and increased research from civil society organisations were some of the actions that helped in widespread awareness of EVs and could be replicated in the case of e-cooking.

Government has been conducting awareness programmes on e-cooking with a focus on consumer-centric approaches, including initiatives carried out in partnership with various organisations under the Go Electric campaign. However, more needs to be done to accelerate uptake. State-level demonstration programmes could showcase efficiency, ease, safety and, most importantly, similarity in taste with electricity-based cooking versus other fuels. In addition, government or manufacturer-supported demonstration programmes in various large-scale retail chains could also help. Support of food bloggers or influencers could also be taken to demonstrate the efficiency and ease of induction cooktops for cooking in India.

Tanzania, for instance, launched its first ever e-cooking awareness campaign, in line with its National Clean Cooking Strategy 2024-2034 with the target to achieve 80% clean cooking adoption by 2034. The campaign plans to use public demonstrations, community engagement, local champion networks, and targeted media outreach across cities, starting with Dar es Salaam, to show the advantages of e-cooking.[49] A pilot e-cooking kitchen has been set up in a school in Dar es Salaam as a model kitchen to be replicated across the country.[50]

v) Create a roadmap for e-cooking

While the government has recognised electricity-based cooking as the future for Indian homes and initiated schemes to promote the same, a clear roadmap is necessary. For instance, the 2024 Kenya National electric Cooking Strategy (KNeCS) lays out a roadmap with three pillars—strengthen the enabling environment for e-cooking, validate innovative e-cooking solutions and bridge affordability and access gaps for e-cooking solutions. These involve boosting local manufacturing, tax waiver study, subsidy programmes, behaviour change communication, training and capacity building etc.[51] Similarly, the Government of Malawi has created a roadmap as a foundation for the development of

[48] PIB. The Solar Surge: India's Bold Leap Toward a Net Zero Future. 19 August 2025.
[49] IPP Media. Tanzania launches first national e-cooking awareness campaign. 16 June 2025.
[50] SEforAll. Clean Cooking Takes Off in Schools with First eCooking Kitchen Launch in Tanzania. 22 July 2025.
[51] Kenya's Ministry of Energy and Petroleum. Kenya National electric Cooking Strategy (KNeCS). 2024.

future clean cooking strategies. The roadmap includes supply side and demand side interventions for increasing adoption of clean cooking.[52]

In 2019, NITI Aayog released a roadmap for clean cooking in India with fuel-agnostic strategies to improve access and adoption.[53] A dedicated roadmap on e-cooking could lay out a phase-wise strategy for e-cooking adoption in India and provide the right policy signals to manufacturers, consumers and financers. Phase 1 of the roadmap could focus on understanding the necessary demand- and supply-side interventions needed in India; phase 2 could look at marketing and awareness programmes to increase adoption and could deal with policy push, like mandating induction-friendly utensil designs and induction cooktops in new home constructions instead of LPG or PNG cookstoves. For instance, in July 2025, New York mandated that all new residential buildings up to seven stories tall and commercial buildings up to 100,000 square feet should be all-electric starting 2026.[54]

For India, the way ahead lies in creating demand incentives by providing financial support for purchasing induction cooktops, and supply incentives for manufacturers to promote design innovation and striving for economies of scale.

Conclusion

Electricity-based cooking holds significant potential for scaling-up, contingent on effective policy and market conditions. With India's massive focus on renewable energy deployment, the time is ripe for the country to move to e-cooking. This would also align with its long-term decarbonisation target.

Switching to e-cooking also makes economic sense since it is not only cost effective compared to other fuels, but also more viable due to its lower import dependence. Where cooking fuels are concerned, import dependence can be precarious, as seen during geopolitical disturbances in other South Asian countries which faced high prices and fuel shortages with the onset of the Russia-Ukraine war.

E-cooking also has the added advantage of no indoor air pollution and no release of nitrogen dioxide or carbon monoxide, offering massive health benefits, safety and energy efficiency. As India continues to transition more households to clean cooking, it has an excellent opportunity to switch to e-cooking and invest in a future-ready option.

[52] Republic of Malawi. E-Cooking Roadmap. March 2024.
[53] NITI Aayog. Roadmap for access to clean cooking energy in India. October 2019.
[54] New York State Assembly. The all-electric buildings law. 25 July 2025.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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