



Enhancing Subnational Planning for Accelerating the E-Cooking Transition

Appendix 4. Nepal Case Study



**Loughborough
University**



Authors :

Gianluca Tonolo (Haki Energy Solutions) and Lawrence Lin as Lead Authors; Sarah Wykes and Ed Brown (Loughborough University); Meron Alemu

October 2026

MECS is funded by the UK government's Foreign, Commonwealth & Development Office (FCDO) through its Global Research and Technology Development (GRTD) portfolio, and forms part of the UK's Ayrton Fund. The views expressed in this report are those of the authors and do not necessarily reflect the official policy or positions of the UK government's FCDO or its partners.

AI was used to assist with the identification of relevant sources, report structure and proofreading

Nepal Case Study

1. Country Context

1.1 Administrative, Geographic and Socio-Economic Context

In 2025, Nepal has a population of 30 million people, with roughly 24% living in urban areas—among the lowest in South Asia. It is a low-income country transitioning toward lower-middle-income status, with a nominal GDP of approximately \$43 billion in 2024 and a GDP per capita of around \$1,450 ([World Bank, 2024](#)). The poverty headcount ratio at \$3.00¹ a day in 2022 reached 2.4% down from 21.5% in 2010 – mainly driven by emigration and remittances of Nepalese workers abroad ([World Bank, 2024](#)). Nepal shares borders with India and China (Tibet) and covers an area of 147,516 km², stretching from subtropical lowlands to Himalayan high-altitude regions, creating strong geographic disparities in accessibility, infrastructure delivery, and cooking practices. Geographic zones strongly influence energy and cooking (see Figure 1):

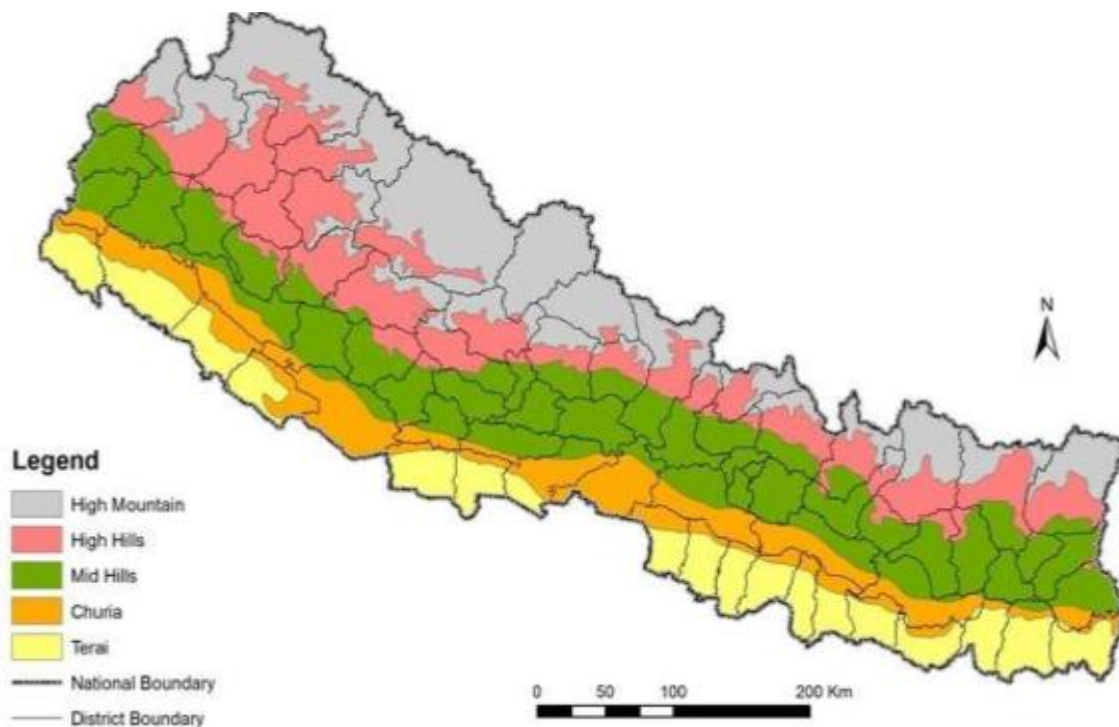
- **Terai (lowlands):** Flat, fertile, and densely populated, with the country's strongest transport corridors and largest agricultural plains.
- **Hill regions:** A broad mid-elevation zone that includes the Churia (Siwalik) foothills, the more populated Mid-Hills, and the higher, steeper High-Hills; characterised by varied terrain, mixed urban–rural settlements, and moderate population density.
- **Mountain districts:** High-altitude, rugged terrain with sparse population, remote settlements, and harsh climatic conditions.

Nepal's current political and administrative system is defined by the [2015 Constitution](#), which established a three-tier federal governance structure consisting of the federal government, 7 provinces and 753 local governments. In addition, the country is divided into 77 districts, which serve administrative and coordination functions but are not a separate tier of government and have no planning mandate. The 753 Local governments are split by:

- 6 Metropolitan Cities
- 11 Sub-Metropolitan Cities
- 276 Municipalities
- 460 Rural Municipalities (Gaunpalikas)

¹ (2021 PPP)

Figure 1: Geographic zones and local government (district) borders (Oludare, 2023)



Further empowered by the [Local Government Operation Act](#) of 2017, local governments are the primary units responsible for development planning, service delivery, and implementation of federal programmes. In practice, provinces and districts function mainly as coordinating and administrative layers, while local governments manage most frontline implementation—even though capacity gaps and overlapping mandates still create challenges within Nepal’s young federal system ([USAID, 2023](#)). Assessments of federalism in Nepal highlight persistent capacity constraints at provincial and local levels, including limited human resources, technical expertise, and long-term development planning experience, as well as ambiguities and overlaps in functional assignments across tiers that can undermine clear roles and coordination. Nepal’s District Coordination Committees — established across all 77 districts to facilitate cooperation among federal, provincial, and local bodies — underscore an institutional effort to bridge coordination gaps in law, even though no systematic evidence is available regarding their effective operationalisation in practice ([World Bank, 2019](#); [Acharya et al., 2020](#)).

Population distribution in Nepal follows a clear geographic pattern: see Figure 3 ([Census, 2021](#); [World Bank, 2024](#)):

- **Madhesh Province** is entirely located in the Terai lowlands and is Nepal’s most populous and densest province (6.12 million), benefiting from fertile plains, strong

market integration, and high economic activity along the east–west transport corridor.

- **Bagmati Province**, spanning all three ecological belts (from a small Terai strip to the Hills and into the Mountain region), is the country’s second most populous (6.08 million) and by far the wealthiest, driven by the Kathmandu Valley, which hosts the national capital and the largest concentration of formal employment and services.

Figure 2: Map of Nepal by province and main urban centres (adapted from [Nations Online Project](#))

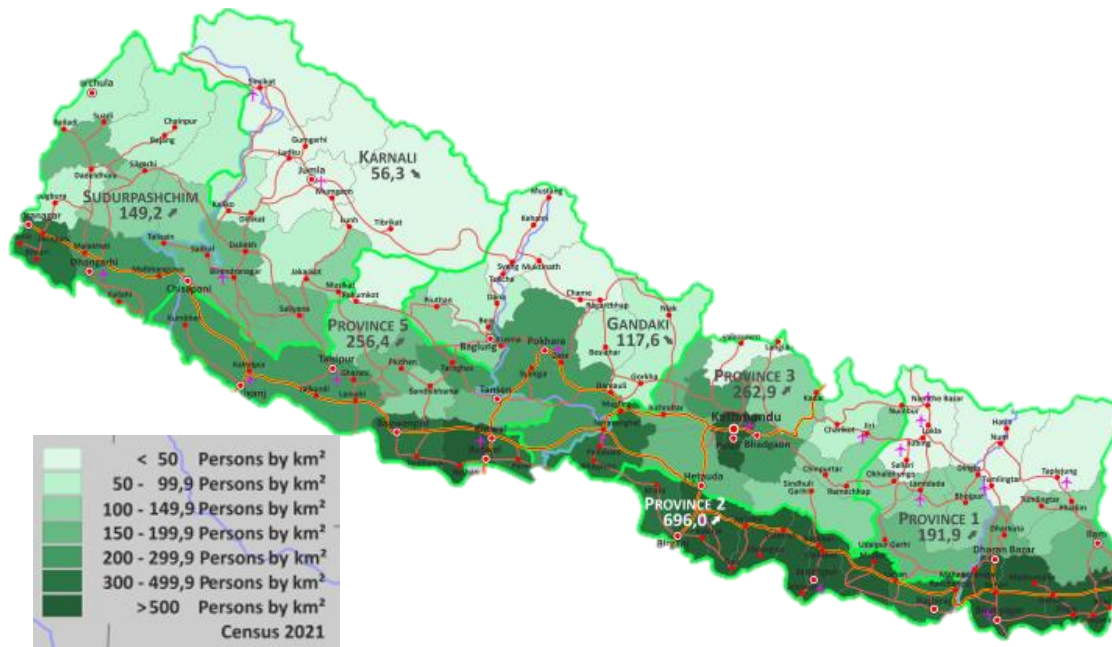


- **Lumbini** and **Koshi** Provinces, both with significant Terai lowland zones, are among the fastest-growing regions demographically and economically, supported by agriculture, cross-border trade with India, and expanding urban centres such as Biratnagar, Janakpur, and Butwal.
- **Gandaki**, **Karnali**, and the upland areas of Sudurpashchim, dominated by the Hill and Mountain belts, are sparsely populated, have lower per-capita incomes, and show high dependence on subsistence agriculture and remittances. These provinces experience the greatest geographic barriers to service delivery and infrastructure expansion ([World Bank, 2022](#)).

Major urban centres include Kathmandu (~860 000 people), Pokhara (~510 000), Bharatpur (~370 000), Lalitpur (~295 000), Biratnagar (~245 000), Butwal and Dhangadhi (~200 000) (see Figure 2).

Economic activity is concentrated in the Kathmandu Valley and along the Indian border corridors, where infrastructure, trade, and service sectors are more developed.

Figure 3: Population density by district ([Geo-Ref.net](https://www.geo-ref.net))



1.2 Energy Context

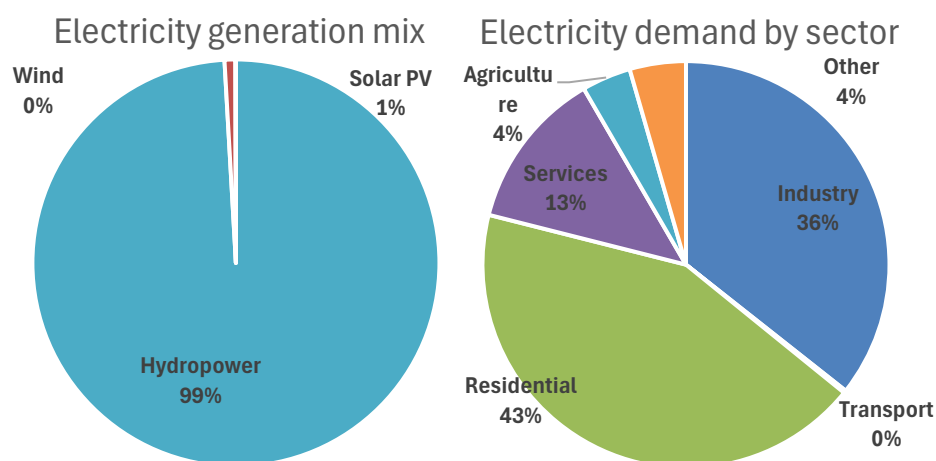
Background

Nepal's overall energy supply is dominated by the traditional use of biomass and imported fossil fuels, with electricity making up a relatively small share of final use. In 2023, biomass accounted for about 65% of total energy consumption – mainly driven by use in the residential sector (cooking and heating), while imported fossil fuels (petroleum products and coal) supply roughly 28%. Electricity – almost entirely from hydropower and small renewables – contributes the remaining ~7%. ([IEA, 2024](#)). Nepal has virtually no domestic oil, gas, or coal resources, making it fully dependent on imports of LPG, petrol, diesel, and coal for cooking, transport, and industry. This heavy import reliance has economic and energy security implications and, combined with the availability of national renewable resources, prompted a national focus on electrifying end-uses (cooking, road transport, etc.) and expanding indigenous renewable energy as highlighted in the country's National Determined Contributions (NDC) ([Nepal NDC, 2025](#); [CAT, 2024](#)).

Nepal's electricity sector is overwhelmingly based on hydropower, which is around 99% of electricity generation ([IEA, 2024](#)), mostly run-of-river plants harnessing the country's steep river gradients. The remainder includes some solar power (~100–150 MW) and a small amount of thermal generation (~50 MW of diesel/heavy-fuel plants) used mainly for backup. Wind power is negligible, with only a few pilot turbines.

As of mid-2025, Nepal's installed electricity capacity reached 3,878 MW ([SASEC, 2025](#)), an almost fivefold increase from just below 1GW a decade earlier ([IRENA, 2025](#)). The recent growth has been driven by multiple new hydropower projects, though Nepal has so far developed only ~7% of its vast economically viable hydropower potential of around 42,000 MW ([World Bank, 2024](#)), leaving significant room for expansion and exports to nearby countries such as India or Bangladesh. The government has an ambitious roadmap targeting 28,500 MW of generation by 2035 (with 15,000 MW earmarked for export) ([SASEC, 2025](#)), signalling its vision to become a regional clean energy supplier ([SASEC, 2025](#)). In 2023, electricity demand was 10,366 GWh with more than 40% consumed in the residential sector and ~35% in the industrial sector.

Figure 4: Electricity mix and demand by sector ([IEA, 2023](#); [IEA, 2023](#))



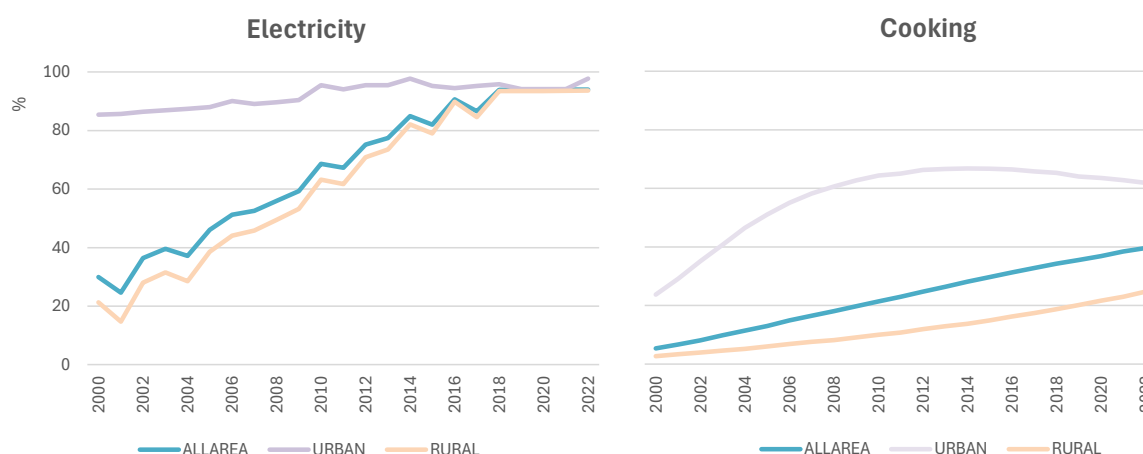
Besides grid-connected, large hydropower, Nepal has a long history of using decentralized and off-grid renewable energy to reach remote communities. The Alternative Energy Promotion Centre ([AEPC](#)) and partners have facilitated thousands of micro-hydropower plants (up to 500 kW) in off-grid mountain areas. As of 2023, multiple thousand off-grid micro-hydro added up to 35 MW in Nepal ([IRENA, 2024](#)), powering around 300,000 households as well as small businesses, community services and agriculture ([EBSCO, 2024](#)). In addition, solar photovoltaic systems have also been deployed. These off-grid solutions, often community-managed, have been critical in raising rural electricity access. However, the sustainability of off-grid micro-hydro plants is sometimes undermined by a

lack of professional operation and maintenance, rainfall variability and natural disasters ([Butchers et al., 2020](#); [Visions, 2023](#), [IIED, 2012](#)), and redundancy when the national grid arrives, causing revenue loss and abandonment ([Visions, 2024](#)). To address grid encroachment and increase supply, Nepal has initiated a policy of allowing grid interconnection of micro-hydropower plants (≤ 100 kW), enabling them to sell surplus electricity to the national utility, the Nepal Electricity Authority (NEA), through standardized power purchase agreements (PPAs) – the first PPA was signed in 2016 and the first interconnection in 2018. This move, spearheaded by AEPC and NEA, aims to improve energy utilization in rural areas, strengthen local grid reliability, and support productive use while preserving community ownership of the plants ([AEPC, 2020](#); [UNDP, 2018](#); [RERL, 2018](#)). Interconnection among micro-hydropower plants is also being tested for this purpose.

Access to electricity and clean cooking

Nepal has achieved near universal access to electricity (98.8%) in both rural (98.1%) and urban areas (99.1%), while clean cooking is still lagging with around 55% of the population – around 80% in rural areas and 40% in urban areas – cooking with traditional or harmful fuels and solutions and less than 1% of the population using electricity for cooking in great contrast with the government ambition of 25% e-cooking by 2030 ([GoN, 2021](#)).

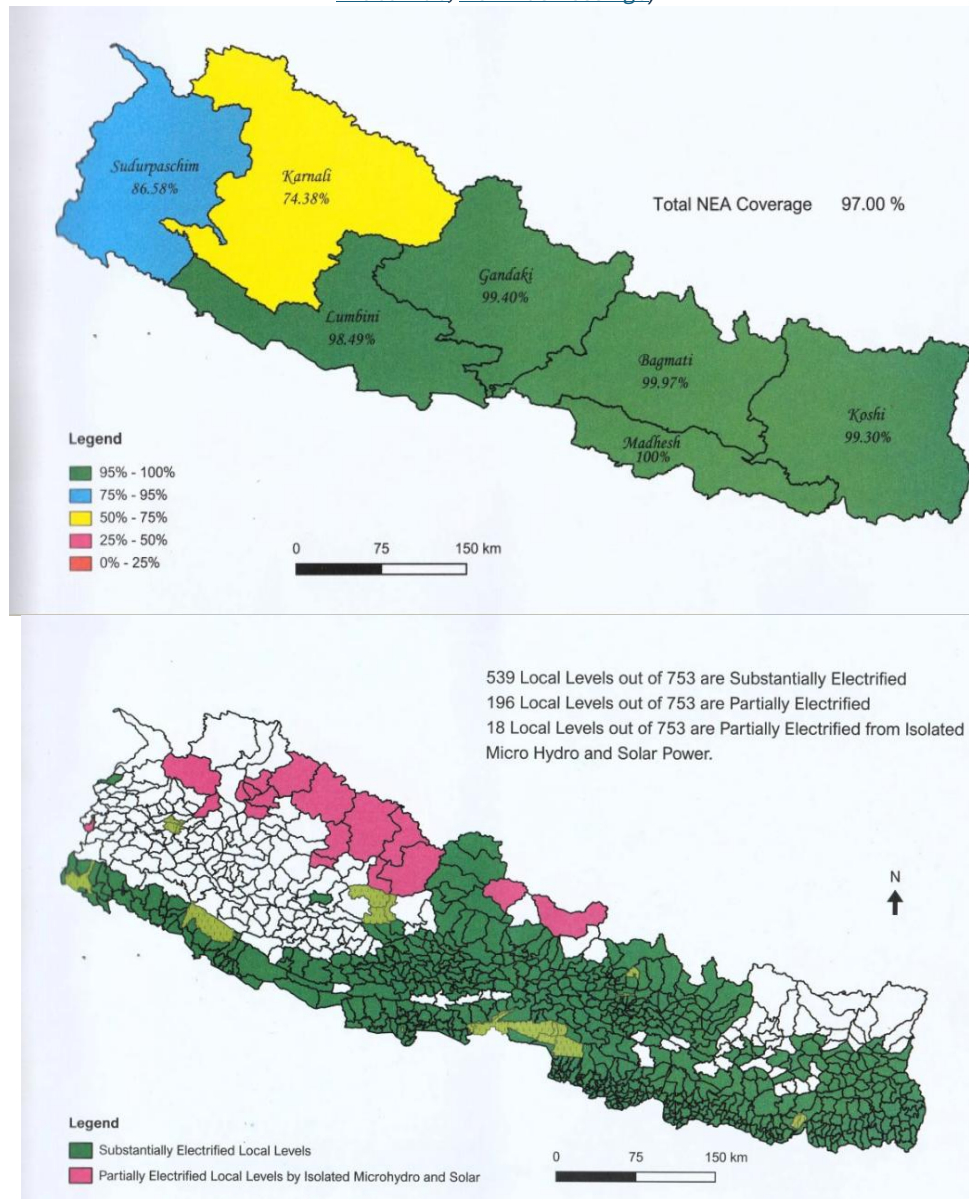
Figure 5: Electricity and clean cooking access rates ([Tracking SDG 7, 2025](#))



Source: Adapted from SDG 7 tracking data 2025

Due to both grid expansion and off-grid programs, Nepal has achieved a substantial increase in electricity access, from only ~45% of the population in 2005 to almost 95% in 2023 ([Tracking SDG 7, 2025](#)) or almost 99% according to the 2021 census ([GoN, 2021](#)) and multiple other sources citing the NEA electrification statistics report 2024.

Figure 6: Electrification by province and district (NEA Electrification Statistics 2024 accessed through [Radio Nepal](#), [Khabarhub](#), [New Business Age](#))



Virtually all urban and peri-urban households are now connected to the grid, and even in rural areas, the majority have some electricity (either via grid or off-grid renewable systems). Using available data on grid connections and off-grid systems it is possible to estimate that around 85-87% of the population has access through the grid and around 5-7% via off-grid sources at a national level. Nepal's rapid electrification—boosting access by over 50% in two decades—was achieved through a dual strategy focusing on national grid and decentralized power. Under the government and UNDP joint Renewable Energy for Rural Livelihoods (RERL) programme launched in 2011, AEPC has supported the deployment of thousands of micro- and mini-hydropower systems to bring electricity to rural and remote communities

(UNDP). Meanwhile, larger-scale rural electrification through grid extension has been undertaken by NEA, complementing the AEPC off-grid-based expansion.

According to the 2024/2025 NEA Annual Report, 539 out of 753 local levels are now substantially electrified, 196 partially electrified and 18 yet not connected to the grid but extensively using off-grid solutions (see Figure 6) (NEA, 2025). However, significant disparities still exist by region and locality. Madhes province leads the nation with 100% electrification, followed closely by Bagmati (99.97%) and Gandaki (99.40%). In contrast, the remote western provinces lag considerably, with Sudurpaschim Province at 86.58% and Karnali Province reporting the lowest access rate at 74.38%. The challenge is further highlighted at the district level, where areas like Humla remain unconnected to the national grid, and districts like Mugu in Karnali have household electrification rates as low as 31.80%.

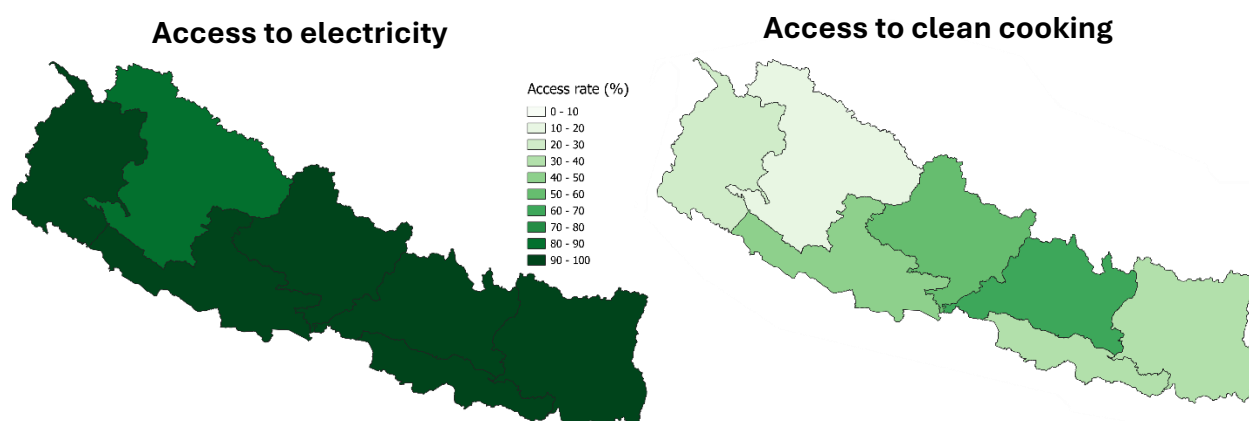
As highlighted above, despite high electricity access, Nepal faces a significant clean cooking deficit. Cooking energy in Nepali households is still heavily reliant on solid fuels, with a slow transition toward modern cooking fuels. As of 2022, almost 55% of households use wood/firewood or other solid biofuels as their primary cooking fuel, while about 40-45% use liquefied petroleum gas (LPG) as the main fuel (Census, 2021; DHS, 2022). Progress on clean cooking has been slower than for electricity access but still significant: a decade earlier (2012), the access rate was below 25%.

The uptake of LPG has driven most of the progress - LPG use rose from ~21% of households in 2011 to 44% in 2022 (Khabarhub, 2025). Only around 0.5% of households use electricity as their primary cooking fuel. Biogas is another contributor in the clean cooking mix. Nepal has run successful household biogas programs (especially in the Terai, where livestock manure is available) reaching more than 400,000 units by 2022 and 1.5% of households use biogas as their primary cooking fuel (>2% in Terai region) - more than electric cooking - (DHS, 2022; Energy Synopsis Report, 2023). Lastly, improved biomass cookstoves (ICS) have also been promoted as a transitional solution to make wood use cleaner and more efficient. Programs under AEPC distributed over 1.4 million mud-brick and 100,000 metal improved stoves by 2022 (Energy Synopsis Report, 2023), aiming to reduce smoke and fuel consumption.

To date, around 60% of urban households have transitioned to clean cooking, whereas only 25% of rural households use primarily clean cooking solutions. In cities and towns, more than half of households use LPG as their primary cooking fuel (DHS, 2022). By contrast, in rural areas an estimated 80% of households still use firewood for cooking as their primary fuel. LPG remains the primary cooking fuel for around 18% of rural households (DHS, 2022).

There are also significant differences across Nepal's ecological zones (see Figure 7). In the Mountain zone, only 14% of the population uses clean fuels for cooking, while in both the Hill zone and in the Terai plains access rates are around 43%. At the provincial level, access follows a similar geographic pattern. Bagmati leads with 70% clean-cooking access, followed by Gandaki (51%) and Lumbini (41%). In contrast, access remains far lower in Karnali (18%) and Sudurpashchim 29%, where extreme terrain, supply-chain constraints, and weaker purchasing power limit LPG uptake ([DHS, 2022](#)).

Figure 7: Nepal access to electricity and clean cooking by province ([DHS, 2022](#))



It is important to note that many Nepali households practice fuel stacking – using multiple fuels for different purposes or seasons. Even among the 40-45% of households counted as LPG users, a large portion continue to use wood (e.g. for animal feed preparation, brewing a Nepalese traditional distilled spirit called raksi , or during winter when a fire doubles for heating). Conversely, LPG has also penetrated traditionally wood-using areas as a secondary fuel; for instance, an extended family might use firewood for routine meals but keep a gas stove for quick tea or during monsoons when dry wood is scarce. Similarly for electric cooking, despite the fact that less than 1% use it as their primary source, around 5-6 % (400,000 households) use e-cooking to some extent ([NDC 2020](#), [NDC 2025](#)).

Electric cooking opportunities and challenges

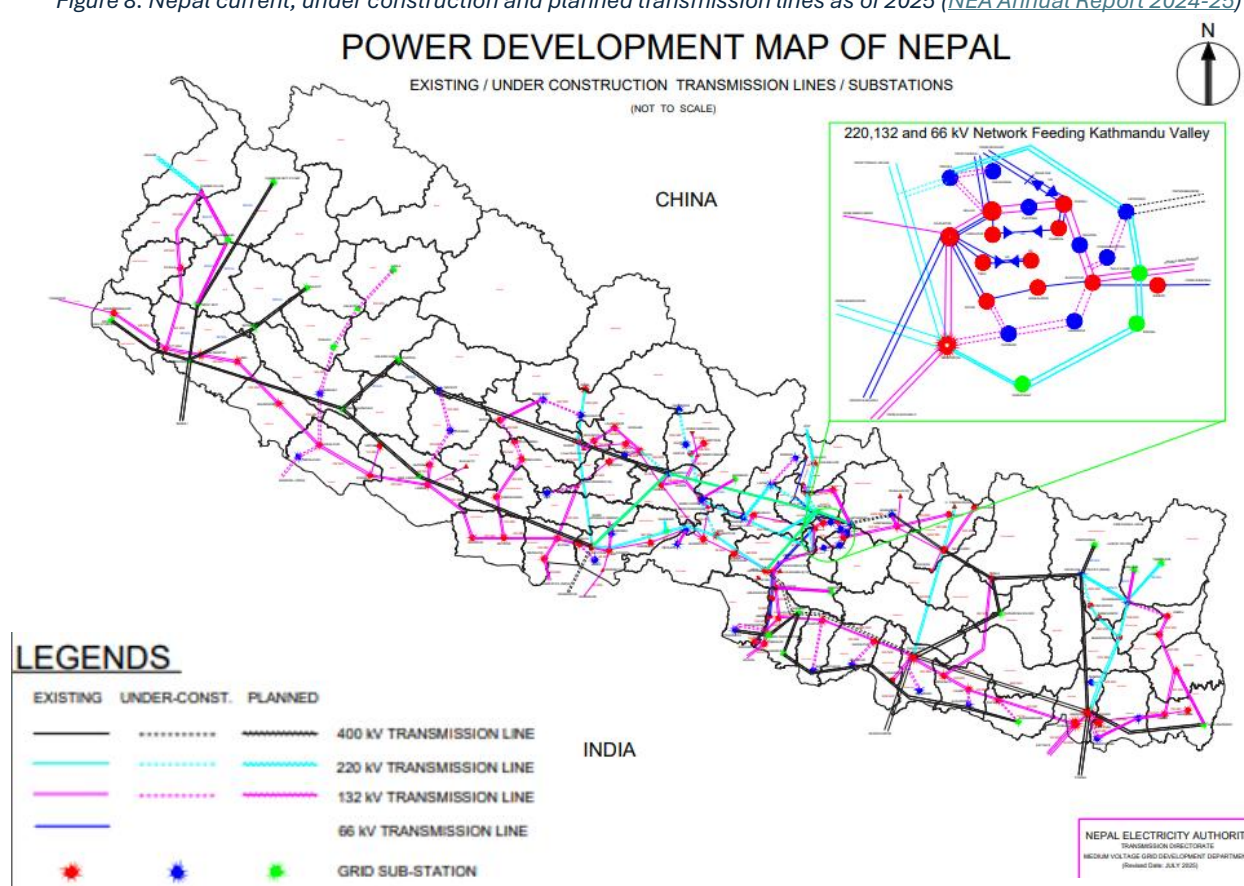
Electricity Networks, Reliability & Coverage

Nepal continues to rapidly expand its national transmission grid to integrate growing hydropower and improve regional connectivity. The country now operates 6,760 circuit-km of high-voltage transmission lines across 66–400 kV networks. A 2,034 circuit-km are under construction, and 6,605 circuit-km are planned or proposed, including major 220–400 kV corridors to reinforce east–west transfer and export to India and later China (see Figure 8)

(NEA, 2025). These investments aim to increase national grid stability, unlock hydropower export revenues, and enable universal grid electrification.

Despite recent gains, Nepal's power sector faces seasonal and reliability challenges. Its run-of-river hydropower plants have large seasonal output swings – rainy season (summer) generation far exceeds generation in the dry season, since river flows drop sharply in winter. As a result, Nepal exports electricity in the wet season when supply is plentiful, but still imports power from India in the dry season to meet peak demand (NEA, 2025; [Economic Times, 2024](#)). Managing this mismatch is critical - Nepal is giving priority to storage-type hydropower projects and exploring seasonal power swap agreements (NEA, 2025).

Figure 8: Nepal current, under construction and planned transmission lines as of 2025 (NEA Annual Report 2024-25)



On reliability, the country has made remarkable improvements. Load-shedding that lasted up to 14 hours per day between 2007 and 2017 has been eliminated ([World Bank, 2024](#); NEA, 2025). Today, power availability reaches 95–99% across most provinces, and even in remote regions like Karnali, supply is available over 84% of the time (NEA, 2025). However, localized outages and quality issues persist in some areas due to transmission and distribution constraints. Many feeder lines are old or overloaded, leading to voltage drops

and occasional unplanned cuts. NEA and partners continuously work on strengthening the grid – upgrading substations, adding transformers, and extending high-voltage lines – to ensure the supply is reliable and robust enough for increasing demand.

For example in FY 2024/25, the utility added 1,073 MVA of high-voltage substation capacity and expanded distribution with 15 new 33/11 kV substations, 3,151 transformers, and over 9,300 circuit-km of new lines (NEA, 2025). Strengthening the network is especially important as more households acquire appliances and as Nepal encourages new uses of electricity (like cooking and vehicles). In rural areas, outages still occur during storms or due to infrastructure limitations. Voltage fluctuations are another problem – low voltage can prevent appliances like induction cookers from functioning properly. Off-grid micro-hydro systems, which many remote communities use, often have limited output and may ration electricity (Clements et al., 2020; Marchand, 2021). These issues lead people to keep backup fuels, but the government is working on solutions including the above cited regulations for interconnecting micro-hydro plants among themselves and with the national grid. Addressing these issues would make e-cooking technically more compatible with a larger number of Nepalese households and in turn increase adoption and reduce reliance on imported fuels such as LPG.

Fuel competition, Energy Prices and Affordability

LPG is the dominant modern cooking fuel in Nepal and in recent years, its consumption has grown rapidly – more than doubling in the ten years 2013-2023 (IEA, 2024). However, the country relies 100% on imports, as it has no domestic oil/gas production or large-scale refining. The Nepal Oil Corporation (NOC), a state-owned monopoly, purchases LPG (and other petroleum fuels) from Indian Oil Corporation under a supply agreement. The LPG is trucked in cylinders across the border and distributed through private dealers. Since 2019, NOC plans to build new LPG storage facilities in all seven provinces (Tank Terminals, 2019) and is exploring a cross-border LPG pipeline from India (Ratopati, 2024; ANN, 2024) to improve supply reliability and reduce bottlenecks. These projects could further expand LPG penetration but could have a lock-in effect for LPG cooking by incentivising the governments to fully utilize new infrastructure investments over the long term.

The retail price of LPG historically is heavily subsidized, and the fuel is sold below cost <https://kathmandupost.com/money/2025/07/15/nepal-oil-revives-dual-pricing-for-cooking-gas-despite-repeated-failures> - :~:text=To%20sustain%20the%20subsidy%2C%20the,nearly%20Rs1%20billion%20monthly%20losses. Given the high volume of sales, the subsidy has become a major burden. To help finance it, NOC uses a cross-subsidy mechanism. It charges higher prices and taxes on other petroleum products such as aviation or industrial fuels. However, the system is

financially strained and often subject to politicization as adjusting fuel prices is a sensitive issue in Nepal. To rationalize subsidies, the government has repeatedly attempted to implement “dual pricing” for LPG, distinguishing household consumers from commercial users (restaurants, hotels, industries). Several news outlets reported that in July 2025, NOC announced a revival of dual pricing: commercial entities would no longer receive subsidized LPG while household consumers could continue to buy at the lower price but with a subsidy refund mechanism ([RATOPATI, 2025](#); [Kathmandu Post, 2025](#)). The plan involves using digital systems (linked to national ID and VAT bills) to refund subsidies directly to household buyers’ bank accounts, capping the number of subsidized cylinders per family (e.g. 8 per year for a family of four). Nepal has a long history of failed attempts at dual pricing, but this latest initiative is more technologically advanced (e-platform and e-coupons) and is backed by a political push to reduce subsidy expenditure.

Overall, Nepal’s LPG market is characterized by state-controlled pricing, heavy subsidies, and rising consumption while being at the centre of both energy security debates and household energy decisions. It is worth noting that even at subsidized rates, LPG is a significant expense for many Nepali households in addition to being fully imported, which adds further economic and supply risks. These factors have driven the government’s interest in moving toward electric cooking and taking advantage of domestic hydropower instead of imported gas (see section 2.2 National Energy Planning Related to E-Cooking). These reasons would also justify a gradual shift of LPG subsidies to targeted electric cooking affordability measures and support.

The opportunity for e-cooking builds on Nepal’s success in expanding power access and generation. The elimination of load shedding and the emergence of surplus hydropower in wet seasons mean that, during much of the year, there is unused electricity that could be put to productive use in kitchens. The Department of Customs reported that imports of electric cooking appliances surged in recent years to 204,393 units in FY 2022/23, a 30% increase from the year before ([My Republica, 2023](#)). The rising imports suggest that many households are at least experimenting with e-cooking as a secondary solution alongside their gas or wood stoves. There are reports that a 2022 survey by the National Statistical Office found that 7.3% of rural households and 14% of urban households use electricity for some cooking tasks ([Khabarhub, 2025](#)) – far higher than the 0.5% using it as the primary fuel. These results imply that a notable share of families have begun stacking electric appliances for certain dishes (e.g. making tea, cooking rice in an electric rice cooker) even if LPG or wood remains their mainstay. Familiarity with e-cooking can be an important step toward wider adoption.

Crucially, the economics of electric cooking in Nepal can in theory be favourable. With the right efficient appliances, cooking on electricity can cost less than cooking on LPG. A recent World Bank analysis found that, on average, electric cooking is ~29% cheaper in Kathmandu and ~39% cheaper nationally than cooking with LPG, given Nepal’s electricity tariffs and prevailing LPG prices ([World Bank, 2025](#)). Another study from the Ministry of Forestry and Environment reviewed at least two studies that found that e-cooking is more than 40% cheaper than LPG in Nepal ([MFE, 2021](#)).

Table 1: Household electricity tariffs for 15 ampere meter ([NEA Tariff data](#))

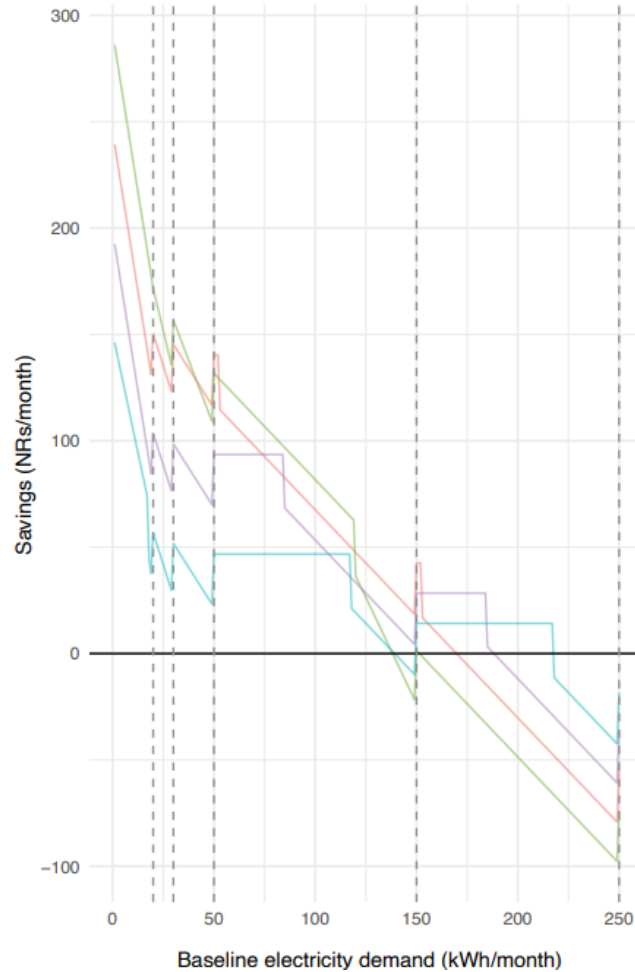
Monthly Consumption Slab (kWh)	Minimum charge (NPR/¢)	Energy Charge per kWh (NPR/¢)	Relevance for E-Cooking
0-20 kWh	50 (34.6¢)	4 (2.8¢)	Cannot support primary e-cooking.
21 - 30 kWh	50 (34.6¢)	6.5 (4.5¢)	Cannot support primary e-cooking.
31-50 kWh	50 (34.6¢)	8 (5.5¢)	Supplementary e-cooking use (boiling/reheating).
51 - 150 kWh	100 (69.2¢)	9.5 (6.6¢)	Primary e-cooking with efficient appliances (EPCs/Induction).
151 - 250 kWh	125 (86.5¢)	9.5 (6.6¢)	Full e-cooking possible
>250 kWh	175 (121¢)	11 (7.7¢)	Full e-cooking possible

Notes: Different minimum charges also exist for 5A, 30A and 60A meters. 15A is the minimum for primary e-cooking. VAT of 5-13% might apply.

This cost advantage comes from the combination of relatively low household electricity tariffs and the high efficiency of devices like induction stoves. Nepal has inclined block tariffs but also offers a lifeline rate for the first 20 kWh units (not enough for e-cooking). The Electricity Regulatory Commission (ERC) in 2022 reduced the tariff for consumers using more than 150 units ([MECS, 2022](#)). All these measures further improve the affordability of e-cooking.

However, while electricity per unit is cheap, there are concerns about monthly bills if a household cooks extensively with electricity as the tariff increases with higher usage, which could make heavy cooking consumption (or e-cooking combined with other baseline loads) more expensive and less competitive with LPG (see Figure 9).

Figure 9: Estimated savings from switching from LPG to induction stoves (CCA, 2021)



Notes: Coloured lines correspond to different baseline LPG consumption: 1 cylinder/ month (green), 0.75 cylinder/month (red), 0.5 cylinder/month (purple), 0.25 cylinder/month (blue). 1 cylinder = 14.2 kg.

The upfront cost of e-cooking appliances remains a hurdle for low-income households. Availability and maintenance in remote areas can also be an issue, though the surge in imports suggests possible wider adoption of e-cooking. The government also reduced the import duty on induction stoves and components in FY 2021/22 from 15% to 1% (MECS, 2022). However, some reporting suggests that the duty reduction benefits were not effectively passed on to customers (Ekantipur, 2024) and one pilot found that giving out free induction stoves still yielded low usage unless households could also afford compatible cookware (MECS, 2024). This indicates a need for affordability support, addressing upfront costs, for example through bundled provision of efficient appliances and compatible cookware. In this context, affordable financing mechanisms such as on-bill repayment schemes for efficient electric cooking appliances may be more effective than free

distribution alone in supporting sustained adoption while keeping electricity bills lower due to efficiency.

Moreover, a very practical barrier is the connection load limit. Many households, especially in older neighbourhoods and rural areas, are on a 5 Ampere single-phase connection. This equates to a maximum draw of about 1 kW, which is barely enough for one small hotplate – turning on an induction cooker (often 1.5–2 kW) would trip the circuit. Upgrading to 15 Amp (standard ~3 kW) is free but requires applying to NEA and paying a higher fixed service fee and meter charge. For many families, this bureaucratic and cost hurdle is a deterrent.

Cultural and behavioural barriers and opportunities

Cultural and behavioural factors could also inhibit e-cooking uptake. Cooking is deeply cultural, and many Nepali dishes have been traditionally cooked on wood or gas flames. There are still some perceived barriers on e-cooking due a lack of familiarity with timing and heat control on devices like induction or EPCs, limited compatibility with traditional cookware, the inability to cook multiple items at once, electricity supply quality and even if more limited also concerns about cooking performance for local dishes ([INS, 2024](#); [Bajracharya, 2022](#)). Programs now often include cooking demonstrations and behaviour change campaigns to show that common Nepali foods can be cooked on electric devices ([Clements et al, 2020](#)). Pilot initiatives have also combined technology deployment with demand-side engagement. For example, Practical Action’s work under an EnDev programme and induction stove pilots in Temal Municipality integrated user information sessions, appliance demonstrations, and market engagement to support adoption, although these efforts remained localised and were not implemented as formal, large-scale behaviour change campaigns ([Practical Action, 2021](#)). However, evidence from the Temal pilot indicates that while households initially experimented with electric cooking following appliance introduction, sustained and exclusive use remained limited over time, with most households reverting to fuel stacking or mostly traditional fuels once real-world constraints (mostly technical and economical) became apparent. These included concerns about electricity reliability during cooking hours, household wiring and meter capacity, perceived affordability risks, and the need to retain alternative fuels as a risk-management strategy ([Marchand, 2021](#)).

2. Policy and Planning Environment

2.1 Institutional Ecosystem

The transition to a federal structure established by the 2015 Constitution delegates significant shared jurisdictional powers and responsibilities across three distinct tiers of government: federal, provincial, and local (see 1.1 Administrative, Geographic and Socio-Economic Context). The resulting ecosystem is complex, characterized by both ambitious national mandates (such as universal clean cooking access by 2030 with 25% e-cooking) and the inherent challenges of harmonizing planning and implementation across multiple administrative levels.

Under this shared mandate, the authority of the federal and provincial governments concerning alternative energy is constitutionally limited primarily to standardization, capacity building, and technology transfer. They set the national stage, but they are not the primary on-the-ground implementers of localized projects. Conversely, local governments (LGs) are affirmed as the primary planning and service delivery unit for sub-national development as reinforced through the Local Government Operation Act (2017). ([Acharya et al., 2020](#); [UN, 2017](#)). For example, while the Nepal Electricity Authority (NEA) manages the national grid (a federal domain), local distribution (up to 33kV) is intertwined with local infrastructure approvals and enforcement, often requiring close collaboration with LGs ([NEA, 2025](#)). Reviews across different sectors indicate that Nepal's federal restructuring progressed faster than the clarification of roles, the establishment of coordination mechanisms, and the development of sub-national institutional capacity. As a result, service delivery in practice often still relies on informal negotiations, ad hoc arrangements, and personal relationships between officials across levels of government, contributing to overlapping mandates and variable outcomes across locations ([World Bank, 2019](#); [Acharya et al., 2020](#); [USAID, 2023](#)). On the positive side, evidence suggests that Nepal's transition to a federal system has already yielded some positive service delivery outcomes at the local level. Studies indicate that decentralisation has strengthened local ownership and accountability, particularly following local elections, contributing to an acceleration of development activities such as local infrastructure delivery. Assessments further show that as local governments build institutional capacity—reflected in improved planning, law-making, and programme implementation—their ability to fulfil constitutional mandates improves, with stronger local institutional performance associated with more effective enactment of local laws ([Adhikari, 2023](#); [Sapkota and Malakar, 2021](#); [GoP, 2020](#)).

The federal government houses the core institutions responsible for strategic direction, regulation, and large-scale implementation in the energy sector. The Ministry of Energy, Water Resources, and Irrigation (MoEWRI) serves as the principal government body for formulating national energy policy, overseeing water resources, and setting strategic directions for the entire sector. MoEWRI maintains direct ministerial control over key operational and regulatory agencies, including the Nepal Electricity Authority (NEA) and the Alternative Energy Promotion Centre (AEPIC) ([MoEWRI & JICA, 2024](#)).

AEPIC operates under the MoEWRI, and its objective is the popularization and promotion of renewable energy technologies. The agency plays a pivotal role in rural electrification (promoting micro hydro) and the clean cooking transition as the central technical authority for achieving national clean cooking goals. For example, AEPIC led, in cooperation with the Clean Cooking Alliance (CCA), the development of the [Country Action Plan \(CAP\) for Transforming the Cookstoves and Fuels Market in Nepal](#), which provides a roadmap for achieving clean cooking goals including integrating electric cooking solutions. AEPIC provides regular input into the revision of renewable energy subsidy policies and ensuring provision of clean and efficient cookstove models. The organizational placement of AEPIC and clean cooking within the energy ministry is a key structural element, forcing a necessary integration of clean cooking actions into broader energy sector planning (such as NEA's grid development) ([AEPIC](#)). AEPIC under the Clean Cooking Solutions Programme in cooperation with the Green Climate Fund has developed Provincial Project Management Units (PPMUs) to provide necessary regional project management, logistical oversight, and capacity building, thereby operationalizing the federal government's support function ([AEPIC](#)).

The NEA is the state-owned, vertically integrated utility responsible for the generation, high-voltage transmission, distribution, and sale of electricity throughout the country. Its operational domain is fundamental to achieving reliable, high-quality electricity access (Tier 3+) necessary for widespread e-cooking adoption ([NEA; Pikkal MEP, 2019](#)). NEA also holds an explicit role in demand-side intervention and e-cooking adoption, intensified by the ambitious national e-cooking objective (25% by 2030) and the country's high potential for hydropower (see 1.2 *Energy Context*). The NEA distribution directorate has also established provincial offices, crucial for coordinating on the ground with local governments ([NEA website](#); [NEA, 2025](#)).

Independent Power Producers (IPPs) generate an important share of Nepal's electricity, especially run-of-river hydropower, operating under licenses and selling power to NEA through PPAs. The Independent Power Producers Association Nepal ([IPPAN](#)) represents these private developers, advocates for regulatory and financial reforms, and supports investment and project development in the hydropower sector.

The ERC, established under the [Electricity Regulation Commission Act of 2017](#), functions as the autonomous body responsible for economic and technical regulation of the electricity market. Its primary mandates include safeguarding electricity users, ensuring quality service, handling complaints, creating a competitive and transparent market and setting electricity tariffs, which are decisive for e-cooking affordability and cost competitiveness ([ERC](#)).

The National Planning Commission (NPC) is the body responsible for coordinating national development policy, formulating long-term strategies, and ensuring financial alignment across sectors ([World Bank, 2019](#); [Energy Synopsis Report, 2023](#)). In collaboration with AEPC and with support from the CCA, the NPC has developed the [Country Action Plan \(CAP\) for Transforming the Cookstoves Market](#).

Nepal Oil Corporation (NOC) is the state-owned monopoly responsible for importing, storing, and distributing all major petroleum products in Nepal. It procures fuels mainly from Indian Oil Corporation (IOC) and manages national supply, pricing, and LPG subsidy administration ([NOC](#)).

The effectiveness of national energy strategies hinges on the institutional structure and planning instruments at the sub-national level. As explained above, provincial governments serve as the intermediate layer, primarily focused on regional coordination, infrastructure development, and capacity building, consistent with their constitutional mandates ([Acharya et al., 2020](#)). Energy is housed within Provincial MoEWRI, as exemplified in [Koshi Province](#). This provincial location of MoEWRI reinforces the focus of the province on regional network connectivity and construction but is not specialized in local access policy.

The core mandate for intergovernmental coordination in Nepal is set by the [Intergovernmental Relations Act, 2020](#), establishing councils to ensure cooperation and coordination across all three government tiers, including within the energy sector. This legal framework is reinforced by the [Provincial and Local Governance Support Programme \(PLGSP\)](#), which provides institutional and capacity-building support. Furthermore, structures like AEPC's PPMUs and NEA local distribution directorate offices create an environment for utilizing the provincial level to provide necessary regional project management, logistical oversight, and capacity building, thereby operationalizing the federal government's support function.

LGs are the frontline implementers of energy access and clean cooking solutions. They are the primary authorities for formulating and approving Local Development Plans (LDPs). To mainstream energy into the LDPs, AEPC developed and piloted the concept of Municipal

Energy Plans (MEPs) using the authority derived from the Local Government Operation Act (2017). MEPs are technical, data-driven documents that also set local targets for electricity and clean cooking ([AEPC, 2020](#)) and include strategic and implementation plans (see more in Section 2.3 Decentralization and Subnational Energy Planning Related to E-Cooking). AEPC also has developed [MEP guidelines](#), which require municipalities to base targets on local baseline surveys of households and enterprises, existing electricity and clean cooking access, demand projections, and feasible supply options, which are then aligned with national policy benchmarks such as SDG 7 and Nepal's NDC. Early MEPs, including the [Phikkal MEP](#), illustrate this approach in practice by setting phased, ward-level electricity and clean cooking targets linked to identified access gaps and locally viable interventions. Local governments also have the authority to establish dedicated energy sections within the municipality to manage implementation plans, as illustrated in the [Palungtar MEP](#). The MEP concept is being reinforced by Nepal's [2025 NDC](#) under which 400 local governments are mandated to formulate and implement MEPs by 2035.

In general, local governments also benefit from established federal, fiscal mechanisms, including constitutionally mandated shares of value-added tax (VAT), excise duty, and natural resource royalties that are supposed to provide them with essential resources to fund and execute locally prioritized projects, including for energy. This local control over budgets means that securing allocations for energy priorities is possible but requires their integration into LDPs. However, assessments further indicate that the effectiveness and predictability of fiscal transfers to local governments vary in practice across provinces and municipalities while also the rules governing budget transfers to local governments remain unclear and sometimes contradictory. Local technical capacity for the development of energy plans is also often lacking and is not limited to technical energy expertise but also include planning, financial management, procurement, and intergovernmental coordination, highlighting the need for support and/or capacity building from provincial, federal and international development actors ([Acharya et al., 2020](#); [UNDESA, 2020](#); [Kayashta et al., 2015](#)).

2.2 National Energy Planning Related to E-Cooking

Nepal's policy framework has increasingly prioritized electric cooking as a cornerstone of clean cooking and energy strategies. This shift is driven by multiple goals: reducing indoor air pollution and health risks but also reducing reliance on imported LPG and leveraging Nepal's expanding hydropower capacity for domestic benefit ([MECS, 2021](#); [CCA, 2022](#); [CCA, 2023](#)). Earlier clean cooking initiatives, as the [Biomass Energy Strategy 2017](#), focused on improved biomass stoves and biogas to achieve universal clean cooking by 2030 ([ICIMOD, 2020](#)). However, policies explicitly targeting electric cooking are relatively recent,

beginning around 2017–2019 as Nepal recognized e-cooking as a viable clean alternative. The result is an evolving and somewhat crowded e-cooking policy landscape with ambitious targets embedded in climate commitments, development plans, and energy roadmaps, though these efforts have been recently consolidated into a more coherent implementation pathway through the AEPC, NPC and CCA [Country Action Plan for Transforming the Cookstoves Market](#) mentioned earlier.

The 2018 MoEWRI Energy White Paper set the tone by launching the campaign “Electric Stove in Every Household” ([MoEWRI, 2018](#)). This set an unprecedented target essentially envisioning universal e-cooking and signalled high-level political will to transition away from traditional fuels even if there seems to be no precise target year or precise actions to achieve it. The subsequent 15th Five-Year Plan (2019–2024) translated this vision into concrete interim goals, targeting 580,000 electric stoves by 2023 (roughly 8-10% of households) and introducing a policy to adjust electricity tariffs to encourage cooking use ([NPC, 2019](#)). This plan marked the first time Nepal’s national development planning explicitly included electric cooking targets and incentives, underscoring the shift from prior biomass and LPG-centric policies. In tandem, Nepal’s international climate commitment – the Second Nationally Determined Contribution (NDC 2.0) submitted in 2020 – reinforced the agenda, pledging that 25% of households would use electric cookstoves as their primary cooking method by 2030 ([GoN, 2020](#)).

Momentum has only increased in recent years. The 16th Five-Year Plan (2024/25–2028/29) ramps up ambition, aiming for 1 million electric cookstoves or ~20% of households by 2028/29, reflecting confidence and political will to scale up electricity use for cooking ([NPC, 2025](#)). Likewise, Nepal’s NDC 3.0 target (2025) raises the bar longer term: it proposes to expand electric cooking to 2.1 million households (30-35%) and 15,000 institutions by 2035 ([GoN, 2025](#)). This target is conditional on international support (unconditional target: 500,000 households by 2035), yet it clearly signals Nepal’s vision of electrifying a large share of cooking within the next decade.

To support these goals, the CAP provides an evidence-based strategy and pathway to achieve Nepal’s clean cooking targets, including high level interventions and short- and long-term implementation plans that could be translated in concrete and specific actions. The plan emphasizes promoting electric cooking and market transformation, including through supply chains, financing, awareness and behavioural change programmes, supply- and demand-side affordability measures and incentives.

Table 2: List of policies and strategies relevant to e-cooking

Policy/Plan Name	Governing Body/Year	Key Measures/Targets Relevant to E-Cooking
<u>2nd Nationally Determined Contributions (NDC)</u>	Government of Nepal (GoN) (2020)	Targets 25% use of electric cookstoves as their primary mode of cooking by 2030.
<u>3rd Nationally Determined Contributions (NDC)</u>	GoN (2025)	Expand the use of electric cookstoves to 2.1 million households and an additional 15,000 institutions/firms by 2035 (conditional on international support; unconditional: 500,000 and 1500).
<u>Country Action Plan (CAP) for Transforming the Cookstoves Market</u>	AEPC/NPC/Clean Cooking Alliance (CCA) (2022)	Provides an evidence-based roadmap to support Nepal's energy access goals, particularly related to promoting electric cooking. Emphasizes transforming the market to boost energy independence.
<u>16th Five-Year plan</u>	National Planning Commission (NPC) (2025)	Target one million electric stoves by 2028/29.
<u>15th Five-Year Plan</u>	NPC (2019)	Targeted 580,000 electric stoves. Included a working policy to set appropriate tariffs to encourage e-cooking.
<u>Energy White Paper: Present Situation and Future Roadmap</u>	MoEWRI (2018)	Increase per capita electricity consumption to 1500 kWh by 2028. Formulated the idea for 'Electric Stove in Every Household'.
<u>National Energy Efficiency Strategy</u>	GoN (2018)	Includes developing minimum energy performance standards for all electrical and mechanical equipment.

Beyond these national policies, Nepal has implemented practical incentives to accelerate e-cooking uptake, including to reduce upfront stove costs and electricity tariffs (see *Fuel competition, Energy Prices and Affordability*). In the 2023/24 budget speech, the government allocated \$12 million to clean cooking including e-cooking ([World Bank, 2025](#)). AEPC has begun distributing free or subsidized electric stoves under various initiatives. For example, a new five-year program co-funded by AEPC and the Green Climate Fund is deploying electric stoves (500 000), Tier 3 improved biomass stoves, and biogas systems in the Terai region to reduce traditional fuel use ([GCF, 2021](#)).

It is noteworthy that local governments also joined the e-cooking push, as the three publicly available MEPs include e-cooking promotion or targets ([Laxminiya](#), [Phikkal](#), [Palungtar](#)). A more detailed analysis of provincial and local clean cooking plans is provided in *2.3 Decentralization and Subnational Energy Planning Related to E-Cooking*.

Nepal's comprehensive suite of policies establishes a positive enabling environment for electric cooking, though the ambition is extremely high. Analysts have pointed out that achieving the e-cooking targets set by the government is a formidable challenge ([AEPC and CCA, 2022](#); [Lohani et al., 2025](#)). As of 2022, only 0.5% of Nepali households were cooking primarily with electricity, and at the current pace, Nepal is not on track. Meeting the government's bold targets will require a rapid acceleration in uptake – on the order of tens of thousands of new e-cooking households per month – sustained over many years. Going forward, the critical test will be how effectively these ambitious plans can be translated into large-scale adoption. With continued investments in infrastructure upgrades to make connections and supply suitable for large e-cooking penetrations, coordinated efforts across government levels, and support from development partners, Nepal stands to make substantial progress.

2.3 Decentralization and Subnational Energy Planning Related to E-Cooking

Nepal's subnational energy-planning system sits within the new federal architecture created by the 2015 Constitution and the 2017 Local Government Operation Act (LGOA), which gives 753 local governments extensive powers over local development, including small electricity projects and alternative energy ([Devkota, K.L., Khanal, G.K., 2024](#); [AEPC, 2020](#)). Nepal's subnational energy planning framework is still evolving, with three main subnational planning and related instruments relevant to electric cooking: (i) Municipal Energy Plans (MEPs), (ii) local development plans and annual budgets, and (iii) emerging clean cooking strategies and investment programmes led at federal level but implemented locally.

Municipal Energy Plans (MEPs) have been piloted since the 2017 Local Government Operation Act and have also recently been reinforced in the [2025 Nepal NDC](#), which mandates the development and commencement of implementation by 2035. In 2020, AEPC developed a standard MEP Guideline ([AEPC, 2020](#)) with a nine-step process for local energy planning (See Table 3: Steps for MEP production).

Table 3: Steps for MEP production (AEPC, 2020)

Step	Explanation
Identify Stakeholders	To ensure broad-level engagement from a cross-section of energy stakeholders who can positively or negatively influence energy planning and implementation.
Establish Energy Sub-Committee Team	To establish leadership within the local government to lead the plan's development, be responsible for its implementation, and monitor progress.
Develop Energy Baseline	To understand the current energy landscape, resources, and consumption, providing a basis for planning and a reference for future monitoring.
Develop Energy Vision, Mission, Goal, Objective and Strategy	To set the overarching commitment and purpose, providing aim and direction for the municipality to improve its energy access situation.
Develop Activities	To identify a broad range of specific programs and projects based on the municipality's vision, goals, and objectives.
Evaluate and Prioritize the Activities	To remain focused and resource efficient by prioritizing identified activities based on need, demand, resource availability, and the best available technology.
Identify Funding Sources	To ensure smooth implementation by identifying the funding required and all possible sources (municipal, federal/state, community, and others).
Compile and Finalize the Plan	To summarize and consolidate all information into a single, comprehensive document and obtain approval from the local government executive committee or council.
Implementation and Monitoring & Evaluation	The phase where the actual implementation of the plan begins and is periodically monitored against pre-defined indicators to track progress and impact.

AEPC's 9-step MEP guideline resembles the Energy Delivery Model (EDM) approach in its emphasis on participatory diagnostics and multi-sectoral assessment, but EDM goes much deeper into user needs, behavioural barriers, market readiness and enabling conditions. Integrating EDM-style approaches into future MEPs could significantly strengthen local e-cooking planning by making scenarios more realistic and improving demand forecasts for NEA and municipal budgeting. GIZ has also financed a more technical guideline to standardize MEP development ([GIZ, 2020](#)).

MEPs are conceived as technical, sector-focused plans that diagnose current energy use including cooking, identify future energy needs, map supply options and propose a five-year portfolio of clean energy interventions. MEPs are to be endorsed by the municipal council and are meant to guide the inclusion of energy projects in annual and periodic plans and budgets as stated in the [Laxminiya MEP](#) (2019), [Palungtar MEP](#) (2018) and [Phikkal MEP](#) (2019). These early MEPs typically start from ward-level diagnostics of current energy demand and resources, then use a bottom-up LEAP-based model to develop scenarios and a five-year implementation plan covering household lighting and cooking, grid upgrades, community services, project pipeline studies and capacity building activities. All three available MEPs mention the deployment of electric stoves, though it is not their focus. However, clean cooking measures are grouped as a dedicated intervention block and account for a substantial share of planned investment—about 29% of total costs in Laxminiya and 51% in Palungtar, financed through a mix of municipal budget and national renewable energy subsidies. It should be noted that only a limited number of completed MEPs are publicly available to date, and all were prepared before the recent federal e-cooking push.

Local government development plans and annual budgets are the legally binding instruments through which municipalities set multi-sector priorities and allocate resources. The 2017 LGOA empowers local governments to prepare periodic (5-year and annual) plans and annual programmes, approve budgets, establish and implement laws and mobilise own-source revenue and fiscal transfers ([Devkota, K.L., Khanal, G.K., 2024](#)). These plans and budgets are cross-sectoral (roads, water, health, agriculture, energy, etc.) and define what gets financed each year. MEPs operate inside the technical energy planning space, while periodic plans and annual budgets operate inside the local public development finance system; the two are not yet systematically linked, but MEPs are designed to feed concrete project lists and investment costs into local budgeting processes ([AEPC, 2020](#)). The CAP also explicitly encourages local governments to integrate clean cooking into municipal plans and budgets and envisages redirection of provincial and local budgets towards household electricity infrastructure upgrades and e-cooking solutions ([AEPC and CCA, 2022](#)).

The AEPC's MEP guideline notes that most municipalities lack the data needed for model-based forecasting, implying that local planning often must rely on more practical approaches and targeted data collection ([AEPC, 2020](#)). A peer-reviewed study similarly finds municipal energy planners require support to generate transparent, disaggregated baseline data to inform local energy planning decisions ([Pelz, 2020](#)).

AEPC and CCA have stated that they will support NPC to develop a clean cooking coordination guideline, which was explicitly requested by local leaders, underscoring the need to harmonize local plans, policies, activities, and budgeting to reduce conflict in resource sharing among the various government tiers. It seems that the guideline document is not yet publicly available, but its aim is to provide guidance and practices for effective coordination and cooperation among the three levels of governance in the clean cooking sector ([CCA, 2023](#)).

To summarise, Nepal increasingly relies on a multi-layered subnational planning ecosystem: MEPs as technical energy plans; periodic local development plans and annual budgets as the binding planning and financing instruments; and national clean cooking strategies, policies and projects that provide targets and guidance but depend on local governments for implementation. Moving forward, finalizing new MEPS and updating them systematically, linking their outputs to annual and periodic local plans and budgets, and creating routine coordination and communication channels with provinces, NPC, MoEWRI and NEA would greatly strengthen this ecosystem. Clearer guidance, capacity support and predictable funding streams for municipalities represent key interventions to make the process effective and accelerate e-cooking scale-up.