



A Study on Financial Analysis of Solar Panels Power Generation at Home's in India

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Abstract:

This study presents a comprehensive financial analysis of residential solar panel installations in India, examining the economic feasibility and investment potential for homeowners. The financial measurements demonstrate compelling investment returns with payback periods ranging from 2-5 years for residential installations.

Key risk factors include initial capital requirements, policy changes affecting net metering benefits, subsidy from central government and price decrease of technology annually. However, the analysis concludes that residential solar installations represent a financially sound investment for Indian homeowners, offering energy independence, protection against rising electricity costs, and contributing to national renewable energy targets while delivering attractive economic returns over the system's operational lifetime.

Key Words: Financial Analysis, Solar Panel Installation, Economic Feasibility, Investment Potential, Payback Period, Initial Capital Requirements

Introduction:

Solar panels electricity generation has turned to be a major reliable and economical means for growing demand of electricity requirements globally. For generating electricity in this system, we use Photovoltaic (PV) cells for converting direct sunlight to electricity or DC direct current. Here the use of limited natural resources like fossil fuels has removed for generating electricity which used to pollute the air, land and water. Hence solar panel power generation is a green electricity available to the world with growing energy requirements.

In a highly populated country like India, the demand for electricity is growing day by day, to meet the growing demand of electricity Solar Panels is a best solution without polluting the environment. It not only safeguards the environment but also helps Individual families with long-term financial savings to their Budget by Installing these solar panels at their “Roof Tops” and generating their own Electricity and selling the excess electricity to DISCOM. For achieving this even Central Government is providing Financial Subsidies to Individual Families for Installing at their Roof Top by “PM SURYA GHAR MUFT BIJLI YOJANA” scheme started on 15th February 2024 by our beloved Prime Minister of India Narendra Modi.

Figure Shows How Solar Panels Installed At Rooftop



How Solar Panel work in Generating Electricity?

Solar panels generate electricity through the photovoltaic effect, where photons from sunlight strike a solar cell in silicon semiconductor cells, creating an electric current. This direct current (DC) is then converted to alternating current (AC) by an inverter for use in homes or the grid. Factors like sunlight intensity, weather, panel efficiency, and system design influence the total energy produced.

Figure Shows How Solar Panels Generate Electricity



FINANCIAL ANALYSIS OF SOLAR PANELS FOR INDIVIDUAL FAMILY IN INDIA

India is the major source of global renewable power generation, with Solar Power Industry leading to a sustainable growth in future. The Country aims to achieve renewable power targets by creating awareness among Individual families about the Economic benefits of Solar Panel Installations at Roof Tops. This study will examine the financial issues associated with investment in Solar Panel Power Generation Projects in India.

Current Market Overview

Driven by falling technology costs, government backing, and growing environmental awareness, India's solar sector has experienced tremendous growth. The country is positioned to exceed China in solar capacity, establishing India as a dominant force in worldwide renewable energy adoption.



Initial Cost Structure of Solar Panel Installation

Average Solar Panel Installation Cost in India, 2025

Here's a detailed table showing Solar Panel Installation Costs in India for the year 2025

Solar System Size	Cost per System (in Rs)
1KW	Rs 65,000 - 85,000
2KW	Rs 1,05,000 - 1,25,000
3KW	Rs 1,50,000 - 1,70,000
4KW	Rs 1,85,000 - 2,05,000
5KW	Rs 2,30,000 - 2,50,000
6KW	Rs 2,85,000 - 2,95,000
7KW	Rs 3,15,000 - 3,25,000
8KW	Rs 3,60,000 - 3,80,000
9KW	Rs 4,05,000 - 4,15,000
10KW	Rs 4,50,000 - 4,60,000

Reference of prices from: <https://bluebirdsolar.com>

This table presents a comprehensive summary of typical solar panel installation expenses across different system capacities in India for 2025.

Solar Panel Installation Cost Per kwh in India

Below the breakdown of per-watt installation cost for different solar panel system sizes:

System Capacity	Approx. Installation Cost per Watt (in Rs)
1 KW	Rs 65
5 KW	Rs 60
10 KW	Rs 56
15 KW	Rs 59
20 KW	Rs 58
25 KW	Rs 57
50 KW	Rs 56
100 KW	Rs 56
250 KW	Rs 51
500 KW	Rs 48
1 MW	Rs 46

Reference of prices from: <https://bluebirdsolar.com>

Please Note: Actual prices may vary based on location, equipment quality, and how complex your installation is.

➤ **Government Subsidies and Financial Support**

In a move to encourage solar energy adoption, the Indian government has significantly expanded its subsidy program, with Central Financial Assistance increasing by 23% from January 2025.

➤ **National Subsidy Programs**

The National Rooftop Solar Subsidy provides 40% subsidy on installation up to 3KW or less and while 3KW-10KW systems qualify for 20% subsidy. Several states also provide additional incentives.



ECONOMIC ADVANTAGES AND INVESTMENTS RETURNS

1. **Reduced Energy Expenses:** The primary financial advantage of residential solar installation is the significant decrease in utility costs. By generating your own renewable energy rather than relying solely on grid electricity, homeowners typically experience monthly bill reductions of up to 50% following solar panel installation.
2. **Cost-Effective Investment Options:** Solar technology has become increasingly accessible over the past ten years, with home installation packages now starting around ₹50,000. Government subsidies and tax incentives further reduce the upfront investment, making residential solar systems more financially viable than ever before.
3. **Substantial Long-Term Financial Benefits:** Although the initial investment may seem considerable, the cumulative savings over time provide excellent returns. Most homeowners recover their installation costs within 7-8 years through reduced electricity bills. Given that solar systems operate effectively for 25-30 years, this translates to approximately two decades of minimal energy expenses.
4. **Enhanced Real Estate Value:** Solar installations serve as valuable home improvements that boost property market value. Energy-efficient homes with solar systems command higher selling prices and attract more potential buyers compared to conventional properties without renewable energy features.



SUPPLEMENTARY ADVANTAGES

1. **Enhanced Property Market Value:** Beyond immediate cost savings, residential solar installations significantly increase real estate worth. Market research demonstrates that solar-equipped homes consistently achieve higher sale prices compared to properties without renewable energy systems.
2. **Market Price Reductions:** Solar photovoltaic technology costs have decreased approximately 90% since 2010, making residential solar systems increasingly budget-friendly for average homeowners.
3. **Innovation and Efficiency Gains:** Ongoing developments in solar panel performance and battery storage capabilities continuously enhance the return on investment for solar installations.
4. **Energy Self-Sufficiency and Grid Independence:** Residential solar systems empower homeowners to minimize grid dependency while maintaining greater authority over energy consumption patterns. Harnessing solar radiation reduces reliance on traditional utility providers, delivering cost reductions while providing insulation against volatile electricity pricing.
5. **Decreased Grid Dependency:** Installing rooftop solar arrays enables independent renewable energy generation, substantially reducing purchased electricity requirements from utility companies. This self-generation capability produces considerable cost benefits, particularly as traditional energy rates continue climbing.
6. **Financial Security Against Market Volatility and Service Interruptions:** Solar power systems provide economic stability as utility rates escalate over time. Following the initial system payback period, energy costs remain predictable for decades. Furthermore, solar installations equipped with battery backup systems maintain power availability during grid outages, ensuring uninterrupted electricity supply.

Conclusion

The financial evaluation of solar panel installations across India demonstrates an attractive investment proposition. With recovery periods spanning 2-7 years, significant extended-term cost reductions, and robust governmental backing through financial incentives, solar technology presents both economically sound and environmentally conscious decision-making.

Essential considerations for prospective adopters:

- **Exceptional Economic Performance:** Recovery timeframes as brief as 2-7 years followed by over two decades of minimal electricity expenses deliver outstanding investment yields.
- **Policy Backing:** Expanded subsidy programs and favorable regulatory frameworks enhance solar accessibility beyond previous levels.
- **Power Stability:** Solar installations offer safeguards against escalating utility rates and grid reliability concerns.
- **Climate Benefits:** Apart from monetary advantages, solar advancement supports India's environmental objectives while minimizing carbon emissions.

For the majority of Indian households, particularly those experiencing elevated power consumption and favorable sun exposure conditions, solar arrays constitute prudent financial decisions yielding both economic and ecological benefits. Nevertheless, thorough assessment of geographical conditions, consumption patterns, and budget constraints remains crucial for achieving optimal outcomes.

The convergence of decreasing equipment costs, advancing technology, policy incentives, and rising conventional electricity prices establishes conducive conditions for solar implementation throughout India. As this sector continues developing, solar power is positioned to assume a progressively vital function in India's energy framework, delivering sustainable alternatives for individual users and national requirements alike.

Reference:

- 1) Photovoltaic Design & Installation for Dummies - **Ryan Mayfield**
- 2) Rooftop Revolution - **Danny Kennedy**
- 3) Solar Power Your Home for Dummies - **Rik DeGunther**
- 4) Solar Photovoltaics - Fundamentals, Technologies and Applications - **Solanki Chetan Singh**
- 5) How To Make Money in Solar Energy - **Govardhan B S and Akshay G**
- 6) A Basic Guide to Saving Money with Solar for Your Home - **Ralph Funk**