

City Climate Change Mitigation Policy: A Methodological Perspective on the Implementation of the Kuala Lumpur Low Carbon Society Blueprint (KL LCSBP) 2030

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There is a lack of a clear and systematic methodology on how to go about implementing climate change policy at the city level. Therefore, this paper attempts to showcase the policy implementation steps and process taken by the Kuala Lumpur City Hall (KLCH), which adopted a 10-Action, 245-Program Kuala Lumpur Low Carbon Society Blueprint (KL LCSBP) 2030 in November 2017 to mitigate the city's Green House Gas (GHG) emissions. To obtain stakeholders' views and feedback, two sessions of focus group discussion have been conducted with 120 participants from various agencies including KLCH internal departments, government technical agencies, private entities and non-government organizations. Apart from the weighted scoring method which was used for evaluating the significance level of programs for implementation, most of the data were descriptively analyzed. Results show that out of the total of 245 programs, 163 Low Carbon Society (LCS) programs (over 66%) scored high in importance for implementation and only nine LCS programs were considered as low in importance. As for the implementation timeline, 154 LCS programs (63 %) were identified to be implemented immediately and considered as long-term programs which entail that they should be implemented continuously. This paper offers a clear methodological guide and a step forward in LCS policy implementation (i.e., policy roadmap) which can be used as an example by other cities.

1. Introduction

Climate change and its impacts attract much attention globally, nationally and sub-nationally. Many studies have been conducted leading to the formulation of various national and city level policies and plans to mitigate climate change. Compared to generic national and regional policies, city-based climate change policies are argued to be more effective, realistic, feasible and relatively easy to deliver, since the latter are believed to be a fundamental, central root cause for fighting against climate change (Gouldson et al., 2016). The implementation of city-level climate policies appears to be rather limited. Many of the formulated documents or policies have been left unimplemented, especially in the developing world, although they may be well-grounded in sound and scientific research. It has been observed that most Asian cities have been largely neglected in research on multi-level governance arrangements and as a result, climate policies and plans, if any, are mostly left unexploited (Gouldson et al., 2016). According to Kedia (2016), the difficulties in deploying and adopting such climate policies and plans are due to technical barriers to implementation such as lack of coordination and engagement between the public and private sectors. Science-based policy-making is all good but insufficient if not followed with actual implementation. Real actions taken on science-based, effective mitigation action plan (see the science-to-action, S2A concept by Ho et al. (2016) become highly crucial especially at this critical climatic moment. According to Steves and Teytelboym (2013), key reasons for a climate change policy to be not well implemented are inefficient government enforcement and low institutional capacity.

Policy implementation is essential because a policy becomes effective only through its implementation. The implementation of the policy allows the desired effect/target to be achieved by providing a guide to research and innovation systems (Mugwagwa et al., 2015). The process of policy implementation and policy-making should not be separated; during policy formulation and design, its implement-ability should always be kept in view. The above principle has been supported by Okoroma (2006), that policies are not only formulated but also implemented, monitored and evaluated. It is also observed that studies on the evaluation of policies that have been implemented and the actual progress towards achieving low carbon development are still limited (Khanna et al., 2014). Against the above background where city-level policy implementation is scanty, only a few countries have taken the policy to the implementation stage (Kedia, 2016). Some of the problems faced by the city government are they do not know how to implement the programs (Wang et al., 2015) and, as argued by Nishioka (2016), a clear, detailed and systematic set of methodology on how to go about policy implementation is still lacking. Therefore, this paper attempts to showcase the policy implementation steps and process taken by the Kuala Lumpur City Hall (KLCH) in tackling Kuala Lumpur's GHG emissions. This paper primarily helps address several key questions covering: (i) what and which programs are deemed significant and to be prioritised in reducing the city's carbon emissions; (ii) the implementation timeline and the target year of implementation; and (iii) who are the potential actors and agencies at the implementation stage. These questions are essential to be answered for more effective, pragmatic policy implementation through a policy roadmap that provides a clear guide and a step forward in policy implementation, which may be up-scaled to and adapted by other cities.

1.1 Background of the Kuala Lumpur Low Carbon Society Blueprint 2030

Low Carbon Society (LCS) aims to minimize carbon emissions in all sectors, shift to a simpler and quality life in coexistence with the environment. Kuala Lumpur, Malaysia's national capital that is under the jurisdiction of the KLCH is strategically located at the center of the Greater Kuala Lumpur/Klang Valley. The city covers an area of 242 km² and is the largest metropolis in Malaysia with a population of 1.67 M in 2010, which is projected to grow to 2.49 M by 2030. With the projected population growth, and the ensuing economic growth and the ever important green, sustainability agenda, the Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) was formulated to propel the city towards becoming a World Class Sustainable City by 2030.

The KL LCSBP 2030 provides Kuala Lumpur with institutionalized policies, targets and programs for reducing GHG emissions of the city. Launched in 2017, the KL LCSBP 2030 serves as a guide for policymakers, investors, businesses, Non-Governmental Organizations (NGOs) and the public to make informed decisions for policies on investments, development, planning for future growth and managing change with climate mitigation in mind. Therefore, the KL LCSBP 2030 provides guidance and strategic policies towards the implementation of more effective GHG reduction measures and at the same time enables the city to pursue its vision of economic growth and social development. The KLCH aims to reduce the city's carbon emissions in terms of intensity of GDP by up to 70% by 2030. The Asia-Pacific Integrated Model (AIM) (Hakim Hishammuddin et al., 2019) estimates that total GHG emissions in Kuala Lumpur may be potentially reduced from 84,314 ktCO₂eq in the 2030 BaU (business as usual) case to 36,106 ktCO₂eq in the 2030 CM (countermeasure) case by the adoption of LCS programs for mitigating GHG emissions (refer to Table 1).

Table 1: Kuala Lumpur GHG emission intensity by GDP (2010, 2020 and 2030)

	2010	2020		2030	
		BaU	CM	BaU	CM
GDP (M MYR)	84,852	227,621	227,621	399,013	399,013
Total CO ₂ Emission (kt CO ₂ eq)	25,427	54,609	38,497	84,314	36,106
GHG Emission Intensity of GDP (kt CO ₂ eq/M MYR)	0.30	0.24	0.17	0.21	0.09
Reduction in Intensity		20 %	43 %	30 %	70 %

Source: UTM LCARC (2017)

The adoption and implementation of 245 LCS programs, grouped by 82 measures and 10 LCS actions that have been formulated based on a holistic, science-to-action (S2A) and people-centric approach will set Kuala Lumpur on a pathway towards low carbon society by 2030. As a guide for the implementers and policymakers, the GHG reduction potential for each 10 LCS Action has been estimated. This will guide them to prioritize and strategize the implementation of the 245 LCS programs (refer to Table 2). As such, to accelerate the realization of LCS in Kuala Lumpur, it is necessary to ensure that the KL LCSBP 2030 is fully adopted and implemented. Towards supporting the KLCH in executing the KL LCSBP 2030, a roadmap is carefully formulated to provide implementation guidance, in which a detailed methodology is discussed in the section below.

Table 2: KL LCSBP 2030 Actions, Sub-actions, Measures and Programs (UTM LCARC, 2017)

Action	No. of actions	Sub-No. of Measures	No. of Programs	Contribution to Potential Reduction (%)
1 Green Growth	4	7	23	5.2
2 Energy Efficient Spatial Structure	3	9	30	6.0
3 Green Mobility	5	8	31	14.2
4 Sustainable Energy System	4	6	14	33.9
5 Community Engagement and Green Lifestyle	4	7	30	18.7
6 Low Carbon Green Building	3	12	30	20.1
7 Green and Blue Network	5	11	26	0.7
8 Sustainable Waste Management	2	5	14	1.1
9 Sustainable Water & Wastewater Management	3	7	17	0.1
10 Green Urban Governance	4	10	30	-
	37	82	245	100

2. Kuala Lumpur Low Carbon Society Blueprint 2030 Implementation Methodology

According to Ohshita et al. (2015), low carbon development planning and implementation are taken in an iterative process with ongoing monitoring in targets and policy implementation. Such iterative process is divided into six stages (refer to Figure 1a). At present, Kuala Lumpur is at Stage 5 of the Low Carbon Development Cycle. This implementation stage is crucial to ensure smooth progression towards complete execution of the LCS programs outlined and hence the realization of the reduction target. The KL LCSBP 2030 Roadmap acts as a framework for the KLCH by coordinating related policies to reduce the GHG emission through the timely and proactive implementation of 245 LCS programs. Towards the implementation stage, there are four important questions that need to be addressed: (i) Which programs should be given priority? (ii) How long is the required implementation period? (iii) When is the appropriate target year of implementation? (iv) Who are the potential implementers to lead, collaborate and be engaged to ensure effective program implementation?

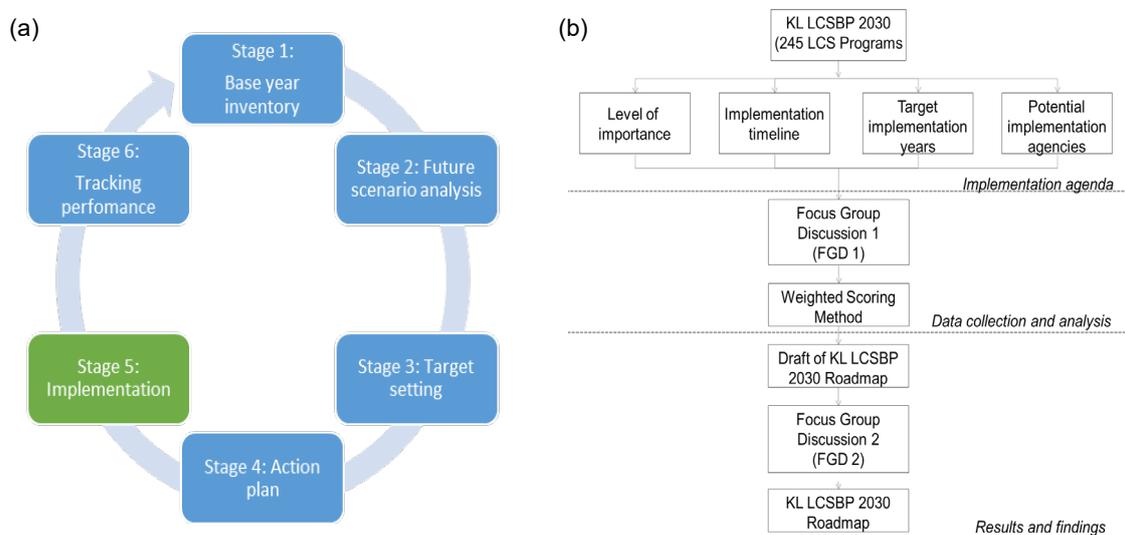


Figure 1: Illustration for (a) low carbon development cycle, and (b) framework towards effective implementation of KL LCSBP 2030

In answering the questions, active engagement among multiple stakeholders built on a scientific and systematic methodology is essential as the KL LCSBP 2030 is a people-centric plan that requires review by multiple stakeholders. The resultant KL LCSBP 2030 Roadmap has been formulated following a guiding framework (refer to Figure 1b) for answering the questions posed by classifying the proposed programs in the blueprint according to priority, timeline and relevant responsible agencies for the program implementation in the 2015-2020, 2021-2025 and 2025-2030 periods. This approach is consistent with the key success factors of project implementation which cover mission, project definition, project schedule/plan, competency personnel, clear communication, top management support and stakeholders' acceptance (Pinto and Slevin, 1988). Two sessions of Focus Group

Discussion (FGD) have been conducted involving some 120 participants from various agencies, including KLCH internal departments, government technical agencies, private entities and non-government organizations. Apart from serving as a data collection method, the FGD is also able to foster close and continuing engagement with stakeholders and obtaining their response and views on the entire direction of the KL LCSBP 2030. Therefore, a template was designed as a data collection instrument based on three mutually exclusive criteria: (1) significance (2) suitability and (3) feasibility. The operational definitions of these criteria are shown in Table 3. Through the FGDs, each LCS program was rated by participants based on three levels: (1) low (L), (2) medium (M), and (3) high (H).

Table 3: Operational definitions of Significance, Suitability and Feasibility

Criteria	Operational definitions
Significance	Compatibility of institutional or corporate objectives or stakeholder policy direction with the proposed LCS program
Suitability	The suitability of the local geographical environment and socio-cultural context as well as the acceptance of Kuala Lumpur's stakeholders on the proposed LCS program
Feasibility	Institutional and corporate capabilities in terms of financial capacity, human capital as well as the availability of technology and material resources in Kuala Lumpur

The results were obtained and analyzed using a 'weighted scoring method'. It involves the following:

(1) Criteria for weightage allocation

The three evaluated criteria describe the stakeholders' agreement on the relative importance of each criterion. Each criterion was given a weight (Significance (0.4), Suitability (0.2), and Eligibility (0.4)) based on justifications to ensure that the basis of the weighting was fully understood and accepted. Significance and Feasibility were given a greater weight because the criteria were considered more important than Suitability. All the weights totaled up to 1.0.

(2) Score allocation for each rating level reflects each LCS program's performance in relation to each criterion.

Determining the appropriate score for each criterion is the next step that needs to be done. Score values were given according to level, namely 1 for low level assessment (L), 2 for medium (M) and 3 for high (H). Then the scores for each LCS program would be summed by multiplying the score with the weightage that has been set for each criterion. The resulted weighted scores were then summed up to obtain an aggregate weighted score for each potential program.

Weighted scores for each criterion for each proposed LCS program were summed. The results show the overall performance of the program that merges all the criteria (significance, suitability and feasibility). Next, the total scores were translated according to the level of importance (Low, Medium, High) and shown along with the implementation timeline (divided into three 5-year periods which are 2015-2020, 2021-2025, and 2026-2030) that has been determined during FGD 1 to guide decision-makers. The overall results from the weighted scoring analysis were then presented in the FGD 2 for verification of the Draft KL LCBP 2030 Roadmap in terms of refining the timeline and potential implementation agencies. The discussion of FGD 2 has led to the final production of the KL LCSBP 2030 Roadmap in which responsible actors consisting of three categories with different but complementary roles are identified (see Table 4).

Table 4: Operational definitions for implementation actors

Actors	Operational Definitions
Responsible	KLCH departments which will initiate, coordinate and liaise with relevant external agencies, KLCH Departments monitor, and/or approve the implementation of a program
Key Partners	Technology providers, financial or government agencies that are relevant and have the authority to organize, facilitate and monitor program implementation
Implementers	Agencies, entities and/or parties that will/are required to implement the programs due to their statutory duty, ownership rights, institutional responsibility, and/or effective serving of collective interests.

With the roadmap, the implementation direction of LCS programs becomes more explicit, and it can be used as one of the engagement mechanisms to gain community support and institutional buy-in. Through the identification of different categories of stakeholders, the KL LCSBP 2030 Roadmap brings to the fore the importance of good cooperation among KLCH internal departments with various external stakeholders to ensure effective implementation of the LCS programs outlined. To test the validity of the methods and steps employed

in the formulation of the policy implementation roadmap, i.e., whether the purpose set by this paper is achieved, some results serving as examples are selected and presented in the following section.

3. Results and Discussions: The Policy Implementation Roadmap of the Kuala Lumpur Low Carbon Society Blueprint 2030

The methodology above offers useful implementation guidance to the KLCH in identifying the level of importance, implementation target and timeline, and implementation agencies for each program. It also helps the KLCH to identify the number of programs that have high-level priority and thus should be implemented immediately. Table 5 indicates the number of LCS programs, based on the importance level and implementation timeline results, and the number of implementation actors for each action as outlined in the KL LCSBP 2030 Roadmap. It shows that 163 LCS programs (over 66%) are rated high in priority level for implementation, especially under Action 2 (Energy Efficient Spatial Structure). For example, under Action 2, two programs, i.e., focus on high density mixed-use development to minimize the need to travel and station area planning score high in importance. Meanwhile, only nine LCS programs, mainly from Action 7 (e.g., develop an integrated pest management plan) and Action 9 (e.g., promote use of phosphorus recovery from waste water as new sustainable fertilizer alternative), are considered as low in importance. As for the implementation timeline, 63% of the LCS programs (i.e., 154 programs) are considered as long-term programs, which entails that they need to be implemented continuously up to 2030. For instance, the high-importance programs above under Action 2 are mostly considered as long-term (2015-2030), while the low-importance programs above under Action 7 and Action 9 are predominately deemed short-term (2026-2030).

Table 5: Number of LCS programs (based on the level of importance and implementation timeline) and the number of implementation actors involved

Actions	Level of Importance			Implementation Timeline			Implementation Actors		
	High	Medium	Low	Long Term	Medium Term	Short Term	No. of responsible KLCH departments	No. of key partners	No. of implementers
Action 1: Green Growth	6	17	-	13	10	-	9	20	1
Action 2: Energy Efficient Spatial Structure	27	3	-	27	3	-	9	21	2
Action 3: Green Mobility	22	9	-	21	8	2	5	22	5
Action 4: Sustainable Energy System	6	7	1	12	1	1	5	20	3
Action 5: Community Engagement and Green Lifestyle	21	8	1	20	7	3	8	18	5
Action 6: Low Carbon Green Building	22	7	1	9	20	1	6	27	5
Action 7: Green and Blue Network	23	1	2	18	2	6	4	14	7
Action 8: Sustainable Waste Management	11	2	1	12	2	-	3	13	13
Action 9: Sustainable Water & Wastewater Management	4	11	2	8	8	1	6	16	14
Action 10: Green Urban Governance	21	8	1	14	13	3	10	20	12
Total	163	73	9	154	74	17		NA	

As for the implementation actors, various KLCH departments play a key role and act as responsible and lead actors to ensure the effective implementation of LCS programs. Throughout the 10 actions and 245 programs, the City Planning Department is identified as the key responsible KLCH department leading, initiating and coordinating the implementation of the highest number of LCS programs by engaging with key partners and implementers. Such a heavy, primary involvement of the City Planning Department is probably due to its main function in formulating development plans and policies that potentially ensure the city's development comply with the sustainability and climate action requirements. There are some other actions to be led by different departments (e.g., the Civil Engineering and Urban Transportation Department), for instance, under Action 6, most of the programs are to be taken charge by the Project Implementation and Building Maintenance

Department. Compared to other actions, Action 10 on Green Urban Governance which crosscuts all the other LCS sectors has involved the most (i.e., 10 different) KLCH departments. It is also discovered that most of the key partners (i.e., 27) and implementers (i.e., 14) are required to be involved in Action 6 and Action 9.

4. Conclusions

To sum up, aside from emphasizing the need for, and importance of, the KL LCSBP 2030 to be translated into real actions (hence S2A), this paper has presented and discussed a methodological framework employed in the formulation of the KL LCSBP 2030 Roadmap, which can be a significant stage for, and a step closer to, ensuring effective LCS programs implementation. That is, via the roadmap, the KLCH and relevant key stakeholders have a clear framework for determining who are the key actors involved to take charge, to support and to execute in the implementation stage; what and which or how many programs can be considered as quick win projects and are more important, feasible, and to be prioritized for implementation; and when a program should be implemented, and for how long a program should be implemented. The overall method and approach (i.e., community engagement via FGD, an importance-level measurement template, the weighted scoring method, the frequency analysis) used provides a first step towards systematic elicitation and analysis of large datasets from multiple actors with respect to developing a clear implementation framework for LCS programs for a city, within a rather short period of time. It is hoped that via the implementation roadmap of the KL LCSBP 2030, the KLCH and other actors can effectively implement the proposed LCS programs on the ground which subsequently qualifies the Kuala Lumpur City to enter into the GHG monitoring and performance tracking stage. As LCS program implementation takes pace in Kuala Lumpur, its tracking and monitoring will become highly essential for the purpose of reviewing and continuously enhancing the implementation roadmap towards enabling effective climate mitigation actions to be taken in the city.

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