INTERNATIONAL ACADEMIC RESEARCH JOURNAL
ISSN :2289-8441
International Academic Research Journal of Social Science
Journal homepage: www.iarjournal.com

Community Knowledge Towards a Low-Carbon City Concept

Nelsey Angeline Josley[1], Norqistina Batrisya Norhalim[1], Nur Alinie Izzati Mohd Ali[1], Nuraqela Binti Mohd Adha[1], Khairun Niesa Binti Zakaria[1], Raiena Ayu Binti Ahdanan[1], Ikmal Zarith Bin Kamaruzaman[1], Norfazira Binti Omar[1], Muhamad Fuad Abdul Karim[1]

[1]Fakulti Sains Pentadbiran dan Pengajian Polisi, Universiti Teknologi MARA Negeri Sembilan, Kampus Seremban

Corresponding email: fuad645@uitm.edu.my

Article Information

Keywords
Low-Carbon City (LCC), Community Knowledge, Sustainable Urban Development, Urban Sustainability

Abstract

Community knowledge and engagement are recognized as fundamentals pillars for the successful implementation of sustainable transitions, such as the Low-Carbon City (LCC) concept. This study assesses the level of community knowledge and community engagement concerning LCC concept among residents of Kuala Lumpur. A quantitative, cross-sectional design was employed using convenience sampling involving 200 respondents. Data were collected through a structured questionnaire and analyzed using descriptive statistics and reliability analysis. The results revealed a high level of community knowledge and engagement, with a mean score of 4.247 and a Cronbach's alpa value of 0.948, indicating excellent internal consistency. The findings suggest that respondents are well-informed and actively engage in the Low-Carbon City (LCC) concept. This study underscores the critical importance of strengthening community knowledge and community participation to support effective Low-Carbon City (LCC) concept and ensure long-term environmental sustainability in Malaysia.

INTRODUCTION

The main driver of climate change is human activities that release greenhouse gases (GHGs), especially carbon dioxide (CO2), into Earth's atmosphere. In general, carbon emissions in Malaysia are high compared to other countries at the same stage of development. This is evident when Malaysia's total greenhouse gas emissions increased by 46% in between 2000 to 2011 as compared to 1958 levels (Hashim et al., 2023). In this regard, urban areas in Malaysia have been identified as major contributors to carbon dioxide (CO2). According to Edenhofer et al. (2014), cities globally are responsible for 67% to 76% of energy consumption and 71% to 76% of energy-related GHG emissions, with the energy and transport sectors being the main contributors. Given the urgent need for climate action, urban development decisions taken over the next few years are critical in determining the success of global climate mitigation efforts. Therefore, for cities, this effort demands a massive reduction in greenhouse gas emissions from new and existing buildings. A new development pattern that prioritizes lower energy consumption is crucial to achieve this goal.

Studies have shown that population and economic growth are the primary drivers behind the increase in CO2 emissions worldwide over the past two decades. This trend is particularly pronounced in developing countries such

as Malaysia, where the impact of population on emissions is more pronounced. On average, a 1% increase in population is associated with a 1.28% increase in CO2 (Shi, 2001). With such a magnitude, global emissions are expected to continue to increase significantly, thus requiring international negotiations that take into account future population growth dynamics, in addition to development alone.

Recognizing this threat, low-carbon city planning (LCC) needs to integrate the ideas of Low Carbon Society (LCS) and the low-carbon economy. The LCS concept, introduced by Japan in 2007, is based on the principle of "No Low Carbon Society, No Low Carbon Technology." Although LCS focuses on transforming consumption patterns and lifestyles, while low-carbon technologies focus on energy patterns, their main goals are the same, which is reducing CO2 emissions while generating economic growth (Yang & Li, 2013).

Accordingly, the LCC concept has been adopted globally, including in Malaysia, as an inevitable and necessary option to address environmental degradation due to rapid urbanization and create sustainable urban development. LCC is defined as a city that adopts green technologies and practices and emits significantly lower levels of CO2 or GHG compared to current practices, making it an efficient, livable, and competitive city (Chin et al., 2007). The main objective is to significantly reduce the carbon footprint without compromising the city's economic development potential (KeTTHA, 2011).

To achieve the country's emissions reduction commitment, the Malaysian government has launched LCS initiatives targeted at cities. The national target is ambitious,namely to achieve zero-carbon cities or townships in all 14 states by 2026 with Melaka City and Iskandar Malaysia targeted to be carbon neutral by 2020. The main policy framework for this direction is the National Low Carbon Cities Masterplan, which consolidates national policies and outlines implementation actions at the Federal, State and Local levels. Five cities which are Putrajaya, Iskandar Malaysia, Cyberjaya, Petaling Jaya and Hang Tuah Jaya have been selected as pilot cities to adopt this planning process (KeTTHA, 2011). However, the success of LCCs depends on the highest level of government support, coupled with awareness and sustainable lifestyles instilled among Malaysians.

Although the policy framework is already in place, the successful implementation of the Low-Carbon City (LCC) initiative, particularly in dense metropolitan areas such as Kuala Lumpur, requires more than government mandates and technological advancements. As emphasized by KeTTHA (2011), it also depends on community awareness and the adoption of sustainable lifestyles. Therefore, understanding the community's level of knowledge, perception, and readiness toward the LCC concept is critical, as civil society serves as the primary recipient and implementer of low-carbon practices in urban areas. In this context, the aim of this article is to examine community knowledge of the Low-Carbon City concept in Kuala Lumpur.

LITERATURE REVIEW

The Malaysian government introduced The Low Carbon Cities Framework (LCCF) in 2011 by the Malaysian Green Technology and Climate Change Corporation (MGTC). It was supported by the Construction Industry Development Board (CIDB) and it helps Malaysian cities as a strategic guideline in completely reducing carbon emissions. The framework aims for key elements which are urban environment, urban infrastructure, urban transportation, and buildings. It is to ensure sustainability and flexible urban development (Ho et al., 2012). Along with these efforts, MGTC promoted the application of the LCCF at the local level by launching the Low Carbon Cities 2030 Challenge. This could engage local authorities, private sectors and communities. This agenda provides assessment implements, practical tools and the launch of Low Carbon Zones to monitor cities' progress towards carbon reduction goals (Ho et al., 2012). LCCF also performs an important role in promoting sustainable instruction practices in Malaysia (Adlina,2025). This is because it connects low-carbon urban planning elements with the construction sector's sustainability aims. Both efforts and actions are supplementary. The LCCF plays as the overall policy framework while the LCC2030C acts as the implementation and monitoring mechanism. In the context of this study on community knowledge toward the low carbon city concept in Kuala Lumpur, it is important to understand these two frameworks to impose the limit of public awareness and comprehension of government efforts to build greener and more sustainable cities by 2030.

Low Carbon City Framework (LCCF), one of the low carbon tools that will decrease the environmental impact of climate change. Correlated with the 12th Malaysia Plan, Malaysia aims to improve environmental rankings and green technology (Economic Planning Unit, 2021b) with all agencies' cooperation. Developing strong coordination and collaboration between numerous agencies and stakeholders is crucial in order to achieve efficiency in the pursuit of low-carbon governance. In order to empower the low carbon city framework (LCCF) and enable the transformation of cities, this cooperative effort is necessary. The local authorities' roles and responsibilities in low carbon administration still need to be completely evaluated due to a need for greater focus on governance elements.

Most Malaysian local authorities use the LCCF as their main resource when making decisions, and they also set specific objectives for implementing their low-carbon framework that are particular according to the particulars of each local context (Nasrudin et al., 2020). In Malaysia, only participating local authorities are liable to the LCCF (UPEN, 2016). This shows that most local authorities use the LCCF as their guide and are aware of the consequences of global warming and its dedication to addressing this global issue. The local government has encouraged low-carbon urban development through a variety of programs and actions in its capacity as the executor. These include improving the infrastructure for walkways and urban green spaces, as well as offering free bus services. Delivering a low-carbon city requires careful consideration of policy planning and implementation. Identified local satisfactions are the best approaches for the local government to choose the wise strategy for climate change policy innovation.

Furthermore, the urban transition toward the Low-Carbon City (LCC) concept faces a significant challenge by the gap between public environmental awareness and the adoption of low carbon lifestyles, which become a major issue for megacities such as Kuala Lumpur. A study in China highlights that high community knowledge of climate issues does not mean that it can change into actual low carbon consumption and transportation behaviors, partly because of a free-rider effect, This does not minimize the motivation for the people to act due to the global scale of environmental problems (Wu et al., 2022). Other than that, LCC adoption in Malaysia is made even harder by implementation and governance issues. In this case, in Shah Alam, structural challenges such as the use of authoritative communication methods and the lack of collaborative effort between governmental and non-government organisations have been leading to low community participation. These factors collectively result in a disorganised operational environment and limit major public engagement (Abdullah et al., 2023). Therefore, the study assessing Kuala Lumpur's community knowledge must go beyond awareness assessing to look at how public behavioural psychology, local governance ability, and coordinated participatory procedures relate.

Other than that, the implementation of low-carbon city initiatives must involve active public engagement along with effective policy enforcement (Juhari et al. 2023) conducted research investigating the impact of the Low Carbon City Framework Checklist (LCCFC) on community satisfaction in Malaysia. It was observed that if local authorities adhere to the framework then the public has a better opinion and greater trust in sustainable urban practices. On the other hand, the study also proves that the policy itself is not enough. Citizens must be informed about such initiatives and engaged with them for significant change to occur. Further, (Watabe 2023) supported the argument and showed the need for deeper citizen engagement in the transition to a low-carbon lifestyle, stating that individual behavioral change is key to the long-term success of the decarbonization process. When the two studies are considered together, it is clear that government policies must be supported by citizen action, if any real progress in the development of low-carbon cities is to be achieved. Policy measures set the basic requirements while active community engagement is what makes it easier and more effective to move towards low-carbon cities.

Low carbon initiative also needs the involvement of green technology. In Malaysia, green technologies applications such as solar-powered lighting, smart irrigation systems, and rainwater harvesting are among the key initiatives in promoting low-carbon development within urban areas by enhancing the effectiveness of Small Urban Parks (SUPs) in mitigating climate change (Aziz et al., 2020). These innovations help minimize energy consumption in park maintenance. Furthermore, the use of digital and data-driven tools, including Internet of Things (IoT) sensors, allows for efficient monitoring of vegetation health, soil conditions, and carbon sequestration rates, thereby enhancing environmental decision-making and resource optimization (Mohd Noor et al., 2021). Therefore, by merging nature-based solutions with advanced green technologies, SUPs can become effective contributors to Malaysia’s low-carbon city initiatives, supporting national efforts toward sustainable urban transformation (Sabri et al., 2023). At the same time, the economic dimension of low-carbon development shows that growth driven by non-renewable energy increases environmental degradation, while green technology promotes sustainable economic progress (Ahmed et al., 2019; Saidi & Omri, 2020). In Malaysia, renewable energy investments help reduce pollution while strengthening long-term economic development through technological advancement (Ridzuan et al., 2020; Bekhet & Othman, 2021). Although early economic expansion tends to raise emissions, the adoption of cleaner technologies eventually improves environmental quality (Sharif et al., 2018; Saudi, 2022). Trade liberalisation and FDI further shape these outcomes, with mixed effects on emissions depending on policy direction (Hasanov et al., 2019; Majekodunmi et al., 2023). Overall, Malaysia’s shift toward green technology and renewable energy demonstrates that low-carbon development can bring both environmental and economic benefits if supported by consistent policy implementation.

As the world's major drivers of consumption and emissions, cities require more than mere political commitment. They demand actionable blueprints to achieve genuine carbon neutrality. This transition from broad aspiration to measurable success is anchored in the fusion of standardized global accounting protocols with localized urban development frameworks, ensuring every policy decision and investment is targeted toward verifiable CO2 abatement. This operation is based on globally acknowledged protocols, like the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC). The GPC serves as an essential instrument since it standardizes emissions

accounting in cities, facilitating the adoption of a consistent framework that enhances the credibility and comparability of local indicator performance across various municipalities and countries. This standardized information is subsequently incorporated into a localized structure, like Malaysia's Low Carbon Cities Framework (LCCF). The LCCF demonstrates how national and local frameworks transform academic concepts into a practical operational resource. It offers the essential framework domains such as encompassing buildings, urban transportation, urban infrastructure, and urban environment, checklists, and evaluation methods that local authorities can utilize to evaluate their current situation, prioritize initiatives, and connect efforts to different funding programs and recognition initiatives that encourage execution. The LCCF serves as the essential link, formalizing the shift from a broad policy objective into a structured carbon reduction strategy for all parties involved (Adlina, 2025). Operationally, many municipalities use a hybrid approach to city management, combining a comprehensive multi-domain indicator dashboard with standardized emissions accounting (like GPC). A number of important urban indicators, including energy intensity, modal share, waste diversion percentage, green space per person, and governance ratings, are tracked by this dashboard. By providing the verified data required to secure green bonds or government grants, this strategic arrangement supports both strategic funding and tactical decisions, such as prioritizing quick transit in regions with high transportation emissions. In the end, having a framework that satisfies institutional capacity and data system requirements is crucial for the successful adoption and efficacy of these systems, particularly in Asian case studies. Lo is improved by using frameworks with a simplified, multi-domain indicator set and a phased implementation strategy that starts with key indicators (Elmousalami, Peng Hui, & Alnaser, 2025).

METHODOLOGY

This study employed a quantitative cross-sectional research design to examine community knowledge towards a low carbon cities concept among Malaysians, focusing on residents of Kuala Lumpur. A total of 200 respondents representing diverse demographic backgrounds from an area were selected using a convenience sampling method. Data were collected through a structured questionnaire via online, encompassing two sections : Demographic Data, and Community Knowledge of the Low-Carbon City Concept in Kuala Lumpur. Responses were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Descriptive statistics, including means and standard deviations, were employed to analyze the data, while Conbrach's alpha coefficient was used to assess the internal consistency of the instrument, with values exceeding 0.80 considered acceptable for reliability. Ethical considerations were rigorously observed throughout the study, ensuring participants' anonymity, informed consent, voluntary participation, and the confidentiality of all collected data.

RESULT AND DISCUSSION

Profile of Respondents

The demographic profile of respondents (Table 1.0) provides important insights into the characteristics of individuals in Kuala Lumpur who participated in this study on community knowledge towards a low carbon city concept. A total of 200 respondents were surveyed. The gender composition shows that female respondents constituted the majority (61.5%), with males representing 38.5% of the sample. The age distribution indicates that more than half of the participants were between 18 and 22 years old (55.0%), followed by those aged 23 to 30 years (31.5%) and 31 to 40 years (10.0%), while only a small proportion (3.5%) were 40 years old and above. In terms of employment status, most respondents were students (66.0%), followed by employed individuals (28.0%) and unemployed participants (6.0%). In relation to educational attainment, a substantial portion of the respondents possessed tertiary-level qualifications, with (59.0%) holding a bachelor's degree, (26.0%) having completed diploma, STPM, matriculation or foundation studies, and smaller proportions holding a master's degree (12.5%), PhD (1.0%) or SPM (1.5%). Overall, these findings suggest that the sample predominantly comprised young, educated individuals, many of whom were still pursuing or had recently completed higher education, reflecting the urban, educated and youth-oriented demographic characteristics of the Kuala Lumpur community in relation to low-carbon city awareness.

TABLE 1.0
PROFILE OF RESPONDENTS (N=200)

Profile	Category	Frequency	Percentage (%)
Gender	Male	77	38.5
	Female	123	61.5
Age	18 and 22 years old	110	55.0
	23 to 30 years	63	31.5
	31 to 40 years	20	10.0
	40 years old and above	7	3.5
Level of Education	SPM	3	1.5
	Diploma/ STPM/ Foundation/ Matriculation	52	26.0
	Bachelor's Degree	118	59.0
	Master's Degree	25	12.5
	PhD	2	1.0
Occupation	Student	132	66.0
	Employed	56	28.0
	Unemployed	12	6.0

Table 1.2 presents Cronbach's alpha was employed to assess the internal consistency and reliability of the measurement items used in this study. As noted by Pallant (2016), a Cronbach's alpha value of 0.60 or higher indicates acceptable reliability, while values between 0.80 and 1.00 demonstrate excellent internal consistency. As presented in Table 1.2, Cronbach's alpha coefficient for the variable "Community Knowledge of the Low-Carbon City Concept in Kuala Lumpur" was 0.948, indicating an excellent level of reliability. This result confirms that the scale items used to measure community knowledge were highly consistent and dependable among respondents residing in Kuala Lumpur.

Table 1.1
RELIABILITY TEST

Variable	Number of Items	Cronbach's Alpha	Reliability Assumed
Community Knowledge Towards a Low-Carbon City Concept	10	0.948	Excellent

Mean and Standard Deviation

The mean and standard deviation analysis provides valuable insights into the respondents' overall knowledge and understanding regarding the low-carbon city concept. Participants assessed their awareness and comprehension of low carbon practices and initiatives within the community using a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). As presented in Table 1.4, the overall mean score was 4.247, which falls within the high range (3.58–5.00) as outlined in Table 1.3, with a standard deviation of 0.685. These results suggest that respondents generally demonstrate a strong understanding of low carbon city practices and a positive inclination toward sustainable behaviors, reflecting a high level of environmental awareness among residents of Kuala Lumpur. The findings indicate that while the community shows substantial knowledge of low-carbon initiatives, there may still be gaps between awareness and consistent implementation in daily practices. To address this, policy measures and community programs should focus on practical engagement strategies, awareness campaigns, and accessible platforms that empower residents to translate knowledge into actionable steps toward creating a sustainable low-carbon city.

.

Table 1.3
LEVEL OF MEAN SCORE RANGE

Mean Score Range	Level
1.00 – 2.33	Low
2.34 – 3.67	Medium
3.58 – 5.00	High

Table 1.4

MEAN AND STANDARD DEVIATION

Variable	Mean	Standard Deviation	N
Community Knowledge Towards a Low-Carbon City Concept	4.247	0.685	200

CONCLUSION

This study highlights the importance of low-carbon city initiatives in strengthening Malaysia's pathway toward sustainable urban development. The findings show that community awareness and willingness to adopt low-carbon practices are growing, but meaningful progress requires stronger policy support, adequate resources, and accessible guidance. Developing resilient low-carbon cities depends on coordinated government frameworks, financial incentives, community participation, and continuous environmental education. Enhanced collaboration among authorities, stakeholders, and local communities is essential to ensure inclusive, effective, and long-term carbon-reduction efforts. Ultimately, advancing low-carbon cities is a shared responsibility that demands collective commitment to secure a sustainable and climate-resilient future for Malaysia.

REFERENCE

Abdullah, Y. A., Zanudin, K., Jamaluddin, N. B., Marzukhi, M. A., & Yusup, M. (2023). *An Exploration Of Community Engagement And Participation In The Low Carbon City (Lcc) Initiative: Case Study Of Majlis Bandaraya Shah Alam. Planning Malaysia, 21*. https://doi.org/10.21837/pm.v21i29.1376

Adlina. (2025, February 25). *Rangka Kerja Bandar Karbon Rendah (LCCF) Malaysia Membuka Jalan untuk Pembangunan Pembinaan Mampan*. CIDB HQ. https://www.cidb.gov.my/eng/malaysias-low-carbon-city-framework-lccf-paves-the-way-for-sustainable-construction-development/

Chin, S. H., Yuzuru, M., Janice, S., & Kei, G. (2007). Low carbon urban development strategy in Malaysia–The case of Iskandar Malaysia development corridor. *Habitat International*, 37: 1-9.

Economic Planning Unit. (2021b). The Twelfth Malaysia Plan (2021-2025): A prosperous, inclusive, sustainable Malaysia. Putrajaya: Percetakan Nasional Malaysia Berhad. https://rmke12.ekonomi.gov.my/en

Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, A., ... & Stechow, C. V. (Eds.). (2014). *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. https://www.ipcc.ch/report/ar5/wg3

Hashim, M., Ng, H. L., Zakari, D. M., Sani, D. A., Chindo, M. M., Hassan, N., Azmy, M. M., & Pour, A. B. (2023). Mapping of Greenhouse Gas Concentration in Peninsular Malaysia Industrial Areas Using Unmanned Aerial Vehicle-Based Sniffer Sensor. *Remote Sensing*, *15*(1), 255. https://doi.org/10.3390/rs15010255

Ho, C. S., Matsuoka, Y., Simson, J., Gomi, K., Ho, C. S., Matsuoka, Y., Simson, J., & Gomi, K. (2012). Low carbon urban development strategy in Malaysia – The case of Iskandar Malaysia development corridor. *Habitat International*, *37*, 43–51. https://doi.org/10.1016/j.habitatint.2011.12.018

Juhari, S. K., Omar, D., Kamaruddin, S. M., & Chong, N. O. (2023b). The Effects Of Low Carbon Cities Framework Checklist (Lccfc) Implementation On Community Satisfaction Level. Planning Malaysia, 21. Https://Doi.Org/10.21837/Pm.V21i29.1362

KeTTHA. (2011). Low Carbon Cities Framework and assessment system. Kementerian Tenaga, Teknologi Hijau dan Air (KeTTHA): Putrajaya, Malaysia.

Malaysian Green Technology And Climate Change Corporation. (2022b, December 7). *Low Carbon Cities 2030 Challenge - Malaysian Green Technology and Climate Change Corporation*. Malaysian Green

Technology and Climate Change Corporation. https://www.mgtc.gov.my/what-we-do/low-carbon-cities-lcc/low-carbon-cities-2030-challenge/

Nasrudin, N., George, A. I., Abdullah, Y. A., Marzukhi, M. A., Leh, O. H., & Rashid, K. (2020). Public awareness and acceptance towards transportation low carbon city programme: A comparison study of MBSA and DBKL. Planning Malaysia, 18(4), 114-127. https://doi.org/10.21837/pm.v18i14.821

Watabe, A., & Yamabe-Ledoux, A. M. (2023). Low-Carbon Lifestyles beyond Decarbonisation: Toward a More Creative Use of the Carbon Footprinting Method. *Sustainability*, *15*(5), 4681. https://doi.org/10.3390/su15054681

Wu, Y., Martens, P., & Krafft, T. (2022). *Public Awareness, Lifestyle and Low-Carbon City Transformation in China: A Systematic Literature review. Sustainability, 14(16), 10121*. https://doi.org/10.3390/su141610121

Yang, L., & Li, Y. (2013), Low Carbon City in China. Sustainable Cities and Society, 9: 62 – 66.

Sabri, S. A. M., Ponrahono, Z., Bakar, A., & Aziz, F. A. (2023).*Importance of small urban parks towards becoming low-carbon cities: Analyzing Malaysian policies and strategies for climate change mitigation. Journal of Tropical Resources and Sustainable Science, 11*(2), 34–40. https://doi.org/10.47253/jtrss.v11i2.1239

Shi, A. (2001). Population Growth and Global Carbon Dioxide Emissions. IUSSP Conference, Brazil, Session-S09. Available online at http://www.iussp.org/Brazil2001/soo/S09_Shi.pdf. Retrieved 4 Nov 2019

Majekodunmi, T. B., Shaari, M. S., Abidin, N. Z., & Ridzuan, A. R. (2023). Green technology, exports, and CO2 emissions in Malaysia. *Heliyon*, *9*(8), e18625. https://doi.org/10.1016/j.heliyon.2023.e18625

Juhari, S. K. B., Ahmad, S. S., & Hashim, N. H. (2019). The implementation low carbon cities framework (LCCF) of local authority in development control towards green cities [Bachelor's thesis, Universiti Teknologi MARA]. UiTM Institutional Repository. https://ir.uitm.edu.my/id/eprint/40239/1/40239.pdf

View of The Effects Of Low Carbon Cities Framework Checklist (Lccfc) Implementation On Community Satisfaction Level. (n.d.). https://www.planningmalaysia.org/index.php/pmj/article/view/1362/1042

Adlina. (2025, February 25). *Rangka Kerja Bandar Karbon Rendah (LCCF) Malaysia Membuka Jalan untuk Pembangunan Pembinaan Mampan*. CIDB HQ. https://www.cidb.gov.my/eng/malaysias-low-carbon-city-framework-lccf-paves-the-way-for-sustainable-construction-development/?hl=en-US

Elmousalami, H., Peng Hui, F. K., & Alnaser, A. A. (2025). Enhancing smart and zero-carbon cities through a hybrid CNN-LSTM algorithm for sustainable AI-driven solar power forecasting (SAI-SPF). Buildings, 15(15), 2785. https://doi.org/10.3390/buildings15152785

Selangor State Government, State Economic Planning Unit (UPEN). (2016). *Workshop On LCCF Application In Planning Permission In Selangor (Selangor, Malaysia).* https://ir.uitm.edu.my/40239/1/40239.pdf