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Financial Feasibility of Solar Energy for Household Consumption and Its Impact

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Solar Energy Review

Solar energy is one of the renewable energy sources that will be a leading renewable energy source for electricity generation in the future. Generation of electricity through solar power plant is clean, environment-friendly and reliable. Solar power is cheaper than the electricity grid. Thermal energy production comes more costly contrarily than rooftop solar energy which offers a one-time investment for your property.

- Increase in property value
- Energy Independence
- Government Incentives
- Tax benefits:

Financial feasibility means **t**he ability of a project to achieve sufficient income, credit, and cash flow to financially sustain the project over the long term and meet all debt obligations.Nepal is endowed with good renewable energy potential. The major sources of renewable energy are mini and micro hydropower, solar energy, various forms of biomass energy, biogas and wind energy etc. Despite huge renewable energy potential, still around 85% of the total final energy consumption in Nepal is met by traditional biomass energy and around 28% of households (HHs) in Nepal do not have access to electricity. It is not possible to significantly improve the living standard of the low income population living in the rural areas if their renewable energy demand is not met. Extension of national grid to reach those areas is not possible in many years to come due to difficult terrain, high cost and existing energy crisis in the country. Therefore, clean and sustainable energy such as Renewable Energy Technologies (RETs) needs to be developed as immediate and long-term solutions. The economic hardship of people living in the rural areas and the high initial cost of the RETs justifies the need of subsidy and concessional credit facilities to increase access to cleaner energy.

The Government of Nepal (GoN) has been supporting promotion and development of RETs since more than past two decades with support from Development Partners (DPs), private sector and nongovernmental organizations. These initiatives have resulted in significant fruitful achievements in the development of renewable energy in the country. The GoN and DPs have been providing financial and technical support to increase energy access in the rural areas both for household's consumption and productive end use. In order to widely develop the RET sector, encourage very poor households to use RETs, timely revision of the subsidy amount and credit and to encourage private sector and financial institutions to invest in the sector while focusing on providing service delivery of utmost quality in rural areas, the existing policy was not adequate and hence, the need to revise and formulate a new policy has been realized. The new policy mainly focuses on gradually replacing subsidy by credit in the long-term.

Similarly, it focuses on further scaling up of RETs and achieving the objectives of the UN's "Sustainable Development Goals" and "Sustainable Energy for All"

The subsidy for community/cooperative/private/public private partnership owned solar electrification projects up to 1000 kWp in areas not connected through national grid or other sources, depending on the choice of the project developer to opt for subsidy on the basis of actual power generation or actual energy consumption.

The Government of Nepal has set a target to achieve per ca-pita electricity consumption of 700 kWh by 2021/22 and 1500 kWh by 2026/27.The higher per ca-pita electricity consumption is assumed to follow the Government's ambition to have an 8.5% economic growth rate, making the country in the list of middle-income countries by 2030 . To deliver such a higher economic growth rate, Nepal needs to increase its electricity consumption. Due to the insufficient supply of electricity and low income, most households who even have access to electricity often consumed for lighting purposes only. Nepal's power sector is bearing an acute shortage of energy, which is primarily exacerbated by energy losses between the prime mover and the consumers' doorsteps. Integration of Renewable Energy Technologies (RETs) at the household level, e.g., through the installation of a rooftop solar photovoltaic (SPV) system, can allow the homeowners to meet their energy need independently. It can also help in the management of energy flows in the national grid and can support to reduce carbon dioxide (CO2) emissions. However, irrespective of whatever is stated above, financial support more than the subsidy amount mentioned above can be provided for pilot projects as per the understanding between GoN and DPs.

As a renewable source of power, solar energy has an important role in reducing greenhouse gas emissions and mitigating climate change, which is critical to protecting humans, wildlife, and ecosystems. Solar energy can also improve air quality and reduce water use from energy production. Renewable Energy Subsidy Policy, 2069 and Urban Solar System Subsidy and Credit Mobilization Guidelines, 2072 have been annulled. In case of domestic renewable energy technologies particularly solar home systems, biogas, metallic improved cook stoves, metallic rocket stove, etc., per unit cost price will be determined for the suppliers every fiscal year depending upon demand of district and geographic region. Users will receive subsidy from recognized company on the basis of the determined per unit cost price. However, such subsidy will not exceed the amount as mentioned in respective technology-specific clauses of this policy. The average global solar radiation in Nepal varies from **3.6-6.2 kWh/m²/day**, sun shines for about 300 days a year, the number of sunshine hours amounts almost 2100 hours per year with an average of 6.8 hours of sunshine each day and average insulation intensity about 4.7 kWhm²/day.

Solar energy in Nepal is abundant and cheap. There is more than enough solar energy for every Nepali to enjoy the same energy consumption as in the developed countries, but without burning any fossil fuels or damming any Himalayan rivers. The solar potential in Nepal is 50,000 terawatt-hours per year, which is 100 times larger than Nepal's hydro resource and 7,000 times larger than Nepal's current electricity consumption. **Solar can easily meet all future energy needs in Nepal**. Solar energy is cheaper than fossil fuels, nuclear and hydro.

The national average is about **15 cents per kilowatt-hour**, according to year-to-date 2022 data from the U.S. Energy Information Administration. They cost significantly less when you don't pay interest. If you can't afford to pay in full, the monthly payments on a 15-year solar loan are often equal to the associated

power bill. You'll save money when you pay it off or make a substantial down payment. A typical return is about 6% per year, but this requires a long-term investment strategy as the company owner. For companies that only install panels for customers who pay all at once, you can see profits of **$5,000 to $10,000 per job**. Customers can also finance solar systems through their home loans by means of a re advance or further loan on the mortgage bond. Recently Nepal inaugurated its largest wind-solar hybrid plant to provide power to a marginalized community in the village of Hariharpurgadi in the Sindhuli district in the country's northeast. The ITC offers a 30% tax credit for solar developers who invest in solar projects. This tax credit can be in use to offset the cost of the project or passed on to investors.

In the future, the Nepali people can expect to achieve a much higher living standard. When Nepal catches up with the developed countries, each person will consume about 15 megawatt-hours per person per year of electricity, which is 70 times larger than today. Clean solar electricity will be used to light and heat homes, cook food, power electric vehicles and drive industry, just like in the developed countries. Over the next 50 years, Nepal will need to install 200 watts of solar panels per person each year (about one square metre of panel per person per year).

This is a similar deployment speed as in Australia, where deployment of solar and wind systems is driving down the cost of electricity.

The area of solar panel required to match the energy consumption per person in developed countries is 40- 50 square metres per person with a nominal power capacity of about 10 kilowatts.Solar energy in Nepal is abundant and cheap. There is more than enough solar energy for every Nepali to enjoy the same energy consumption as in the developed countries, but without burning any fossil fuels or damming any Himalayan rivers and mountains.

Much of this solar panel area can be located on rooftops. Some can be on the ground. Some can be floated on lakes and hydroelectric reservoirs. Some solar systems can be located in food growing areas (agrivoltaics) where widely spaced solar panels shade 10 per cent of the crop but cause little loss of production because they reduce wind speeds and evaporation rates.

The speed of development of the global solar industry and the rapid price reductions are so fast that previous reports on energy options for Nepal require updating. Therefore, all parts of Nepal are favourable for solar energy. It can contribute to the living standard of individual household, saves electricity consumption for firms and industries for the economic growth and development.

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