



# NEPAL

## Beyond Connections

Energy Access Diagnostic Report  
Based on the Multi-Tier Framework

### *Executive Summary*



**MTF**



Multi-Tier  
FRAMEWORK

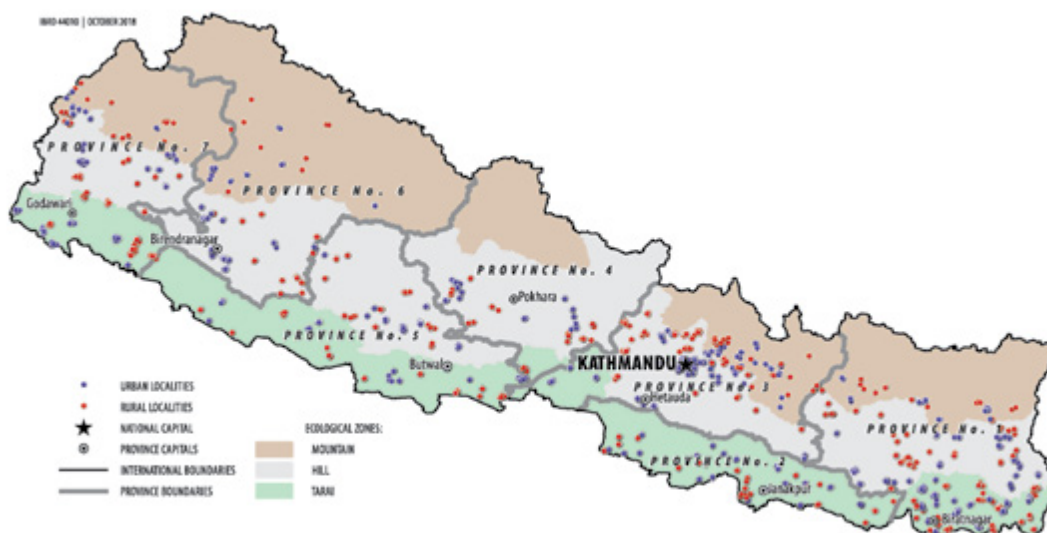


**The Multi-Tier Framework (MTF) was developed to address the specifics of energy-access needs outlined in the Sustainable Development Goals (SDGs) of the United Nations and the Sustainable Energy for All (SEforAll) initiative launched by the Secretary-General of the United Nations.** It examines a variety of energy-service issues and solutions that include but go beyond access alone. For example, MTF considers the viability of decentralized off-grid solutions (such as mini-grid and solar home systems) as well as on-grid solutions as sources of electricity.

**The Energy Sector Management Assistance Program (ESMAP) in the World Bank, in consultation with multiple development partners, has developed the Global Tracking Framework (GTF) to measure and monitor energy access using the MTF in terms of attributes and tiers.** The MTF defines energy access as one that is “adequate, available when needed, reliable, of good quality, affordable, legal, convenient, healthy, and safe for all required energy applications across households, productive enterprises, and community institutions.”

**As part of the stock-taking exercise on measuring access via the MTF, ESMAP has launched detailed data collection activities in 17 countries.** One of those is Nepal, a country of 29 million people in South Asia committed to achieving the Sustainable Development Goal on Energy Access (SDG 7.1). With the Government of Nepal, the World Bank carried out a nationally representative household survey in 2017 to determine a baseline for Nepal’s access to energy. The findings of this report are based on the data from that survey.

### **Spatial distribution of the households in Nepal sampled for the Multi-Tier Framework survey**

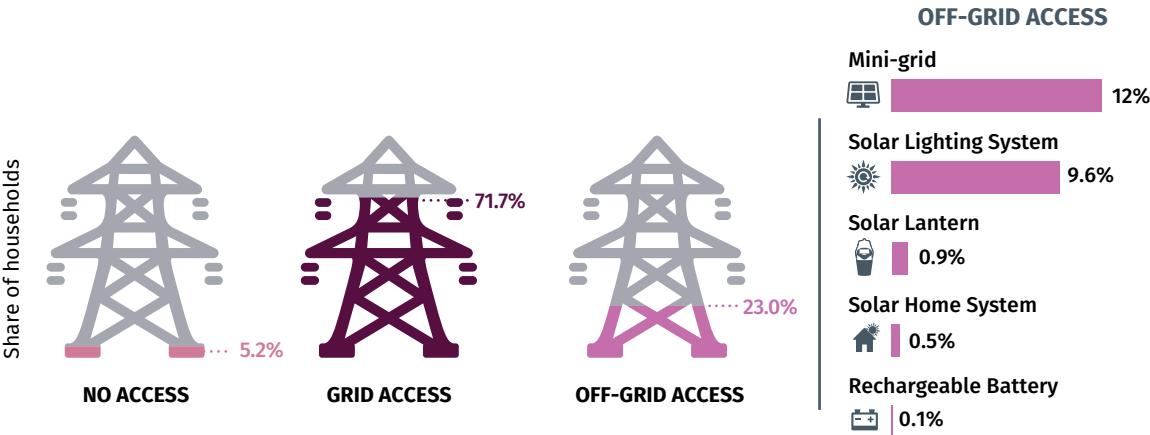




# ACCESS TO ELECTRICITY

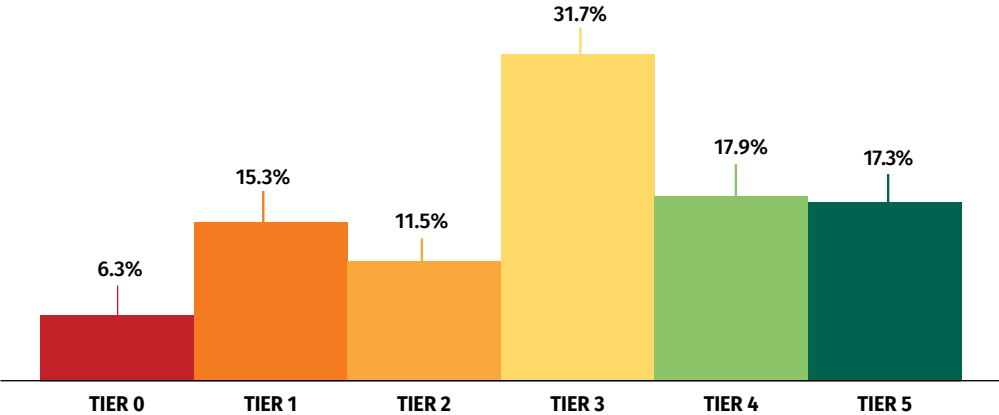
Nepal has made great strides toward achieving universal access to electricity: 71.7% of households have electricity from the national grid, and 23% are connected to off-grid sources. Among households using an off-grid solution, the mini-grid and solar lighting systems are the most common sources. Twelve percent of Nepalese households are connected to an isolated mini-grid: a pico-hydro, microhydro, or mini-hydro system. Households connected to a pico-hydro system as their main source of electricity make up 2% of the households in this study. About 5% of the households in Nepal have no access to electricity in any form and rely on dry-cell batteries or solid fuels for lighting.

FIGURE 1 • Share of households with access to different technologies (nationwide)



The MTF analysis shows that Tier 3 households make up the largest share of households nationwide, at 31.7%. A significant share of households are in the higher tiers—17.9% in Tier 4 and 17.3% in Tier 5—while Tiers 1 and 2 have 23.2% of the households combined. In Nepal, 6.1% of households are in Tier 0, and most of them have no access to electricity.

FIGURE 2 • The MTF aggregate tier distribution (nationwide)



**The availability of electricity supply is a major concern for households connected to the national grid.** While 47.4% of grid-connected households receive almost 24 hours of electricity supply, the situation for half the population is less optimistic. Over 41.7% of the households have fewer than 4 hours of electricity available between 6 p.m. and 10 p.m. On average, grid-connected households consume 46.63 kWh each month.<sup>1</sup> They invest in backup sources of lighting using rechargeable batteries and solar lighting systems.

**The Reliability and Quality of grid electricity also affect the level of service and access for households.** Even though households report not having load shedding, the incidence of unscheduled and unpredictable outages is high. Issues of the Reliability of the electricity supply affect 70% of households. In addition, 17% of households report having serious voltage problems that damage appliances. To offset the voltage issues, households invest in stabilizers. These findings are reflected in households’ perspectives of the main challenges with the grid electricity supply and their coping mechanisms.

**Households connected to mini-grids have lower electricity access levels than others, making up 38.1% of the households in Tier 1, mainly due to Capacity constraints and limitations in Availability, Reliability, and Quality attributes of the electricity service.** Households face constraints due to the Capacity of the mini-grid system when operators impose restrictions on the households’ appliances and load. These households use low-load appliances limited to lighting, mobile phone charging, radios, and televisions. Unlike households that use the grid, most of those (91%) in mini-grid areas have sufficient electricity supply between 6 p.m. and 10 p.m., but they have limited supply throughout the 24-hour period. These households are generally less well-off and consume less electricity than grid-connected households.

**Most of the households (89.6%) that use a solar device as their main source of electricity are in Tier 1, because they are limited by the capacity of their device.** These households are unable to power appliances beyond basic lights, radios, and mobile phone chargers. Only 4% of the solar users own televisions even though there is a latent demand—households report that one of their main problems with solar devices is that they cannot power larger appliances. Households are also affected by availability of electricity supply through the day. Their devices provide limited supply, which is mainly used from 6 p.m. to 10 p.m.

**For households with no access, adopting a solar device is a more affordable short-term solution than other options.** Of all households in Nepal, 6.1% are in Tier 0, and 5.2% have no source of electricity. Out of those households with no access, 30% are not connected to the grid because of administrative barriers. The expense of connecting to the grid and the distance from a household to the grid are also reported obstacles that prevent households from gaining electricity access.

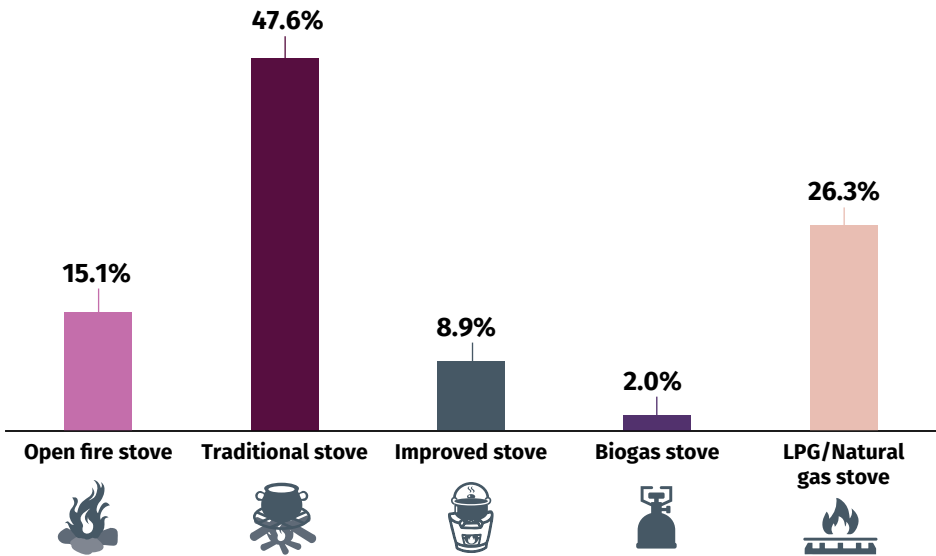
**The Government of Nepal has recently outlined strategies for increasing generation capacity, improving the transmission and distribution of grid electricity and introducing high-capacity solar generation.** The White Paper “Current Status and the Roadmap for the Future” provides a plan for the energy sector for the next 10 years. The proposed measures on planning and financing the various aspects of grid and off-grid electrification are important steps in the government’s effort to close gaps in access. Households connected to the national grid and mini-grids will require more reliable electricity supply in the future, with fewer outages and voltage fluctuations. Better quality of service will be able to facilitate increased demand. Households currently using solar devices and other low capacity sources of electricity will need to switch over to the grid or high-capacity off-grid solutions in the medium to long terms. For the last mile connections, households with no electricity can be offered low-cost renewable electricity with flexible payment options as an interim solution.

# ACCESS TO MODERN ENERGY

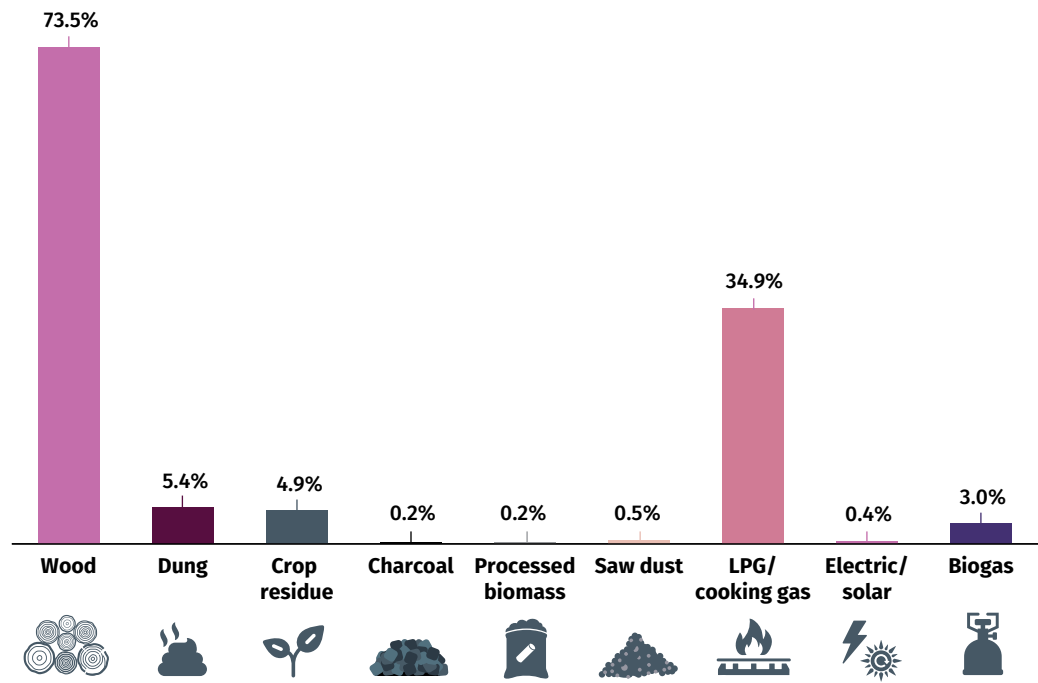
## COOKING SOLUTIONS

In Nepal, a majority of the households use biomass stoves as their primary stove: 15.1% of all households cook on an open fire and 47.6% of all households cook on a traditional stove with an enclosed fire, while 8.9% of households use improved biomass stoves. Clean-fuel stoves are becoming more prevalent, with 26.3% of households using liquefied petroleum gas (LPG) stoves and 2% using biogas. Firewood is the most widely used source of cooking fuel—73.5% of the households depend on wood. Animal waste and crop residue or plant biomass are the other sources of biomass fuel for households. Across the country, 16.3% of households use two types of stoves for cooking while 1% of the households use 3 types of stoves; 7.3% of households use an LPG stove with their traditional stove.

FIGURE 3 • Distribution of primary stoves (nationwide)

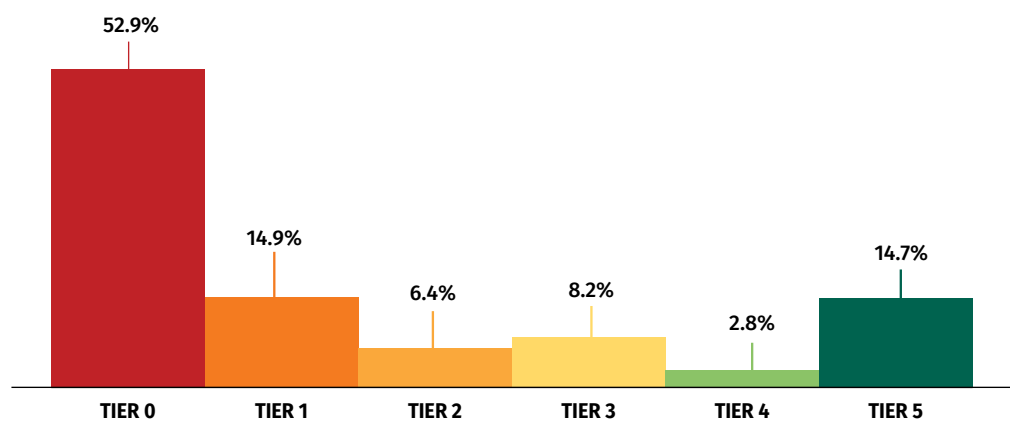


**FIGURE 4 • Fuel penetration rate: share of households using a type of fuel (nationwide)**



In Nepal, a majority of the households are clustered along the lower end of the tiers, with **52.9% of them in Tier 0**. About 15% of households are in Tier 1, while Tiers 2 and 3 have 14.8% of the households. Tiers 4 and 5 represent households that have attained access to modern energy cooking services, and they have 2.8% and 14.7%, respectively, of the total households in Nepal.

**FIGURE 5 • MTF cooking tier distribution (nationwide)**





**The main attributes that hinder households' level of access are the Cooking Exposure, the Convenience, and the Affordability of the cooking solution.** A large share of households use traditional stoves and solid biomass and are mainly in Tiers 0 and 1 for Cooking Exposure. A large amount of time is spent collecting and preparing the fuel as well as preparing the stove for cooking, resulting in only 19.1% of the households across the country to reach Tier 5. Finally, about 14.3% of the households spend more than 5% of their household expenditure on cooking fuels annually, putting them in Affordability Tier 3.

**To shift households up the tiered framework, a short- to medium-term solution is to switch households to improved cooking solutions.** As biomass, in the form of fuelwood, animal waste, and crop residue, is dominant in the energy mix, improved biomass solutions can be a transitional technology until clean fuels are more sustainably available with better supply chains. The Government of Nepal's Biomass Energy Strategy and other energy subsidy programs have facilitated policy making around the issue of clean cooking. However, there is still a long way to go to completely shift households away from polluting technology and fuels. A lack of awareness among households using traditional stoves and a constraint of financial resources are impediments that can be overcome through smart subsidies and flexible payment options. The stoves promoted should incorporate some of the desirable features for households: ease of use, speed of cooking, and cleanliness of the stove.

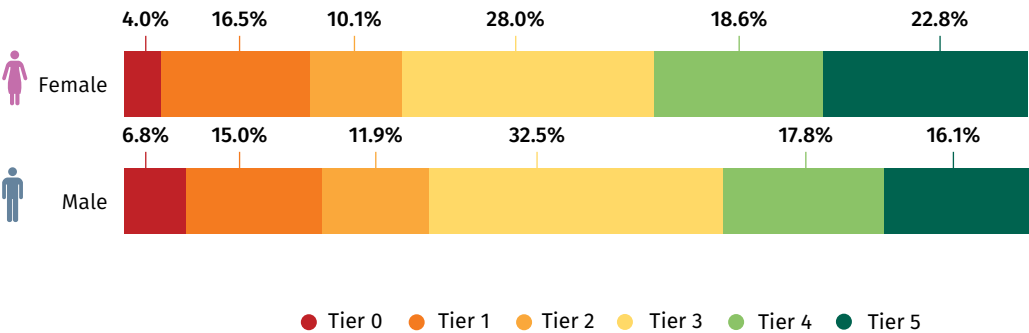
**Getting households to switch to clean fuels such as electric stoves or biogas can be a long-term solution for Nepal.** Given the high monetary and time cost on the import of LPG, the Government of Nepal is focusing on increasing access to biogas and electric cooking solutions for households who want to switch to clean options. Biogas has the potential to be adopted by a wide share of the population, given that it requires biomass waste. The government already has put policies in place to promote the use of biogas as well as increase the penetration of biogas through various financing incentives. The government and the Nepal Electricity Authority (NEA) have to work in parallel to provide reliable and high-quality service so that households can adopt and use electric cooking solutions without any hinderance.

**Nepal requires a multi-pronged approach to address the modern energy cooking solution challenge.** First, markets need to come together and target users through private sector involvement and such strategies as results-based financing. Second, for quality assurance and monitoring, the country needs to develop a decentralized testing and labelling regime. Third, local governments can play a crucial role in improving access to improved and clean cooking solutions. They need to be brought into the policy-making process, and local capacity needs to be built.

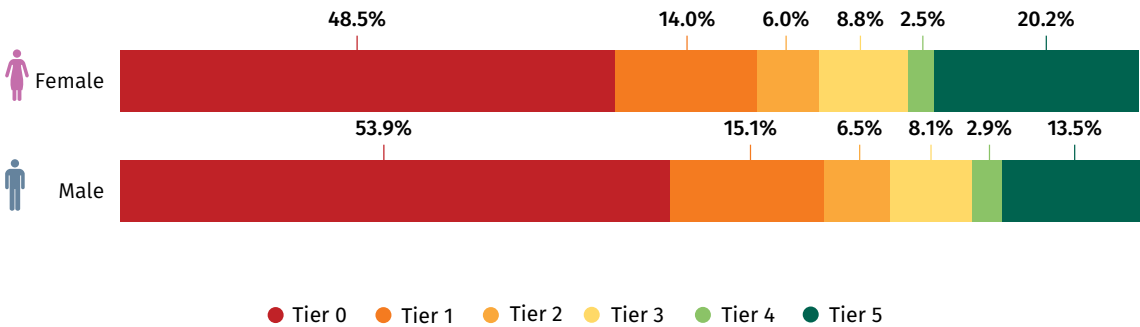
# ACCESS BASED ON GENDER

**Gender disparity is relatively low in energy access, despite the fact that female-headed households are not as economically well off as male-headed households.** In Nepal, a large proportion of households have a male as the head (81.8%), as compared to households with a female head (18.2%). Female-headed households have a lower budget and the female head receives less education. More female-headed households belong to the bottom quintile of household expenditure (31.1%), compared to male-headed households (17.6%). Among the households in grid-electrified areas, female- and male-headed households have similar rates of connection, 95.1% and 91.7%, respectively. The take-up rates for mini-grid connection in areas with only mini-grid and for solar devices in areas with neither grid nor mini-grid are also similar between female- and male-headed households. Additionally, 43.6% of female-headed households use an electric, LPG, or biogas cookstove, compared to 36.1% of male-headed households.

FIGURE 6 • Distribution of MTF electricity tiers by gender of household head



**FIGURE 7 • Distribution of MTF cooking tiers by gender of household head**



**Gender matters when it comes to how time is allocated among tasks, particularly time spent when households have different energy solutions.** To understand the impact of improved energy solutions on women’s empowerment, women’s time-use data were compared across households with different energy solutions. Among the households in the bottom 20% of the overall household economic expenditure , women in households with a grid connection spend more time studying or helping with school work and on entertainment and socializing than do women in households that do not have grid connection. Women in households that use an electric, biogas, or LPG stove spend more time on entertainment and socializing than do women in households that do not use these stoves. Clean and improved solutions can play a role in bringing more gender parity and development for households. To gain a more comprehensive understanding of the drivers and barriers for energy access and the use of time, further analysis and complementary studies are required to establish causality. The current analysis provides an indication of the relationships and shows correlations but is not statistically significant.

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