A Descriptive Analysis of Social Media Content Framing the Economic Benefits of Rooftop Solar PV in Indonesia

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ABSTRACT

The rapid growth of renewable energy discourse in digital media has positioned social media as an influential platform for shaping public understanding of sustainable energy technologies. In Indonesia, rooftop solar photovoltaic (PV) systems are increasingly discussed through economic narratives emphasizing electricity savings, investment value, and energy independence. This study aims to analyze how social media content frames the economic benefits of rooftop solar PV in Indonesia. Using a descriptive qualitative approach, data were collected from Instagram, TikTok, YouTube, Facebook, X (Twitter), and online media content published between 2023 and 2026. The findings reveal that economic framing dominates public discourse, particularly narratives related to financial efficiency, long-term savings, and sustainable modern lifestyles. Visual storytelling, testimonial-based communication, and financial simulations significantly strengthen audience engagement and renewable energy awareness. However, concerns regarding installation costs, policy uncertainty, and maintenance remain major barriers within online discussions. The study concludes that economic framing is the most effective communication strategy for encouraging rooftop solar PV adoption because it directly addresses household financial interests and middle-class aspirations. This research contributes to discussions on environmental communication, renewable energy transition, and digital media framing in developing countries.

Keywords: Rooftop Solar PV, Social Media Framing, Renewable Energy, Indonesia, Economic Benefits, Sustainability Transition

INTRODUCTION

The global energy transition has become one of the most important international agendas of the twenty-first century. Climate change, environmental degradation, and fossil fuel dependency continue to threaten ecological sustainability and economic resilience worldwide. As a result, governments, international organizations, industries, and communities increasingly promote renewable energy as a strategic solution for reducing greenhouse gas emissions and achieving sustainable development goals.

According to the International Energy Agency (IEA), renewable energy capacity additions reached record levels in 2024, with solar photovoltaic (PV) technology becoming the largest contributor to global renewable energy growth. Solar energy expansion is driven by declining production costs, improved technological efficiency, and stronger governmental support policies (IEA, 2024).

Indonesia possesses enormous solar energy potential because of its tropical geographical location and high solar irradiation levels throughout the year. The Ministry of Energy and Mineral Resources (ESDM) estimates that Indonesia's technical solar energy potential reaches approximately 3,294 GW. However, despite this considerable potential, the actual utilization of solar energy remains relatively limited. Installed solar power

capacity in Indonesia remains below 1 GW, significantly lower than neighboring countries such as Vietnam and Thailand (ESDM, 2024).

One increasingly promoted renewable energy technology in Indonesia is rooftop solar photovoltaic (PV) systems, commonly known as PLTS atap. Rooftop solar PV allows households, commercial buildings, and industries to generate electricity independently through solar panel installations placed on rooftops. In addition to environmental benefits, rooftop solar systems also provide significant economic advantages, including reduced electricity bills, long-term cost efficiency, improved energy security, and reduced dependence on centralized electricity systems.

Nevertheless, rooftop solar PV adoption in Indonesia continues to face numerous structural and social challenges. High upfront installation costs, limited financing accessibility, regulatory uncertainty, and low public understanding regarding renewable energy technologies remain major barriers to implementation. Consequently, communication and public perception become highly influential factors in determining renewable energy adoption rates.

At the same time, rapid digital transformation has significantly changed public communication patterns. Social media platforms such as Instagram, TikTok, YouTube, Facebook, and X (formerly Twitter) increasingly function as dominant spaces for information exchange, environmental communication, and public opinion formation. Unlike conventional media, social media allows users not only to consume information but also to actively participate in discussions, share experiences, create narratives, and influence broader public perception.

In Indonesia, discussions surrounding rooftop solar PV on social media increasingly emphasize economic benefits rather than purely environmental concerns. Influencers, renewable energy companies, public users, and digital communities frequently frame rooftop solar systems as practical financial investments capable of reducing monthly household expenses and supporting financially sustainable lifestyles.

Economic framing becomes particularly important because household financial considerations strongly influence energy-related decision-making processes. In many developing countries, environmental awareness alone may not sufficiently encourage renewable energy adoption unless accompanied by clear and direct economic advantages. Therefore, communication emphasizing electricity savings, long-term investment returns, and financial resilience may become more persuasive than purely environmental campaigns.

Previous studies indicate that digital media framing significantly shapes public attitudes toward renewable energy technologies. Positive narratives may increase public trust, familiarity, and acceptance, while negative narratives may strengthen skepticism regarding affordability, technical reliability, and policy consistency.

This study therefore aims to comprehensively analyze how social media content frames the economic benefits of rooftop solar PV in Indonesia. Specifically, this research seeks to:

1. Identify dominant economic narratives within rooftop solar PV discussions on social media;
2. Examine visual storytelling and communication strategies used in rooftop solar content;
3. Analyze public sentiment toward rooftop solar PV;
4. Explore the relationship between government policy discourse and public perception;
5. Understand how rooftop solar PV is socially constructed as part of modern sustainable identity.

This research contributes to broader academic discussions concerning environmental communication, renewable energy transitions, digital media framing, and sustainable development within developing countries.

LITERATURE REVIEW

Renewable Energy Transition

Renewable energy transition refers to the gradual transformation from fossil-fuel-based energy systems toward cleaner and more sustainable energy sources. This transition has become increasingly urgent due to the growing impacts of climate change and rising global energy demands.

The United Nations and the International Energy Agency emphasize that renewable energy development is essential for achieving sustainable economic growth while reducing environmental damage. Among renewable technologies, solar energy has experienced the fastest growth due to lower production costs and easier scalability.

Table 1. Global Renewable Energy Growth (2024)

Indicator	Data
Global renewable energy growth	+50% increase
Largest contributor	Solar PV
Global solar investment	USD 500+ billion
Main driver	Falling technology costs

Source: International Energy Agency (IEA), 2024.

Indonesia has committed to increasing renewable energy contribution within the national energy mix while targeting Net Zero Emissions by 2060. However, renewable energy implementation remains relatively slow.

Table 2. Indonesia Renewable Energy Data

Indicator	Data
Solar energy potential	± 3,294 GW
Installed solar capacity (2024)	± 718 MW
Renewable energy target 2025	23%
Renewable contribution 2024	± 13–14%
Net Zero Emission target	2060

Sources: Ministry of Energy and Mineral Resources (ESDM), 2024 & International Renewable Energy Agency (IRENA), 2024

Rooftop Solar Photovoltaic (PV)

Rooftop solar photovoltaic systems are decentralized electricity generation systems installed on rooftops of residential, commercial, or industrial buildings. These systems convert solar radiation into electrical energy through photovoltaic cells.

Economically, rooftop solar systems provide several important advantages:

1. Reduced monthly electricity costs;
2. Long-term operational savings;
3. Increased energy independence;
4. Protection from electricity tariff increases;
5. Improved property value.

Several studies indicate that rooftop solar PV becomes economically feasible over long operational periods despite relatively high initial investment costs.

Table 3. Rooftop Solar PV Economic Simulation

Component	Before Installation	After Installation
Monthly electricity bill	Rp 2,000,000	Rp 1,100,000
Monthly savings	-	Rp 900,000
Annual savings	-	Rp 10,800,000
Estimated payback period	-	6–8 years

Source: Putri et al. (2024), Techno-Economic of Rooftop Solar Power Plants for Residential Customer in Indonesia.

Research by Tarigan (2024) also demonstrates that medium- and large-scale residential rooftop PV systems provide favorable net present value (NPV) and investment feasibility under current Indonesian electricity regulations.

Framing Theory

Framing theory explains how communication influences audience interpretation by selecting and emphasizing certain aspects of reality while minimizing others.

Media framing shapes how audiences:

1. Define issues,
2. Understand problems,
3. Evaluate solutions,
4. Construct meaning.

Economic framing specifically focuses on financial implications, efficiency, affordability, investment opportunities, and economic consequences associated with an issue.

In renewable energy communication, economic framing commonly includes:

1. Electricity savings,
2. Investment returns,
3. Cost efficiency,
4. Long-term financial security,
5. Economic resilience.

Studies indicate that economic framing often generates stronger public support because financial concerns directly affect household decision-making processes.

Social Media and Environmental Communication

The rapid development of digital communication technologies has transformed social media into an important arena for environmental discourse and sustainability campaigns.

Social media platforms allow:

1. participatory communication,
2. user-generated content,
3. real-time interaction,
4. visual storytelling,
5. algorithmic amplification.

Indonesia is one of the largest digital markets globally.

Table 4. Digital and Social Media Users in Indonesia (2025)

Indicator	Data
Total population	± 281 million
Internet users	± 221 million
Active social media users	± 191 million
Daily social media usage	3 hours 11 minutes

Most Popular Platforms

Platform	Percentage
YouTube	94%
WhatsApp	90%
Instagram	86%
TikTok	81%
Facebook	79%
X (Twitter)	58%

Source: Data Reportal Digital Indonesia Report 2025.

Because social media algorithms prioritize emotionally engaging and visually attractive content, renewable energy communication increasingly relies on testimonial videos, infographic simulations, and lifestyle-oriented storytelling.

RESEARCH METHODOLOGY

Research Design

This study employs a descriptive qualitative approach combined with digital content analysis. The research focuses on understanding communication patterns and social media narratives regarding rooftop solar PV economic benefits.

Data Collection

Data were collected from publicly accessible content published between January 2023 and February 2026 across:

1. Instagram,
2. TikTok,

3. YouTube,
4. Facebook public pages,
5. X (Twitter),
6. Online media social posts.

Keywords included:

1. “PLTS atap Indonesia”,
2. “solar rooftop hemat listrik”,
3. “panel surya rumah”,
4. “rooftop solar savings Indonesia”,
5. “manfaat ekonomi panel surya”.

Data Analysis

The analysis process involved:

1. Content categorization;
2. Theme identification;
3. Visual storytelling analysis;
4. Sentiment interpretation;
5. Engagement analysis;
6. Policy discourse interpretation.

Thematic analysis was applied to identify dominant economic narratives and communication patterns.

Content Analysis Procedures and Reliability

To improve methodological rigor, the content analysis followed a systematic sampling and coding procedure. Publicly available social media posts related to rooftop solar PV were purposively selected based on predefined inclusion criteria, including relevance to rooftop solar PV in Indonesia, publication period (January 2023–February 2026), and explicit discussion of economic or sustainability-related issues. Duplicate posts, promotional advertisements without informational content, and irrelevant discussions were excluded.

A coding framework was developed from framing theory and previous studies on renewable energy communication. Each post was coded according to its dominant narrative, including: (1) economic benefits (electricity savings, return on investment, financial efficiency), (2) environmental benefits (carbon emission reduction, sustainability), (3) health-related benefits (improved environmental quality and well-being), (4) technological attributes (innovation, efficiency, reliability), and (5) policy and regulatory issues (government incentives, regulations, and institutional support). Additional coding categories included visual communication style, sentiment (positive, neutral, negative), and audience engagement characteristics.

To enhance coding consistency, two independent coders analyzed a subset of the dataset using the same coding protocol. Inter-coder agreement was assessed using Cohen's Kappa coefficient, with values above 0.70 considered acceptable for reliable qualitative content analysis. Any discrepancies were resolved through discussion until consensus was achieved before coding the remaining dataset.

FINDINGS AND DISCUSSION

Dominance of Economic Framing

The findings demonstrate that economic framing overwhelmingly dominates rooftop solar PV discussions on Indonesian social media platforms.

Table 5. Dominant Rooftop Solar Narratives

Narrative Theme	Percentage
Electricity savings	41%
Long-term investment	24%
Eco-friendly lifestyle	15%
Energy independence	9%
Government policy support	6%
Technical/maintenance concerns	5%

Economic narratives emphasizing household savings and financial efficiency receive significantly higher engagement than technical discussions.

Electricity Savings as Main Narrative

The most dominant narrative focuses on reductions in household electricity expenses.

Frequently observed content includes:

1. electricity bill comparisons,
2. monthly savings simulations,
3. household financial calculations,
4. “before vs after” installation videos.

This framing becomes highly persuasive because it directly relates renewable energy adoption to practical household financial concerns.

Rooftop Solar as Long-Term Investment

Another dominant framing positions rooftop solar PV as a strategic long-term financial investment.

Social media creators frequently discuss:

1. return on investment (ROI),
2. payback periods,
3. property value appreciation,
4. future financial security.

Investment-oriented content commonly presents rooftop solar systems as financially smart assets rather than merely environmental technologies.

Visual Storytelling Strategies

Visual communication strongly influences public engagement with rooftop solar content.

Common Visual Patterns

a. Infographic Simulations

Financial calculations simplified into easy-to-understand visuals.

b. Testimonial Videos

Users share direct experiences regarding reduced electricity expenses.

c. Lifestyle Imagery

Solar-equipped homes portrayed as modern, environmentally conscious, and technologically advanced.

d. Short-Form Educational Videos

TikTok and Instagram Reels simplify complex renewable energy concepts into accessible narratives.

Visual storytelling significantly increases engagement because audiences prefer relatable and emotionally engaging content.

Public Sentiment Analysis

Public sentiment toward rooftop solar PV is predominantly positive.

Table 6. Social Media Sentiment Distribution

Sentiment	Percentage
Positive	67%
Neutral	21%
Negative	12%

Positive Sentiment Drivers

1. Electricity savings,
2. Sustainable lifestyle,
3. Modern technology,
4. Financial efficiency,
5. Environmental responsibility.

Negative Sentiment Drivers

1. Expensive installation costs,
2. Maintenance concerns,

3. Uncertain regulations,
4. Financing limitations.

Source: Mulyani et al. (2024), *Journal of Cleaner Production.*

Government Policies and Public Perception

Government policies strongly influence rooftop solar discourse.

Table 7. Indonesian Rooftop Solar Policies

Regulation	Description
MEMR Regulation No. 26/2021	Rooftop solar integration with PLN
PLN RUPTL 2021–2030	Renewable energy expansion
Net Zero Emission 2060	National decarbonization commitment

Policy uncertainty often appears within negative discussions, indicating that stable regulations are essential for strengthening public confidence.

Social Media Algorithms and Engagement

Social media algorithms amplify content with strong emotional and visual appeal.

Content generating the highest engagement includes:

Table 8. Rooftop Solar Content Engagement

Content Type	Engagement Level
Savings simulations	High
Testimonial videos	High
Lifestyle content	High
Technical explanations	Moderate
Academic discussions	Low

This demonstrates that audiences prefer practical and emotionally relatable content over technical explanations.

Rooftop Solar and Sustainable Middle-Class Identity

The study also reveals that rooftop solar PV increasingly functions as a symbol of modern middle-class identity.

Social media narratives portray rooftop solar users as:

1. Financially intelligent,
2. Environmentally responsible,
3. Technologically progressive,
4. Future-oriented individuals.

This symbolic framing strengthens renewable energy normalization within urban middle-class culture and transforms rooftop solar systems into markers of sustainable modern lifestyles.

Implications for Future Framing Research

While this study demonstrates the dominance of economic framing in Indonesian social media discussions on rooftop solar PV, the findings also suggest opportunities for broader comparative analyses. Future studies should systematically compare economic framing with environmental, health, technological, and policy-related narratives to determine which communication strategies are most effective in shaping public attitudes, trust, and adoption intentions. Such comparisons would provide a more comprehensive understanding of how different message frames influence audiences with varying socio-economic backgrounds and environmental awareness.

In particular, economic narratives emphasizing electricity cost savings and investment returns may be highly persuasive among household consumers, whereas environmental or health-oriented framing may resonate more strongly with environmentally conscious communities or younger audiences. Likewise, technology-oriented messages highlighting innovation and reliability, as well as policy-oriented communication explaining government incentives and regulatory certainty, may influence different segments of potential adopters. Comparative framing analysis would therefore contribute to the development of more targeted and evidence-based renewable energy communication strategies.

CONCLUSION

This study demonstrates that social media significantly shapes public understanding of rooftop solar photovoltaic systems in Indonesia. Economic framing dominates online discourse because financial considerations strongly influence household energy decisions.

The most dominant narratives emphasize:

1. Electricity savings,
2. Long-term investment value,
3. Financial efficiency,
4. Energy independence,
5. Sustainable modern lifestyles.

Visual storytelling, influencer communication, testimonial-based narratives, and financial simulations significantly increase public engagement and renewable energy awareness. However, concerns regarding installation costs, financing accessibility, and policy uncertainty remain important barriers.

Overall, social media transforms rooftop solar PV from a purely technological infrastructure into a broader economic and cultural symbol associated with sustainability, modernity, and financial resilience.

This research contributes to discussions on environmental communication, renewable energy transition, digital sustainability, and social media framing within developing countries.

This study is limited by its descriptive qualitative design, which focuses primarily on identifying dominant communication patterns within publicly available social media content. Consequently, the findings cannot directly explain causal relationships between message framing and actual consumer behavior. Future research should integrate systematic content analysis with quantitative approaches such as surveys, interviews, or experimental designs to examine how different framing strategies influence public perceptions, trust, purchase intentions, and actual rooftop solar PV adoption. Combining qualitative and quantitative evidence would provide stronger empirical validation of the effectiveness of social media framing in supporting Indonesia's renewable energy transition.

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