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Article

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The Bright Revolution: Accelerating Adoption of Solar Energy in India's Dynamic Landscape

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ABSTRACT

This research paper delves into the global shift towards sustainable energy, focusing on the substantial energy consumption and greenhouse gas emissions of the agricultural sector. Emphasizing the need for cleaner energy sources, particularly solar technology, the study scrutinizes the cases of India to unravel the complexities influencing the adoption of solar technology in diverse socio-economic landscapes. The paper aims to contribute to the ongoing conversation about energy transition, providing a nuanced understanding of challenges and opportunities associated with widespread solar technology deployment. Focusing on solar technology as a transformative solution, the paper explores adoption and integration challenges, considering India as a case study due to its abundant solar resources. The research examines technological, economic, social, and institutional forces to illuminate the potential of solar technology in shaping sustainable and inclusive energy landscapes. The paper underscores the importance of community support for renewable energy projects and addresses material and attitudinal influences. Geographical location, government policies, and awareness campaigns are identified as critical elements for successful solar technology integration.

Keywords: Solar Technology, Energy Transition, Solar Energy Adoption, Government Policies, Awareness and Education
JEL Classifications: E21, E70, Q47

1. INTRODUCTION

The global scene of energy utilization is undergoing a very significant change as the world faces some complex issues related to climate change and sustainable development. As remarked by (Sharvini et al., 2018), energy is a key contributor to the satisfaction of various human demands and even drives economic growth in industrial, transportation, and agricultural industries among others. 89% of global CO_2 emissions can also be attributed to the continued reliance on conventional fossil fuels across our planet, consequently driving us towards a worldwide climate catastrophe. Policymakers and scholars across the globe are, therefore, forced to come up with new ways of addressing this crisis (Agovino et al., 2019; Sharma et al., 2021; Waheed et al., 2018). So, the agricultural industry is of great concern as it consumes a lot of energy and contributes significantly to greenhouse emissions. Technological advancements and greater emphasis on mechanization in agriculture have further contributed to the problem as consumption of fossil fuels rises with increased greenhouse gas effect (Farajian et al., 2018). In response, policymakers globally are now realizing that it is high time to shift the agricultural sector towards cleaner energy sources (Qiao et al., 2019; Shahbaz et al., 2019). In this task, renewable energies (res) stand out as a ray of hope providing endless and green alternatives to fossil fuels (Hazboun et al., 2020; Levenda et al., 2021; Mbungu et al., 2020; Quitzow et al., 2021). In turn, their implementation in industries, agriculture, and services not only contributes to sustainable economic growth but also promotes low-carbon production (Paramati et al., 2018), which makes them a strong reply against the global climate change process together with an accelerator of environmental pollution reduction. In India, where considerable progress has been made regarding extending the grid coverage as well as increasing village electrification still rural areas of India have energy poverty (Joshi and Yenneti, 2020). It is estimated that many of those with connectivity often face voltage fluk and sometimes low volt age after every day at least once. Not to mention that energy poverty in India is closely connected with the socio-economic differences present within one country, primarily dictated by caste affiliations and social class. (Patnaik and Jha, 2020). This huge disparity in terms of energy access requires a holistic approach to tackle the peculiar situation that various groups must deal with (Dugoua et al., 2017).

In this background, the research paper concentrates on solar technology as a transformative approach to challenges from traditional energy resources (Bilgili et al., 2017). Geographic and socio-economic landscapes from all around the world converge in this context, making it clear that solar technology should be adopted by both developed countries as well as developing countries (Pelz et al., 2021). Comparing the trend with cases from Iran and India, this research will attempt to unravel the complexity of the adoption of solar technology while identifying factors influencing its acceptance as well as integration into existing energy frameworks (Atuguba and Tuokuu, 2020; Kwakwa, 2021). One case in point is the national solar mission of India's Jawaharlal which aims to provide 100 GW of solar power by the year 2022 as part and parcel of our renewable energy push across the world (Misila et al., 2020). In its journey, the major success of Hawaii's second pricing model in solar photovoltaic (PV) installations it enables us to evaluate some difficulties and opportunities with adopting this type of technology (S. Moore, 2022; K. Calvert, 2015; Minelli et al., 2014; Carrion et al., 2008). The comparison of India's miraculous achievements in grid electrification together with the unchanging phenomenon of rural energy poverty serves as a testimony to how complicated and many-faceted this grandiose project is. Additionally, analyzing India's attempt to achieve a balance between promoting solar energy and ensuring adequate agricultural support allows us to discover the fragile relationship at play among land-use planning for sustainment. Forecasting renewable energy output has a big influence on how power system management and operation choices are made (Huseynli, 2023).

With the world seeking to achieve carbon reductions and shift its focus towards environment-friendly energy harnessing, the adoption of solar technology becomes one key element in this transition (Fayet et al., 2022). The research aims to join the conversation about energy transition and provide more complex perspectives as well as empirical data regarding the challenges, and opportunities of the widespread deployment of Sun technology (Noon et al., 2021). The complex interactions of technological, economic, social, and institutional forces will be investigated in the book to shed light on how a path toward a future with a strong presence of solar technology can contribute to defining sustainable and inclusive energy landscapes. Also, it is of interest to see the cost-effective irrigation systems for smallholder farmers (Grant et al., 2022) and designing the entire solar farms in such a way that it provides commercial synergistic value (Nordberg et al., 2021). .

2. LITERATURE REVIEW

2.1. Cost

The scale of solar equipment facilitated depends on several factors that include sunlight availability locally, water demand pumping depth, and total system costs. Farmers regularly have issues related to irregularities in electricity supply and increased prices, which often result in improper irrigation that further impacts the yield Kumar et al., 2019; Ministry of New and Renewable Energy (Hanna et al., 2014). solar energy products are perceived as cost-effective, reliable, and environmentally friendly hence a way to go (Fatima et al., 2018; Huang et al., 2018). However, installations have drawbacks, such as high installation costs and investment, especially at the initial stage. It is mentioned that solar technology does not produce electricity during the night period, however, this problem can be resolved using battery backup systems and net metering Ministry of New and Renewable Energy (Alam et al., 2013; Eid et al., 2014). The major reasons for hesitance to adopt solar energy products listed by (Zeng et al., 2022) include a long payback period and high investment costs. Increasing environmental problems and the idea of social responsibility are major factors that will attract people to purchase these products (Mughal et al., 2023). The high cost of producing electricity from solar photovoltaic technology was highlighted by (Voland et al., 2022).

H_1: Cost has a positive relationship with Solar Technology Adoption.

2.2. Reliability and Performance

Reliability and Performance are important considerations when assessing solar energy products. The capacity utilization factor is one of the performance metrics, which indicates the ratio between energy delivered by photovoltaic panels and its maximum annual output (Al-Shahri et al., 2021; Zhang et al., 2013). While these are some of the benefits associated with renewable energy, challenges such as longer payback periods, significant initial costs, and concerns about long-term system performance make it difficult for widespread adoption. Potential non-adopters are concerned with the risk of being unprofitable associated with investment in solar energy due to its high upfront costs and long-time frames for payback (Ansari et al., 2013; Blenkinsopp et al., 2013). They provide high performance, guarantee customer satisfaction, and act as environmentally friendly energy-generating systems in irrigation networks (García et al., 2019). In terms of the return-on-investment variable – gross revenue and production costs it can be seen as a useful measure for evaluating farm performance (Kleemann et al., 2014). So, beyond environmental sustainability, it is important to choose solutions that are reliable and performant by selecting options corresponding to requirements without compromising their functionality (Zheng and Ma, 2023).

H_2: Reliability and Performance has a positive relationship with Solar Technology Adoption.

2.3. Community Influence

Community acceptance hinges on various factors, including the perceived costs and benefits, environmental risks, socioeconomic considerations, trust, fairness, proximity to the planned power plant, and the regulatory framework (Wüstenhagen et al., 2007). Examining public acceptance and environmental planning literature reveals key variables influencing community views on onshore wind and solar farms. Two main categories emerge: 'material arguments' that either oppose or support projects and 'attitudinal/social influences' that shape positive or negative social responses to these technologies. Material arguments against onshore wind and solar farms often revolve around concerns about visual impacts on scenic and natural landscapes (Dhar et al., 2020; Wolsink, 2000). The type of land cover also plays a role in shaping acceptance (Betakova et al., 2015; Trandafir et al., 200). Additionally, environmental considerations, such as bird collisions with wind turbines, are raised due to their implications for biodiversity conservation (Gove et al., 2016). Economic factors further contribute to support or opposition, encompassing concerns about property values, tourism, employment, and agricultural impacts (Brudermann et al., 2013; Gibbons, 2015). And finally, to check whether community ownership affects people choice in adopting wind farm technology (Warren & McFadyen, 2010).

H_3: Community Influence has a positive relationship with Solar Technology Adoption.

2.4. Government Policies

Making decisions with the understanding of government regulations is necessary as compliance has an important part in the success and sustainability of any initiative. In terms of the agricultural sector, the link between renewable energy and public policies is vital in addressing problems associated with water, food oil security (Merkulova et. al., 2022). It is particularly worth noting that renewables are naturally strong in agriculture, which highlights the need to combine energy solutions with practices of land use (Chel and Kaushik, 2011). These approaches are not only effective in reducing risks but also could influence public perceptions. Focusing on issues related to distributive and procedural justice can help in gaining an improved comprehension of the concerns as well as trades-off against low carbon transition (Sovacool et al., 2019). Such efforts towards decarbonization have been noted to yield positive effects on social acceptance. Recognizing and sharing the challenges of moving towards a low-carbon economy can support an increased acceptance of energy policies and projects, facilitating overall success in decarbonization efforts (Tabi and Wüstenhagen, 2017).

H_4: Government Policies has a positive relationship with Solar Technology Adoption.

2.5. Awareness and Education

Increase the effectiveness of solutions designed for the broad utilization of Solar Energy Farming (SEF) technologies by promoting awareness and providing education. In the backdrop of India, where organizational entities work in partnership with governments through integrated strategies and farmer capacity development approaches, it is evident that a significant lack of awareness among farmers emanating from their not knowing about SEF technologies, together with entry knowledge related to care maintenance a d irrigation practices stands out as major barriers against the economic stability along social sustainability associated with SEF (Agrawal and Jain, 2016). These barriers require special initiatives aimed at educating farmers and awareness campaigns adapted to the peculiarities of each group. This can be done through educational programs on sustainable irrigation practices and changing cropping patterns or timings that make sense, setting a solar energy goal about food security while ensuring water use efficiency (Xue, 2017).

H_5: Awareness and Education has a positive relationship with Solar Technology Adoption.

3. RESEARCH METHODOLOGY

This research was conducted in the Howrah and Kolkata districts where data were collected from 250 people actively using solar energy. The sample encompassed people from diverse demographics including men and women of different age groups, having jobs like business and service along with sociopolitical origins. The data from this study was gathered through well-organized questionnaires using a five-point Likert scale with respondents rating each factor on the range "1" for strongly disagree to "5" for strongly agree. This investigation is concerned with statistically testing correlations between demographic factors and customer satisfaction. In the context of eco–friendly transport, the researchers employed the Chi-square test.

4. FINDINGS AND DISCUSSION

We used SPSS software to do an Exploratory Factor Analysis (EFA) (Table 1) in order to organize qualities that have significant loadings and comparable traits into clearly interpretable constructs. The weighted values of these attributes in the research are displayed together with the relationships between the retrieved constructs and their attributes in this analysis. It can be observed that five factors were identified, namely "**Cost**" accounting for 5 variables, "Reliability and Performance" accounting for 5 variables, "Community Influence" accounting for 5 variables "Government Policies" accounting for 5 variables and "Awareness and Education" for 5 variables.

As illustrated in Table 2, it can be depicted that the AMOS measurement model has shown significant satisfaction with regard to all model fit indices. The model's P-value is substantial and its Chi-square is lesser than five (Wheaton et al., 1977a). It has also been suggested that the CFI and GFI of a model must ideally exceed 0.90 and be closer to 1. To get probability for fit indices with given cutoffs (P = 0.05), recommended criteria by (Hu and Bentler (1999) have been applied. In our findings, it can be observed that the model fit indices, namely RMSEA, SRMR, CFI and GFI meet the threshold requirements. It is indicated that there is good conformity when the SRMR values, which range from 0 to 1, are <0.05 (Byrne, 2010). Based on the research, it is evident that every model result falls within the acceptable range of 0.05.

Table 1: exploratory factor analysis

constructs	component				
	cost	reliability and performance	community influence	government policies	awareness and education
The affordability of solar energy facilities is crucial, especially for rural consumers in india.	0.869				
The cost is a significant factor in the adoption of sustainable energy technologies.	0.854				
The solar energy products are perceived as cost-effective, reliable, and environmentally friendly.	0.801				
The reliability and performance are important considerations when assessing solar energy products.	0.798				
Investing in renewable energy systems negatively impacts their overall economic performance.	0.754				
The reliable and high-performance renewable energy solutions are essential for widespread adoption.		0.892			
The adoption of solar technology should be a global effort, involving developed and developing countries.		0.875			
The solar technology is a reliable option for meeting energy needs in the long term.		0.785			
The investments in solar technology contribute positively to overall reliability in energy production.		0.764			
The advancements in solar technology have made it a more natural choice for energy production.		0.713			
The local communities agree with the implementation of water conservation measures to mitigate water scarcity.			0.804		
The industries strongly agree that investing in environmentally friendly practices positively impacts their long-term success.			0.761		
The solar energy contributes to environmental safety and pollution reduction.			0.742		
The community attitudes and social norms impact the adoption and integration of solar technology into everyday practices.			0.701		
The community-led financing models are effective in overcoming financial barriers.			0.695		
the policymakers disagree with the belief that environmental regulations hinder economic growth and competitiveness.				0.814	
the government officials strongly agree that supporting sustainable practices leads to long-term economic benefits for a nation.				0.779	
the solar energy plays a crucial role in revolutionizing agriculture by addressing water scarcity challenges.				0.705	
The policymakers disagree with the notion that traditional energy sources are more reliable compared to renewable alternatives.				0.701	
The renewable energies, such as solar power, provide green alternatives to fossil fuels and contribute to sustainable economic growth.				0.69	
The solar technology can be a transformative approach to challenges posed by traditional energy resources.					0.824
The stakeholders perceive the agreeable integration of solar technology into existing infrastructure and urban planning strategies.					0.789
The investment in solar technology research and development is a natural progression towards a sustainable future.					0.759
The economic, and environmental implications are strongly disagreeing with the integration of solar technology into energy policy frameworks.					0.741
The natural factors are leading to either agreement or disagreement with its widespread adoption?					0.703

Table 2: Correlations, measures of reliability and validity

Factor	CR	Cronbach's Alpha	AVE	CT	RP	CI	GP	AE
Cost	0.96	0.89	0.81	0.9				
Reliability and Performance	0.95	0.89	0.81	0.76	0.9			
Community Influence	0.88	0.87	0.71	0.64	0.63	0.84		
Government Policies	0.93	0.86	0.74	0.56	0.54	0.53	0.86	
Awareness and Education	0.94	0.81	0.76	0.42	0.4	0.39	0.38	0.87

In social science research, confirmatory factor analysis is frequently employed. CFA and exploratory methods are used to analyze shared variance in variables. From the above Table 3, we can see that we are getting satisfied results for the confirmatory factor analysis.

It is evident from the above figure (Figure 1) that the Structured Equation Modelling is yielding satisfactory results. According to the structural equation model, "Cost" is the most significant factor and has a regression weight of 0.52, is predicted to have a stronger influence on Solar Technology Adoption (STA). The research has demonstrated that, to some extent, there is also a favourable correlation between STA and Reliability and Performance and Awareness and education with a regression weight of 0.40 and 0.34 respectively.

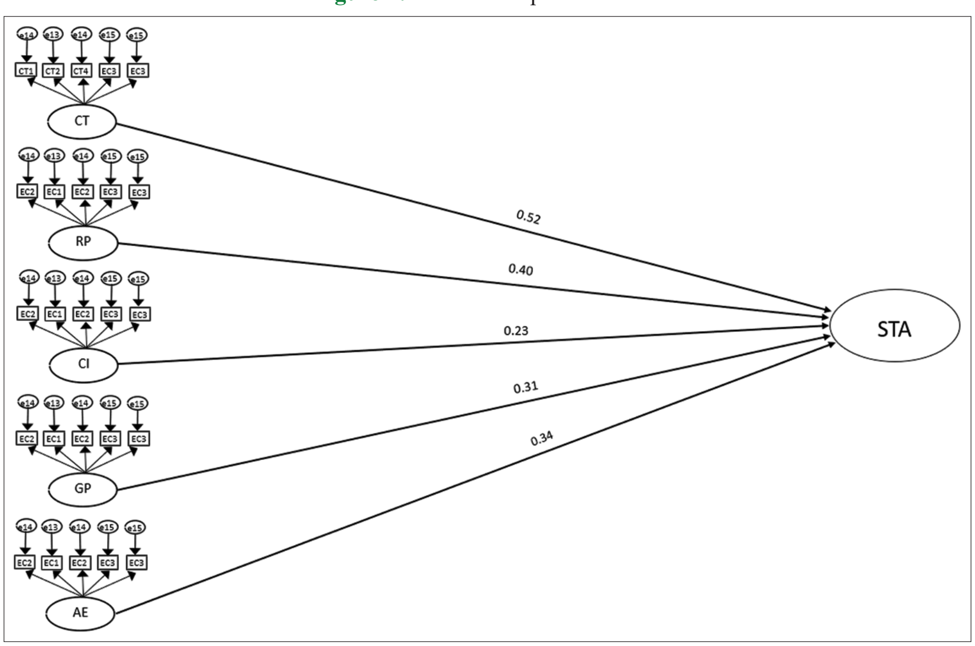
5. THEORETICAL IMPLICATION

The theory implications emanating from the debate on solar energy adoption, reliability, performance, cost, community influence, geographical location, government policies, awareness, education, and energy requirements are numerous and complex (Rafindadi and Ozturk, 2017). First, unraveling the multidimensional aspect of solar energy uptake necessitates an integrative approach which captures the ecological consciousness, fiscal stimuli, social components, and technological advancement. This highlights the need for interdisciplinary collaboration between industrial engineers, academics, and government officials for curtailing the costs linked with solar energy components and installation processes, especially in areas such as rural India wherein promotion of renewable energy can have far-reaching positive impact both on the environment and the local communities (Tan et al., 2022). Moreover, seeing that solar technology has functional advantages that include cost-effectiveness, reliability, and eco-friendliness, it is the framing of solar energy as a viable and attractive option among consumers which is important, and hence influences their adoption decisions (Bright et al., 2017; Akehurst et al., 2012). Nevertheless, non-renewable energy sources also have harmful environmental impacts which need to be recognized and combated, simultaneously encouraging the move towards renewable energy options (Mahalik et al., 2021; Yu et al., 2023). Furthermore, the resolution of issues associated with upfront expenses and payback periods is paramount for widespread acceptance which calls for inventive financing schemes and benefit structures to alleviate financial problems (Ansari et al., 2013; García et al., 2019). In addition, geographic placement of solar power plants plays a critical role that affects energy output due to sunlight availability, land cover, vegetation, and proximity to the electrical substations (Baseer et al., 2017). Government policies act as catalyst to the establishment of regulatory frameworks that encourage take up of renewable energy resources and thereby smart subsidies and polices require that sustainability and social justice should be emphasized (Chel and Kaushik, 2011; Alonso et al., 2019). Community influence is vital in successful implementation of renewable energy projects, implying the need for stakeholder engagement, transparency, and effective communication to address issues of visual impacts, land use, biodiversity conservation and economic consequences (Wüstenhagen et al., 2007; Dhar et al., 2020). Besides, necessary campaigns and educational programs should be undertaken for overcoming obstacles which stop solar

Table 3: Model fit indices (Confirmatory Factor Analysis)

CFA	CMIN/DF	P	GFI	AGFI	NFI	TFI	CFI	PCLOSE	RMSEA
	2.31	0.000	0.93	0.91	0.9	0.94	0.951	0.54	0.046
SEM	CMIN/DF	P	GFI	AGFI	NFI	TFI	CFI	PCLOSE	RMSEA
	3.64	0.000	0.87	0.84	0.85	0.88	0.9	0.046	0.07

Figure 1: Structural equation model



energy adoption with focus on farmers and rural community with consideration of tailored capacity building programs and outreach systems (Agrawal and Jain, 2016; Kumar et al., 2017).

In all, the theory suggestions emerging from the discourse on solar energy adoption emphasize the need for a more holistic and interdisciplinary approach that considers the environmental, economic, social, and technological considerations. Through understanding solar energy is multi-causal and dealing with reliability, performance, cost, community influence, geographical location, government policies, awareness, education, and energy needs barriers, stakeholders can create a suitable environment for solar energy widespread adoption, hence a step towards a more sustainable and resilient energy future.

6. CONCLUSION AND MANAGERIAL IMPLICATIONS

In conclusion, transitioning to sustainable energy especially for the agriculture sector where the energy consumption and greenhouse gas emission are major exporting factors for environmental degradation is important. The research emphasizes the need for adopting cleaner energy resources with solar technology being the innovative solution for countering the adverse effects that come along with the heavy reliance on fossil fuels. Main insights point to the complex nature of these challenges and opportunities associated with the widespread adoption of solar power. The considerations such as performance, infrastructure, reliability, cost, community effect, geographical position, government policies, knowledge, and energy needs are widely accepted to be the key elements determining the acceptance and integration of solar technology. The article also calls for interdisciplinary collaboration among policymakers, industrial engineers, academicians, and the local community to handle these problems as best as possible. A holistic approach taking into consideration environmental, economic, social, and technological dimensions highlighted the theoretical implications of fostering solar energy dissemination. The managerial implications place a huge emphasis on policy makers who should use a supportive regulation and a smart subsidy-oriented policy. While stakeholders must engage communities, use transparent communication, and follow strategic geographical placement. Beyond that, businesses and investors are recommended to look for efficiency and performance indicators when choosing solar energy solutions.

The results of this study have far reached managerial implications for different stakeholders that are in the process of adopting and integrating solar technology into existing energy systems. Firstly, the policymakers, governmental bodies especially in regions such as Iran and India should focus on raising the awareness for transition to renewables through strong regulations and smart subsidy-oriented policies. Further, targeted awareness and education material is required to enlighten the farmers and other end-user groups on the workability and long-term benefits of solar technology. These programs can aid the need for a bigger buy-in among key stakeholders, namely, the somewhat handicapped would-be applicants, in commitment, which could prompt wider adoption and usage of solar solutions. The consideration of local sentiments, socio-economic conditions and the environment by the stakeholders involved in community engagement, project planning and implementation would yield the necessary support from the affected community. This requires active involvement of stakeholders, transparent communication, and incorporation of community feedback into the project design as well as decision making. In addition, the paper highlights the significance of choosing suitable geographical areas for solar power plants depending on factors like solar resource accessibility, land cover and distance from electrical substations. Well-chosen location impacts positively energy production, logistic simplification and reduced environmental interference resulting in better financial viability and sustainability in renewable energy ventures. This means that capacity utilization factor and the return on investment are determined as the metrics to guarantee adequate returns and realization of the performance expectations over the long run. In addition, community leaders need to initiate reactive outreach drives to deal with concerns and solicit people's support for solar energy projects attaching importance to the environmental benefits, the economic opportunities and the social implications related to solar technology. To overcome the shortcomings and reach the full potential of solar energy as a comprehensive and long-term solution to the global energy crisis, collaboration between the government, business community, and local communities will be essential. By expanding the use of solar technology, the management ramifications encourage stakeholders to take the lead in driving the energy transition to a varied and sustainable environment.

REFERENCES

Agovino, M., Casaccia, M., Ciommi, M., Ferrara, M., Marchesano, K. (2019), Agriculture, climate change and sustainability: The case of EU-28. Ecological Indicators, 105, 525-543.

Agrawal, S., Jain, A. (2016), Sustainability of Solar-Based Irrigation in India. CEEW Working Paper.

Akehurst, G., Afonso, C., Gonçalves, H.M. (2012), Re-examining green purchase behaviour and the green consumer profile: New evidences. Management Decision, 50(5), 972-988.

Alam, M.J.E., Muttaqi, K.M., Sutanto, D. (2013), Mitigation of rooftop solar PV impacts and evening peak support by managing available capacity of distributed energy storage systems. IEEE Transactions on Power Systems, 28(4), 3874-3884.

Alonso, A., Feltz, N., Gaspart, F., Sbaa, M., Vanclooster, M. (2019), Comparative assessment of irrigation systems' performance: Case study in the Triffa agricultural district, NE Morocco. Agricultural Water Management, 212, 338-348.

Al-Shahri, O.A., Ismail, F.B., Hannan, M.A., Lipu, M.H., Al-Shetwi, A.Q., Begum, R.A., & Soujeri, E. (2021), Solar photovoltaic energy optimization methods, challenges and issues: A comprehensive review. Journal of Cleaner Production, 284, 125465.

Ansari, M.F., Kharb, R.K., Luthra, S., Shimmi, S.L., Chatterji, S. (2013), Analysis of barriers to implement solar power installations in India using interpretive structural modeling technique. Renewable and Sustainable Energy Reviews, 27, 163-174.

Atuguba, R.A., Tuokuu, F.X.D. (2020), Ghana's renewable energy agenda: Legislative drafting in search of policy paralysis. Energy Research and Social Science, 64, 101453.

Baseer, M.A., Rehman, S., Meyer, J.P., Alam, M.M. (2017), GIS-based site suitability analysis for wind farm development in Saudi Arabia. Energy, 141, 1166-1176.

Betakova, V., Vojar, J., Sklenicka, P. (2015), Wind turbines location: How many and how far? Applied Energy, 151, 23-31.

Bilgili, F., Ozturk, I., Kocak, E., Bulut, U. (2017), Energy consumption-youth unemployment nexus in Europe: Evidence from panel cointegration and panel causality analyses. International Journal of Energy Economics and Policy, 7(2), 193-201.

Blenkinsopp, T.C.S.R., Coles, S.R., Kirwan, K. (2013), Renewable energy for rural communities in Maharashtra, India. Energy Policy, 60, 192-199.

Bright, J.M., Babacan, O., Kleissl, J., Taylor, P.G., Crook, R. (2017), A synthetic, spatially decorrelating solar irradiance generator and application to a LV grid model with high PV penetration. Solar Energy, 147, 83-98.

Brudermann, T., Reinsberger, K., Orthofer, A., Kislinger, M., Posch, A. (2013), Photovoltaics in agriculture: A case study on decision making of farmers. Energy Policy, 61, 96-103.

Byrne, B. M. (2010). Structural equation modeling with amos: Basic concepts, applications, and programming (2nd ed.). New York: Taylor and Francis Group.

Calvert, K., Mabee, W. (2015), More solar farms or more bioenergy crops? Mapping and assessing potential land-use conflicts among renewable energy technologies in eastern Ontario, Canada. Applied Geography, 56, 209-221.

Carrión, J.A., Estrella, A.E., Dols, F.A., Toro, M.Z., Rodríguez, M., Ridao, A.R. (2008), Environmental decision-support systems for evaluating the carrying capacity of land areas: Optimal site selection for grid-connected photovoltaic power plants. Renewable and Sustainable Energy Reviews, 12(9), 2358-2380.

Chel, A., Kaushik, G. (2011), Renewable energy for sustainable agriculture. Agronomy for Sustainable Development, 31, 91-118.

Dhar, A., Naeth, M.A., Jennings, P.D., El-Din, M.G. (2020), Perspectives on environmental impacts and a land reclamation strategy for solar and wind energy systems. Science of the Total Environment, 718, 134602.

Dugoua, E., Liu, R., Urpelainen, J. (2017), Geographic and socio-economic barriers to rural electrification: New evidence from Indian villages. Energy Policy, 106, 278-287.

Eid, C., Guillén, J.R., Marín, P.F., Hakvoort, R. (2014), The economic effect of electricity net-metering with solar PV: Consequences for network cost recovery, cross subsidies and policy objectives. Energy Policy, 75, 244-254.

Farajian, L., Moghaddasi, R., Hosseini, S. (2018), Agricultural energy demand modeling in Iran: Approaching to a more sustainable situation. Energy Reports, 4, 260-265.

Fatima, T., Xia, E., Ahad, M. (2018), An aggregate and disaggregate energy consumption, industrial growth and CO_2 emission: Fresh evidence from structural breaks and combined cointegration for China. International Journal of Energy Sector Management, 12(1), 130-150.

Fayet, C.M., Reilly, K.H., Van Ham, C., Verburg, P.H. (2022), The potential of European abandoned agricultural lands to contribute to the Green Deal objectives: Policy perspectives. Environmental Science and Policy, 133, 44-53.

García, A.M., Gallagher, J., McNabola, A., Poyato, E.C., Barrios, P.M., Díaz, J.R. (2019), Comparing the environmental and economic impacts of on-or off-grid solar photovoltaics with traditional energy sources for rural irrigation systems. Renewable Energy, 140, 895-904.

Gibbons, S. (2015), Gone with the wind: Valuing the visual impacts of wind turbines through house prices. Journal of Environmental Economics and Management, 72, 177-196.

Gove, B., Williams, L.J., Beresford, A.E., Roddis, P., Campbell, C., Teuten, E., & Bradbury, R.B. (2016), Reconciling biodiversity conservation and widespread deployment of renewable energy technologies in the UK. PLoS One, 11(5), e0150956.

Grant, F., Sheline, C., Sokol, J., Amrose, S., Brownell, E., Nangia, V. (2022), Creating a solar-powered drip irrigation optimal performance model (SDrOP) to lower the cost of drip irrigation systems for smallholder farmers. Applied Energy, 323, 119563.

Hanna, R., Kleissl, J., Nottrott, A., Ferry, M. (2014), Energy dispatch schedule optimization for demand charge reduction using a photovoltaic-battery storage system with solar forecasting. Solar Energy, 103, 269-287.

Hazboun, S.O., Howe, P.D., Coppock, D.L., Givens, J.E. (2020), The politics of decarbonization: Examining conservative partisanship and differential support for climate change science and renewable energy in Utah. Energy Research and Social Science, 70, 101769.

Hu, L., Bentler, P.M. (1999), Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6, 1-55.

Huang, J., Rikus, L.J., Qin, Y., Katzfey, J. (2018), Assessing model performance of daily solar irradiance forecasts over Australia. Solar Energy, 176, 615-626.

Huseynli, B. (2023), Renewable solar energy resources potential and strategy in Azerbaijan. International Journal of Energy Economics and Policy, 13(1), 31-38.

Joshi, G., Yenneti, K. (2020), Community solar energy initiatives in India: A pathway for addressing energy poverty and sustainability? Energy and Buildings, 210, 109736.

Kleemann, L., Abdulai, A., Buss, M. (2014), Certification and access to export markets: Adoption and return on investment of organic-certified pineapple farming in Ghana. World Development, 64, 79-92.

Kumar, A., Sah, B., Singh, A.R., Deng, Y., He, X., Kumar, P., Bansal, R.C. (2017), A review of multi criteria decision making (MCDM) towards sustainable renewable energy development. Renewable and Sustainable Energy Reviews, 69, 596-609.

Kumar, V., Hundal, B.S., Kaur, K. (2019), Factors affecting consumer buying behaviour of solar water pumping system. Smart and Sustainable Built Environment, 8(4), 351-364.

Kwakwa, P.A. (2021), What determines renewable energy consumption? Startling evidence from Ghana. International Journal of Energy Sector Management, 15, 108-118.

Levenda, A.M., Behrsin, I., Disano, F. (2021), Renewable energy for whom? A global systematic review of the environmental justice implications of renewable energy technologies. Energy Research and Social Science, 71, 101837.

Mahalik, M.K., Mallick, H., Padhan, H. (2021), Do educational levels influence the environmental quality? The role of renewable and non-renewable energy demand in selected BRICS countries with a new policy perspective. Renewable Energy, 164, 419-432.

Mbungu, N.T., Naidoo, R.M., Bansal, R.C., Siti, M.W., Tungadio, D.H. (2020), An overview of renewable energy resources and grid integration for commercial building applications. Journal of Energy Storage, 29, 101385.

Merkulova, E.Y., Margarita, S.S., Svetlana, S.S. (2022), Problems of ensuring energy security in the focus of sustainable development: From traditional resources to alternative ones. International Journal of Energy Economics and Policy, 12(2), 1-10.

Minelli, A., Marchesini, I., Taylor, F.E., De Rosa, P., Casagrande, L., Cenci, M. (2014), An open-source GIS tool to quantify the visual impact of wind turbines and photovoltaic panels. Environmental Impact Assessment Review, 49, 70-78.

Misila, P., Winyuchakrit, P., Limmeechokchai, B. (2020), Thailand's long-term GHG emission reduction in 2050: The achievement of renewable energy and energy efficiency beyond the NDC. Heliyon,

6(12), e05720.
Moore, S., Graff, H., Ouellet, C., Leslie, S., Olweean, D. (2022), Can we have clean energy and grow our crops too? Solar siting on agricultural land in the United States. Energy Research and Social Science, 91, 102731.
Mughal, Y.H., Nair, K.S., Arif, M., Albejaidi, F., Thurasamy, R., Chuadhry, M.A., Malik, S.Y. (2023), Employees' perceptions of green supply-chain management, corporate social responsibility, and sustainability in organizations: Mediating effect of reflective moral attentiveness. Sustainability, 15(13), 10528.
Noon, M.L., Goldstein, A., Ledezma, J.C., Roehrdanz, P.R., Cook-Patton, S.C., Spawn-Lee, S.A., & Turner, W.R. (2022), Mapping the irrecoverable carbon in Earth's ecosystems. Nature Sustainability, 5(1), 37-46.
Nordberg, E.J., Caley, M.J., Schwarzkopf, L. (2021), Designing solar farms for synergistic commercial and conservation outcomes. Solar Energy, 228, 586-593.
Paramati, S.R., Apergis, N., Ummalla, M. (2018), Dynamics of renewable energy consumption and economic activities across the agriculture, industry, and service sectors: Evidence in the perspective of sustainable development. Environmental Science and Pollution Research, 25, 1375-1387.
Patnaik, S., Jha, S. (2020), Caste, class and gender in determining access to energy: A critical review of LPG adoption in India. Energy Research and Social Science, 67, 101530.
Pelz, S., Chindarkar, N., Urpelainen, J. (2021), Energy access for marginalized communities: Evidence from rural North India, 2015–2018. World Development, 137, 105204.
Qiao, H., Zheng, F., Jiang, H., Dong, K. (2019), The greenhouse effect of the agriculture-economic growth-renewable energy nexus: Evidence from G20 countries. Science of the Total Environment, 671, 722-731.
Quitzow, R., Bersalli, G., Eicke, L., Jahn, J., Lilliestam, J., Lira, F., & Xue, B. (2021), The COVID-19 crisis deepens the gulf between leaders and laggards in the global energy transition. Energy Research and Social Science, 74, 101981.
Rafindadi, A.A., Ozturk, I. (2017), Dynamic effects of financial development, trade openness and economic growth on energy consumption: Evidence from South Africa. International Journal of Energy Economics and Policy, 7(3), 74-85.
Shahbaz, M., Balsalobre-Lorente, D., Sinha, A. (2019), Foreign direct Investment-CO_2 emissions nexus in Middle East and North African countries: Importance of biomass energy consumption. Journal of Cleaner Production, 217, 603-614.
Sharma, G.D., Shah, M.I., Shahzad, U., Jain, M., Chopra, R. (2021), Exploring the nexus between agriculture and greenhouse gas emissions in BIMSTEC region: The role of renewable energy and human capital as moderators. Journal of Environmental Management, 297, 113316.
Sharvini, S.R., Noor, Z.Z., Chong, C.S., Stringer, L.C., Yusuf, R.O. (2018), Energy consumption trends and their linkages with renewable energy policies in East and Southeast Asian countries: Challenges and opportunities. Sustainable Environment Research, 28(6), 257-266.
Sovacool, B.K., Kester, J., Noel, L., de Rubens, G.Z. (2019), Energy injustice and Nordic electric mobility: Inequality, elitism, and externalities in the electrification of vehicle-to-grid (V2G) transport. Ecological Economics, 157, 205-217.
Tabi, A., Wüstenhagen, R. (2017), Keep it local and fish-friendly: Social acceptance of hydropower projects in Switzerland. Renewable and Sustainable Energy Reviews, 68, 763-773.
Tan, K., Siddik, A.B., Sobhani, F.A., Hamayun, M., Masukujjaman, M. (2022), Do environmental strategy and awareness improve firms' environmental and financial performance? The Role of Competitive Advantage. Sustainability, 14(17), 10600.
Trandafir, S., Thomas, P., Bidwell, D., Rezendes, R. (2023), Community benefit agreements for solar energy: Examining values, preferences and perceived benefits in the United States using a discrete choice experiment. Energy Research and Social Science, 106, 103305.
Voland, N., Saad, M.M., Eicker, U. (2022), Public policy and incentives for socially responsible new business models in market-driven real estate to build green projects. Sustainability, 14(12), 7071.
Waheed, R., Chang, D., Sarwar, S., Chen, W. (2018), Forest, agriculture, renewable energy, and CO_2 emission. Journal of Cleaner Production, 172, 4231-4238.
Warren, C.R., McFadyen, M. (2010), Does community ownership affect public attitudes to wind energy? A case study from south-west Scotland. Land Use policy, 27(2), 204-213.
Wheaton, B., Muthen, B., Alwin, D. F., & Summers, G. (1977). Assessing Reliability and Stability in Panel Models. Sociological Methodology, 8, 84-136.
Wolsink, M. (2000), Wind power and the NIMBY-myth: Institutional capacity and the limited significance of public support. Renewable Energy, 21(1), 49-64.
Wüstenhagen, R., Wolsink, M., Bürer, M.J. (2007), Social acceptance of renewable energy innovation: An introduction to the concept. Energy Policy, 35(5), 2683-2691.
Xue, J. (2017), Photovoltaic agriculture-New opportunity for photovoltaic applications in China. Renewable and Sustainable Energy Reviews, 73, 1-9.
Yu, C., Moslehpour, M., Tran, T.K., Trung, L.M., Ou, J.P., Tien, N.H. (2023), Impact of non-renewable energy and natural resources on economic recovery: Empirical evidence from selected developing economies. Resources Policy, 80, 103221.
Zeng, S., Tanveer, A., Fu, X., Gu, Y., Irfan, M. (2022), Modeling the influence of critical factors on the adoption of green energy technologies. Renewable and Sustainable Energy Reviews, 168, 112817.
Zhang, H.L., Baeyens, J., Degrève, J., Cacères, G. (2013), Concentrated solar power plants: Review and design methodology. Renewable and Sustainable Energy Reviews, 22, 466-481.
Zhang, P., Li, W., Li, S., Wang, Y., Xiao, W. (2013), Reliability assessment of photovoltaic power systems: Review of current status and future perspectives. Applied Energy, 104, 822-833.
Zheng, H., Ma, W. (2023), Smartphone-based information acquisition and wheat farm performance: Insights from a doubly robust IPWRA estimator. Electronic Commerce Research, 23(2), 633-658.