

令和元年度
低炭素社会実現のための都市間連携事業委託業務

(マレーシア国クアラルンプール市における
建築物の省エネ普及に向けた低炭素制度基盤構築支援事業
(クアラルンプール市-東京都))

委託業務報告書

令和 2年 3月
公益財団法人地球環境戦略研究機関

目次

1.	件名	2
2.	業務の内容	2
3.	業務の実施方法	3
3.1	制度基盤構築の支援	3
3.2	省エネ技術の紹介と導入可能性の検討	23
3.3	JCM設備補助案件につながる詳細な実地調査と実施体制の検討	27
3.4	共通事項	27
3.5	スケジュール一覧	27

1. 件名

令和元年度低炭素社会実現のための都市間連携事業委託業務

(マレーシア国クアラルンプール市における建築物の省エネ普及に向けた低炭素制度基盤構築支援事業
(クアラルンプール市-東京都))

2. 業務の内容

本業務は、東京都ークアラルンプール市(以下、「KL市」という。)間の都市間連携事業として、KL市における低炭素都市構築に向けた制度的基盤構築の実現のため、省エネ分野における取組として、建築物の省エネ推進に係わる東京都が有する政策とその実施状況及びそのために必要な技術の紹介と導入可能性を検討するものである。

具体的には、マレーシア国クアラルンプール市(KL市)でニーズの高い省エネルギー分野の制度構築支援として、東京都が有する建築物の省エネ推進に係わる政策の経験とその実施状況及びそのために必要な技術の紹介とKL市における導入可能性等を検討するものであり、本年度は以下の活動を実施した。

KL市側の進捗や関心についてのヒアリングを行ったうえで、KL市への現地訪問やKL市側の来日機会など各種機会を有効活用し、KL市側で関心及びニーズがある分野にかかる東京都の建築物分野に対する省エネ・CO2削減の経験・ノウハウをKL市に伝えることで、KL市の政策立案・実施能力の向上を支援するとともに、都の経験・施策の移転を目指した。

東京都の活動とは別に、IGESの取組としてマレーシアがJCMの署名国になった場合、同制度につながる案件形成の可能性を模索した。

関係団体と役割

地球環境戦略研究機関(IGES)	全体統括
東京都環境局	建築物分野に対する省エネ・CO2削減の経験・施策の移転
KL市	省エネ・創エネ対策の市有施設への導入
持続可能なエネルギー開発庁(SEDA)	データベースの構築支援とデータの解析
マレーシア工科大学(UTM)	シナリオ分析とKL市側関係者の連絡調整

3. 業務の実施方法

3.1 制度基盤構築の支援

(1)KL市の政策立案・実施能力を高めるために、東京都の建築物に関する省エネ・省CO2制度の構築・運用に関する経験を共有した。

1) 背景

マレーシアでは、経済成長とICT環境の整備により、消費電力量が加速度的に上昇している。この傾向を緩和するため、再生可能エネルギー関連法規が既に整備され、今後省エネについても手掛ける予定である。エネルギー計測機器に加え、バイオガスや小水力、バイオマス等の再生可能エネルギー由来の発電設備を併用することでネット・ゼロ・ビルの実現を目指している。

日本のZEB関連制度は、低炭素型建物の評価制度という点で優れており、定性的なアプローチを取る欧州と異なり、定量的で、これまで日本と低炭素化に取り組んできたマレーシアにアレンジ次第では適切である、とマレーシア側は理解している。マレーシアではカーボンニュートラル達成率が50%以上70%未満をReady to Go、70%以上100%未満をNear Zero、100%達成をNet Zeroと位置づけており、再生可能エネルギーの活用が今後の鍵のひとつとなる。

Sustainable Energy Development Agency（持続可能エネルギー開発庁、以降SEDA）はネット・ゼロ・ビルの実現のため、オンラインで受講できるモニタリングやエネルギーアセスメント等の講座を中央政府および地方府の行政官に提供したり、マレーシア独自の建物の省エネ診断と評価制度（例：グリーンパス）を構築している。

クアラルンプール市（KL市）は、2019年に低炭素ブループリントを発表。マレーシアのNDC目標（GDPあたりBAU比2030年45%削減。）を実現するために首都KL市が他自治体の模範として進める行動計画である。経済成長を阻害しない形で2020年までにCO2 排出量の43%、2030年までに70%の削減を目指している。

行動計画は245の具体的な施策から構成され、都市空間関連計画（Kuala Lumpur Structural Plan 2020, Kuala Lumpur City Plan 2020）を2030開発アジェンダやNew Urban Agendaと連動させて低炭素化を目指すものとなっている。

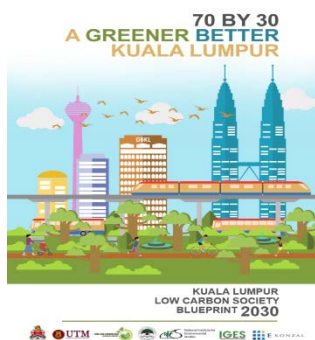


図1: Kuala Lumpur Low-Carbon Society Blue Print 2030

1 低炭素ブループリント: Kuala Lumpur Low-Carbon Society Blue Print 2030

「Kuala Lumpur Low-Carbon Society Blue Print 2030(KLLCSBP2030 低炭素社会実現のためのロードマップ2030)」は18か月かけて策定され、2017年11月にKL市役所(以降KL市)に提出された。KLLCSBP 2030は2017年12月ボンで地球環境戦略研究機関とマレーシア工科大学が企画したUNFCCCの第23回COPでのサイド・イベントで発表され、KL市が正式に2018年4月から施策として取組むようになった。KLLCSBP2030はKL市と関連するステークホルダーが実施する10のアクション、37のサブアクション、82の手段、245のプログラムから構成される。KLLCSBP 2030 はFederal Territory (Planning) Act 1982 (Act 267)に従いながら、KL市の行動計画2040に反映される過程にあり、ゆくゆくはKL市の無秩序な地域開発をコントロールするツールである。

KLLCSBP 2030 は、科学的で実践的なアプローチを特徴とするアジア太平洋統合評価モデル(AIM)を使う国立環境研究所(NIES)と京都大学の日本AIMチームの支援を受けた。AIMのモデリングの結果と提案されている施策アクション、手段、プログラムは、フォーカス・グループ・ディスカッションを幾度も重ねて、KL市の主要なステークホルダーがレビューしている。

AIMの推定では、KL市のGHG排出量は現状のまま施策を打たなければ、2010年の25,427 ktCO₂eq から2020年には54,609 ktCO₂eq、2030年には84,314 ktCO₂eqに上昇する(図2)。2010年の時点で、民生分野の建物(商業ビルや住宅)の排出量がKL市では49%と最も大きい。KL市のGHG排出量は緩和策を何も実施しなければ2030年には66%増加する予定である。

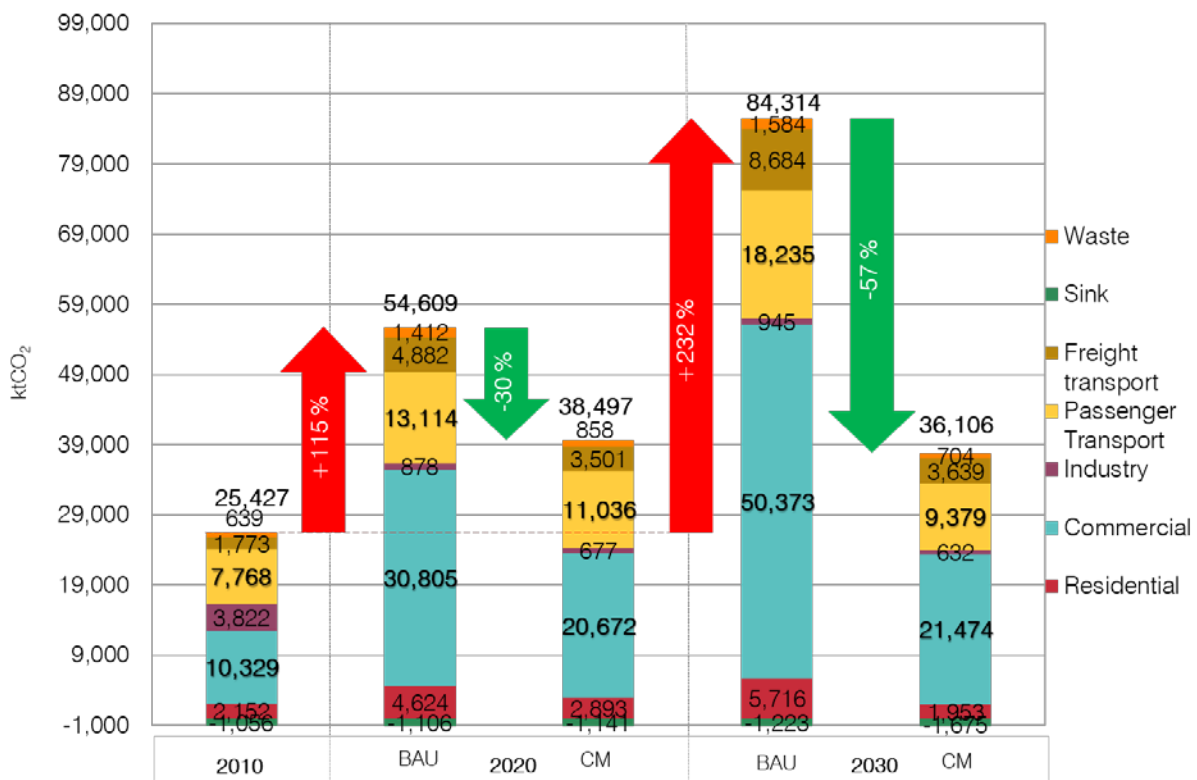


図2: 2010年のデータを基準値として算定した2020年及び2030年の分野別GHG排出量の将来推計(BaU)と、気候変動対策のシナリオ(KLLCSBP 2030, 2018, p.0-13)

AIMモデルの推定では、KL市の炭素強度の削減ポテンシャルが2030年で70%(2010年比)、GHG排出量の

削減ポテンシャルが48,206 ktCO₂eqだった。KLLCSBP 2030の「アクション6ー低炭素グリーンビルディング」は、建物の施策をまとめており、GHG排出量削減ポテンシャルは9,763 ktCO₂eq、つまりブループリントの全施策の20.1%の相当する。(図3)

建物はKL市の2010年のGHG排出量の3分の2を占めるため、「アクション6ー低炭素グリーンビルディング」の関連施策を通して、2030年までにグリーンビルディングを全体の1%から2030年には60%に増やす計画である。代表的な手段は例えば、持続可能なデザインやエネルギー効率の高い技術の導入、再生可能エネルギーの活用、グリーンビルディングのモニタリングと効果的な運用である。

更に、低炭素都市に発展する過程を早めるため、KLLCSBP 2030には、KL市が“低炭素リーダー”として行動する重要性を「アクション10ーグリーンアーバングバナンス; 10-2.2. 低炭素排出量を実現する技術のデモンストレーション・プロジェクト」の文中に示している。具体的な方策として市有施設の半分に低炭素技術を導入し2030年までにエネルギー効率を20%改善することが提案されている。

KL市が市有建物や施設のエネルギー消費量とGHG排出量の削減目標を達成すれば、効率的な運用の実現可能性を示す事例となり、他の建物を触発し同じような手段を選択することが期待されている意味では重要である。

上述の通り、KL市が2030年までにGHG排出量を大幅に削減するには、まずはKL市が市内の商業建物、市有建物が省エネや再エネ設備の導入に取り組むように戦略と手段の実施に注力することが明らかに最も効果である。

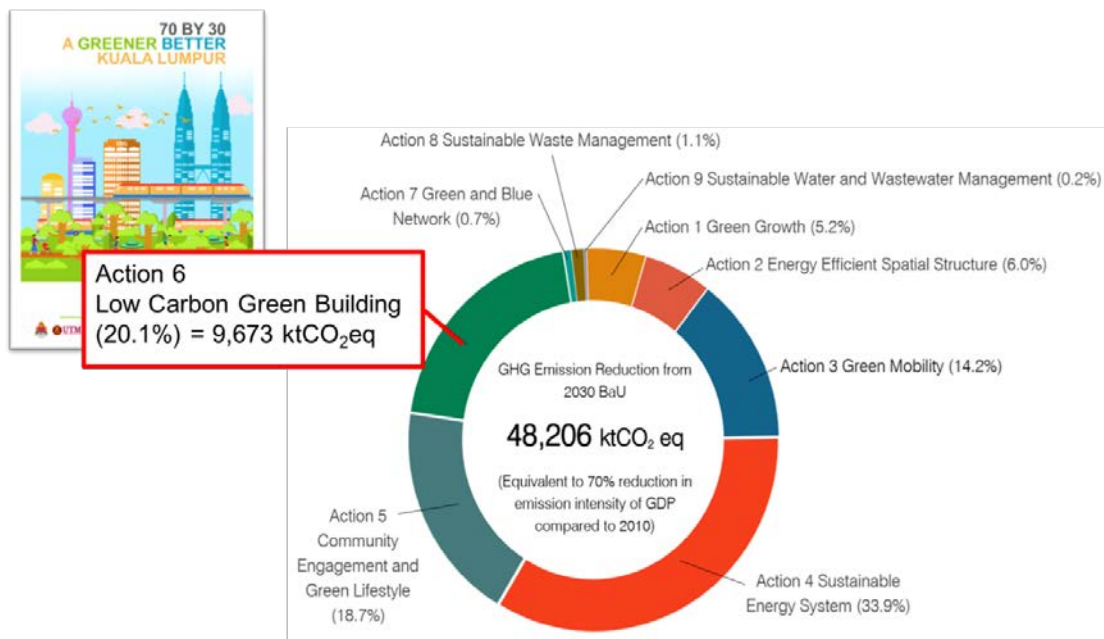


図3: KL市の2030年までの温室効果ガス排出量削減ポテンシャルと、高い削減効果が予想される10のアクション

KL市側から、東京都が都有施設で進めてきた省エネ・CO₂削減対策や民間建物を対象としたCO₂削減施策等を参考に、KL市における低炭素施策を展開していくため、東京都とKL市による低炭素システム(T2KLLCS)の構築が提案された。

なお東京都は2050年までにゼロ・カーボン宣言をしており、KL市も2040年までにカーボンニュートラル・レディ、2050年にはカーボンニュートラルを目指している。T2KLLCSは気候変動対策と世界的な1.5°C目標の達成に貢献し、日本とマレーシアの画期的な事例となるポテンシャルがある。

2. 第1回会合と現地視察

1. 第1回会合

ネット・ゼロ・ビルの実現を目指すKL市において、KL側からの、まずは市の建物でローカーボンのショーケースを作っていくとの意向を踏まえ、東京都が持つ気候変動関連施策のうち、都有施設における省エネ対策を中心とするノウハウの移転が進むこととなった。2019年6月28日には現地において、東京都が進めている建物対策の全体像や、東京都が都有施設で展開している施策事例として、建物のタイプ毎(消費エネルギー量、新築・既存建物)に複数の対策事例(建物運用対策や設備更新対策。再生可能エネルギー設備の設置等)があること等がKL市に紹介された。まずは建築物の基礎データを集めることが必要との東京都からのアドバイスのもと、KL市側で、KL市の市有施設195か所の住所、床面積、竣工年、設置されている設備、設備導入時期等を主要項目とするデータベースの構築と削減ポテンシャルの推計等に取り組むことが決定した。データベース化にあたっては、マレーシア側の既存システム等を踏まえて、SEDAのオンライン認証制度グリーンパスを使うことが検討されている。東京都からは、東京都が整理しているデータベースの諸元事例やこれまでの施策経験を踏まえた削減対策のグッドプラクティス等のポイントを適宜助言していくこととなった。

参加者:

Datuk Mahadi Bin C. Ngah, Special Advisor to the Mayor, DBKL

Ms. Norzaini binti Noordin, Deputy Director, Project Implementation and Building Maintenance Department, DBKL

Mr. Steve Anthony Lojuntin, Sustainable Energy Development Authority (SEDA)

Dr. Ho Chin Siong, Universiti Teknologi Malaysia (UTM)

Mr. Chau Loon Wai, Universiti Teknologi Malaysia (UTM)

東京都環境局地球エネルギー部 課長代理 千葉稔子

東京都環境局地球エネルギー部 課長代理 菅原久美子

東京都 東京都環境局総務部 増田彰規

IGES 上席研究員 藤野純一

IGES 主任研究員 中野綾子

IGES 研究員 小池宏隆



図4:KL市と東京都の第一回会合 議論模様



図 5:KL 市と東京都

2. 第一回現地視察

7月29日には、本事業でKL市が得た知見を実証する市有施設の候補地を視察した。KL市および周辺地域は、多様な文化が混じり合い、近代的なタワーマンションやショッピングモールが集積する国際都市である。今後もインフラの整備が進むことが予想される。視察先のひとつ、市内開発地区「カポンバル」(Kapung Bharu、Tamu Hotel)は、古い低層住宅が集積するKL市の代表的なビジネス地区であるKLCCに隣接する再開発の予定地である。マレー文化を象徴する商業と居住が混在する地区として、中心街区への居住者を呼び戻すモデル地区として開発が望まれており、政府公社(Kapung Bharu Agency)が地権者とディベロッパーを取りまとめている。ただ、地権が細分化して複雑になっており、区画整理がなかなか進まず、10年にわたり再開発を妨げる要因となっていることが紹介された。(カポンバルは後日、実証事業の候補地から外れている。)東京都側の関係者は、この他に政府管轄の研究施設(Institut Latihan Dewan Bandaraya (IDB))と市立公園(Pudu Ulu Recreational Park)を視察し、それぞれのグリーン・イニシアティブについて説明を受けた。



図 6: カボンバルを視察する模様



図 7: 市立公園(「Pudu Ulu Recreational Park」)を視察する模様

3 第 1 回ウエビナー研修

令和元年7月9日、KL市が以後1955か所の市有施設のデータベースを構築するにあたり、有益なノウハウとして東京都が都市施設のエネルギーの管理を支援するために使っている各種ツール(表1)を、KL市を支援するSEDAやUTMと共有するウエビナーが開催された。

参加者:

Ts. Steve Anthony Lojuntin, Director for Energy Management, SEDA

Prof TPr Dr HO Chin Siong, Director, LCA UTM

TPr CHAU Loon Wai, Co-Director, LCA, UTM

東京都環境局地球エネルギー部 課長代理 千葉稔子

東京都環境局地球エネルギー部 課長代理 菅原久美子

東京都 東京都環境局総務部 増田彰規

IGES 上席研究員 藤野純一

IGES 主任研究員 中野綾子

IGES 研究員 小池宏隆

表1: エネルギー管理の支援ツール

ツール	内容
<p> 都有施設の創エネ・省エネ仕様 </p>	<p> 新築・改築時等に順守すべき建物外皮、設備機器、再生可能エネルギーの具体的な仕様を指定するもの。都有施設を対象とする。 </p>
<p> 削減ポテンシャルの簡易算定方法 </p>	<p> 設備機器のエネルギー消費削減ポテンシャルの簡易的な算定方法。設備機器の情報が揃っていない時に使う </p>
<p> 省エネ・カルテ </p>	<p> 東京都が条例に基づき大規模事業所向けに適用している「CO2総量削減義務と排出量取引制度(キャップ&トレード制度)」で集めたデータ等をもとに作成し、事業所に提供しているデータ解析結果。都内に立地する同一用途の事業所のCO2排出レベルとの比較もできるツール </p>

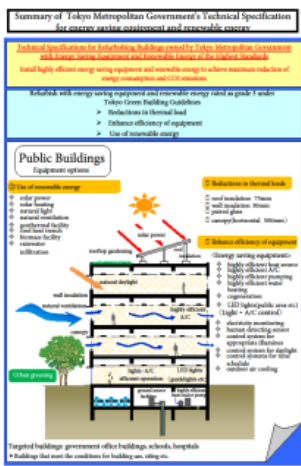


図 8: 都有施設の省エネ・創エネ仕様

Year	CO2 (kg)	CO2 (kg)	CO2 (kg)	CO2 (kg)	CO2 (kg)	CO2 (kg)	CO2 (kg)
2016	5,750	5,750	5,750	-	-	-	13,200
2015	-	17,000	17,000	-	-	-	17,000
2014	-	5,828	5,828	-	-	-	11,239
2013	-	5,230	4,950	4,950	-	-	8,900
2012	-	420	490	-	-	-	2,788
2011	-	250	252	252	-	-	254

図9: 東京都 省エネ・カルテ

4 第1回 国内ワークショップの開催と優良施設の視察

令和元年7月29日~8月1日、KL市側の代表団が来日し、第1回意見交換会(6月)で取り決めた都有施設の省エネ対策を紹介するワークショップと都内の優良な省エネ事例として森ビル仙谷山森タワーの視察が実施された。ワークショップには、KL市職員とSEDA、UTMの代表者が参加した。

参加者:

Datuk Mahadi Che Ngah, Executive Director Planning, DBKL

Ms. Norzaini binti Noordin, Deputy Director, Project Implementation and Building Maintenance Department, DBKL

Mr. Zulkifli Bin Nordin, Deputy Director, Mechanical and Electrical Department, DBKL

Ms. Wan Nurazlin Binti Wan Mustaffa, Senior Electrical Engineer, Mechanical and Electrical Dept, DBKL

Ir. Dr. Sanjayan Velautham, CEO, SEDA

Ts. Steve Anthony Lojuntin, Director for Energy Management, SEDA

Prof TPr Dr HO Chin Siong, Director, LCA UTM

TPr CHAU Loon Wai, Co-Director, LCA, UTM

東京都環境局地球エネルギー部 課長代理 千葉稔子

東京都環境局地球エネルギー部 課長代理 菅原久美子

東京都 東京都環境局総務部 増田彰規

IGES 上席研究員 藤野純一

IGES 主任研究員 中野綾子

IGES 研究員 小池宏隆



吉村東京都環境局長へマハディ副市長が表敬



森下地球審 表敬訪問

1. 国内ワークショップ:事例紹介

都内ビルの設備投資および運用改善を促進するため東京都が条例に基づき大規模事業所向けに適用している「CO2総量削減義務と排出量取引制度(キャップ&トレード制度)」では、削減ポテンシャルの推計分析により対策を省エネ効果のレベルによって三つに分類し、優先度が高い対策から取り組むことをビルオーナーに提案している。

東京都より、建物での省エネ対策事例として、高効率なものへの設備更新に加え、建物管理者とテナントや施設利用者との協力(節電への協力)によりローコスト或いはノーコストで実施できる可能性がある事例(建物運用対策)が紹介された。省エネのためには、運用対策は極めて重要であるため、こうした運用対策にも積極的に取り組んだほうが良いとの助言がなされた。(表2)

そのためには、市政府が設定する市有施設の省エネ目標値を共有し、マニュアルを配布することで建物管理者による保守・運用の継続的な実施を徹底すること、また、テナントや施設の利用者には、省エネ行動への理解を深めるため、日常業務で留意してほしい省エネのポイントを記載したマニュアル(またはパンフレット)の配布や啓発用のラベルを室内に貼り付けること、継続的なアクションを促していくためには省エネ対策効果をフィードバックしていくことが重要であることなどが紹介された。また、これを実現していくためには、建物管理従事者と建物使用者の連携が重要との説明がなされた。

表2:運用対策事例(ローコスト・ノーコストで実施できる可能性のある取組事例)

事例	具体的な対策
照明設備	対策①: 不必要な時間帯やエリア、過剰照明の消灯(照度管理) 対策②: 照明スイッチに点灯マップの表示
空調設備	対策③: フィルターや室外機のフィン of 定期点検・清掃 対策④: 室内の温度ムラをサーキュレータにより解消 対策⑤: ブラインドや遮光フィルムの活用で上手に昼光を取り込むことで照明の点灯を減らし、日射熱を大幅にカットして冷房負荷を低減
給排水設備(上水)	対策⑥: 節水コマ、節水シャワーヘッドの導入
OA機器	対策⑦: 省エネモードの活用 対策⑧: 不要時の電源オフとスリープ機能の活用
フィードバック	対策⑨: 使用者、来館者への啓発ポスターの掲示例 対策⑩: 電気使用の削減量、コスト削減量の結果を前年度同月比で比較して掲示

2. 優良施設の視察:仙谷山森タワー

令和元年7月29日、森ビル(株)の協力を得て緑園都市としてKL市の職員が立体緑園都市「仙谷山森タワー」を視察した。森ビルから、東京都港区の六本木ヒルズやミッドランドスクエアで進めるエネルギーのエリアマネジメ

ントシステムや仙谷山森タワーに導入されている蓄熱槽を使って夜間電力の省エネに努める熱源システムの説明があった。東京都の容積率の緩和措置による地権者への実質的メリットの提示等を行いながら、時には30年かけてじっくりと住民の理解を得ることもあることなどが説明された。

■ Vicinity of ARK Hills



図10: 森ビル(株) アークヒルズ周辺の地域開発



図11: 仙谷山森タワーの太陽光発電設備

3. 都市間連携事業の紹介

令和元年7月30日、IGESが主催する持続可能なアジア太平洋に関する国際フォーラムで本事業が紹介された。



図12: ISAPでKL市副市長(中央)が登壇

5 東京都とKL市の低炭素システム(T2KLLCS)ローンチングセレモニーと現地ワークショップの開催

東京都とKL市の低炭素システム事業の立ち上げをKL市市長及びKL市を管轄する連邦直轄領省など上層部に公開する式典が令和元年8月23日にKL市とUTMIによって、KL市内で開催された。式典に参加したKL市の様々なステークホルダーとマレーシア各地から集まった地方政府の代表者に事業をアピールする場となった。

1. 東京都とKL市の低炭素システム(T2KLLCS)のローンチングセレモニー

式典名称:HIGH-LEVEL LAUNCHING CEREMONY OF TOKYO-KUALA LUMPUR LOW CARBON SYSTEM

実施時期:令和元年8月23日

参加人数:100名程度

会場:Biro Pelancongan Kuala Lumpur

KL市側参加者:

KL市長 YBhg. Dato' Nor Hisham bin A Dahlan

KL市 副市長 Datuk HJ. Mahadi Bin C. Ngah

連邦直轄領省 代表

KL市 職員

周辺都市代表

日本側参加者:

在マレーシア大使館 中島参事官

東京都 東京都環境局地球エネルギー部 小川部長

東京都 東京都環境局地球エネルギー部 課長代理 千葉稔子

東京都 東京都環境局地球エネルギー部 課長代理 菅原久美子

国際協力事業団(JICA) マレーシア事務所 深沢氏

日本商工会議所マレーシア事務所(JACTIM) 北栄氏

IGES上席研究員 藤野純一

IGES主任研究員 中野綾子

議事次第

開会の辞 KL市 市長 YBhg. Dato' Nor Hisham bin A Dahlan

在マレーシア大使館 中島参事官

東京都環境局地球エネルギー部 小川部長

写真撮影とコーヒープレイク (並行してプレスカンファレンスとエキシビション)

パネルセッション

発表① 東京都の成功事例:ゼロエネルギー及びカーボン建物

東京都環境局 千葉課長代理

発表② クアラルンプール市庁舎の省エネ・ポテンシャル

KL市副市長 Datuk HJ. Mahadi Bin C. Ngah

発表③ マレーシアの持続可能なエネルギーの普及、支援と実施

SEDA 取締役 Mr. Steve Lojuntin

発表④ 気候変動対策を加速する方策:科学分析に基づいた実施

UTM Prof. Ho Chin Siong

パネルディスカッション

スピーチおよび発表要旨

ヒシャム市長

東京都が蓄積してきた新築および既存の建物の省エネ・創エネ対策をKL市の施策策定プロセスに反映するために、Tokyo to Kuala Lumpur Low Carbon System (T2KLLCS) を立ち上げたことを宣言。

KL市は街路灯のLED化、政府系建物の設備の省エネ化、植樹、歩きやすくサイクリングに適した街づくりの実現に努めてきた。今後は、民間が所有するビルのグリーンビルディング化の誘導、既存の建物の更改で、低炭素社会ブループリント2030の実現を目指す。

小川部長、東京都環境局地球エネルギー部

東京都では、設備管理の担当者だけでなく、建物のなかで働く人も含め、全員で、「エネルギー消費量削減の目標」を共有している。

東京とクアラルンプール市の低炭素システム(Tokyo to KL Low Carbon System)の取組を通じて、東京都がこれまで成功してきたこと・失敗してきたこと、脱炭素社会の実現に向けてチャレンジが必要だと思っていることを共有することで、東京とKL市双方で、お互いの取組を高め合っていきたい。

マハディKL市副市長

政府系建物1955棟の電力消費額は年間6000万リンゲット(15億円)に上る。うち70%は代表的な405棟のもの。

KL市が検討する実現可能性の高いシナリオ1は、二酸化炭素の排出削減目標が35%、経費削減額は700万リンゲット(1億7500万円)である。野心的なシナリオ2は二酸化炭素の排出削減目標が47%、経費削減額は900万リンゲット(2億2500万円)である。

東京都が2050年までに排出量を半減しようとしている。KL市も努力しなければいけない。

ホー教授 マレーシア工科大学

省エネ、創エネは、雇用対策、貧困対策、環境対策、経済対策など様々な面から捉えなければいけない。KL市の低炭素行動計画は、7つの分野に焦点を絞って削減ポテンシャルを計算

している。廃棄物、炭素シンク、貨物車と乗用車の交通、産業、商業、民生部門である。そして、かつては環境のみに力点を置きすぎた研究手法の反省から経済、環境、社会の三側面がバランスよく連動する施策の策定と実施に務めなければならない。低炭素対策は恵まれない人々の生活レベルの改善に深く関係する。

これまでインベントリの構築、低炭素行動計画の策定、行動の実施、モニタリングと進めてきた。次は、実施の成果のトラッキング手法の開発に移る。



図13:ヒシャム市長と小川部長



図14: プレス対応 図15: 発表者と主催者一同

ローンチングセレモニーの結果

両市の連携への関心の高さはセレモニーに集まったプレスの多さ(10社弱)が象徴している(記事は別添資料を参照方)。東京都からは、エネルギー消費量が2000年に比べて約23%削減されたこと、建物におけるCO2削減対策としては大きく分けて二つあることが紹介された。ひとつが建物内のエアコンや照明などの設備機器をエネルギー効率の高いものに更新すること、もうひとつが日常の業務のなかで、設備管理の担当者だけではなく、建物のなかで働く人も含め、関係者全員で省エネに取り組んでいくことである。東京が取り組んできた対策事例のなかから、建物管理者と使用者が協力して実施することが有効と考える施策の事例が簡単に紹介され、詳細は別途、本事業の国内研修等でKL市側に共有されることとなった。

- ・ 照度の適切な管理
- ・ 空調設備の適切な運用
- ・ 電気機器の省エネモードやスリープ機能の活用
- ・ 照明スイッチへの点灯マップの表示
- ・ 来庁者への啓発活動
- ・ フィルターや室外機のフィンの定期点検・清掃
- ・ 電気使用の削減量、コスト削減量の結果の使用者へのフィードバック

6 アジア太平洋都市フォーラム(APUF)で本事業を紹介

開催時期: 令和元年10月13日～18日

開催場所: マレーシア国ペナン自治区

フォーラムの趣旨: アジア太平洋都市フォーラムとは、国連アジア太平洋経済社会委員会(UNESCAP)、UN-HABITAT 国際連合人間居住計画(ハビタット)、マレーシア国住宅・地方自治体省、そしてホスト都市であるペナン市によって主催された、4～5年に一度アジア太平洋地域で行われる最も大きな都市に関する会議。8000人近くが参加し、持続可能な都市開発に資するベストプラクティスやテクノロジー、ツール、政策などが共有され、参加者が議論を展開した。

10/14 本事業を総会で紹介(IGES 武内理事長)

10/15 本事業を大臣級のHigh Level Seminarで紹介(IGES 武内理事長)

10/16 ロイター通信の取材(東京都環境局地球エネルギー部 菅原課長代理)

本事業をLeaders Dialogue 3: Smart Citiesで紹介(東京都 菅原課長代理)

本事業をDeep Dive Session: Sustainable Buildingで紹介(IGES藤野氏)



図15: 東京都菅原課長代理

7 第2回 国内ワークショップの開催

令和2年1月15日、第2回国内ワークショップが都内で開催され、KL市より1955か所の市有施設のデータベース構築の進捗状況が共有された。東京都の持つ省エネ対策事例のうち、「機器の運用対策の効果的な進め方」、「熱源と照明機器の省エネ・ポテンシャル簡易計算方法」がKL市に紹介された。また、次年度の取組みや両市が取り交わすLoI(連携についてのレター)について協議された。

参加者:

Datuk Mahadi Bin C. Ngah, Special Advisor to the Mayor, DBKL

Mr. Nik Mohammed Faizal Nik Ali, Project Implementation and Building Maintenance Department, DBKL

Mrs. Nor Hashida Binti Harun, City Planning Department, DBKL

Mr. Mohd Shazni, Bin Saringat, Mechanical and Electrical Engineering Department, DBKL

Mr. Muhamad Amirul Khirudin, Legal & Prosecution Department, DBKL

Mr. Steve Anthony Lojuntin, Sustainable Energy Development Authority (SEDA)

Dr. Ho Chin Siong, Universiti Teknologi Malaysia (UTM)

Mr. Chau Loon Wai, Universiti Teknologi Malaysia (UTM)

東京都 東京都環境局地球エネルギー部 課長代理 千葉稔子

東京都 東京都環境局地球エネルギー部 課長代理 菅原久美子

IGES上席研究員 藤野純一

IGES主任研究員 中野綾子

IGES研究員 小池宏隆



図16: 第2回国内ワークショップの様様



図17: 次年度の取組みについて協議

1. KL市の発表: 市有施設のデータベース構築について

マハディ前副市長が座長を務めるデータ収集委員会に1955か所の市有施設の3076件の電力料金請求書が電力会社テナガ・ナショナル(TNB)から提供され、口座番号、部署名、月間消費量、契約の種別(商業施設、工場、街路灯)等の項目の情報が整備されたことが、KL市から共有された。その結果、KL市の市有施設のエネルギーシェアの63%は空調設備に由来し最も大きく、次が照明であると、判明した。

回収されたデータをもとにモデル施設が4か所選定され、SEDAのオンライン・プラットフォームBeDOS (Building Energy Demand Online System)を使った詳細なエネルギー消費の解析が開始された。KL市の Menara1、Menara2、Menara3、IDB(KL市の研修施設)の4か所のデータが入力されれば、月間エネルギー使用量と月間CO2排出量が時系列でオンライン上に画面表示される予定である。東京都は、削減ポテンシャル推計に活用できるようにするため、電力を使用する主要な設備機器(空調機器等)の詳細(容量や設置年、台数等)をBeDOSの入力項目に加えることを推めた。

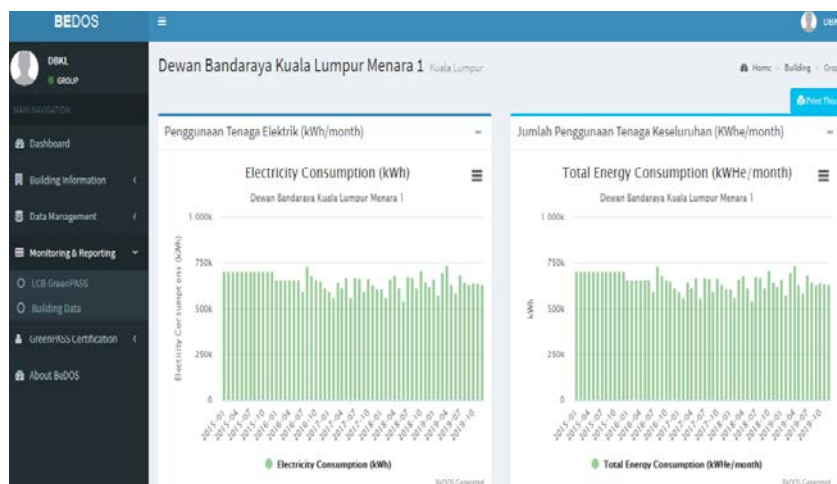


図18: KL市 Menara1のエネルギー消費を表示したBeDOS

2. SEDA の発表: 建物の認証制度「グリーンパス」とオンラインシステム「BeDOS」の紹介

グリーンパスはUNEPが開発した建物の認証制度をマレーシアの状況に合わせてSEDAが改めたものである。CO2排出量の削減幅が評価の基準の自主的な制度で、オンラインシステムBeDOSによって時間の経過とともに削減傾向が解析できるのが特徴のひとつである。BeDOSを毎年最新のデータでアップデートすれば、都度、グリーンパスの省エネ行動の証明書が発行される。マレーシアのプトラジャヤ市やマラカ市の建物60か所が既に認証されている。KL市の市有施設の認証システムは、両市での経験を踏まえてつくっていく予定。



図19: グリーンパス

3. 東京都の発表①: 熱源と照明機器の省エネ・ポテンシャル簡易計算方法

東京都は消費量の大きい機器の更改から優先的に進めることを KL 市に提案し、高効率な機器購入のコストベネフィ

ットを試算するにあたり、熱源機器と照明機器の削減ポテンシャルの簡易算定方法を紹介した。

詳細な算定方法は、現在の機器の定格 COP や電気使用量の実データ等を用いて、最新の設備機器へ更新した際の省エネ効果を推計するもの。より粗い算出方法は、設備機器の設置年度のデータをもとに、マレーシア国内における当時の平均的な COP を設定・活用し、稼働時間や床面積から電気使用量の概算値等を試算し、最新の設備機器へ更新した際の省エネ効果を推計するもの。

Calculation of Roughly Reduction Potential on Heat Source

<算定式>

$$\text{CO2削減量}[\text{t}] = \left(\text{現在の熱源機器における電気使用量}[\text{kWh}] - \text{更新後の熱源機器における電気使用量}[\text{kWh}] \right) \times \text{電気の排出係数}[\text{t/kWh}]$$

①現在の熱源機器における電気使用量[kWh] = 建物全体の電気使用量[kWh] × 熱源のエネルギーシェア (%)

②更新後の熱源機器における電気使用量[kWh] = 現在の熱源機器における電気使用量[kWh] × $\frac{\text{更新前の定格COP}}{\text{更新後の定格COP}}$

<example> Renovation from rated COP 4.50 ⇒ 6.00

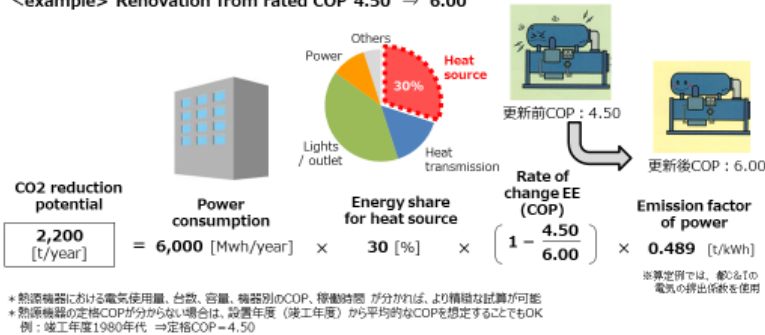


図 20: 削減ポテンシャルの簡易算定方法

4. 東京都の発表②: 機器の運用対策の効果的な進め方

東京都は、省エネを効果的・継続的に推進するため、使用者と建物管理従事者が連携する運用対策の重要性を強調した。

東日本大震災直後に、最大電力を早急に大幅削減しなければならなかったときは、照明の照度管理(照明間引きによる 500 ルクス以下への削減(執務室の場合))を都有施設及び民間施設で提示し、また、都有施設で使用されるパソコンのプラグ等は週末には差し込み口からパワーケーブルを全て抜くことを徹底していたことなどが説明された。

パソコンについては、全体管理対策として、省エネモードの設定をデフォルト化することなども提案された。

省エネの効果を高めるコツとして、推進体制の整備、マニュアルやチェックリストの活用、各部署による自己点検、点検結果の事務局への報告とPDCAサイクルが紹介された。

特に推進体制については、継続的な省エネに成功している建物の事例として、予算執行権限等のあるリーダー(上層部)が省エネ所管事務局に権限を委譲し、各部署に配置された責任者が取組状況を事務局に定期的に報告、それを受けて事務局は横並びで評価し取組成果を共有したりする仕組みなどが、都内の民間事業所等でも展開されていることが紹介された。

省エネ活動は、「即時実施すべき取組」、「進捗状況に応じて積極的に対応する取組」、「PDCAサイクルを通して継続的に対応する取組」の三つのレベルに分け、特に、KL市側の建物はオール電化であることを踏まえて、「即時実施すべき取組」のうち電気機器の省エネモード設定の標準化を優先度の高い対策として行うこと東京都が強く推奨した。KL市はパソコンを職員に支給する前にあらかじめ省エネモードに設定しているが、その設定を解除されてしまう場合があり憂慮していることなどが共有された。

運用対策の効果的な進め方

- ・職員自らが取り組むことで、費用をかけずに、エネルギー使用を削減することができる。
- ・推進体制を整備して、PDCAにより改善しながら継続していくことが重要

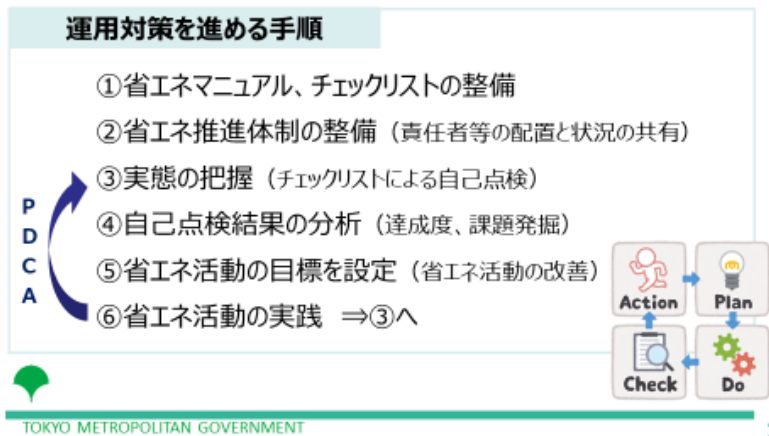


図21:運用対策の研修資料

(2)制度基盤が仮に構築された場合の効果の試算

- 1) KL市のアレンジによる実現可能性の高い建築物での実地調査(削減量、コストの試算に必要な情報の取得)

1955か所の市有施設のデータベース構築の進捗状況がKL市側から共有された。説明によれば、用途(事務所、公務員社宅、マーケット、会議場、公園など)、規模(公衆トイレから集合住宅の一室、事務所など)が多様で、電力使用量は集計値を一括して支払っていた。集計されたデータをもとに、事務所13か所(全35の内)、公園14か所(全16の内)を分析した結果、エネルギー消費量とGHG排出量の削減ポテンシャルは期待できるものであった。KL市が考える二つのシナリオは、実現可能性の高い「シナリオ1」と高い技術と投資金額を要する更に野心的な「シナリオ2」である。

No	Type of Building	No. of Buildings	Data Given
1	Quarters	1,063	0
2	Offices	35	13
3	Clinic for Pregnant Women & Children	15	0
4	Library	8	0
5	Building under <i>NAD/</i>	13	0
6	Building under <i>Jabatan Penilaian & Pengurusan Harta</i>	592	0
7	Guesthouse	23	0
8	Public Toilet	34	0
9	Market	38	0
10	Hawker Centre	45	0
11	Kiosk	26	0
12	Community Centre & Multipurpose Hall	30	0
13	Stadium & Sport Complex	15	0
14	Park	16	14
15	Others	2	0
Total		1,955	

図22: KL市の市有建物と施設を種別に分類

	Scenario 1					Scenario 2				
	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO ₂ Reduction (kgCO ₂ e/yr)	% CO ₂ Reduction	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO ₂ Reduction (kgCO ₂ e/yr)	% CO ₂ Reduction
Offices (13/35 buildings)	15,870,384	3,808,892	1,587,038	3,744,776	35	15,870,384	4,761,115	1,587,038	4,405,619	47
Parks (14/16 parks)	36,005,220	5,400,783	7,201,044	8,745,668		36,005,220	10,801,566	7,201,044	12,493,811	
Total	51,875,604	9,209,675	8,788,082	12,490,444		51,875,604	15,562,681	8,788,082	16,899,430	
Assumptions (Offices)	<input type="checkbox"/> CO ₂ Conversion is based on 2014: Baseline CO ₂ for Peninsular - 0.694 tCO ₂ / MWh <input type="checkbox"/> Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) <input type="checkbox"/> Estimated 10% of Contribution from Renewable Energy is based on estimated roof space of the building					<input type="checkbox"/> Estimated 24% potential reduction is based on potential average energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan <input type="checkbox"/> Estimated 30% potential reduction is based on average of highest range energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan				
Assumptions (Parks)	<input type="checkbox"/> CO ₂ Conversion is based on 2014: Baseline CO ₂ for Peninsular - 0.694 tCO ₂ / MWh <input type="checkbox"/> Estimated 15% potential reduction is based on conservative assumption <input type="checkbox"/> Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway					<input type="checkbox"/> Estimated 30% potential reduction is based on stretch value of possibility with the consideration of best technology available (higher effort and higher investment) <input type="checkbox"/> Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway				

図23:市有建物と施設のエネルギー消費量とGHG排出量の削減ポテンシャルを試算した二つのシナリオ

東京都からは民間企業に提案しているコストと削減効果の両面から有望な技術一覧の情報提供がなされた。KL市側では、それも参考に、組織や予算の制約の範囲内で選択できるメニューの検討を詰めていくこととなった。

ただデータの収集が進むと、想定以上にKL市市有建物と施設の電力消費のデータや請求書の回収の難しさが明らかになった。課題だった月額使用料を電力会社テナガ・ナショナルから受け取れるようになって、1955か所の請求書が3076件あることが明らかになった。

KL市は一連の会議と議論から電気料金の請求書と施設が紐づいていない事実に気づき、市有施設のエネルギー消費量とGHG排出量を明快にするためにデータの「クリーニング」に取り掛かり、現在も作業を続けている。

「クリーニング」は完了していないが、まずは405か所(全1955棟のうち)の解析結果が共有された。405か所のエネルギー消費量は11億1800万kWh/年でKL市の全消費量の77%を占め、排出量は7760万キロ(CO2e/年)だった。更にKL市の建物のエネルギー消費量の63%は空調機器、14%は照明機器に由来するものだった。大幅なエネルギー消費と経費の削減が空調機器の更改で見込めることが判明した。

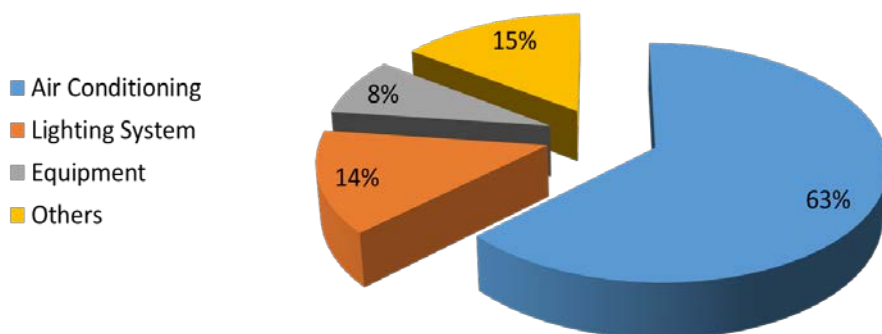


図24: KL市 405棟のエネルギー消費の内訳。空調機器の消費量が最も大きい。

表3: エネルギー消費量を可能にするKL市の市有施設の技術ソリューション

Building Envelope	1	Infiltration - Airtight Building Envelope
	2	Reduce Direct Sunlight - Shading, Window Blind
	3	Insulation - Green Roof, Roof Insulation, Wall Insulation, Window Tinted, Window Glass
Air-Conditioning System	4	Outdoor Air Ventilation Control
	5	Zoning & Control of Air Distribution System - VAV, Temperature & Humidity Control, Setback & Shut-off Control, Off-hour control
	6	High Efficiency Fan System
	7	High Efficiency Air Filtration
	8	Effective Piping & Ducting Insulation
	9	High Efficiency Unitary Air Conditioning System - Single Split, Package, Multi Split, VRF
	10	High Efficiency Centralized Air Conditioning System - Chiller, Hydronic System, Cooling Tower
	11	Control of Centralized Air Conditioning System - Automation & Optimization
Lighting	12	Lighting Control - Daylight Control, luminance Control, Zoning Control, Motion Control, Off-hour Control
	13	High Efficiency Lighting System - Indoor & Outdoor
Energy Management Control System	14	Control of Equipment, Monitoring of Equipment, Integration of Equipment and Other Sub-systems, Energy related Data Collection and Analyses
Renewable Energy	15	Solar PV

予算と資源の制約を考慮して、技術ソリューションと必要な設備投資額を基準として、KL市側関係者により、二つのシナリオが検討された。シナリオ1は、実現可能性が高いノーコスト或いはローコストの取組みを中心とする。GHG排出量の削減ポテンシャルは35%、1250万kgCO2e/年で、700万/年リングットの経費削減が見込める。シナリオ2は、野心的な内容で、高い技術レベルを要するものを想定しており、GHG排出量の削減ポテンシャルは47%、1690万kgCO2e/年で、900万/年リングットの電力経費の削減が見込める。(図15)KL市側関係者が決めた二つのシナリオの試算根拠となる技術・ソリューションの概要は下表に示す。

	Scenario 1	Scenario 2
CO ₂ EMISSION IMPROVEMENT	35%	47%
Approach	Moderate	Aggressive
CO ₂ EMISSION REDUCTION	12.5 million kgCO ₂ e/year	16.9 million kgCO ₂ e/year
Monetary saving	MYR 7 million/year	MYR 9 million/year

図25: 405棟のCO₂ 排出量と経費の削減ポテンシャルを実現可能性が高いシナリオと野心的なシナリオの二つで試算した結果

表4: KL市の脱炭素シナリオ

シナリオ1	シナリオ2
お昼休みに機器の電源を切る。	ビル・オートメーション・システム
室温を24°Cに設定する	外皮にグリーンテクノロジーを使用
照明を使う空間のゾーニング	高効率チラー
照明機器をLED照明に更改する	太陽光発電を代替電力として使用
計算根拠: ・ CO ₂ 排出係数; Baseline CO ₂ for Peninsular-0.694 tCO ₂ / MWh (2014)を使用 ・ 事務棟の建物エネルギー指標 (BEI) はプトラジャヤの BEIと Common Carbon Metric Study(2010)の研究結果を使用 ・ 24%の削減ポテンシャルは第11期マレーシア計画のエネルギー監査事業で省エネの取組の実証実験の対象となった23棟の平均値を参照した。	計算根拠: ・ CO ₂ 排出係数; Baseline CO ₂ for Peninsular-0.694 tCO ₂ / MWh (2014)を使用 ・ 事務棟の建物エネルギー指標 (BEI) はプトラジャヤの BEIと Common Carbon Metric Study(2010)の研究結果を使用 ・ 30%の削減ポテンシャルは第11期マレーシア計画のエネルギー監査事業で省エネの取組の実証実験の対象となった23棟の平均値を参照した。 ・ 削減量のうち、20%は再生可能エネルギーによるもので、建物の屋根面積から試算した。

3.2 省エネ技術の紹介と導入可能性の検討

(1) KL市のアレンジによる実地調査(KL市の公共施設)

回収されたデータをもとにモデル施設が4か所 (Menara 1、Menara 2、Menara 3、IDB (Institut Latihan Dewan Bandaraya)) が選定され、SEDAのオンライン・プラットフォーム BeDOS (Building Energy Demand Online System) を使ってSEDAが詳細なエネルギー消費の解析を実施した。エネルギー消費傾向や削減ポテンシャルをもとに、設備投資金額を試算した結果を下に記す。

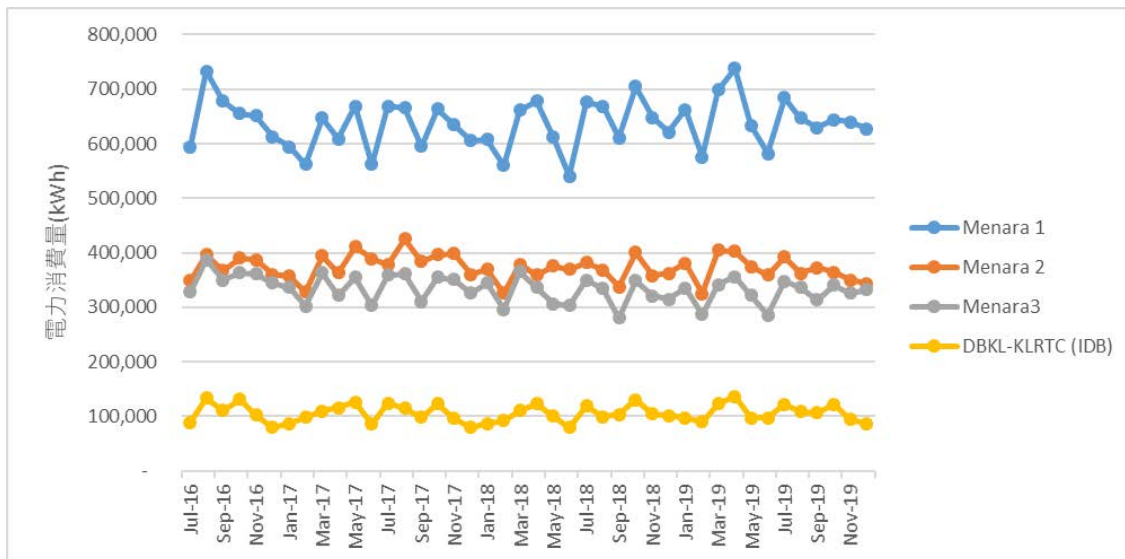


図26: モデル施設4か所のエネルギー消費量の推移。(2016年6月～2019年11月)

表 5: モデル施設で想定される運用対策と省エネ技術

建物名	シナリオ 1 (ノーコスト・ローコスト)	シナリオ2 (コストが平均～高い技術)
Menara 1	お昼休みに機器の電源を切る。 室温を24°Cに設定する 照明を使う空間のゾーニング 照明機器をLED照明に更改する	消費電力量を階ごとに計測 太陽光発電を代替電力として使用
Menara 2	お昼休みに機器の電源を切る。 室温を24°Cに設定する 照明を使う空間のゾーニング 照明機器をLED照明に更改する	消費電力量を階ごとに計測 ビル・オートメーション・システムの導入 太陽光発電を代替電力として使用
Menara 3	お昼休みに機器の電源を切る。 室温を24°Cに設定する 照明を使う空間のゾーニング 照明機器をLED照明に更改する	消費電力量を階ごとに計測 ビル・オートメーション・システムの更改 外皮にグリーンテクノロジーを使用する 太陽光発電を代替電力として使用
IDB(研修施設)	お昼休みに機器の電源を切る。 室温を24°Cに設定する 照明を使う空間のゾーニング 照明機器をLED照明に更改する	消費電力量を階ごとに計測 ビル・オートメーション・システムの更改 高効率チラー 太陽光発電を代替電力として使用

表6: 経費削減につながる技術やアクションから算定されたエネルギー消費量の削減ポテンシャル

	Menara 1	Menara2	Menara 3	IDB	TOTAL
エネルギー消費量 (kWh/year)	7,761,095	3,922,623	4,433,750	1,283,350	17,400,818
削減量 [kWh]	3,647,715	1,843,632	2,083,863	603,175	8,178,384
省エネ	2,328,329	1,176,786	1,330,125	385,005	5,220,245
再エネ	1,319,386	666,845	753,738	218,170	2,958,139
高効率機器の投資額	10,943,144	5,530,898	6,251,588	1,809,524	24,535,153
太陽光発電機器の投資額	9,235,703	4,667,921	5,276,163	1,527,187	20,706,973
設備投資額合計 [リンゲット]	7,761,095	10,198,819	11,527,750	3,336,710	45,242,127

設備投資の財源を未だ特定されていないが、利用可能な市の予算と必要があれば外部資金も検討することを想定している。KL市は全ての外部資金、技術支援やマレーシア政府が認可する国際的なクレジットメカニズムによる資金援助を受け入れる。条件が合意できるもの、マレーシア政府が認可する市内企業や海外の団体との合弁事業(JV)や官民パートナーシップ(PPP)、プライベート・ファイナンス・イニシアチブ(PFI)もKLLCSBP 2030でコミットしたGHG排出削減量の実現にあたり検討したいと考える。

市有建物と施設のデータ回収作業が進むにつれ、全1955棟を詳細に解析するには長い時間を要することが判明し、まずMenara 1、Menara 2、Menara 3、IDB(Institut Latihan Dewan Bandaraya、KL市の研修施設)の4か所を優先的に解析することになった。概算では、これら4か所のエネルギー消費量は全市有建物と施設の約10%を占めるが、更に詳細に解析され本事業で共有される予定である。回収された3000件の請求書のデータクリーニングは、東京都とSEDAの支援と意見交換から得る知識を活用しながら全1955棟が完了するまでKL市が継続して実施する。

モデルケースはKL市のエネルギー消費量の大部分を占めるため、詳細な調査と解析結果から学ぶことが多く、省エネ技術やアクションが導入されれば大幅な削減量と経費削減が見込める。第一フェーズ(2019年度)で解決すべき課題を4棟で特定して、残り1951棟の建物や施設を対象に研究することも考えられる。これを本事業の第二フェーズ(2020年度)に実施したい。更に第三フェーズ(2021年度)まで進めば、KL市と東京都の強い連携から学んだ省エネの施策、戦略、手段と技術がKL市が管轄する全ての市有建物と施設でゆくゆくは適用されるようにしたい。

KL市は気候変動の重要性和緊急性を認識し、気候変動の緩和と1.5°C目標の実現に貢献しようとしている。KL市は2050年までにカーボン・ニュートラルを実現するために野心的で積極的な目標値とアクションを真剣に検討しており、東京都との長期の連携とパートナーシップに期待する。短期的にはKLLCSBP 2030の主流化に努め、2040年以降のカーボンニュートラル・レディの達成をKL市の二酸化炭素排出量の削減目標値として加えることも検討している。

(2)現地ワークショップにて適用可能な技術の紹介

市内植物園(Botani Tamari)は、夜間も市民が憩う場所として親しまれている。人の振動によって発電し夜間の照明を提供するシステムを入れてライトアップしてはどうかと東京都から提案があった。

モデル施設であるMenara 1、2、3とIDBのウォークスルー調査の際、事前に共有されていた運用対策と省エネ技術の一覧から適切なものがないかも併せて検討された。



図27 Menara 2



図28 IDB

(3)建築物分野の関連企業との打ち合わせ・視察

経済成長と人口の増加が見込まれるKL市において開発計画の速やかな遂行が期待される。緑園都市の開発として有名な森ビル(株)から持続可能な街づくりのポイントを学び、適用技術を視察した。(「P10 2. 優良施設の視察:仙谷山森タワー」の再掲。)

3.3 JCM 設備補助案件につながる詳細な実地調査と実施体制の検討

上述の東京都の建築物分野に対する省エネ・CO2削減の経験・ノウハウをKL市に伝える意見交換会を中心とした活動を活用しつつ、別にIGESの取組としてマレーシアがJCMの署名国になった場合、同制度につながる案件形成の可能性について日本商工会議所のマレーシア事務所と令和元年10月18日に意見交換を実施した。この前提として、ウォークスルー調査は、6月28日、8月24日の二日間、市立公園、市庁舎、研修センターに対して行われたこと、SEDAによるKL市の支援もあり、ウォークスルー調査と回収されたエネルギーデータからモデル施設が特定され、エネルギー削減ポテンシャルが特定できたことで、具体的な案件が想定できるようになったことが、本事業の成果である。

実際にKL市とは、具体的な技術について2019年8月には意見を交換し、DBKLの2020年予算への折り込みが検討されたが、必要な情報が揃わなかったため、次年度に持ち越されることとなった。

もし、DBKLの予算の割り当てされた場合は、日本商工会議所との話し合いで、他国の技術と比べて日本製はコストが高い事、JCMが導入されれば、市場開拓の可能性が広がることが指摘された。その際は、どのような公募をするべきか等のノウハウと経験のDBKLへの提供が必要である。

実施体制としてはIGESが全体コーディネーションをしつつ、UTMIは現地コーディネーション、SEDAには省エネ・再エネ技術のアドバイスを受けつつ、現地に進出している日系企業と協働して実施することが有望であることがわかった。

3.4 共通事項

(1) 海外出張等

※ 3.5 海外出張を含めたスケジュール一覧を参照方。

(1) その他

1) 月次進捗報告(メールベース)

適宜、報告事項があるときに宜実施した。

2) 環境省への進捗報告会

環境省に進捗と結果を報告する為、二度登庁、ほかにも機会がある度に報告した。

3) 事業実施者及び自治体間の打合せ

※ 3.5 海外出張を含めたスケジュール一覧を参照方。

3.5 スケジュール一覧

令和元年6月28日	自治体間の第1回会合と現地視察
令和元年7月10日	第1回ウェビナーによる事業実施者の打合せ
令和元年7月28日	第1回国内ワークショップと都内優良案件の視察

令和元年8月1日	ISAP: 持続可能なアジア太平洋に関する国際フォーラム
令和元年8月23日	東京都とKL市の低炭素システム(T2KLLCS)のローンチングセレモニー
令和元年9月5日	第1回 環境省への進捗報告会
令和元年10月13日~17日	アジア太平洋都市フォーラム(APUF)会場において意見交換
令和元年12月19日	第2回 環境省への進捗報告会
令和二年1月14日~15日	第2回国内ワークショップと次年度の取組みの協議
令和二年2月	最終報告書の執筆
令和二年2月20日	環境省への最終報告会

Science to Action (S2A) for Accelerating Climate Actions in Malaysian Cities

Launching of the Tokyo-Kuala Lumpur Low Carbon System (ToKL₂CS)

23 August 2019

DBKL Tourism Bureau, Jalan Tangsi, Kuala Lumpur



Prof. TPr. Dr. HO Chin Siong

TPr. CHAU Loon Wai

*UTM-Low Carbon Asia Research Centre
Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia
Johor Bahru, Malaysia*

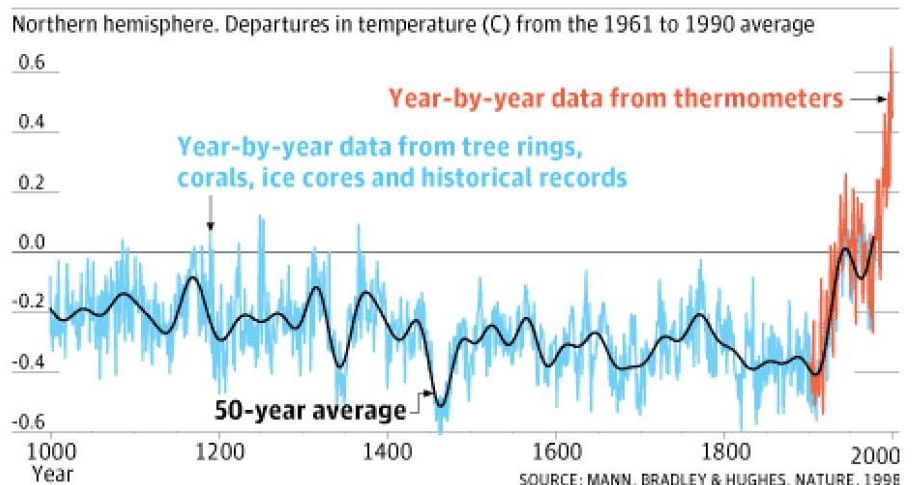
地球温暖化のホッケースティック曲線

It's Climate Emergency! It's Science!

THE CLIMATE HOCKEY STICK



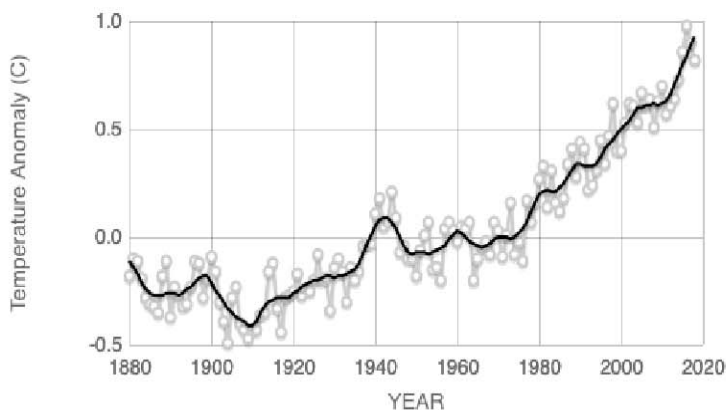
Variations of the Earth's surface temperature



Credit: Remitti, GCoM, 2019

It's Climate Emergency! It's Science!

LAND-OCEAN TEMPERATURE INDEX



Source: climate.nasa.gov

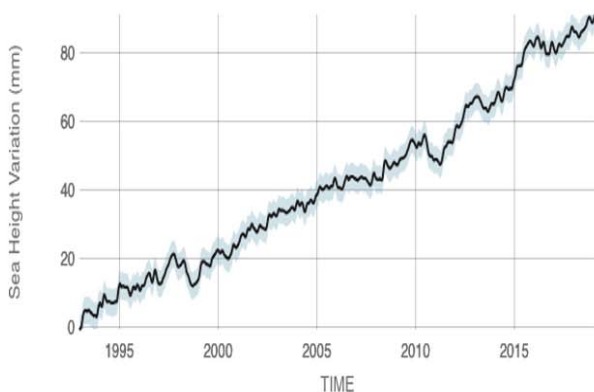
The change in **global surface temperature** relative to 1951-1980 average temperatures shows that eighteen of the 19 warmest years all have occurred since 2001, with the exception of 1998.

The year 2016 ranks as the warmest on record. **The latest annual average anomaly for 2018: + 0.8 °C**

Credit: Remitti, GCoM, 2019

It's Climate Emergency! It's Science!

SEA LEVEL



Source: climate.nasa.gov

Sea level rise is caused primarily by two factors related to global warming: the added water from melting ice sheets and glaciers and the expansion of seawater as it warms. The change in sea level since 1993 as observed by satellites shows as latest measurement for February 2019 a **sea height variation on the long term average of 91 (\pm 4) mm, with a annual rate of change of + 3.3 mm.**

Credit: Remitti, GCoM, 2019

地球温暖化対策になぜ都市の取組みが重要か？
 2030年にはマレーシアの人口の80%が都市部に集中する可能性がある

WHY CITIES?

- <2% of land area
- >52% of population
- ~80% of global prosperity
- 60-80% of energy consumption
- ~75% of natural resource consumption
- ~75% of GHG emissions
- 70-75% of waste generation

>80%

Malaysia Urbanisation Rate by 2030

UTM-LCARCが選ぶ優れた低炭素行動計画づくりで知られる都市

Selected City Climate Actions by UTM-LCARC

Iskandar Malaysia

- MBJB
- MBIP (then MPJBT)
- MPPG
- MPKu
- MDP
- (2009-2018, ongoing)

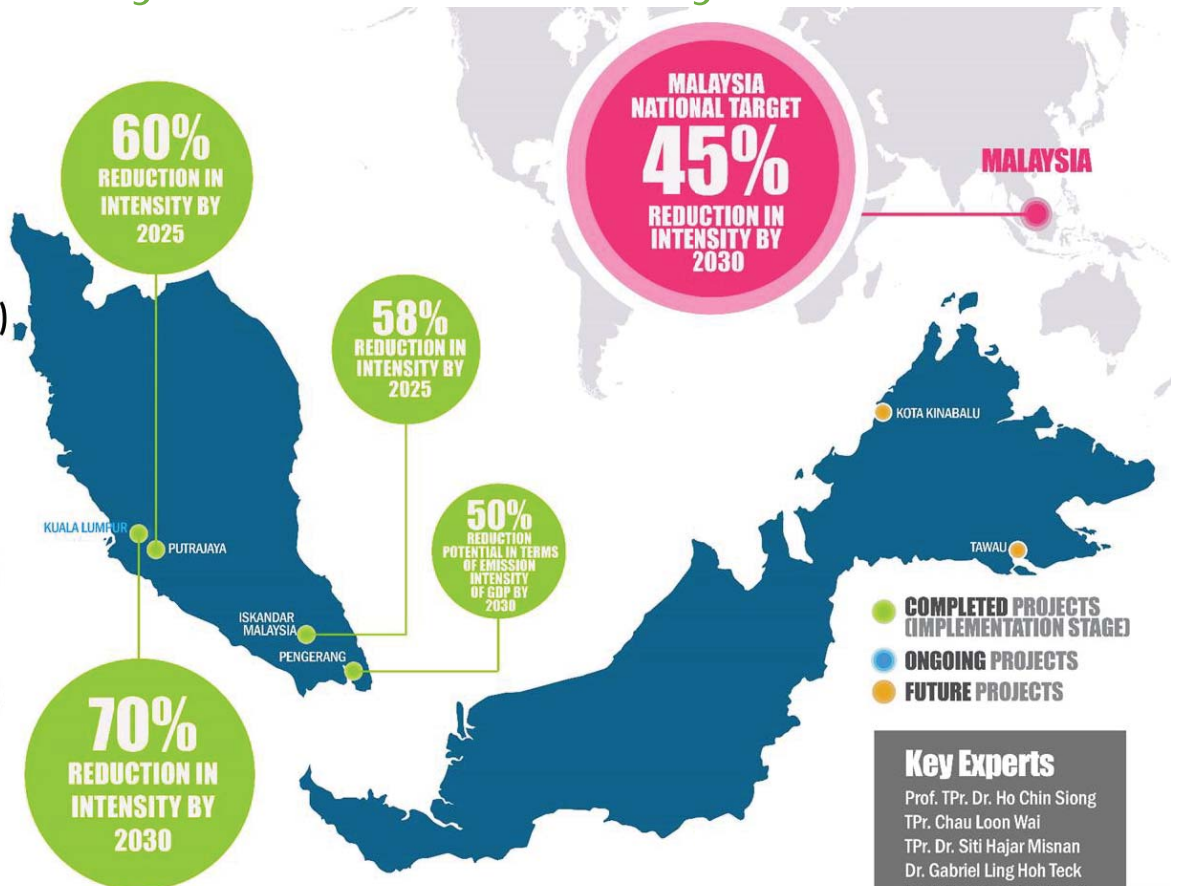
- Putrajaya
- (2011-2013, ongoing)

- Kuala Lumpur
- (2016-2017, ongoing)

- Pengerang
- (2017-2018, ongoing)

- Kota Kinabalu
- Tawau

(Coming soon?)



Selected Climate Action Plans by UTM-LCARC



2009-2018

UTM-LCARCが目指すのは科学的で実践的な低炭素都市計画づくりの進め方

UTM-LCARC Research Approach



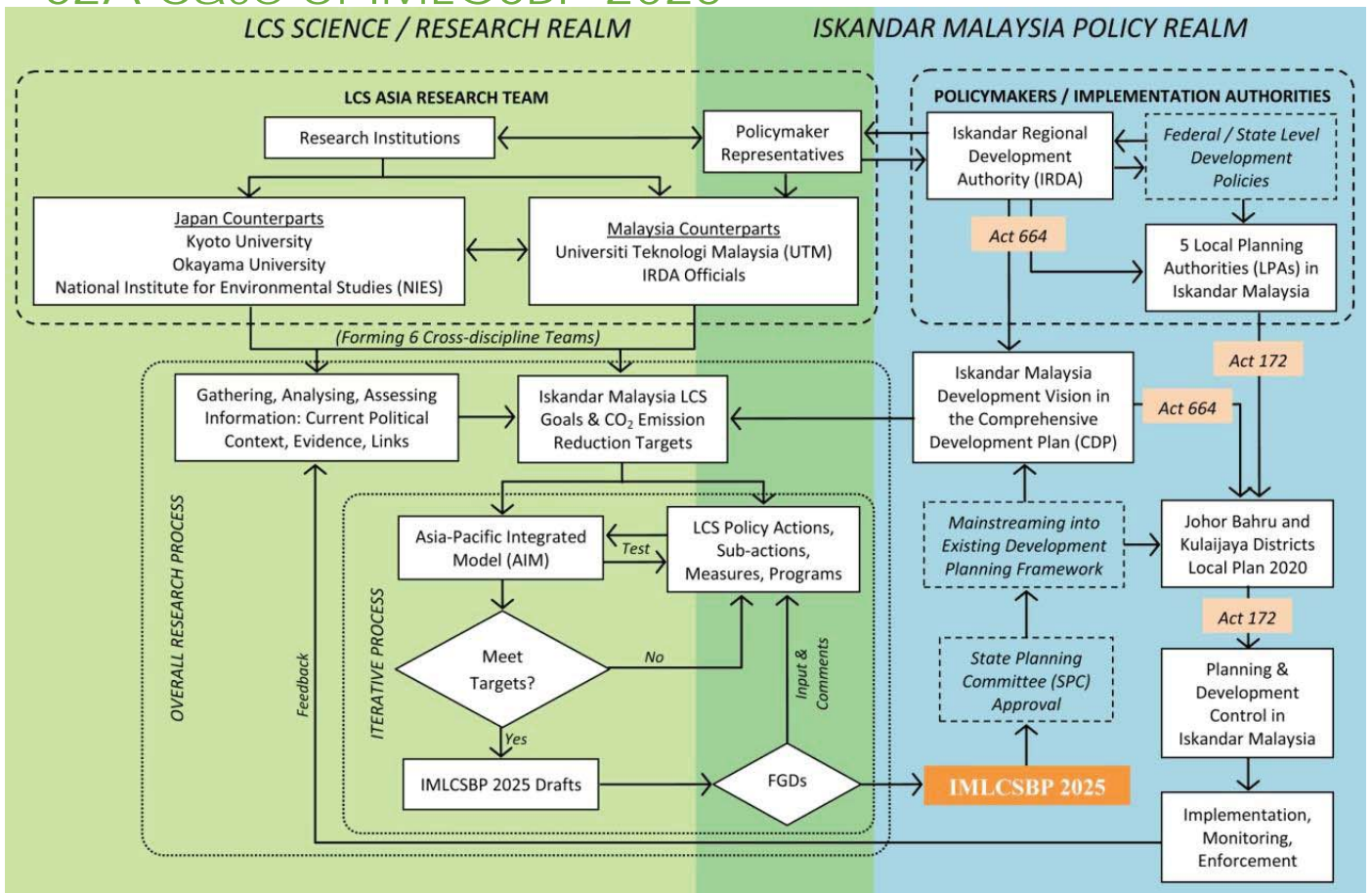
We believe in
Science
 to **Action**
 in making
 Low Carbon Society
 a Reality

UTM-LCARC S2A Approach



政策策定の事例：マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリント

Policymaking with Implementation in Mind: The S2A case of IMLCSBP 2025



Iskandar Malaysia – Potential CO₂ Reduction

Table 1: Projected main socio-economic variables

	2005	2025	2025 /2005
Population (1000)	1,353	3,000	2.22
Household (1000)	303	706	2.33
GDP (Bill. RM)	35.7	141.4	3.96
Gross output (Bill. RM)	121.4	438.9	3.61
Primary industry	1.5	2.4	1.59
Secondary industry	86.2	274.0	3.18
Tertiary industry	33.7	162.5	4.82
Passenger transport demand (Mill. passenger-km)	9,565	59,524	6.22
Freight transport demand (Mill. ton-km)	8,269	26,054	3.15

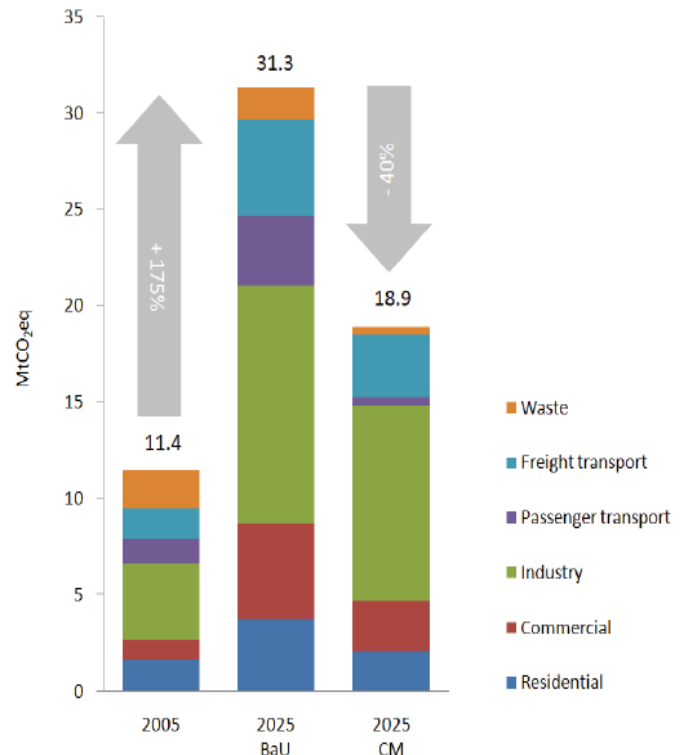
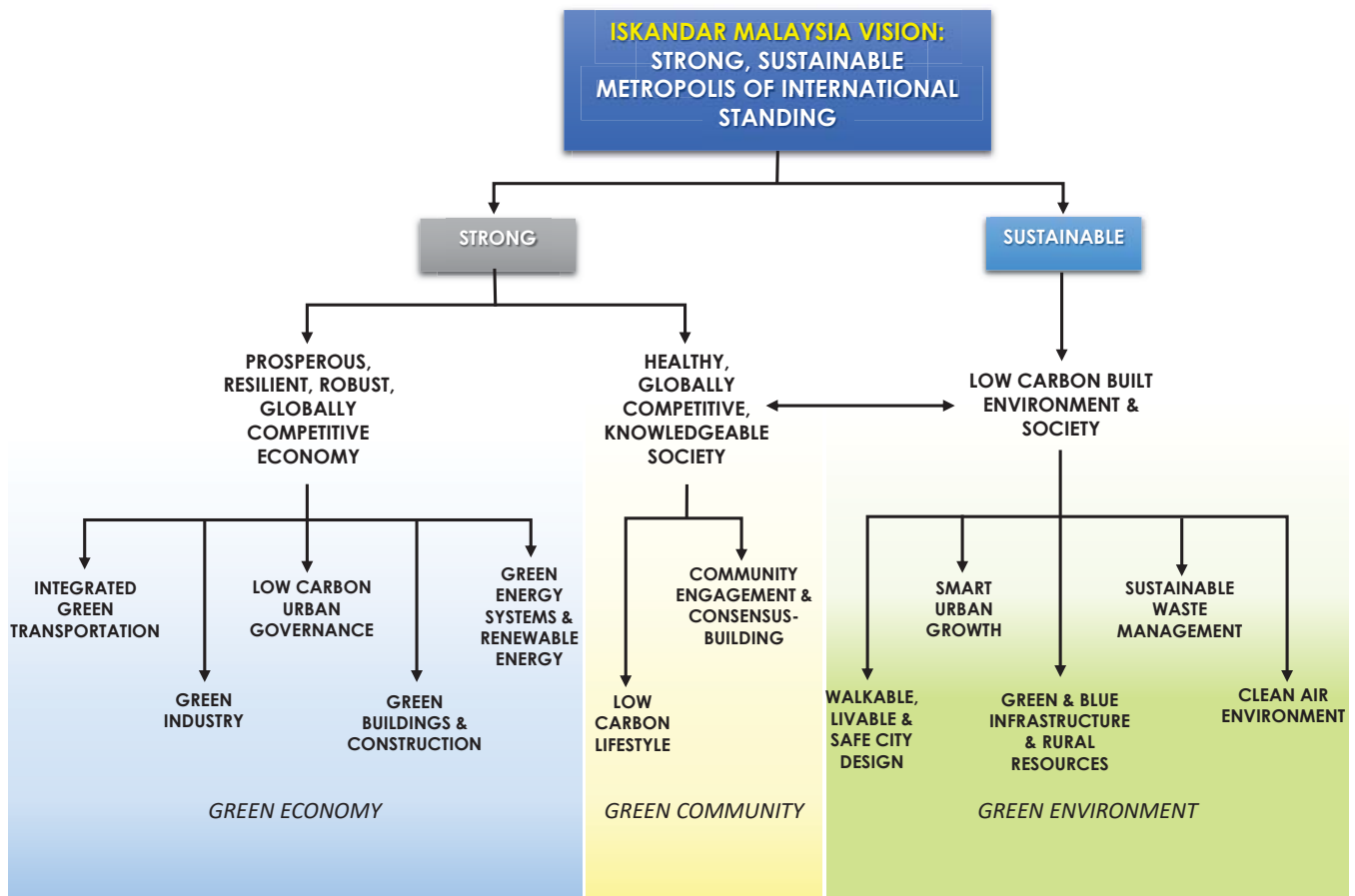


Figure 1: GHG emissions by sectors

Source: Low Carbon Society Blueprint for Iskandar Malaysia 2025 – Summary for Policymakers (2nd Ed.), 2013, p.1

政策オプションの例：マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリント

Policy Scoping for IMLCSBP 2025

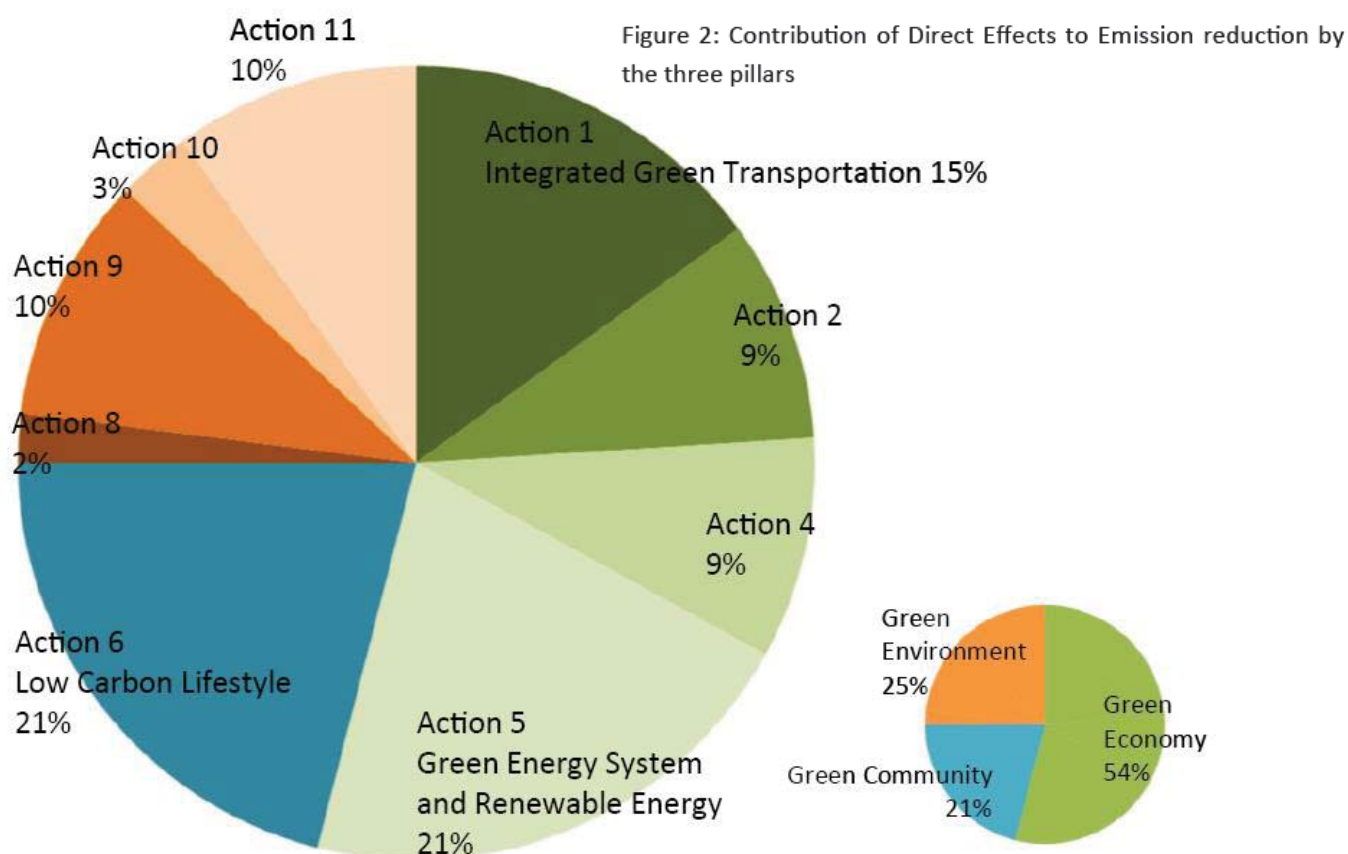


LCS Actions for IM by Three Main Themes

	Action Names	Themes
1	Integrated Green Transportation	GREEN ECONOMY
2	Green Industry	
3	Low Carbon Urban Governance	
4	Green Buildings & Construction	
5	Green Energy System & Renewable Energy	
6	Low Carbon Lifestyle	GREEN COMMUNITY
7	Community Engagement & Consensus Building	
8	Walkable, Safe, Livable City Design	GREEN ENVIRONMENT
9	Smart Urban Growth	
10	Green and Blue Infrastructure & Rural Resources	
11	Sustainable Waste Management	
12	Clean Air Environment	

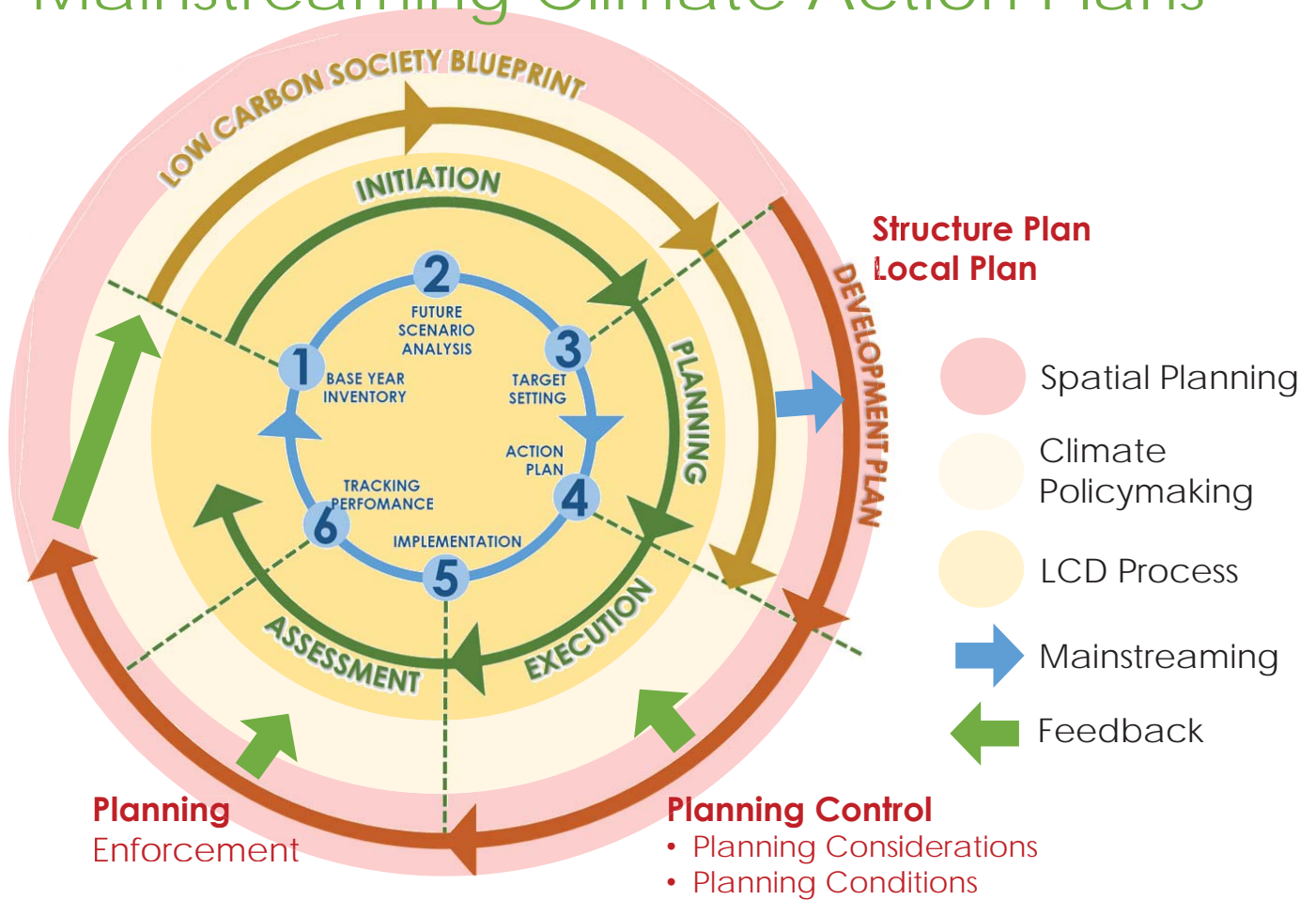
マレーシア・イスカンダル開発地区の低炭素対策のCO2排出量削減ポテンシャル

LCS Actions for IM – Potential CO₂ Reduction



Source: Low Carbon Society Blueprint for Iskandar Malaysia 2025 – Summary for Policymakers (2nd Ed.), 2013, p.2

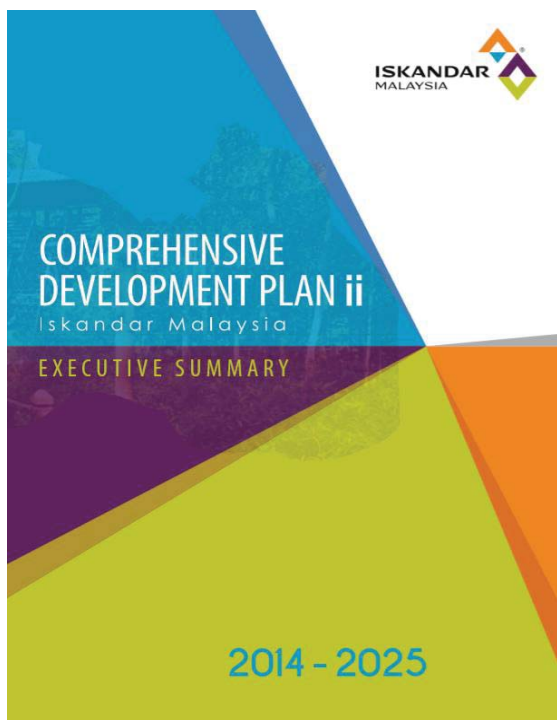
Mainstreaming Climate Action Plans



マレーシア・イスカンダル開発地区の総合計画に低炭素対策を反映

LCS Mainstreamed into the Iskandar Malaysia Comprehensive Development Plan-2 (CDP-ii)

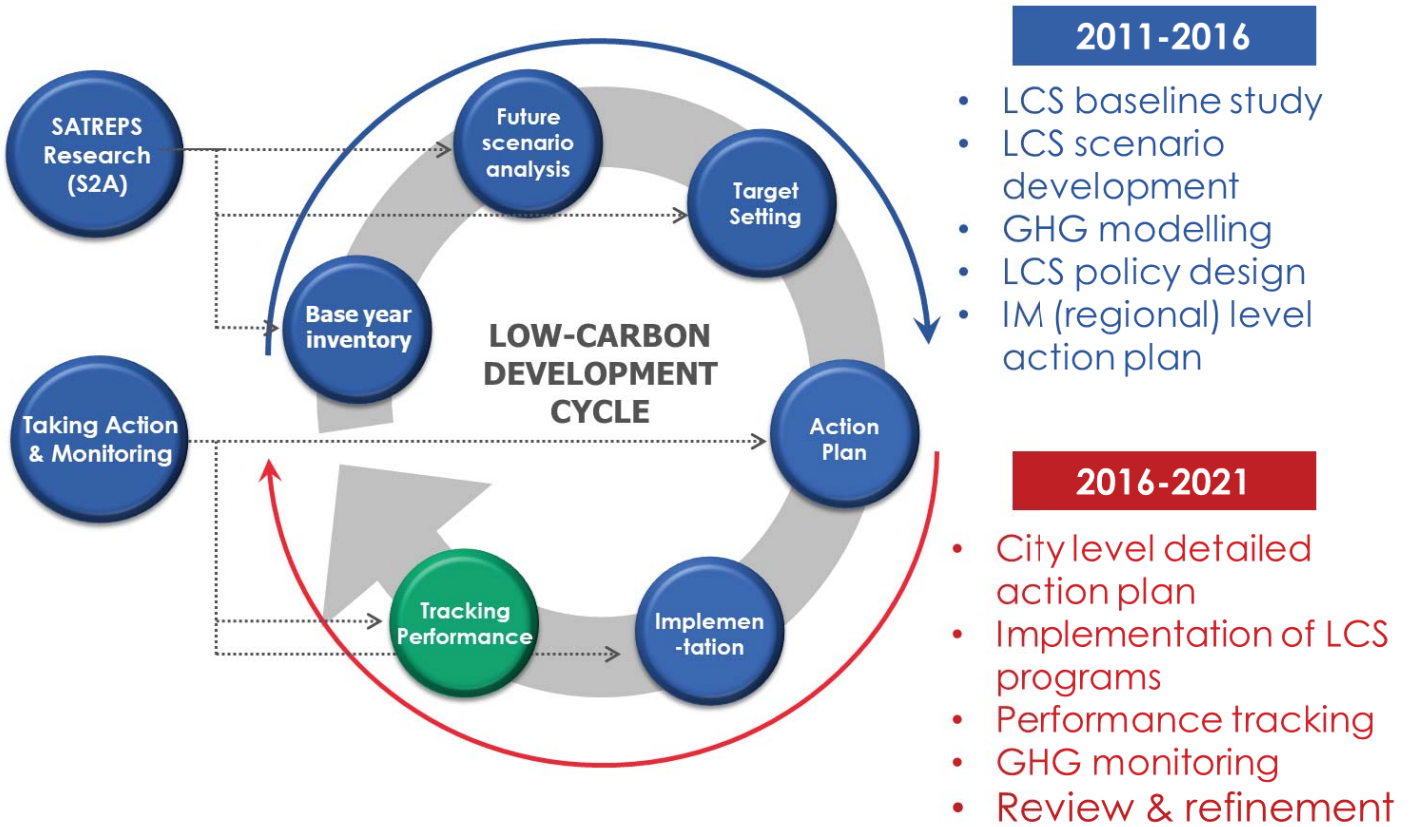
Iskandar Malaysia CDP-ii is a statutory plan prepared under Parliamentary Act No. 664



Iskandar Malaysia Circle of Sustainability: LCS as one of the CDP-ii's three main pillars

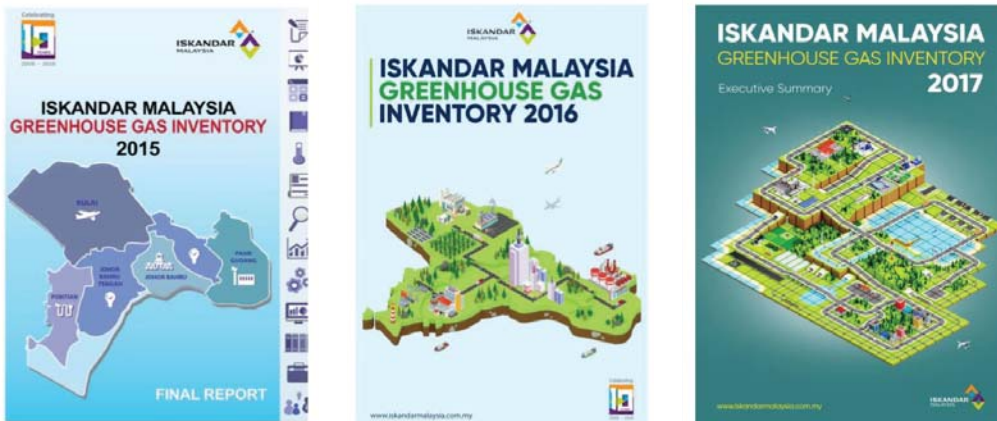


Iskandar Malaysia LCSBP Comes Full Cycle

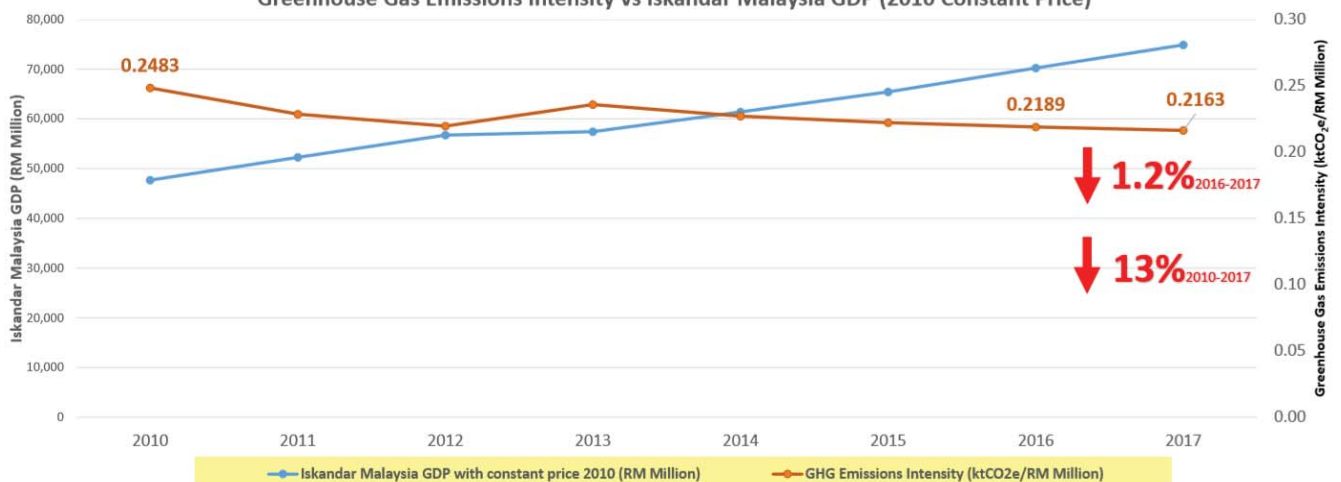


マレーシア・イスカンダル開発地区における2025年の低炭素社会に向けたブループリントの策定から実施まで

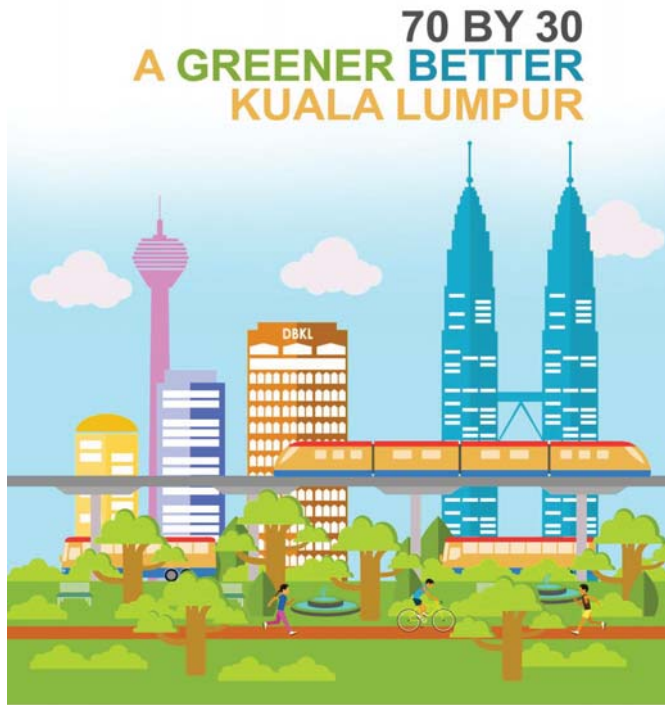
Iskandar Malaysia LCSBP Comes Full Cycle



Greenhouse Gas Emissions Intensity vs Iskandar Malaysia GDP (2010 Constant Price)



Extending IM's Experiences – KL LCSBP 2030

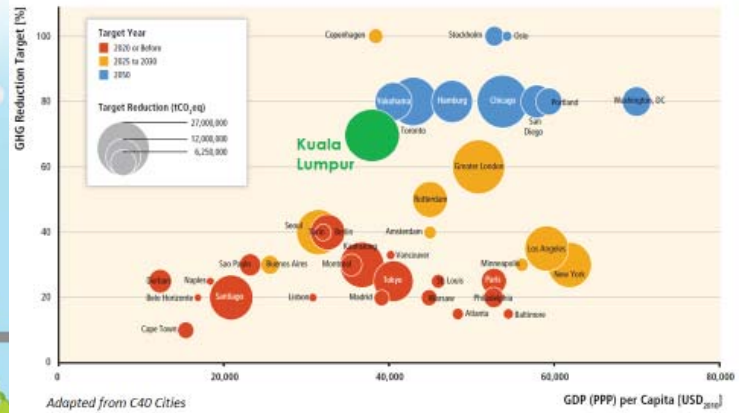


DRAFT KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030



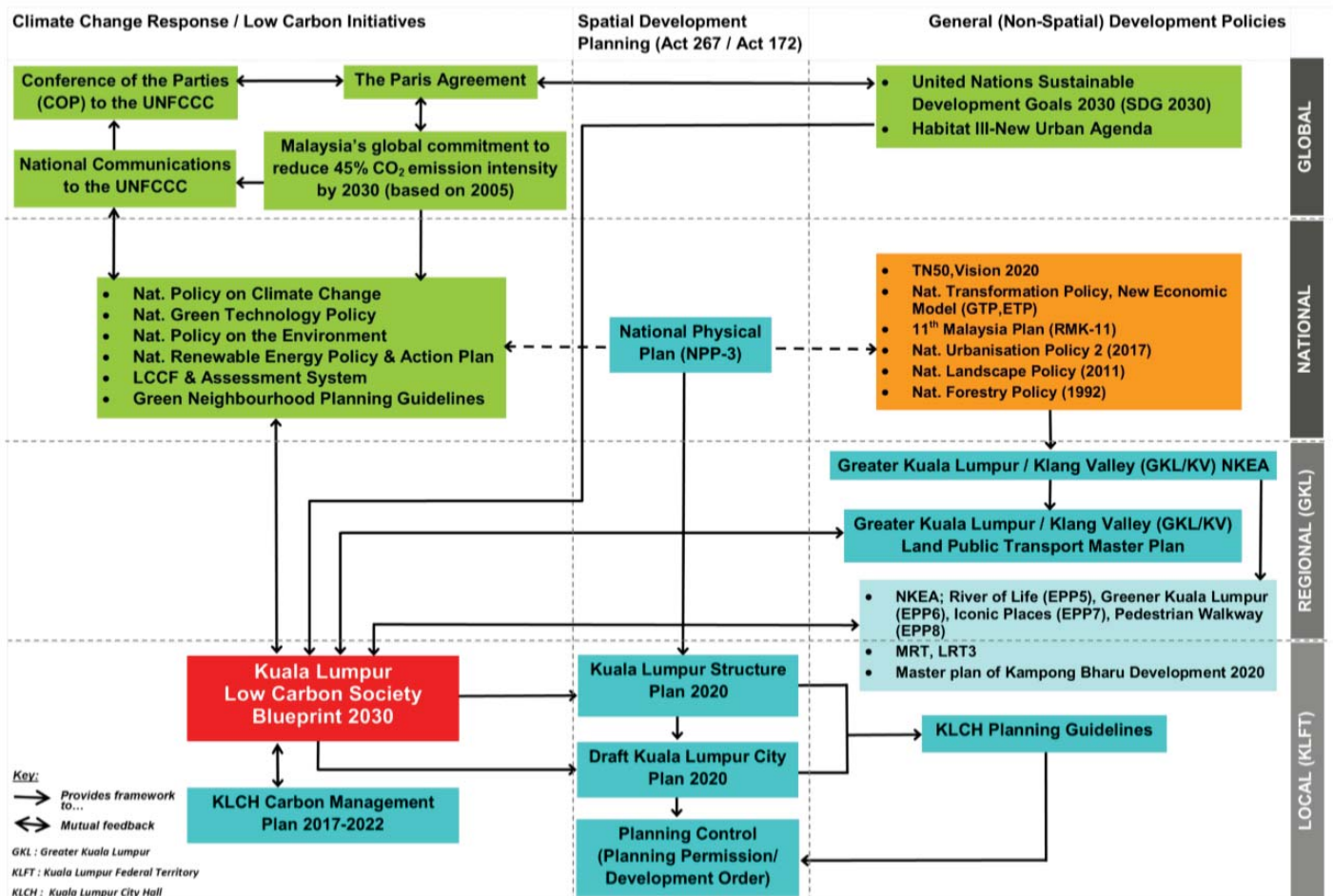
WHY GO FOR LOW CARBON?

FURTHER ENHANCING KL'S INTERNATIONAL STANDING

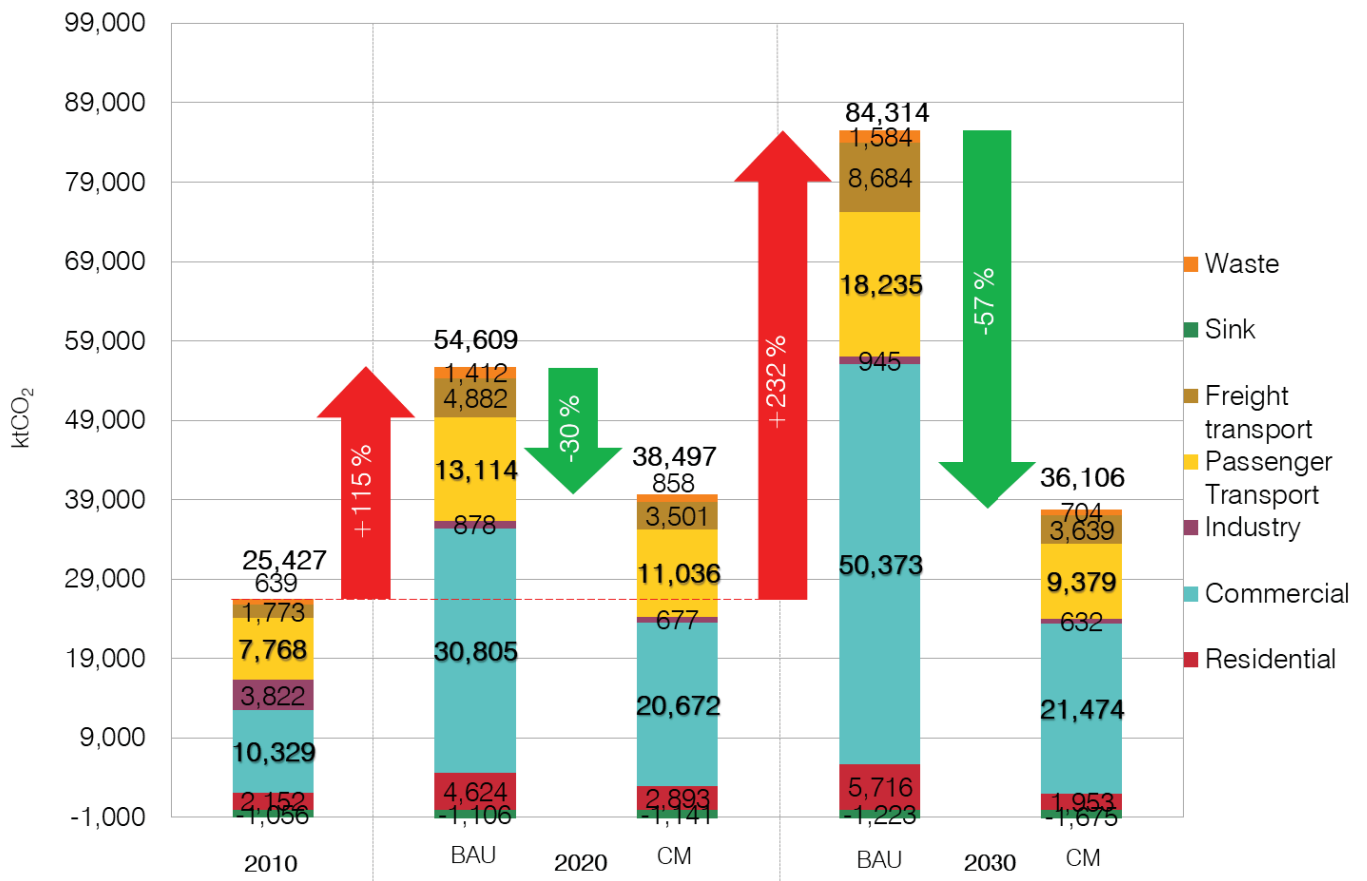


クアラルンプール市における2030年の低炭素社会に向けたブループリントの関連計画

Policy Positioning: Raison D'être of KL LCSBP 2030



Kuala Lumpur GHG Emissions Reduction Potential



クアラルンプール市における2030年の低炭素社会に向けたブループリントの政策オプションと枠組み

Policy Scoping & Framework for KL LCSBP 2030

Current Vision KLSP 2020 Draft KLCP 2020	WORLD CLASS CITY 2020		
LCS Vision for Kuala Lumpur	WORLD CLASS SUSTAINABLE CITY 2030 70 by 30: A Greener Better Kuala Lumpur		
Triple Bottom line of sustainability	Economy	Social	Environment
Thrusts	Thrust 1 Prosperous, Robust and Globally Competitive Economy	Thrust 2 Healthy, Creative Knowledgeable and Inclusive Community	Thrust 3 Ecologically Friendly Liveable and Resilient Built Environment
Sustainable Development Goals 2030	Goals: 1,2,7,8,9,11,12,13,17	Goals: 3,4,5,10,11,12,13,16,17	Goals: 6,11,13,14,15,17
New Urban Agenda Transformative Commitments	Sustainable and Inclusive urban prosperity and opportunities for all	Sustainable urban development for social inclusion and ending poverty	Environmentally sustainable and resilient urban development
Key Principles Draft KL City Plan 2020	World-class Business Environment	World-class Working Environment	World-class Living Environment
KL Low Carbon Society Actions	World-class Governance		
	Green Growth	Community Engagement and Green Lifestyle	Low Carbon Green Buildings
	Energy Efficient Spatial Planning		Green and Blue Network
	Green Mobility	Sustainable Waste Management	
	Sustainable Energy System	Sustainable Water and Wastewater Management	
Green Urban Governance			

KL LCSBP 2030 GHG Emissions Reduction Potential

Thrusts	Actions	Reduction (ktCO ₂ eq)	Share (%)*
Economy (59%)	Action 1 Green Growth (GG)	2,502	5.2
	Action 2 Energy Efficient Spatial Structure (SS)	2,872	6.0
	Action 3 Green Mobility (GM)	6,868	14.2
	Action 4 Sustainable Energy System (SE)	16,327	33.9
Social (19%)	Action 5 Community Engagement and Green Lifestyle (CE)	9,015	18.7
Environment (22%)	Action 6 Low Carbon Green Building (GB)	9,673	20.1
	Action 7 Green and Blue Network (BG)	316	0.7
	Action 8 Sustainable Waste Management (WM)	527	1.1
	Action 9 Sustainable Water and Wastewater Management (WW)	105	0.2
Enabler	Action 10 Green Urban Governance (UG)	0	-
Total		48,206	100

クアラルンプール市における2030年の低炭素社会に向けたブループリントの実施ロードマップ

KL LCSBP 2030 Implementation Roadmap

Action 5 COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
CE 1 Survey sustainable consumption practice				Health & Environment Dept.	KLCH (Branch Services Dept., Information Management Dept.), JPWPKL, HEIs	KLCH (Housing Management & Community Development Dept.), Local research and higher learning institutions, NGOs, Resident's assoc.
CE 2 Stimulate sustainable consumption practice				Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Branch Services Dept.)	LA21KL, NGOs, Resident's assoc.

KL LCSBP 2030 Implementation Roadmap

Responsible KLCH Dept. :

KLCH department with primary **responsibility for initiating, coordinating, liaising** with relevant external agencies, **monitoring, and/or approving** implementation of programs

Key Partners:

Technology providers, funding agencies or entities, and relevant government agencies with **approving authority** for, and/or statutory duty of regulating, facilitating and overseeing implementation of programs

Implementers:

Agencies, entities and/or parties that implement, or are needed to implement, programs due to their statutory duty, ownership rights, institutional responsibility, and/or effective serving of communal interests

City Climate Action Impacts (some KL examples)



Malaysian LCS at COP 24



Malaysian LCS at COP 24

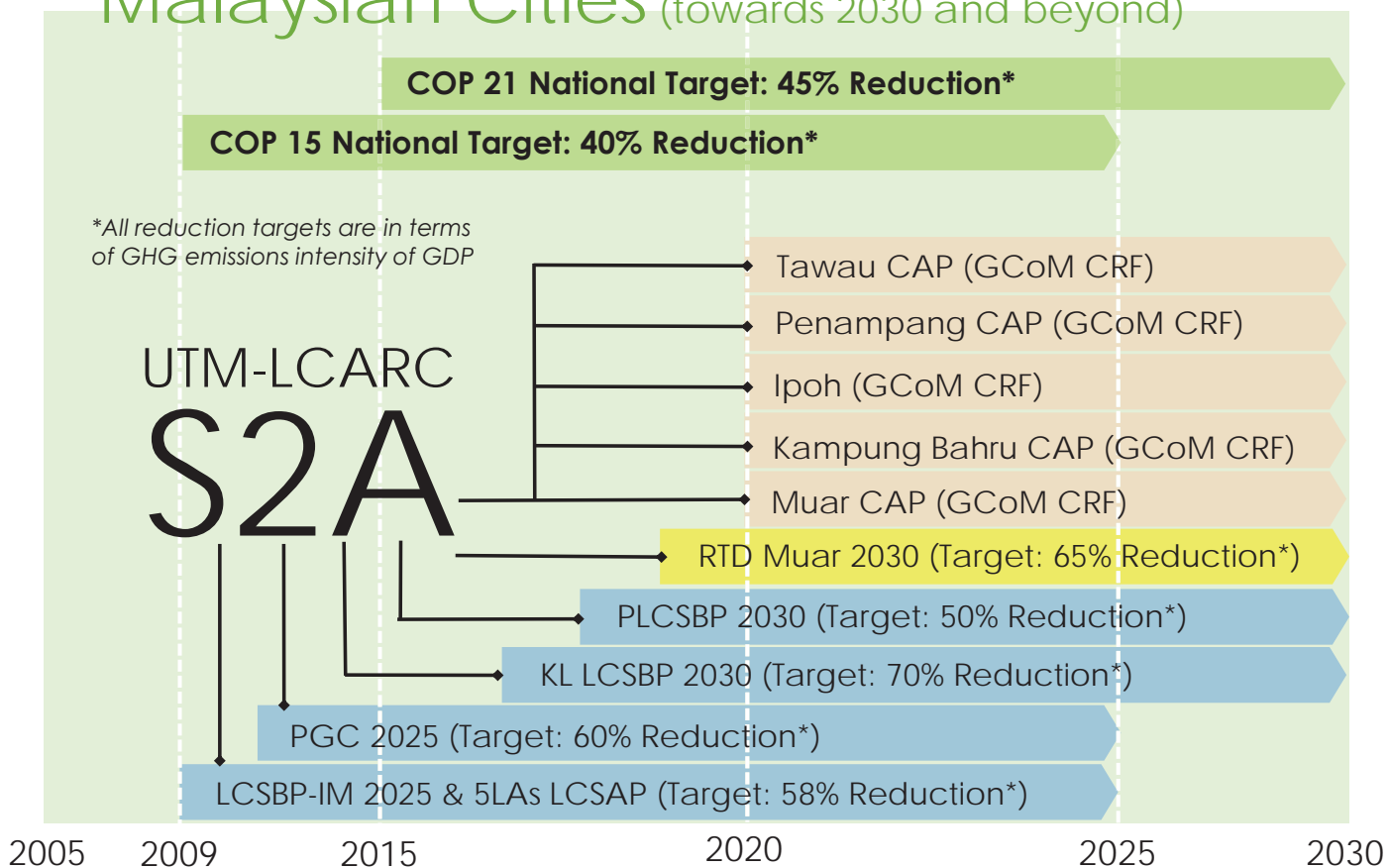


Malaysian LCS at COP 24



マレーシアの都市の気候変動対策の概観図

Accelerating Climate Actions in Malaysian Cities (towards 2030 and beyond)



CONCLUSION

City Climate Actions **MUST** be taken!

The time is **NOW!**

Good News: It **CAN** be done!

Because it **HAS** been done!

When If we **ALL WORK TOGETHER!**

THANK YOU!

UTM-Low Carbon Asia Research Centre
Block B12, 02-04-01
Faculty of Built Environment & Surveying
Universiti Teknologi Malaysia
81310 UTM Johor Bahru
Johor, MALAYSIA

T: +60-7-5557359
M: +60-12-2986302
E: lwchau@utm.my
W: www.utm.my/satreps-lcs



クアラルンプール市 (KL市) の発表資料
2019年8月23日 (ローンチングセレモニー)
発表者: 副市長マハディ氏



A GREENER, BETTER KUALA LUMPUR



By:
Datuk Haji Mahadi Bin Che Ngah
Executive Director (Planning)
Kuala Lumpur City Hall



KL市の基礎情報



1.0

KUALA LUMPUR



The Capital and the largest city in Malaysia

LAND AREA

243km² (24,221 hectares)

POPULATION (2018)

1.87 million people

POPULATION DENSITY

7407 person/sq.km

VISION

“A World Class Sustainable City For All”



1.0

KL市の経済成長の要因

KUALA LUMPUR'S DRIVING FORCE



マレーシアで最も人口が多い



The city has the highest number of population in Malaysia:

1,674,621	(2010)
2,198,400	(2020)
2,488,399	(2030)



国内総生産

Gross Domestic Products (GDP) (Mil.(RM))

84,852	(2010)
227,621	(2020)
399,013	(2030)



Fastest Growing Region / Global City:

With growth rate of 9.2% pa in 2010, KL is home to several national and multinational companies

最も経済成長が甚だしい国際都市



2.0



目標値：2030年には炭素強度を70%削減（2010年比）

Kuala Lumpur aims to reduce the City's carbon emissions intensity of GDP by **70% by 2030**, (based on the 2010 level) without compromising its vision and economic growth targets.



KL市の10の主要な対策：クアラルンプール市における2030年に向けた低炭素社会ブループリント





3.0

KL LCSBP 2030 PROGRAMMES IMPLEMENTATION STATUS



電光掲示板を使った市の取組みの市民との共有



3.1

ENHANCE THE USE OF EFFECTIVE VARIABLE MESSAGE SIGNS; ON DELIVERING GREEN INFORMATION TO PUBLIC



“Reduce congestion;
together, we use public
transportation”





3.2

ALL FORESTS ARE GAZZATTED FOR PUBLIC PURPOSE



- Bukit Nanas Forest Reserve (10.5 hectares) - Gazetted as Wildlife and Bird Sanctuary in 1934
- Bukit Sungai Puteh Forest Reserve - Gazetted as Wildlife Reserve in 1932
- Bukit Sungai Besi Forest Reserve (42.29 hectares)
- Bukit Lagong Tambahan Forest Reserve (2.10 hectares)



商業地区の自転車専用レーン



3.3

DEDICATED CYCLE LANES IN DOWNTOWN AREA OF KUALA LUMPUR





3.4

PROPERTY DEVELOPERS ARE ENCOURAGED TO BUILD GREEN BUILDINGS WITH SPECIAL INCENTIVES PACKAGE



太陽光を道源とする空調設備完備の歩行者専用道路



3.5

AIR-CONDITIONED ELEVATED WALKWAYS ARE RUN BY SOLAR ENERGY





3.6

KUALA LUMPUR CAR FREE MORNING



市の緑地を公園に



3.7

POCKET PARK : LAMAN TUN PERAK





3.8

LANEWAY UPGRADING



商業地区を走る無料バス



3.9

FREE BUS RIDES WITHIN DOWNTOWN KL



- KLCC - Bukit Bintang (Green Line)
- Pasar Seni - Bukit Bintang (Purple Line)
- Titiwangsa - Bukit Bintang (Blue Line)
- Titiwangsa - KL Sentral through Dataran Merdeka (Red Line)
- Titiwangsa - MINDEF (Orange Line)
- LRT Universiti - PPR Pantai Ria (Pink Line)





3.10

COMMUNITY FOOD WASTE COMPOSTING PROJECT



Our Composting piles



バイオ・ディーゼル (B10)



3.11

USING B10 BIODIESEL





3.12

BLUE POOL



災害に強靱な都市づくり



4.0

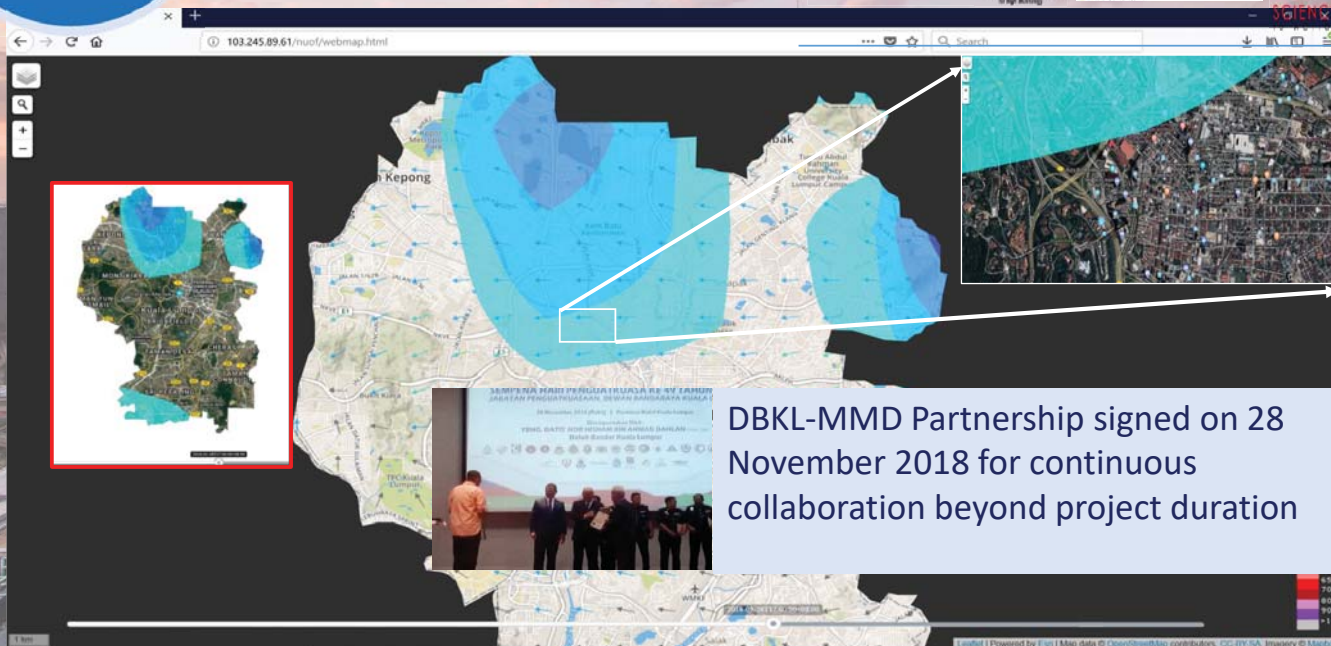
KUALA LUMPUR TOWARDS A RESILIENT CITY



DISASTER RESILIENT CITIES: FORECASTING LOCAL LEVEL : CLIMATE EXTREMES AND PHYSICAL HAZARDS FOR KUALA LUMPUR

On Going
Collaboration

Innovate UK **MiGHT** **Newton-Ungku Omar Fund**





5.0

NEW ADDITIONAL PROGRAMME



1. To introduce cooling district for all new projects with land area more than 10 acres.
2. To retrofit 1,800 units of existing facilities owned by KLCH to use alternative energy equipment.
3. All new KL City Hall buildings will adopt green building concept. More green building owned by private developers are encouraged as well.
4. Collaborating with TNB to use solar energy for KL City Hall buildings and street lights.
5. Reduce private vehicles entering the city center of Kuala Lumpur during peak hours.
6. Increase public outreach and engagement programme to get the buy in from all the stakeholders.



結論



6.0

CONCLUSION



These initiatives need everyone's commitment; government, private developers, NGO's, local communities as well as private individuals. Together, they need to shoulder the shared responsibility of implementing the programmes to reduce carbon emissions.

Apart from the low carbon society initiative, KLCH has also embarked on computer application to predict local weather condition three days in advance. With this application, KLCH can prepare all the necessary actions to cope with the irregular weather related hazards to increase city's resilience.

It is a big challenge to KLCH as a comprehensive awareness and outreach programme for all stakeholders is needed.

Based on the projection (base year 2010), a reduction of more than 43% in carbon emissions will be achieved by 2020. But we need to do more with full commitment together, if we were to achieve the 70% reduction target by 2030.



THANK YOU

TERIMA KASHI , DZIĘKUJĘ , DANKE , ありがとう



Tokyo Climate Change Strategy

～ Towards Zero Emission Buildings ～

Toshiko CHIBA

Climate Change and Energy Division,
Bureau of Environment,
Tokyo Metropolitan Government



東京都の2030年目標



Tokyo Metropolitan Government

2030 Goals

4.2% increase

2017 preliminary



30%
reduction

compared to 2000 levels

Greenhouse
Gas Emissions

23% reduction

2017 preliminary

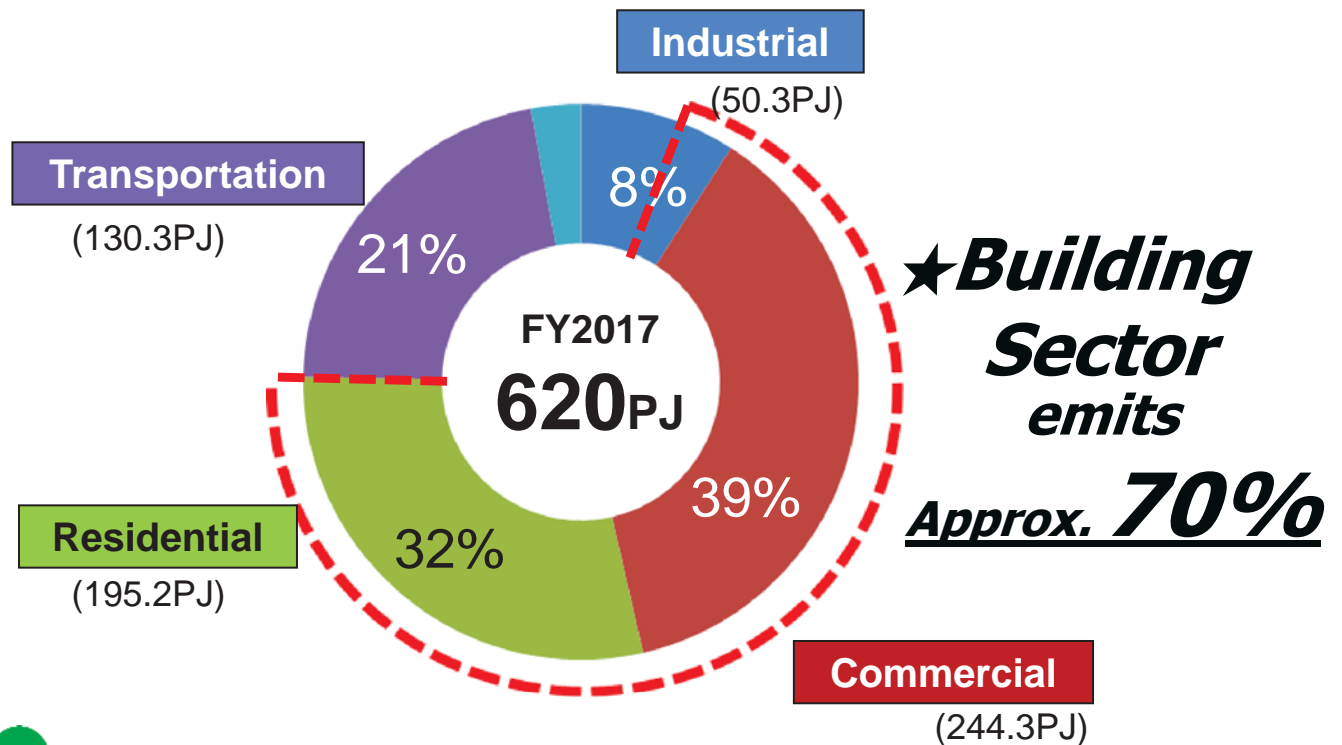


38%
reduction in
energy consumption

compared to 2000 levels

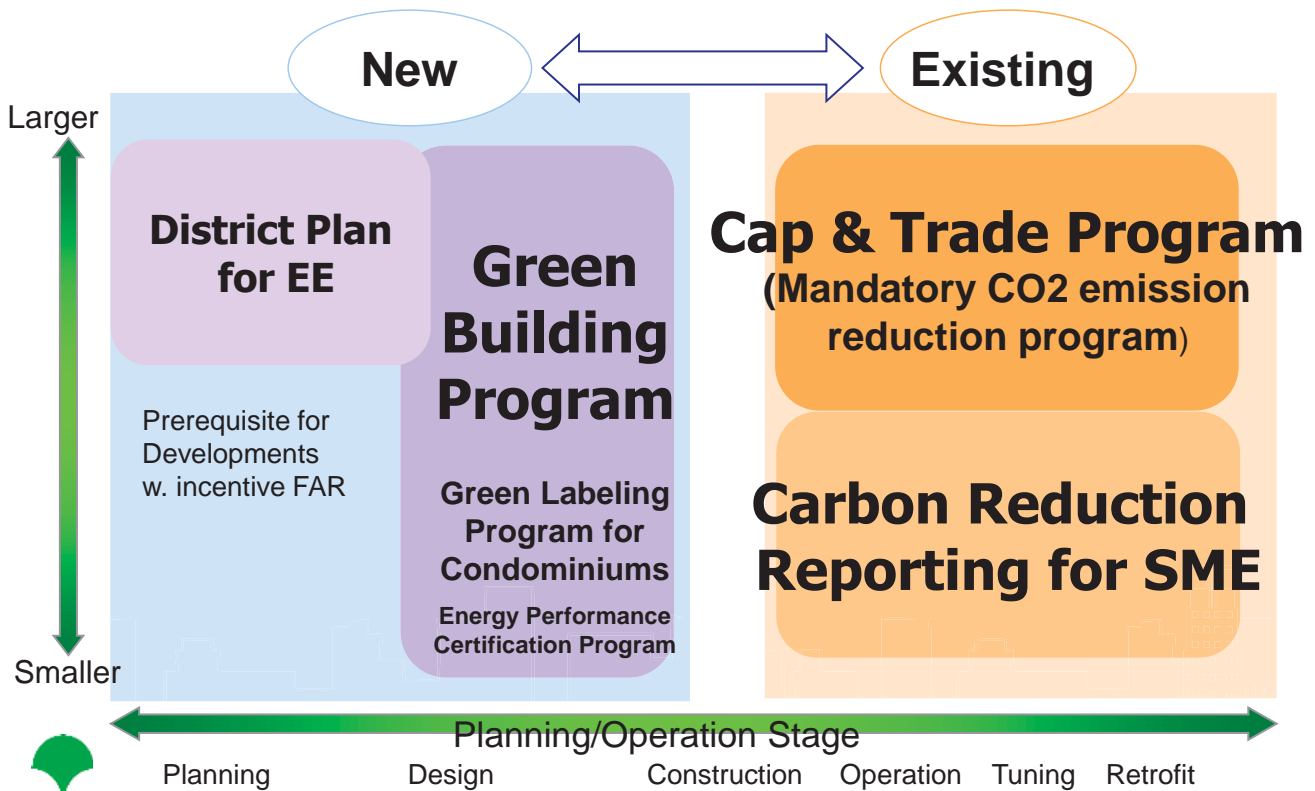
Energy Efficiency

Energy Consumption in Tokyo (2017)



東京都の建物を対象とした気候変動対策

Climate Change Policy Framework for Buildings in Tokyo

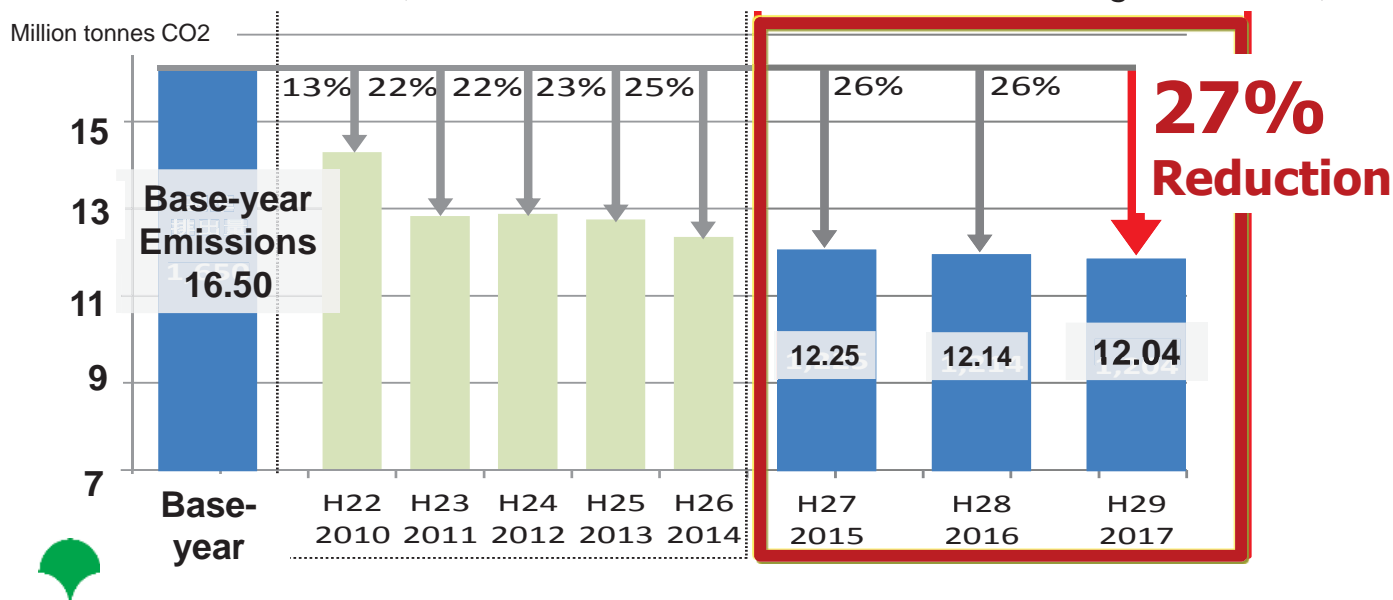


For Existing Large-sized Buildings

Tokyo Cap-and-Trade Program

• Mandatory CO2 Reduction Program

- Launched in 2010 by Tokyo ordinance
- 1200 facilities (office, commercial & institutional buildings, factories)



TOKYO METROPOLITAN GOVERNMENT

5

大規模事業所で取り組まれたCO2削減対策

For Existing Large-sized Buildings

Main Measures for CO2 Reduction

for 2nd compliance Period (2015-2019)

1. Installation of **high-efficiency heat source equipment**
2. Installation of **LED lights**
3. Installation of **high-efficiency air conditioning equipment**
4. Installation of **external air volume control** based on CO2 concentration



Start from Proposer

Initiative
from city government
bringing policy up

- 1. Action for TMG properties**
(measure for public buildings)
- 2. Action for TMG city hall**



Tokyo Metropolitan Government

7

For **TMG** properties

都有施設における削減目標

Action for Public Buildings of TMG

✓ **Planning period:** 2015-2019 *revised every 5 years*

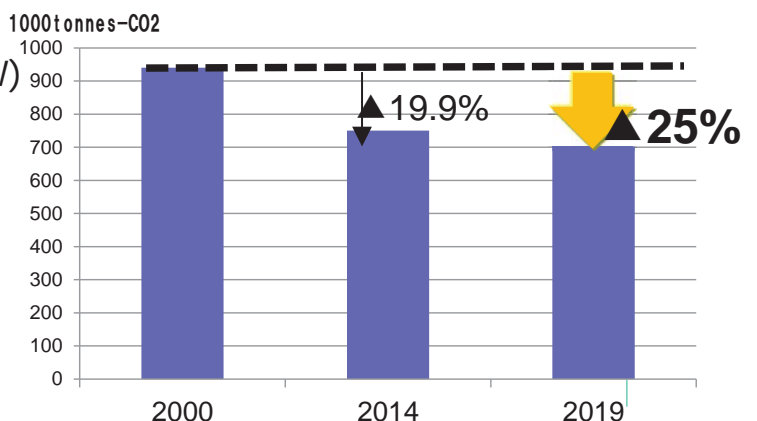
✓ **2019goal**

- **25%reduction in GHG Emissions** compare to 2000
- **25% reduction in energy consumption** compare to 2000
- **Installation of new solar power equipment:**

4200kW

(*Already installed by 2014: 3122kW)

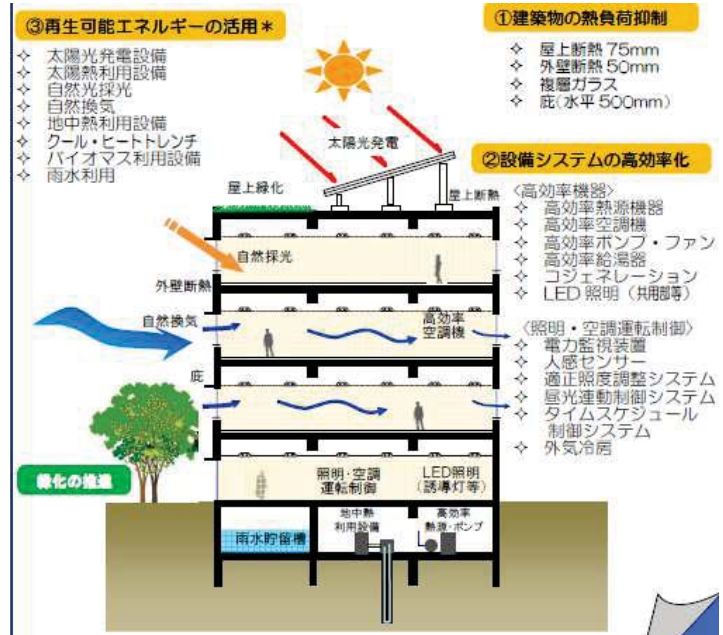
✓ **Boundary:**
government office
(not include public enterprise)



Policy1: Highly Energy Efficiency Equipment Installation

◆ Follow the TMG guideline

“TMG guideline on **energy efficiency** and **renewable energy specification**” for **new or renovated buildings**



Policy2: Energy Efficient Operation

1. Management of light illuminance

- **less than 500 lux** on the desk

2. Efficient management of air conditioning equipment

- Room temperature

ex. 28°C for cooling

- Reduce of volume of fresh air

ex. CO2 concentration 900ppm

With an action "COOL BIZ"



Policy2: Energy Efficient Operation

3. Other daily efforts

- ① **Utilizing energy saving mode or functions**
switching the power off or sleep mode during not used

Set the energy saving mode
= ensure data security



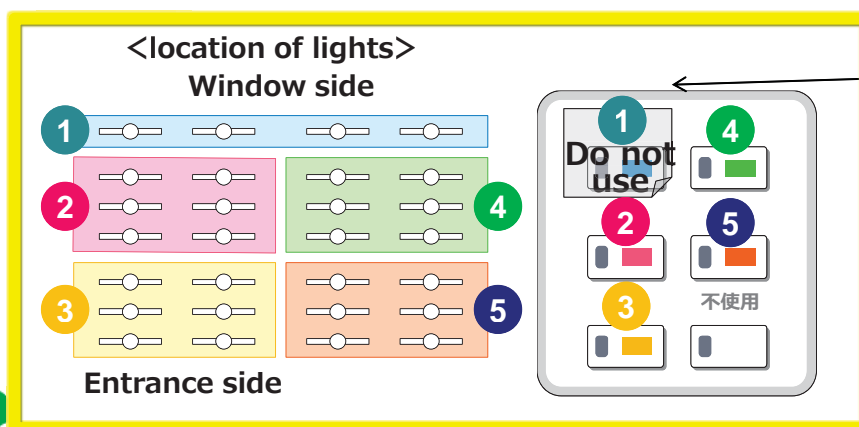
TOKYO METROPOLITAN GOVERNMENT



11

Policy2: Energy Efficient Operation

- ② **Place the location of the lights beside the switch** for turning off lights when and where not required, and restrain from over use of lights



Placing a cover over the switch that prevents use is also quite effective



TOKYO METROPOLITAN GOVERNMENT

12

Policy2: Energy Efficient Operation

③ Raising awareness for visitors and employees

Posters

Business card



TOKYO METROPOLITAN GOVERNMENT

Policy2: Energy Efficient Operation

④ Make sure to check and clean the filters and the outdoor units regularly

省エネ事例／空調室外機の清掃(フィンコイル)

現状 熱交換器のフィンが目詰まりしていた。



目詰まりの例



対策実施 フィンを清掃し、風量を確保することで消費電力を削減する。



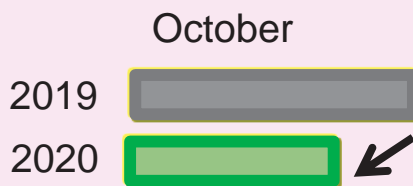
TOKYO METROPOLITAN GOVERNMENT

Polocy2: Energy Efficient Operation

- ⑤ Give feedback the information the effect to employees and visitors for keeping their motivation

Example

We success our power fee reduction!!



¥ 25,000-
Compare to last year



Thanks for your cooperation! 😊

Polocy3: Renewable Energy Usage

- 1. Installation of solar power for new building and retrofit others** (solar thermos, ground thermos, passive solar /wind, etc.) are also important, so that we are needed to consider based on the characteristic of location and floor type.
- 2. Strengthen the renewable power procurement**

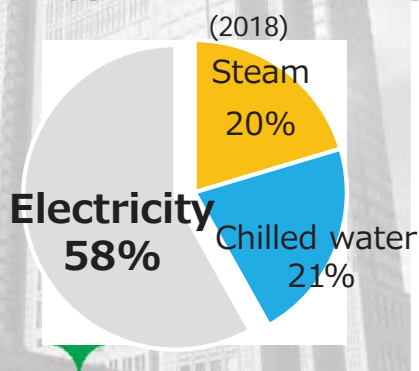


Action for TMG City Hall

30% CO2 reduction

compare to 2000's
<2017 Performance>

Energy share of TMG city hall



“+ action” in 2019

Moving to **100% renewable energy (power) procurement** at City Hall from Aug. 2019

省エネを効果的・継続的に推進するための取組

How to facilitate sustainable and effective energy efficiency

Investment
(hardware)



Management & operation (soft methods)

Replace with highly efficient equipment, etc

Collaboration

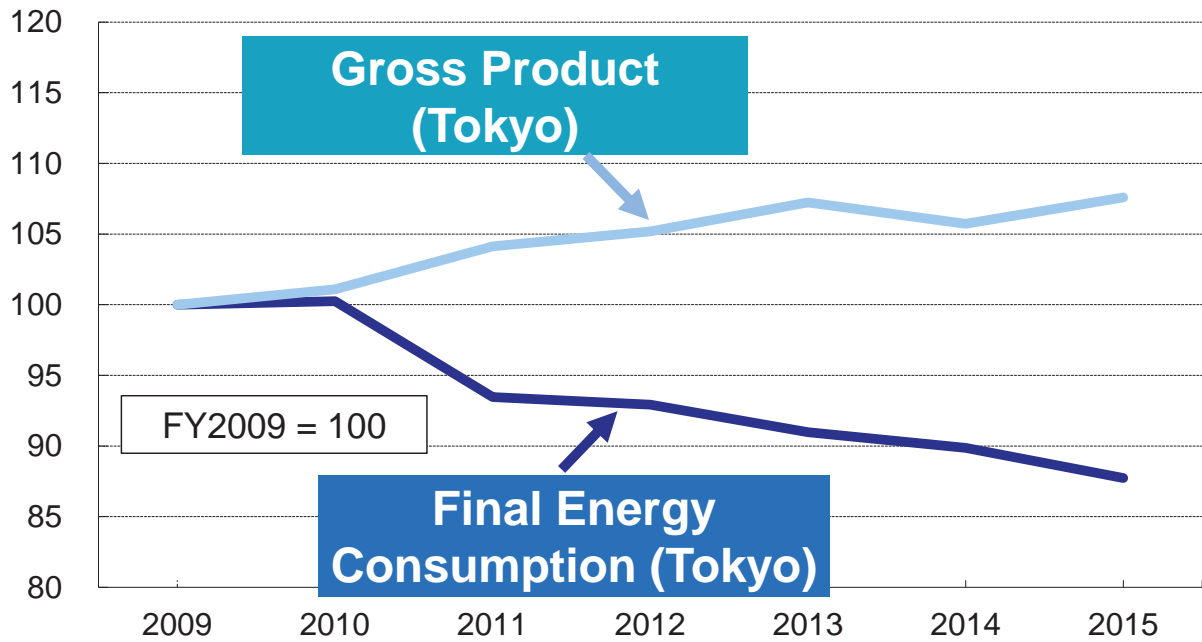
Building management side



Employees and visitors



“Decoupled” Energy Consumption and Economic Growth in Tokyo



TOKYO METROPOLITAN GOVERNMENT



2050年にCO2排出実質ゼロに貢献する「ゼロエミッション東京」を目指して

Realizing Zero Emission Tokyo by 2050

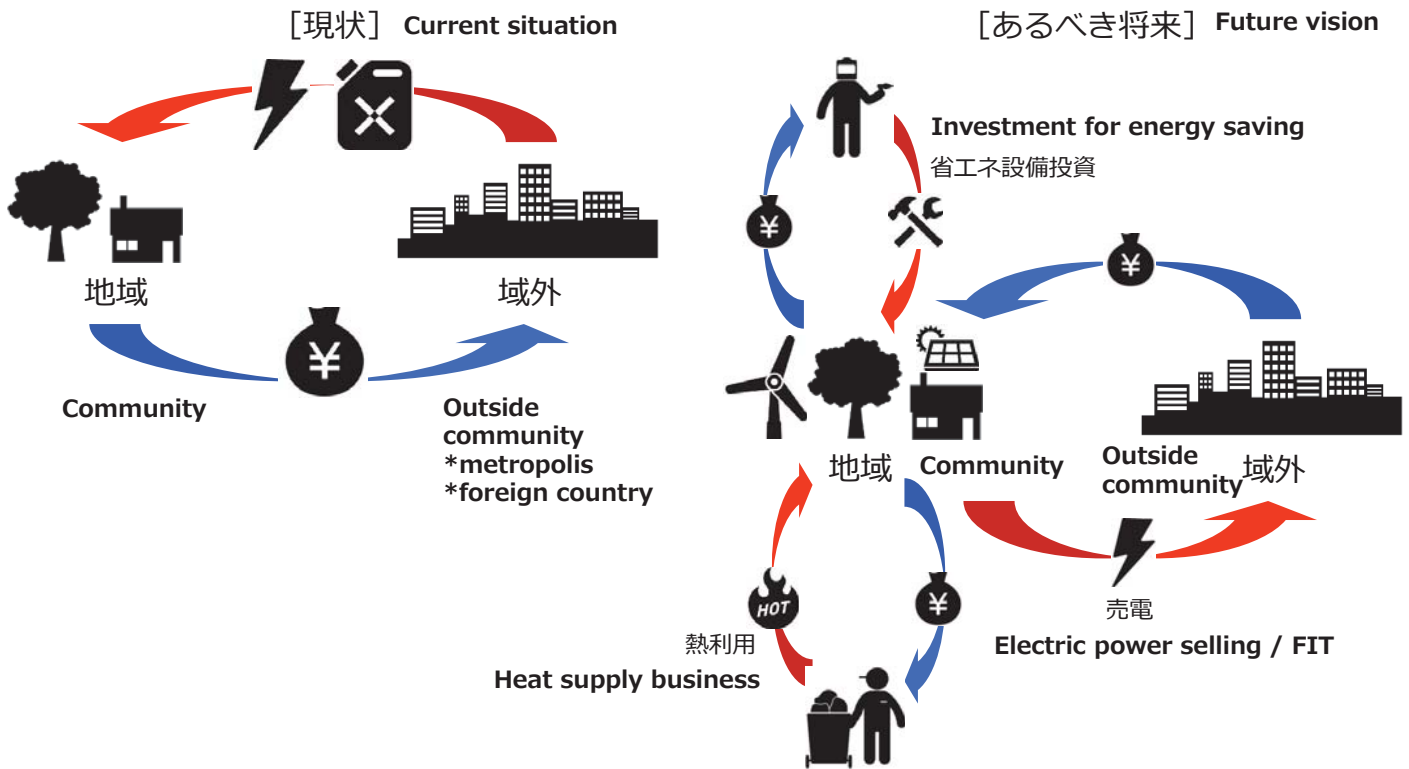


Investments for Our Future

Towards realizing decarbonized society

TOKYO - KUALA LUMPUR LOW CARBON SYSTEM (T2KLLCS)

Bureau of Environment,
Tokyo Metropolitan Government



© 2018 Local Policy Design Office

自然エネルギー財団 / Renewable Energy Institute

出費があるのなら、初期投資と運用経費どちらが割安でしょうか。

Which is your choice ?

地域政策デザインオフィス
Local Policy Design Office

Their color, design, dimension and room layout are most of the same.



A

Building cost
¥ 20,000,000

Energy cost
¥ 200,000/year



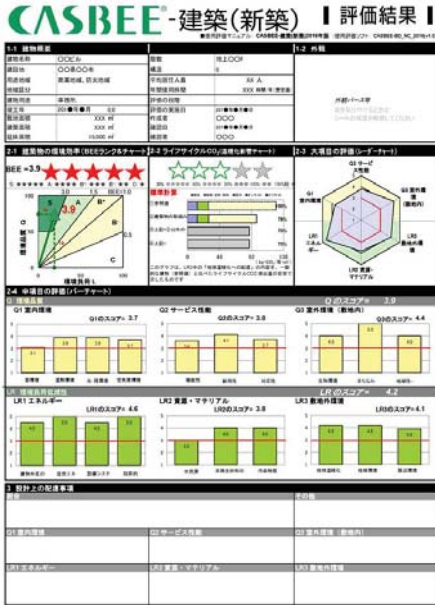
B

Building cost
¥ 22,000,000

Energy cost
¥ 100,000/year

エネルギーコストと環境へのインパクトを分析するツール

They use assessment tools for energy cost or environment effect.

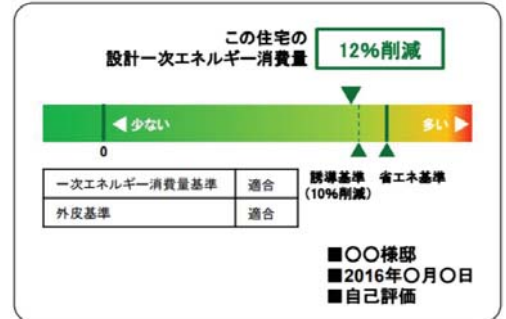


CASBEE



Energy Pass

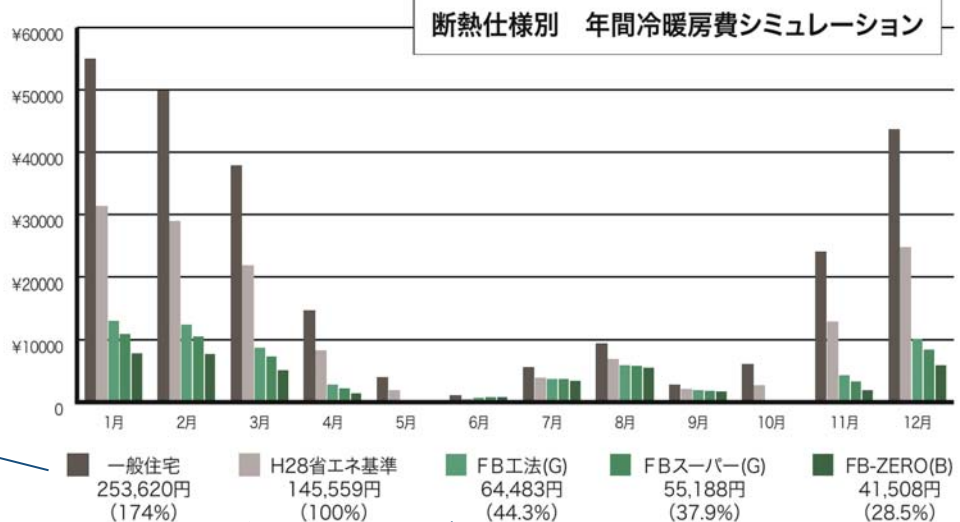
© 2018 Local Policy Design Office



Primary Energy Calculating Program

長野県の事例:ホクシンハウス

Nagano case : Hokushin House Co.



Energy Cost in Nagano
Mid-level
¥253,620/year

National Energy Saving
Model
¥145,559/year

Hokushin House
Low-level Model
¥64,483/year

Hokushin House
Mid-level Model
¥55,188/year

Hokushin House
High-level Model
¥41,508/year

Best Practice in Tokyo

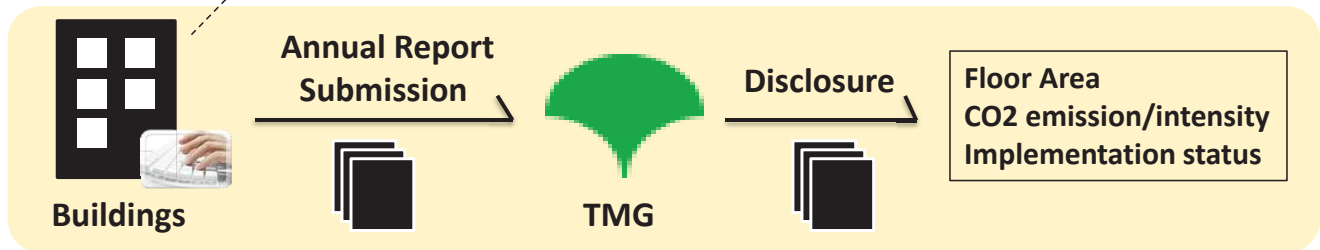
- Tokyo Metropolitan Government (TMG) has operated Carbon Reduction Reporting Program for mid-small scale buildings, which aims to enhance mitigation actions.
- The program asks buildings to monitor and report their CO2 emission as well as mitigation actions taken by owners and/or tenants.

1. Energy Consumption and CO2 Emission in Previous FY

- Calculate CO2 emissions from previous FY's fuel, energy, electricity, water and sewerage use

2. Mitigation Actions Taken in Previous FY

- Choose measures taken from 255 option menu which has been categorized by TMG



Continuous Efforts on the Global Warming Measures

- Realize continuous understanding/management of energy consumption
- Continuous efforts and improvement on the global warming measures

CO2 Emission Reduction (10% reduction has achieved)

5



気候変動行動計画をUTMとIGESとで作成

Selected Climate Action Plans by UTM-LCARC
In collaboration with IGES



NDCs: National Determined Contributions

LDCs: Locally Determined Contributions



VLR: Voluntary Local Review

VNR: Voluntary National Review



Sustainable Energy Low Carbon Building Assessment System (GreenPASS) and Building Energy Data Online System (BeDOS) - How SEDA Malaysia can support DBKL's Low Carbon Building Program (Data collection for Building Sector).



Steve Anthony Lojuntin

Director, Technical Development & Facilitation
Sustainable Energy Development Authority (SEDA) Malaysia

Tel : +6019-2829102

steve@seda.gov.my / asetip@damansara.net



15 January 2020

CONTENT



- a) SEDA Malaysia current initiatives under the Low Carbon Building Facilitation to State, Local Authorities (PBTs) and building industry.
- b) How SEDA Malaysia can assist and facilitate DBKL using SEDA Malaysia's initiatives and tools.

SEDA MALAYSIA SUSTAINABLE ENERGY PROGRAM



SUSTAINABLE ENERGY

RENEWABLE ENERGY

- Solar Photovoltaic
 - Biomass
 - Biogas
 - Small Hydro
- i. Feed-In Tarif
- ii. Net Energy Metering (NEM)
- iii. Self-consumption (SELCO)

ENERGY EFFICIENCY

- Energy Conservation
- Energy Efficiency
- Energy Management
- i. Energy Audit
- ii. Sustainable Low Carbon Building Facilitation
- iii. Low Carbon Building Certification – GreenPASS

SUSTAINABLE ENERGY INTEGRATED PROGRAM

- i. Trainings & Capacity Building
- ii. Technical experts & facilitation
- iii. Sustainable Energy Low Carbon Development
- iv. Zero Energy Building Facilitation Program.

政府向けのプログラム

SEDA MALAYSIA's LOW CARBON BUILDING FACILITATION PROGRAM

(For PBTs & States Government)

(For PBTs & States Government)

- Any activities under the current SEDA's Program;
 - ✓ Energy Efficiency / Energy Management program.
 - ✓ Monitoring and Verification (setting target and annual assessment).
 - ✓ Building Energy Data Online System (BeDOS) for data collection program.
 - ✓ Online energy & power monitoring system .
 - ✓ Energy Audit and Retrofitting program.
 - ✓ Low carbon green building design input & management (new buildings).
 - ✓ Awareness program & promotion.
 - ✓ Development of Common Carbon Metric (CCM) for various building topology.
 - ✓ Data repository on carbon emission from building sectors.
 - ✓ Building performance assessment using GreenPASS.
 - ✓ Development of EE performance based incentive.
 - ✓ Zero Energy Building (ZEB).
 - ✓ Solar PV Net Energy Metering (NEM).



ビルの低炭素化に役立つサービス

Sustainable Energy Low Carbon Building Facilitation Offered by SEDA



- Development Data & Inventory carbon reduction in building sector.
- Development of Common Carbon Metric for various type of building topology.
- Development of Low Carbon Building program.
- Sharing data & information.
- Capacity buildings

グリーンビルディングの認証制度



by SEDA Malaysia

SUSTAINABLE LOW CARBON BUILDING ASSESSMENT

(Under the Low Carbon Building Facilitation Program)

A voluntary & industry driven initiative by: Using:

Sustainable Buildings and Climate Initiative
Common Carbon Metric

Carbon Reduction in Existing Building:

MEASURES	ANNUAL SAVING	
	Electrical kWh/yr	RM/yr
No Cost Measures		
De-lamping office lighting	13,476	8,153.38
Low Cost Measures		
Use timer controller for temperature and operate silo ventilation	687,760	160,935.84
Use of daylight in warehouse	19,943	4,666.66
Replace normal EXIT signage to LED	2,208	516.67
Awareness campaigns	703,931	164,719.85
High Cost Measures		
Replace the Metal Halide lamps to T5HO lamps	957,012	228,940.81
Lighting zoning	498,584	116,668.66
TOTAL	2,882,914	684,601.87

Example of CO₂ Reduction for LEO Building:

Measure	Energy Index kWh/m²/year
Reference case	275
Daylight use	247
Insulation in walls & roof	239
EE Lighting 22-16 W/m²	223
Equipment 27-20 W/m²	195
EE Lighting 16-8 W/m²	173
EE Equipment 22-16 W/m²	123
"Energy Management"	112
Room T. 23-24°C	102
Especially tight building	100

56% reduction

Potential GreenPASS (Operational Carbon) Assessment: ★★★★

www.seda.gov.my/greenpass

fppt.com

ゼロ・エネルギー・ビル 認証制度 グリーンパス

Sustainable Energy Low Carbon Building / Zero Energy Building : LCB - GreenPASS Certification

Rating Classification

The table belows shows SEDA LCB – GreenPASS Assesment and their respective diamond rating scores;

TOWARDS CARBON NEUTRAL	Level of Achievement (% of CO ₂ e Reduction)	Assessment Scheme for buildings (diamond)	Proposed ZEB Scheme *
	TOWARDS ZERO ENERGY (ZEB)	100% Carbon Neutral	★★★★★
	≥ 70 to < 100	★★★★	Near ZEB (nZEB)
	≥ 50 to < 70	★★★	Ready Towards ZEB
	≥ 30 to < 50	★★	
	≥ 10 to < 30	★	
	≥ 1 to < 10	0	

GreenPASS = CIDB's Construction Industry Standard (CIS) 20 : 2012

Low Carbon Building GreenPASS Certification



GreenPASS join certification by SEDA –
Local Authority



GreenPASS certification by SEDA

Low Carbon Building GreenPASS Certification Event with PBT

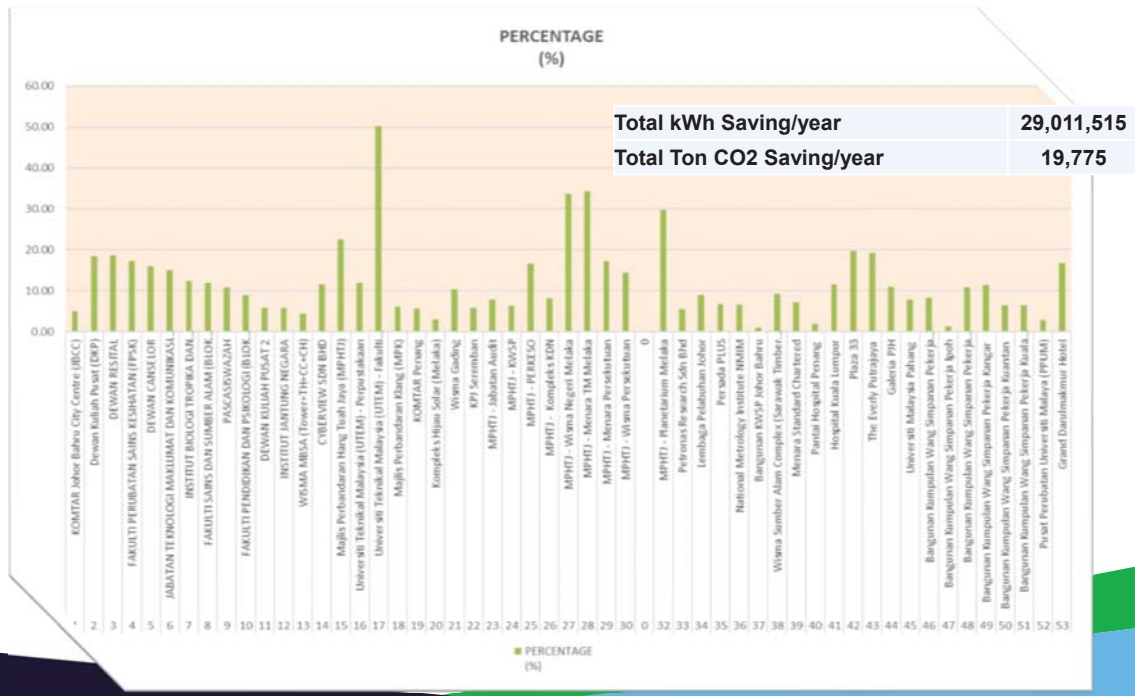


Handing over GreenPASS certificate to building owners

二酸化炭素削減量を示すデータ

Carbon Reduction Data

Low Carbon Building Assessment GreenPASS



ビルのエネルギーデータを管理するオンラインシステム



Building Energy Data Online System (BeDOS)

by

SEDA Malaysia



www.seda.gov.my/bedos

Building Energy Data Online System (BeDOS)



MULTI PURPOSE APPLICATIONS

ONLINE APPLICATION FOR GREENPASS CERTIFICATION

- i. Yearly Certification.
- ii. Self assessment and simulation of potential GreenPASS rating achieved.
- iii. Apply GreenPASS certification

DATA COLLECTION

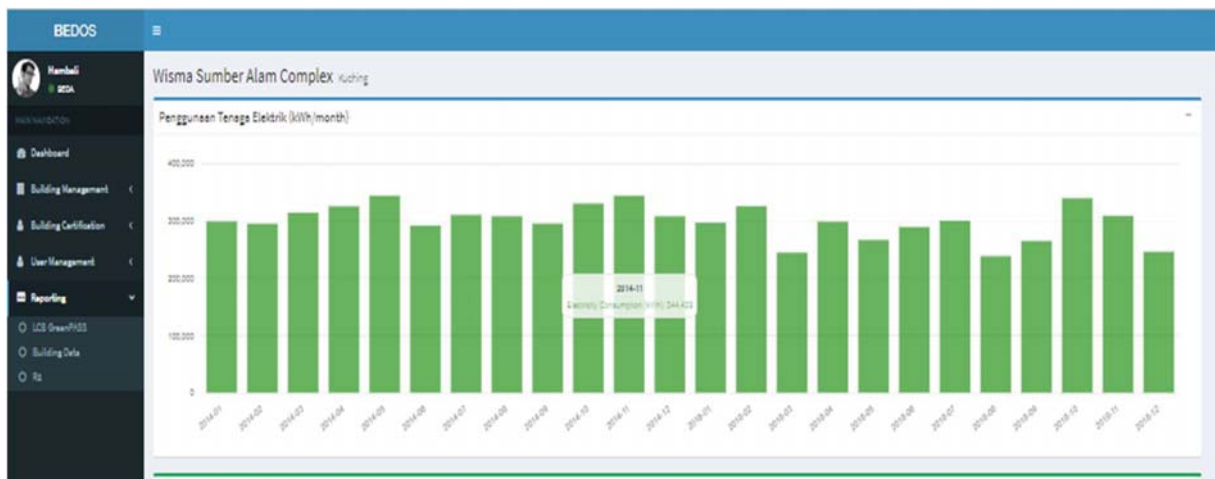
- i. Monthly data collection, submitted by building owners or their maintenance.

ENERGY MANAGEMENT & REPORTING PROGRAM

- i. Routine energy monitoring activities.
- ii. Operation & maintenance

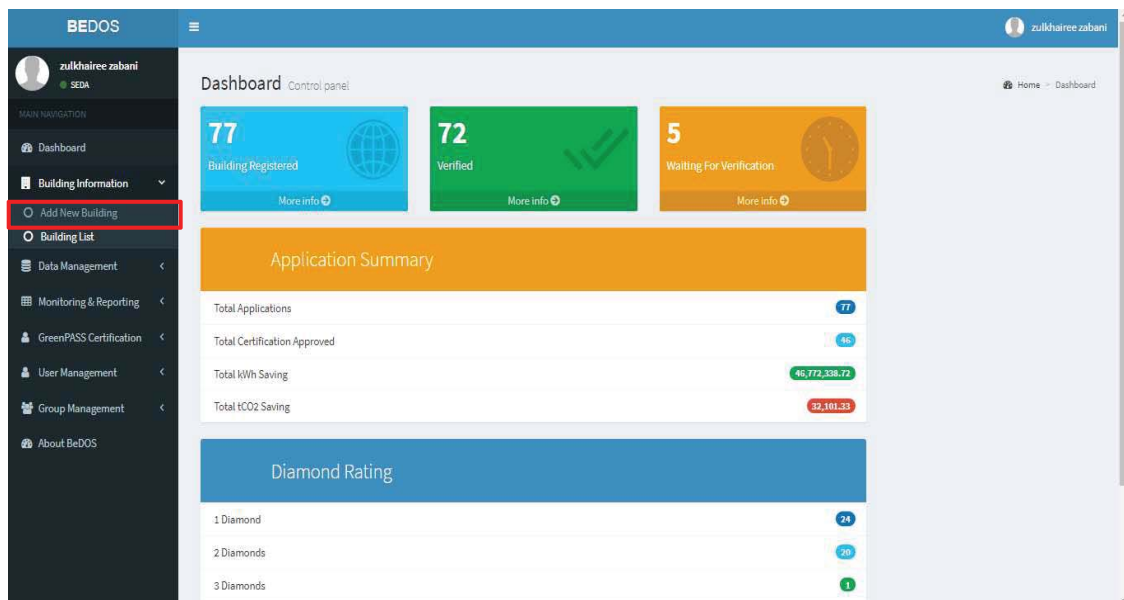
Building Energy Data Online System (BeDOS)

- To encourage users to self key-in Baseline & Current Data to apply Green PASS certification.
- Provides analysis and GreenPASS Rating achieved for certification.
- Historical Baseline and current performance.



PART B

FILL IN YOUR BUILDING INFORMATION



Upon logging into BEDOS, click the **Building Information** tab and select ① **'Add New Building'** to fill in required information of the building that is to be registered

BEDOS zulkhairee zabani

Building Management New

A - General Information

Building Name *
Building Name

Building Address *
Building Address Line 1
Building Address Line 2

Building Owner Name/Organisation *
Building Owner Name/Organisation

Telephone * **Fax**
01X12345678 01X12345678

Owner Email *
abc@example.com

Contact Person Name *
John Doe

Contact Person Telephone * **Contact Person Fax**
01X12345678 01X12345678

Postcode * **City ***
12345 City

State *
Please Select

Local Authority *
Please Select

Electricity Account Number * **Electricity Tariff ***
Electricity Account number Please Select
*If multiple account number, please separate by '|'. e.g. 1234|567

The primary information needed is the building's ② **General Information** such as **Building Name**, **Building Address** and **Contact Person details**. All the information with red starred(*) are compulsory

3 **B - Building Physical Information**

Physical building background
Please select

Age Of Building
Age of building

Total No of Storey(s)
Total No of Storey(s)

Total No of Building Block
Total No of Building Block

Net Floor Area *
Net Floor Area m²

Total No of Basement Floor
Total No of Basement Floor

Total Gross Floor Area *
Total Gross Floor Area m²

Air-conditioned Area
Air-conditioned Area m²

Carpark Area
Carpark Area m²

Electrical Drawing
Choose File No file chosen

Floor Plan Layout
Choose File No file chosen

C - Building Operating Information

Total number of occupants
Total number of occupants

Occupancy rate (current year)
Occupancy rate (current) %

Building operating hours schedule per week
Building operating hours schedule per week Hours

Chiller Available?

District Cooling Available?

Part B includes ③ **Building Physical Information** such as **Net Floor Area**, **Age Of Building**, **Total No of Storey(s)** etc. All the information with red starred(*) are compulsory

B - Building Physical Information

Physical building background
Please select

Age Of Building
Age of building

Total No of Storey(s)
Total No of Storey(s)

Electrical Drawing
Choose File No file chosen

Net Floor Area *
Net Floor Area m²

Total No of Basement Floor
Total No of Basement Floor

Total Gross Floor Area *
Total Gross Floor Area m²

Air-conditioned Area
Air-conditioned Area m²

Total No of Building Block
Total No of Building Block

Carpark Area
Carpark Area m²

Floor Plan Layout
Choose File No file chosen

C - Building Operating Information

Total number of occupants
Total number of occupants

Occupancy rate (current year)
Occupancy rate (current year) %

Building operating hours schedule per week
Building operating hours schedule per week Hours

Chiller Available?

District Cooling Available?

Part C indicates ④ **Building Operating Information** such as the **Total number of occupants** and **Building operating hours schedule per week**

D - Building Maintenance Information

Manpower
Manpower Person

Maintenance Contractor
Maintenance Contractor

Availability of energy management engineer
Please select

Contact Person
Contact Person

Contact Person Email
abc@example.com
* Email will be sent to this email for them to login

Training of Maintenance Workers
Training of Maintenance Workers cumulative hrs/year

Save!

Part D includes ⑤ **Building Maintenance Information**. Once this section is completed, click **“Save!”**

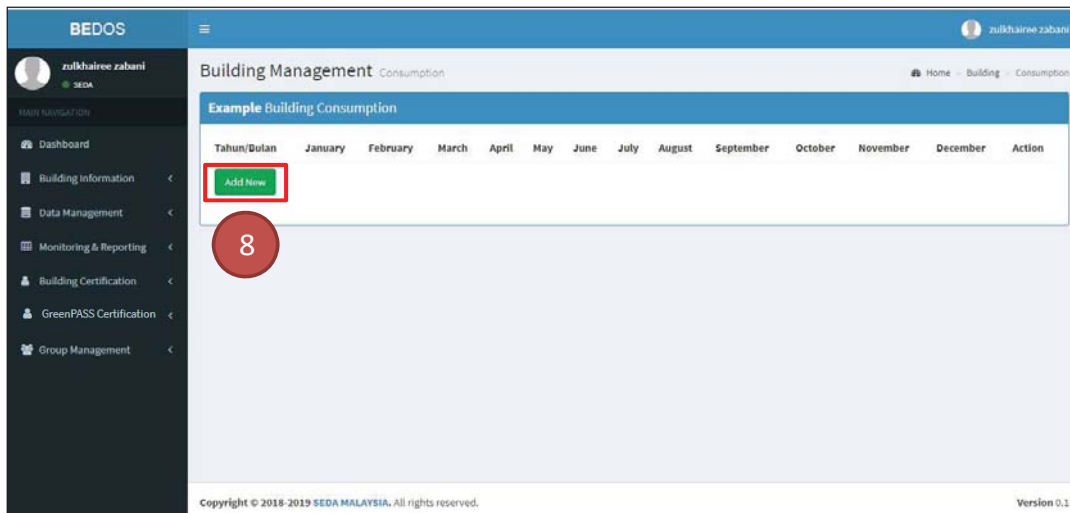
PART C

FOR DATA MANAGEMENT

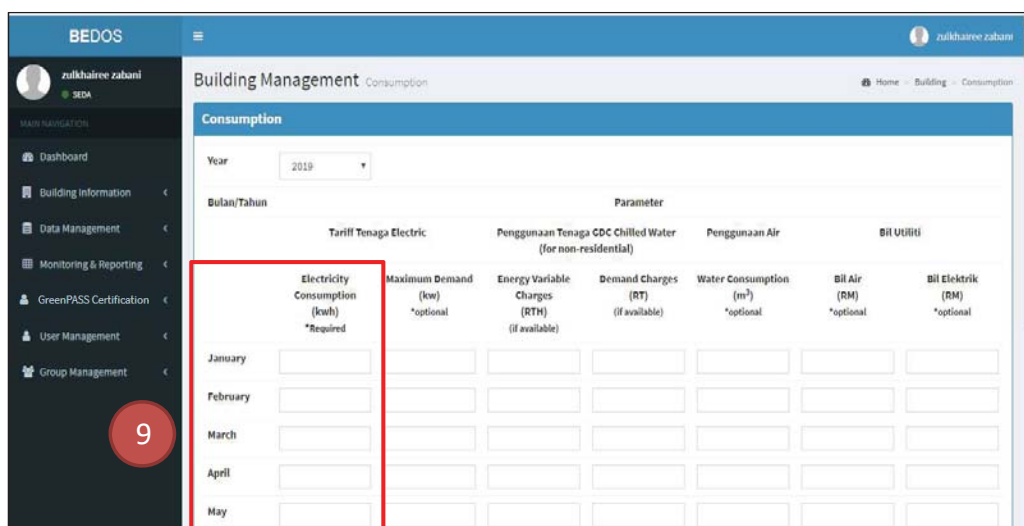


The screenshot displays the BEDOS web application interface. On the left, a dark sidebar contains a navigation menu. The 'Data Management' option is expanded, and 'Building List' is selected, indicated by a red circle with the number 6. The main content area shows the 'Building Management Listing' page. At the top, there are search filters for 'Search', 'State', 'Building Category', and 'Local Authority'. Below the filters is a green 'Search' button. The main content is a table titled 'Building List'. The table has columns for '#', 'Building Name', 'Building Maintenance Contractor', 'Status', and 'Action'. The first row contains the number '1', the name 'Example', an empty contractor field, and a status of 'VERIFIED'. The 'Action' column for this row contains two buttons: 'Update Energy Consumption' and 'View Energy Consumption'. The 'Update Energy Consumption' button is highlighted with a red circle and the number 7.

Next, select ⑥ 'Building List' under the **Data Management** tab. Then, click on the ⑦ 'Update Energy Consumption' to fill in your monthly data consumption



Select ⑧ 'Add New' to start key in your monthly data consumption



In this section, monthly ⑨ **Electricity Consumption(kwh)** of the target year and baseline year is to be filled up. Then, click 'save!' to save your data in the system

PART D

FOR DATA MONITORING AND REPORTING



BEDOS Building Management Listing

zulkhairree zabani SEDA

Dashboard
Building Information
Data Management
Monitoring & Reporting
GreenPASS
Building Data
GreenPASS Certification
User Management
Group Management

Building List

ID	Building Name	Status	Action
1	Example	GREEN	Show Graph

In order to monitor your building data, click on ⑩ 'Building Data' under the **Monitoring & Reporting** tab. Then, select ⑪ 'Show Graph'

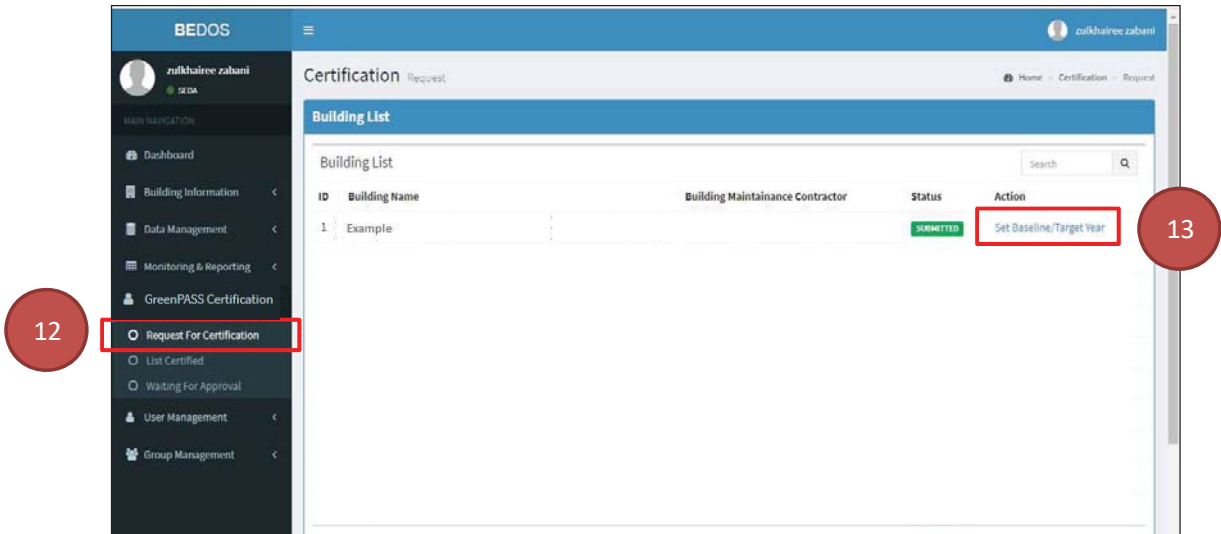


All these graph will be displayed on your screen and show all the data that you want. Now, you can start monitoring your building data

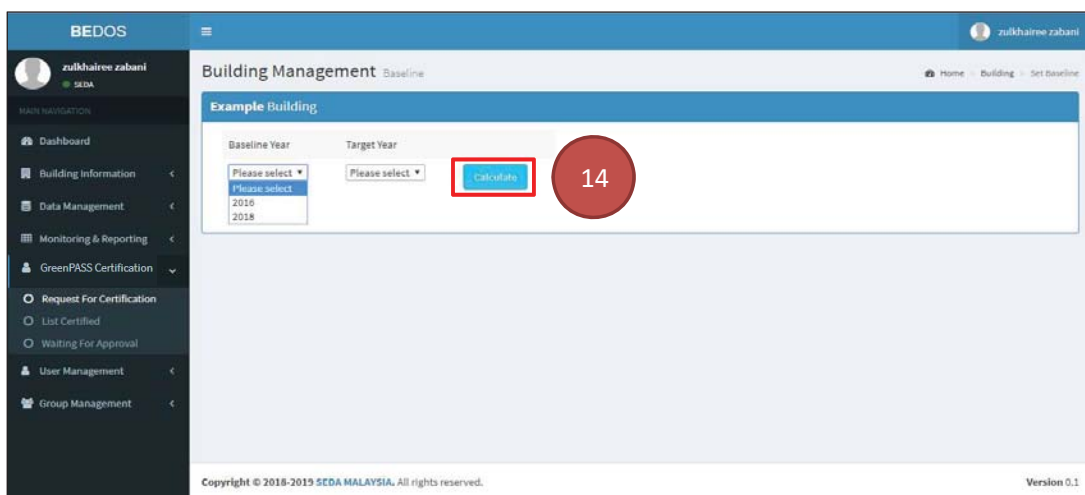
PART E

FOR CERTIFICATION PURPOSES





Next, under the **GreenPASS Certification** tab, select ⑫ **'Request For Certification'**. Proceed to click on ⑬ **'Set Baseline/Target Year'** placed in the action column for the building that has been registered



Select the relevant **Baseline Year** and **Target Year** then click on ⑭ **'Calculate'**. The system will then proceed to calculate the energy savings that has been achieved based on the baseline and target year selected.

Month	Baseline Consumption data (kWh) (2016)	BEI Baseline Year (2016)	Performance Data (kWh/Year) (2018)	BEI Target Year (2018)	Energy Saving (kWh)	Energy Saving (%)
1	985,678	97.57	322,324.00	31.91	663,354.00	67.30
2	976,679	86.78	234,325.00	23.19	642,354.00	73.27
3	678,578	66.97	434,233.00	42.08	242,345.00	35.82
4	976,886	86.80	343,235.00	33.97	533,651.00	60.86
5	987,665	97.76	435,421.00	43.10	552,244.00	55.91
6	886,879	87.79	344,325.00	34.10	542,354.00	61.15
7	987,790	97.78	423,456.00	41.92	564,334.00	57.13
8	678,799	67.19	353,422.00	34.98	325,377.00	47.98
9	898,766	88.96	345,432.00	34.19	553,334.00	61.57
10	989,887	97.98	235,265.00	23.29	754,602.00	76.23
11	789,987	78.20	454,354.00	44.97	335,633.00	42.49
12	989,887	97.98	456,352.00	45.17	533,335.00	53.89
Total	10,625,261.00	87.64	4,382,344.00	36.15	6,242,917.00	58.76

Submit for Certification

15

The final step is to select ⑮ ‘Submit for Certification’. The registration process is now complete. An email will be sent to the contact person once it is approved. The name of the building will be placed in the certified list of buildings



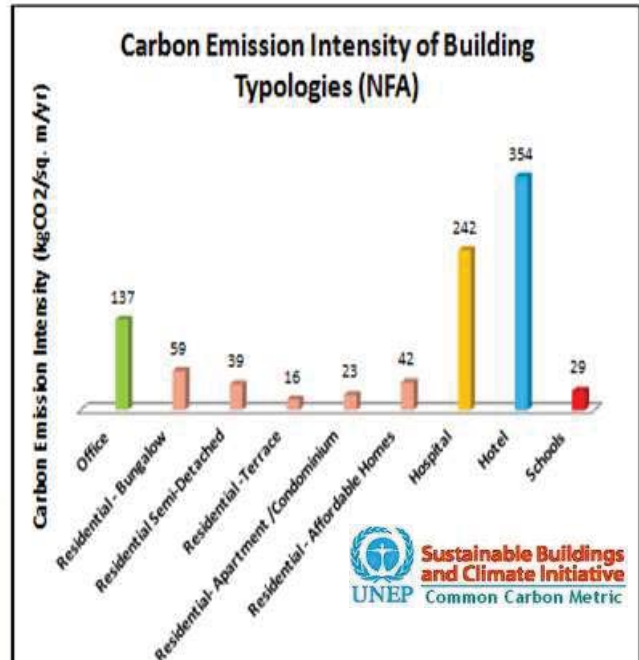
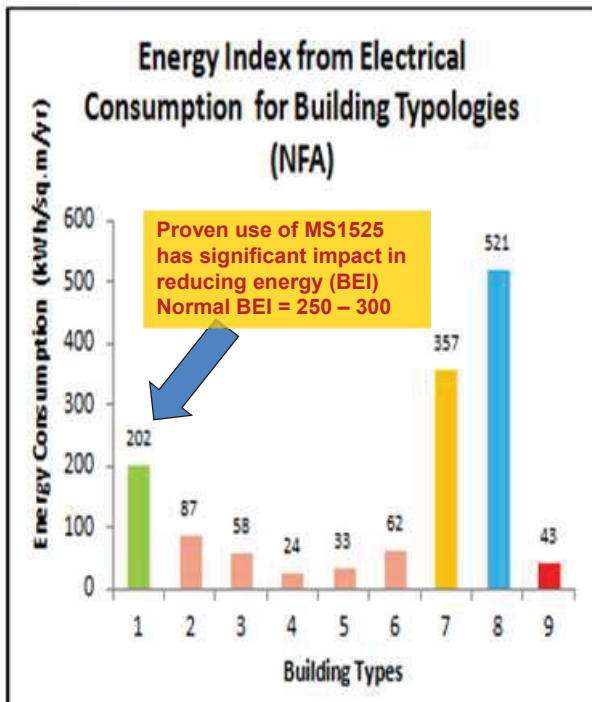
Common Carbon Metric (CCM) for Building Sector for Various Type of Building



Building Energy Index and Carbon Emission Intensity for Building Typologies



In PUTRAJAYA



Access

DBKL ADMIN (Can see, create, monitor)

DBKL 1	DBKL 2	DBKL 3	IDB
<ul style="list-style-type: none"> i. i. Account dedicated for DBKL1. ii. Can see own building data only. iii. To be keyin by person incharge / maintenance 	<ul style="list-style-type: none"> i. Account dedicated for DBKL2. ii. Can see own building data only. iii. To be keyin by person incharge / maintenance 	<ul style="list-style-type: none"> i. Account dedicated for DBKL3. ii. Can see own building data only. iii. To be keyin by person incharge / maintenance 	<ul style="list-style-type: none"> i. Account dedicated for DBKL IDB. ii. Can see own building data only. iii. To be keyin by person incharge / maintenance

ACCESS

Thank you for your attention



NEED HELP ON LOW CARBON GREEN BUILDING PROGRAM / ZERO ENERGY BUILDINGS?
- Tel / SMS / WhatApps: **+6019-2829102**
steve@seda.gov.my / asetip@damansara.net

SEDA Malaysia,
Galeria PjH, Level 9
Jalan P4W, Persiaran Perdana,
Presint 4, 62100 Putrajaya, Malaysia.

Steve Anthony Lojuntin

Phone : +603-8870 5800 / 5841
Email: steve@seda.gov.my
Web: www.seda.gov.my

KUALA LUMPUR CITY HALL ENERGY REDUCTION POTENTIAL

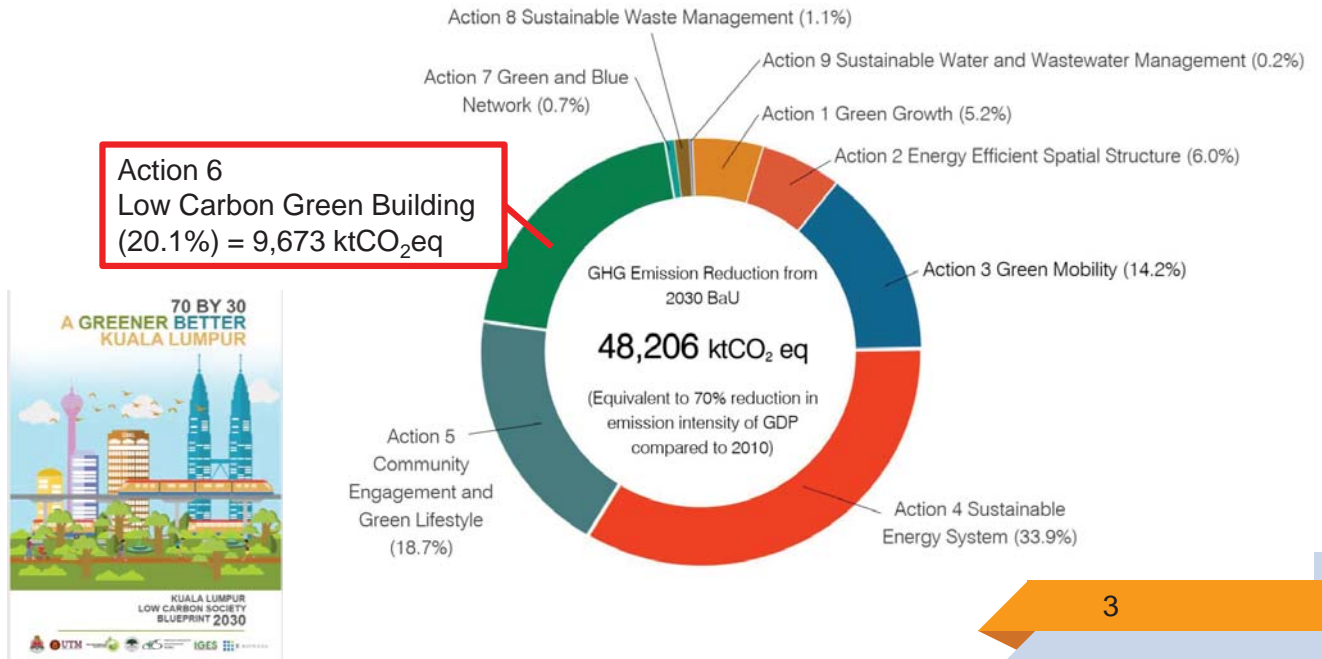
29 JULY 2019

1

BACKGROUND

2

Buildings contribute to 49% of total GHG emissions in Kuala Lumpur



3

DBKL Buildings by Type

No	Type of Building	No. of Buildings	Data Given
1	Quarters	1,063	0
2	Offices	35	13
3	Clinic for Pregnant women & Children	15	0
4	Library	8	0
5	Building under NADI	13	0
6	Building under <i>Jabatan Penilaian & Pengurusan Harta</i>	592	0
7	Guesthouse	23	0
8	Public Toilet	34	0
9	Market	38	0
10	Hawker Centre	45	0
11	Kiosk	26	0
12	Community Centre & Multipurpose Hall	30	0
13	Stadium & Sport Complex	15	0
14	Park	16	14
15	Others	2	0
	Total	1,955	

4

2

PRELIMINARY ANALYSIS

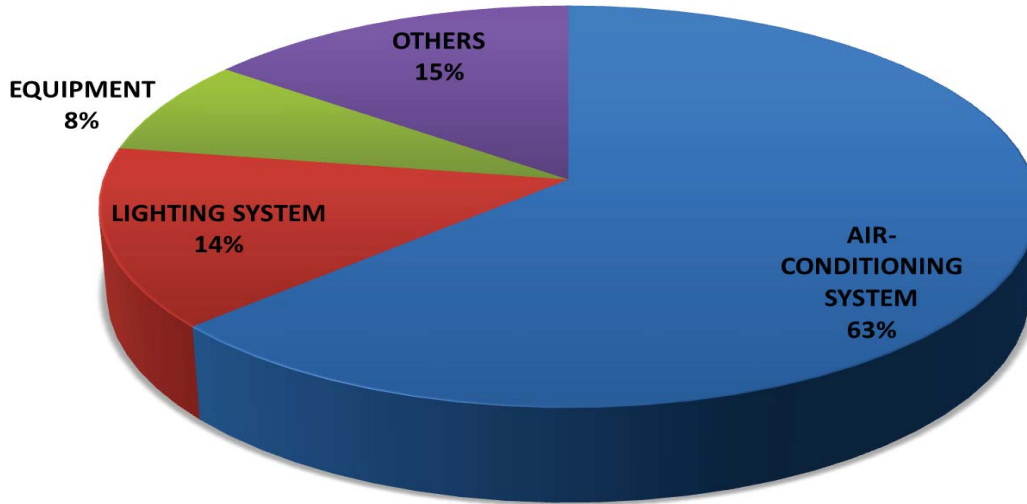
5

	Scenario 1					Scenario 2				
	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO ₂ Reduction (kgCO ₂ e/yr)	% CO ₂ Reduction	Annual Elec Consumption (kWh/yr)	Potential Annual Elec Reduction (kWh/yr)	Potential Annual RE (kWh/yr)	Potential Annual CO ₂ Reduction (kgCO ₂ e/yr)	% CO ₂ Reduction
Offices (13/35 buildings)	15,870,384	3,808,892	1,587,038	3,744,776	35	15,870,384	4,761,115	1,587,038	4,405,619	47
Parks (14/16 parks)	36,005,220	5,400,783	7,201,044	8,745,668		36,005,220	10,801,566	7,201,044	12,493,811	
Total	51,875,604	9,209,675	8,788,082	12,490,444		51,875,604	15,562,681	8,788,082	16,899,430	
Assumptions (Offices)	<ul style="list-style-type: none"> <input type="checkbox"/> CO₂ Conversion is based on 2014: Baseline CO₂ for Peninsular - 0.694 tCO₂/ MWh <input type="checkbox"/> Building Energy Index (BEI) for Offices is based on BEI and Common Carbon Metric Study in Putrajaya (2010) <input type="checkbox"/> Estimated 10% of Contribution from Renewable Energy is based on estimated roof space of the building 					<ul style="list-style-type: none"> <input type="checkbox"/> Estimated 30% potential reduction is based on average of highest range energy saving measures value for 23 offices building under Energy Audit Conditional Grant, program under 11th Malaysia Plan 				
Assumptions (Parks)	<ul style="list-style-type: none"> <input type="checkbox"/> CO₂ Conversion is based on 2014: Baseline CO₂ for Peninsular - 0.694 tCO₂/ MWh <input type="checkbox"/> Estimated 15% potential reduction is based on conservative assumption <input type="checkbox"/> Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway 					<ul style="list-style-type: none"> <input type="checkbox"/> Estimated 30% potential reduction is based on stretch value of possibility with the consideration of best technology available (higher effort and higher investment) <input type="checkbox"/> Estimated 20% of Contribution from Renewable Energy is taking into consideration possibility of usage of walkway 				



TYPICAL OFFICE ENERGY APPORTIONING

Typical Energy Apportioning for Offices



7

3

POSSIBLE TECHNOLOGY IMPLEMENTATION

8



POSSIBLE TECHNOLOGY IMPLEMENTATION

Building Envelope	1	Infiltration - Airtight Building Envelope
	2	Reduce Direct Sunlight - Shading, Window Blind
	3	Insulation - Green Roof, Roof Insulation, Wall Insulation, Window Tinted, Window Glass
Air-Conditioning System	4	Outdoor Air Ventilation Control
	5	Zoning & Control of Air Distribution System - VAV, Temperature & Humidity Control, Setback & Shut-off Control, Off-hour control
	6	High Efficiency Fan System
	7	High Efficiency Air Filtration
	8	Effective Piping & Ducting Insulation
	9	High Efficiency Unitary Air Conditioning System - Single Split, Package, Multi Split, VRF
	10	High Efficiency Centralized Air Conditioning System - Chiller, Hydronic System, Cooling Tower
	11	Control of Centralized Air Conditioning System - Automation & Optimization
Lighting	12	Lighting Control - Daylight Control, Illuminance Control, Zoning Control, Motion Control, Off-hour Control
	13	High Efficiency Lighting System - Indoor & Outdoor
Energy Management Control System	14	Control of Equipment, Monitoring of Equipment, Integration of Equipment and Other Sub-systems, Energy related Data Collection and Analyses
Renewable Energy	15	Solar PV

9

4

SUMMARY

10



**BENEFITS UP TO BASED ON 2nd
SCENARIO:**



16,899,430 kgCO₂e/year

CO₂ EMISSION REDUCTION



24,350,764 kWh/year

ENERGY SAVING



**= approx.
MYR 9.74
million!**



47%

CO₂ EMISSION IMPROVEMENT



11



THANKS!



12

The Importance of Good Building Operation Management

- Good collaboration between building management officers and users is essential to promote effective and continuous energy saving actions

Investment
(hardware)



Management & operation (soft methods)

Replace with highly efficient equipment, etc.

Collaboration

Building
management
side



Employees
and
visitors



TOKYO METROPOLITAN GOVERNMENT

運用対策の効果的な進め方

1

Effective operational measures

- Cost effective measures to save energy can be achieved from the actions of the officials.
- It is crucial to continue to improve through a PDCA cycle and by institutionalizing energy saving.

Steps for operational measures

- ① Develop energy saving manuals & checklists
- ② Institutionalize energy saving (share information between section heads, status)
- ③ Correctly perceive the reality (self checking by checklists)
- ④ Analyze the results (achievement levels, issue-mining)
- ⑤ Set targets for energy saving activities (improve energy saving activities)
- ⑥ Carry out energy saving measures ⇒③

P
D
C
A



TOKYO METROPOLITAN GOVERNMENT

2

① Energy saving manuals & check-lists

- Building operations manager should develop energy saving manuals, operation procedures and self-checklist (for civil officers).
- Manuals, operation procedures could serve as reference for self-checking.

<Example of a checklist for self-checking>

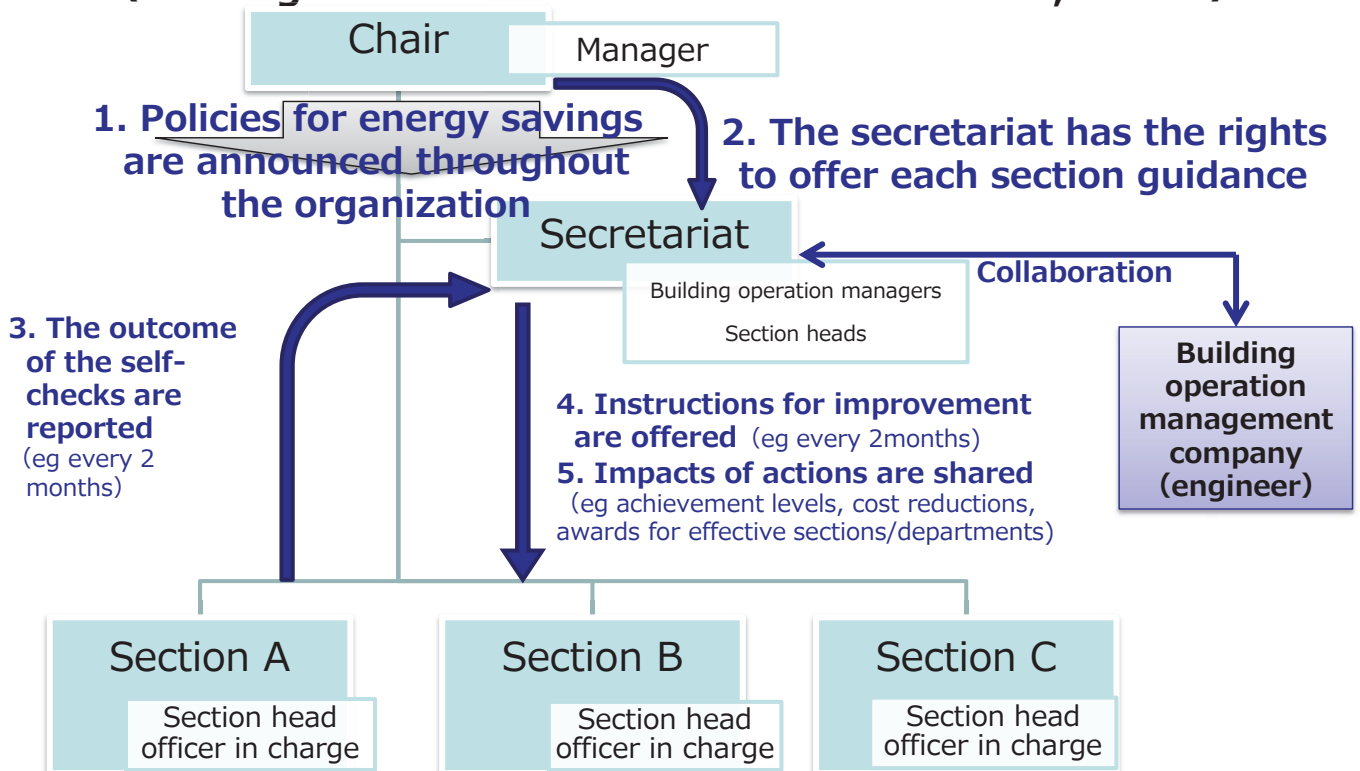
Item	Practiced		Not practiced	N/A	Execution rate
Setting ○○	For the whole floor				
	For 50% of the floor				
	For 20% of the floor				
Switching off ○○	For the whole floor				
	For 50% of the floor				
	For 20% of the floor				
...					



省エネ推進体制の整備（責任者の配置、状況の共有）

② Institutionalization of energy saving

(Sharing information between section heads, status)



Section head : The person responsible for the activity within the section
 Officer in charge : The officer in charge of conducting the activity (self-checks)

③ Correctively perceive the reality

(self checking by checklists)

- The officer in charge checks the status of his/her section
- A common checklist for self-checking is used
- Numerical targets such as execution rates are used which will allow the officer to evaluate the status and recognize the issues even without technical knowledge

<Example of a checklist for self-checking>

Item	Practiced		Not practiced	N/A	Execution rate
Setting ○○	For the whole floor	○			100%
	For 50% of the floor				
	For 20% of the floor				
Switching off ○○	For the whole floor				50%
	For 50% of the floor	○			
	For 20% of the floor				
...					




④ Analyze the results

(achievement levels, problem mining)

- Analyze their own checklist and identify measures to counter their issues (eg. Check which items have not exceeded 95% = work on those specific items)
- Report the self-check results to the secretariat
 - ⇒ The secretariat conducts comparative studies and offers pointers for improvement

<Example of an evaluation>

Status	Levels	Criteria
<p style="text-align: center;"> Good  Bad </p>	5	Over 95% is practiced
	4	Over 70% and less than 95% is practiced
	3	Over 30% and less than 70% is practiced
	2	Over 5% and less than 30% is practiced
	1	Less than 5% is practiced



⑤ Set targets for energy saving

activities (improve energy saving activities)

- Target setting is conducted according to the results to the self checks
- The targets are satisfied if all of the planned actions / measures are implemented (target is completed)
⇒ move on to new actions and higher achievement levels

<Example for target setting>

<Policies set by the Chair>
**All energy saving actions itemized in “step 1”
 reach level 5 within a year**



The secretariat should develop the Targets

PDCA cycle	Target
6 months	【Interim target】 All items reach level 3 or higher
12 months	【Final target】 All items reach level 5 or higher



⑥ Carry out energy saving actions

“immediate implementation”

- Once the functions are set, it is not required for a second time. Immediate action is favored.
- carry out the actions immediately and notify the official in charge when completed ⇒ report goes to the secretariat

Action / Measures	By whom
<p>○ PC is set at an energy saving mode</p> <ul style="list-style-type: none"> • Appliances enter into a sleep mode if they are left unattended for a short timespan. • The displays are set at an appropriate luminance (Especially for new PCs which are set at 100% and are the reason for eye fatigue) * Officers are notified of how to set their appliances through the distribution of manuals (Building Operation Manager) 	Officer(user) / Building operation manager
<p>○ Printers, and facsimile are set at energy saving mode</p> <ul style="list-style-type: none"> • Appliances enter into a sleep mode if they are left unattended for a short timespan. 	Building operation manager
<p>○ Lighting floor maps and specific locations prohibited for lights is illustrated</p>	Building operation manager
<p>○ Lightings are set at the appropriate luminance</p> <ul style="list-style-type: none"> • For example offices are set at 500lx 	Building operation manager



⑥ Carry out energy saving actions

“Active measures”

- Measures that need to be conducted actively at times
- Awareness raising required to facilitate voluntary actions

Action / Measures	By whom
<ul style="list-style-type: none"> ○ Use window shades (blinds) <ul style="list-style-type: none"> • Block sunlight using window shades during the time of day when direct sun radiation comes inside the building • Utilize daylight by calibrating the angle of the blades for the window shade 	Official
<ul style="list-style-type: none"> ○ Utilize daylight to calibrate the luminance <ul style="list-style-type: none"> • Switch off some of the lights along the window cells: places that are bright 	Building operation manager
<ul style="list-style-type: none"> ○ Utilize lighting floor maps and see that areas with no occupants are switched off partially 	Official
<ul style="list-style-type: none"> ○ Frequently switch off PC displays <ul style="list-style-type: none"> • Switch it off when vacant from the desk • Close the lid of the notebook pc (also effective security-wise) * Place awareness raising labels on the PC displays (Building operation manager) 	Official / Building operation manager
<ul style="list-style-type: none"> ○ Regular inspection and cleaning of filters and the blades for the A/C outdoor unit <ul style="list-style-type: none"> • Eg. Filters: 2 times/year, blades: once per 5 years * With no maintenance, electricity consumption can rise by 50% in two years 	Building operation manager
<ul style="list-style-type: none"> ○ Confirm the difference in temperature within the room <ul style="list-style-type: none"> • identify locations where there is a drop/rise in room temperature, such as windowsills and near office appliances. • utilize circulators to accommodate for the difference in these specific locations rather than change the A/C setting of the room temperature 	Building operation manager

TOKYO METROPOLITAN GOVERNMENT

9

省エネ活動の実践：「継続改善」型取組み

⑥ Carry out energy saving actions

“Continued implementation”

- Actions with continued improvements using a PDCA cycle
- Official in charge should regularly check up ⇒ and report to the secretariat

Actions / Measures	By whom
<ul style="list-style-type: none"> ○ Lights and A/Cs are switched off per each area by the last official <ul style="list-style-type: none"> • The checklist is used by the last official to prevent them from forgetting to switch off the appliances (light, A/C, printer, facsimile etc..) 	Official
<ul style="list-style-type: none"> ○ Pull PC cables out of the sockets when departing from office <ul style="list-style-type: none"> • When vacant from the office for a long time during office hours, switch off and pull the cable out from the power socket (to prevent consumption of the standby power which happens even if it is switched off) * use table taps with switches to make it simple 	Official
<ul style="list-style-type: none"> ○ Appropriate temperature setting for A/Cs <ul style="list-style-type: none"> • Define rules that acknowledge the area's characteristic (number of officers, use (dedicated for officers only, a rooms to which visitors are admitted etc..)) * Be mindful of the difference in the temperature within the room (Building operation manager) 	Official/Building operation manager
<ul style="list-style-type: none"> ○ Switch off the A/Cs in rooms that are vacant or when they are vacant <ul style="list-style-type: none"> • Lights and A/Cs for conference rooms, locker rooms, tea rooms etc.. Should be switched off * An awareness raising poster should be placed on the conference room door (Building operation manager) 	Official/Building operation manager
<ul style="list-style-type: none"> ○ Switch off appliance outside of office working hours <ul style="list-style-type: none"> • Switch off appliances outside of office working hours (ventilation facilities (toilets, warehouse etc..), electric water heater etc.) 	Official



TOKYO METROPOLITAN GOVERNMENT

10

⑥ Carry out energy saving actions

<Example: Checklist when departing from office>

Date and time of departure		Check if lights are switched off・A/C is off			Close doors and windows			Last official to depart		Confirmation by the section head (next day)
Month / day	Time	Office	Copy room	Design room	Office	Copy room	Design room	Dept. / section	Full name	
1/15	19:00	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Strategic section	〇〇〇〇	<input checked="" type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>

- Each area is required to check if the last official has turned all the appliances off before departing by using the checklist.
- The checklist will be placed near the door from which everyone departs.
- The section head should confirm the following day if the checklist is complete.
- The building operation management company should check during their night time patrol.

TOKYO METROPOLITAN GOVERNMENT

11

70 BY 30 A GREENER BETTER KUALA LUMPUR

KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030

SUMMARY FOR POLICYMAKERS 4th EDITION

JULY 2018



UTM-LOW CARBON ASIA
RESEARCH CENTRE



National Institute for
Environmental
Studies





EDITORIAL TEAM

Ho Chin Siong
Chau Loon Wai
Gabriel Ling Hoh Teck
Miysha Nurshyla Abdul Rahim
Mohamad Zulikhram Zulibrahim
Muhammad Akmal Hakim Hishammuddin
Rohayu Abdullah
Nur Syazwani Saari
Nadzirah Jausus

WHAT'S INSIDE

SUMMARY FOR POLICYMAKERS

KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030

WHAT'S INSIDE SPM **1** FOREWORD FROM THE MINISTER **2**
FOREWORD FROM THE MAYOR **3** PREAMBLE **4** PREFACE **5** KEY
MESSAGES TO POLICYMAKERS **6**

Kuala Lumpur Basic Profile **pg 8**

Baseline Scenarios at a Glance **pg 10**

Kuala Lumpur 70 by 30 **pg 12**

Introduction to KL LCS **pg 12**

Policy Context of KL LCSBP 2030 **pg 13**

KL LCSBP 2030 Process and Methodology **pg 14**

Objectives **pg 15**

Road to Achieving 70 by 30 Goal **pg 16**

Kuala Lumpur Emission Profile **pg 18**

10 Mitigation Pathways towards Kuala Lumpur 70 by 30

Action 1 Green Growth **pg 20**

Action 2 Energy Efficient Spatial Structure **pg 26**

Action 3 Green Mobility **pg 32**

Action 4 Sustainable Energy System **pg 38**

Action 5 Community Engagement and
Green Lifestyle **pg 42**

Action 6 Low Carbon Green Building **pg 48**

Action 7 Green and Blue Network **pg 54**

Action 8 Sustainable Waste Management **pg 60**

Action 9 Sustainable Water and Wastewater
Management **pg 64**

Action 10 Green Urban Governance **pg 68**

HOW TO READ KL LCSBP 2030 ROADMAP **76** ACRONYMS AND
ABBREVIATIONS **79** REFERENCES **80** PROJECT TEAM MEMBERS
81 ACKNOWLEDGEMENTS **82**



Tuan Hj. Khalid bin Abd. Samad
Minister of Territories

FOREWORD FROM THE MINISTER

At the 2009 United Nations Climate Change Conference in Copenhagen, the former Prime Minister announced Malaysia's commitment to reducing its carbon emission intensity in comparison to Gross Domestic Products (GDP) by up to 40% by the year 2020 compared to the 2005 level, with the assistance from developed countries.

The country has achieved great progress since then, recording a 33% reduction in emission intensity by 2015. Building on this success and as a further commitment to tackling global climate change, Malaysia has ratified The Paris Agreement 2015 and re-pledged to reduce the country's carbon emission intensity of GDP by 45% by 2030.

In order to stand by our pledges, our actions have to be planned, informed and coordinated across different cities, townships and communities. We have to ensure that our future generations inherit a place that is not only fit for human habitation, but also conducive for future growth and prosperity.

As the nation's capital, Kuala Lumpur must lead the change. It is essential for Kuala Lumpur to put in place and implement concrete Low Carbon Society (LCS) blueprint towards reducing greenhouse gases (GHG) emissions of the city. I commend the Kuala Lumpur City Hall (KLCH) in leading the cause, and hope that the LCS blueprint would increase and strengthen investments in environmental assets, green technology and production for Kuala Lumpur.

May this initiative serve as a working model for other cities within Malaysia and beyond.

FOREWORD FROM THE MAYOR

Tan Sri Hj. Mhd. Amin Nordin bin Abd Aziz
Mayor of Kuala Lumpur



We have an ambitious vision yet achievable for Kuala Lumpur.

We envision Kuala Lumpur to be a World Class City by 2020. We are enhancing our economic growth, societal wellbeing and development of its people. We hope to see Kuala Lumpur on par with other global cities like Melbourne, Copenhagen, Tokyo and New York, by adopting a holistic approach in managing resources, environment and space within the city.

With this in mind, the Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) is formulated. This blueprint will provide Kuala Lumpur City Hall (KLCH) with a strategic direction and clear framework for coordinating related policies and programs towards the reduction of GHG emissions for Kuala Lumpur. It also optimises the City's limited resources towards more effective and impactful implementation of various measures related to GHG emissions reduction.

Based on the projected development scenarios and baseline assessment of GHG emissions reduction potentials in 2020 and 2030, we have identified 10 Actions and 245 Programs to be implemented in a timely and proactive manner. I expect Kuala Lumpur City Hall to play the leading role in the process, engaging our stakeholders to work together in achieving our targets.

I wish to thank the UTM-Low Carbon Asia Research Centre team for their invaluable research efforts and consultation throughout the formulation of the Kuala Lumpur Low Carbon Society Blueprint 2030.

PREAMBLE

This Summary for Policymakers (SPM) offers a concise synopsis of the Kuala Lumpur Low Carbon Society Blueprint 2030 (the Blueprint). It is aimed at facilitating quick and convenient reference to the Blueprint's 10 Low Carbon Society (LCS) actions and the potential carbon emission reductions achievable from the implementation of the actions in Kuala Lumpur. It is targeted especially at readers who need to get a *straightforward yet sufficient* overview of the LCS actions and how the actions, severally and jointly, potentially contribute to reducing carbon emission levels in Kuala Lumpur, without the burden of unneeded technical complexities. Target reader groups include policy/decision makers or relevant officials of various public, private and/or not-for-profit entities, as well as stakeholder groups and citizens concerned with Kuala Lumpur's development and its impacts on the environment, society and climate change, and anyone who would like to have a role in reducing carbon emission in Kuala Lumpur.

This summary focuses readers on key explanations and justifications of each LCS 'action' and their supportive 'sub-actions' that are deemed vital and sufficient for guiding *strategic- and policy-level discussions and decision making*, saving all scientific and technical details to the master Blueprint document. Therefore, 'measures' and 'programs' that follow each LCS sub-action are listed under the relevant LCS action but specific descriptions and explanations of the measures and programs, which are more pertinent to the operational and implementation levels, have been excluded from this summary. When these and further technical details are required, and for better insight into the complete strategies to transform Kuala Lumpur into a low carbon society, readers should consult the master Blueprint document.

PREFACE to KL LCSBP 2030

Cities are increasingly recognised as the most effective and important non-state actors in mitigating global climate change in terms of yielding real cuts in urban Greenhouse Gas (GHG) emissions. Kuala Lumpur, as the Capital City and economic powerhouse of rapidly developing Malaysia, needs to lead the way to reducing GHG emissions of rapid economic growth, especially in contributing to the achievement of the national target of 45% reduction in GHG emission intensity of GDP by 2030 (compared to the 2005 level). To that end, the formulation and implementation of a holistic, scientifically grounded and people-centric city-level climate change mitigation plan – the Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) – using the ‘Science to Action’ (S2A) approach are highly essential.

As a holistic plan, the KL LCSBP 2030 proposes 10 Actions, 37 Sub-actions, 82 Measures and 245 Programs for implementation that straddle three key thrusts: 1) Prosperous, Robust and Globally Competitive Economy; 2) Healthy, Creative, Knowledgeable and Inclusive Community; and 3) Ecologically Friendly, Liveable and Resilient Built Environment.

Being scientifically grounded, the internationally-recognised Asia-Pacific Integrated Model (AIM) has been used to project Kuala Lumpur’s GHG emission intensity reduction potential under various scenarios (with different sets of parameters and justified assumptions for the proposed Measures and Programs). The model shows Kuala Lumpur can potentially reduce its GHG emission intensity by up to 70% by 2030 (compared to the 2010 level), which is equivalent to an absolute reduction of 48,206 ktCO₂eq from the business as usual scenario.

As a people-centric plan, the proposed Actions, Sub-actions, Measures and Programs have been put under scrutiny and review by multiple stakeholders in three Focus Group Discussion (FGD) workshops. The KL LCSBP 2030 is therefore the outcome of review by, and feedback from, the multiple stakeholders engaged in the workshops.

Ultimately, the KL LCSBP 2030 seeks to be a people’s policy that is grounded in scientific research with practical implementation in mind. It will provide a strategic direction and clear framework for coordinating and consolidating various related but largely unconnected sustainability and climate change mitigation policies and programs to optimise the City’s limited resources towards more effective and impactful implementation of GHG reduction measures towards meeting the city’s emission intensity reduction target of 70% by 2030.

November 2017

UTM-Low Carbon Asia Research Centre (UTM-LCARC)
Faculty of Built Environment and Surveying
Universiti Teknologi Malaysia
Johor Bahru
Malaysia





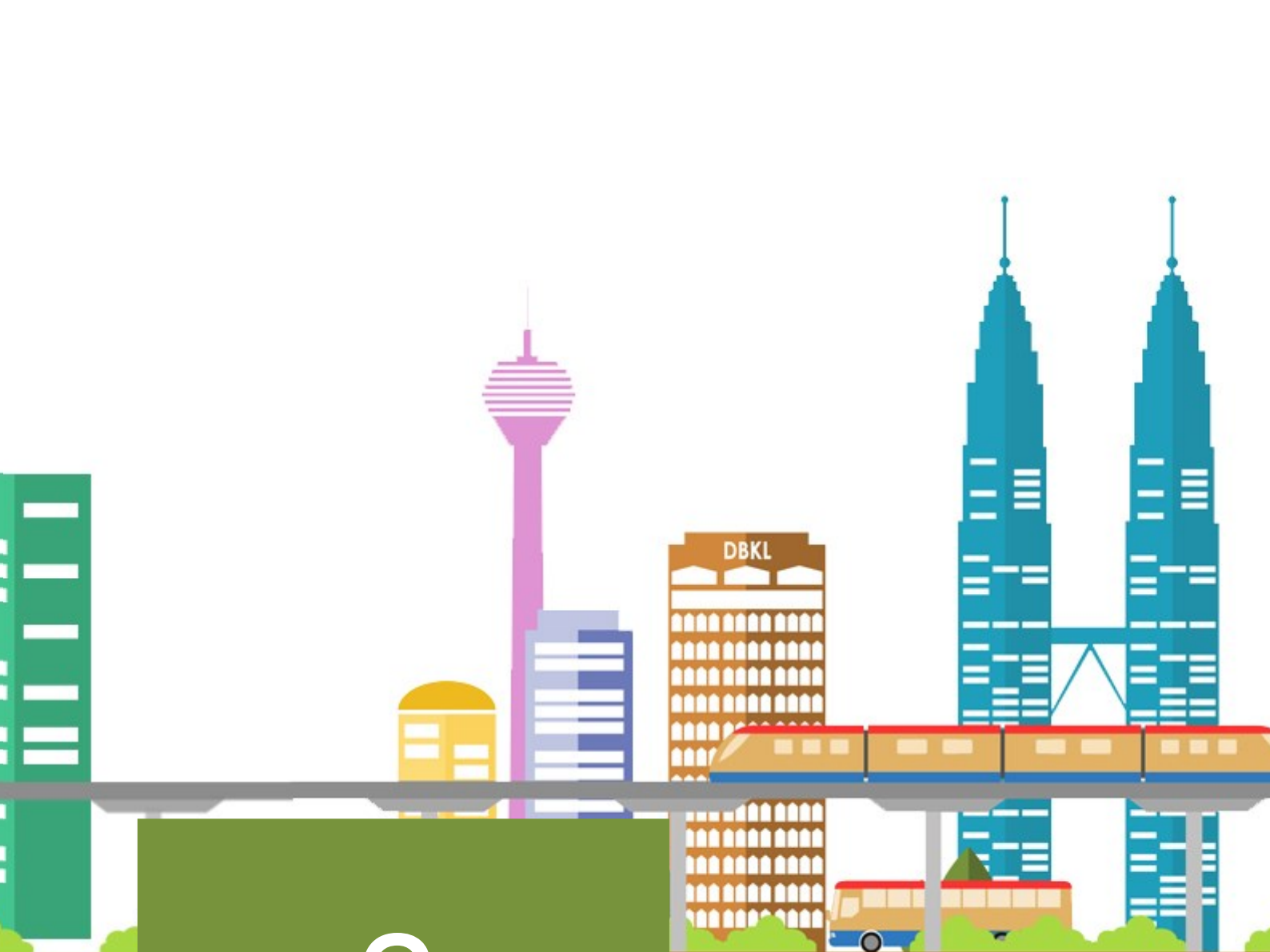
KEY MESSAGES TO POLICYMAKERS

1

Kuala Lumpur as Malaysia's economic capital and an emerging global city is well positioned to lead developing cities nationally and globally towards reducing significant GHG emissions of rapid economic growth

2

Kuala Lumpur presents a huge potential for reducing over 48,000 ktCO₂eq by 2030 and up to 70% of the reduction can be effected through measures and programs that are under KLCH's direct and indirect purviews



3

Immediate adoption and progressive implementation of LCS Blueprint by KLCH are crucial to putting Kuala Lumpur on the path towards achieving carbon neutrality beyond 2030

4

KLCH needs to work with, and secure effective buy-in of the KL LCSBP 2030 from, various stakeholders, including residents and the civil society; businesses and industries; as well as relevant ministries and federal agencies



KUALA LUMPUR

Function

National Capital of Malaysia. One of the major commercial, financial, education, entertainment, healthcare, cultural, and tourism centres of Asia.



On the central west coast of Peninsular Malaysia, enclave within the State of Selangor and Klang Valley.

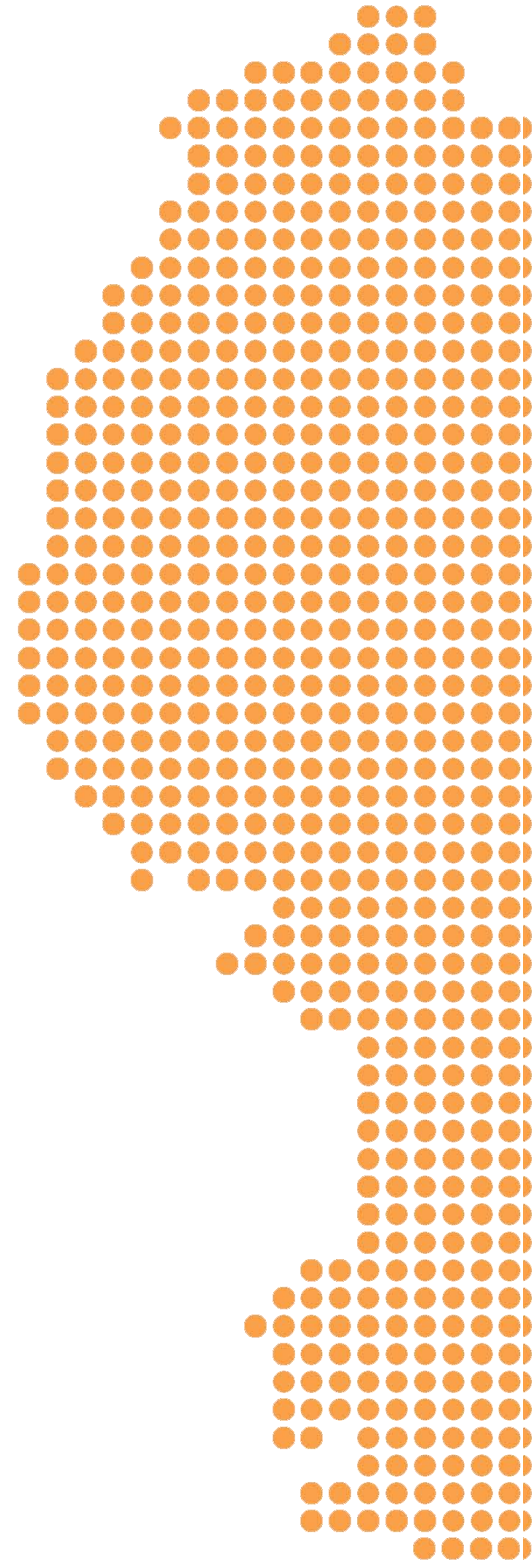
3.1390° N, 101.6869° E

Location



242km² (24,221 hectares)

Area



BASIC PROFILE

1,674,621 (2010);
2,198,400 (2020 projected);
2,488,399 (2030 projected)



Population

RM 84,852 million (2010);
RM 227,621 million (2020 projected);
RM 399,013 million (2030 projected)



Gross Domestic Product

A World Class City

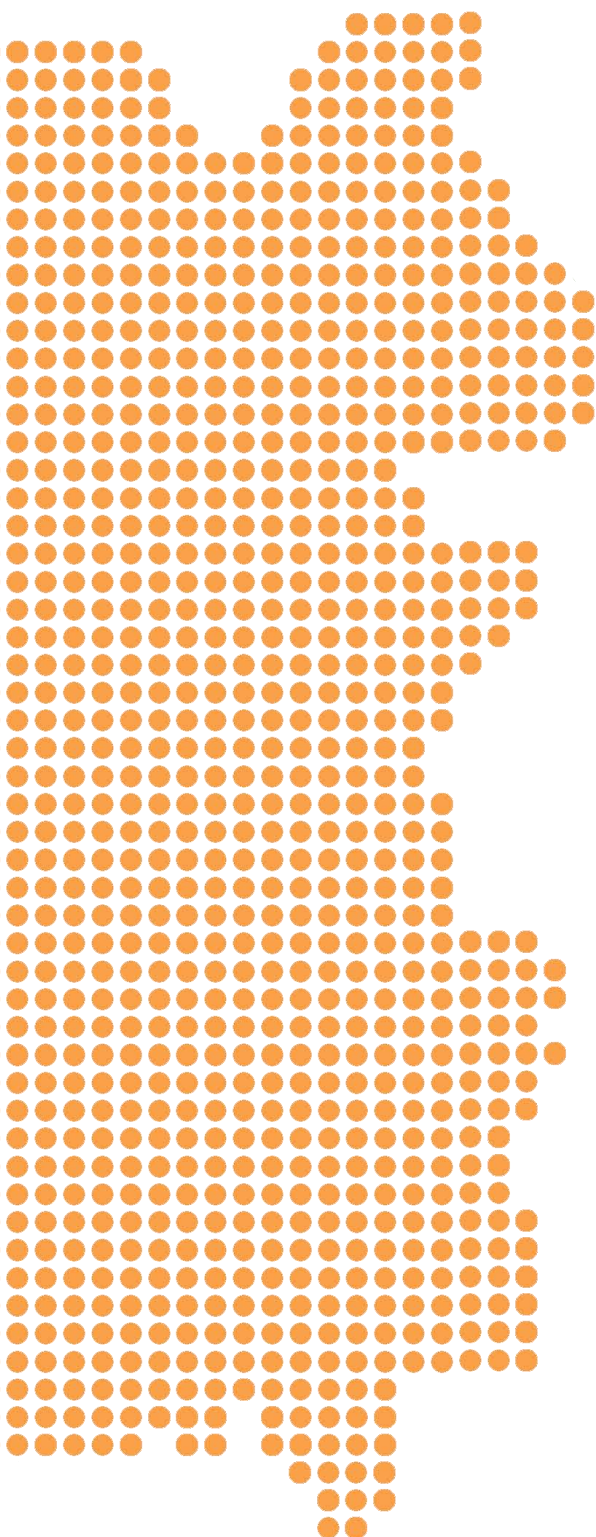


Vision

Kuala Lumpur City Hall (KLCH)



Administration



KL LCSBP 2030

BASELINE SCENARIOS

AT A GLANCE

Sector/Aspects	Components	2020 (Mid-term) Targets	2030 Targets	Cumulative Reduction Induced in 2030
Transport				
Trip Generation (trips/person/day)	Transport	4.5	3.7	12,690 ktCO ₂ (26.3%)
Mode Share (%)	Public Transport	30	60	
	Private Transport	70	40	
Average Trip Distance (km)	Public Transport	64	70	
	Private Transport	15	23	
Passenger Vehicle by Fuel Type (%)	Conventional Vehicle Oil	90	40	
	Conventional Vehicle (Biodiesel)	1	15	
	Hybrid (Oil)	7	20	
	Hybrid (Biodiesel)	0	5	
Bus by Fuel Type (%)	Electric Vehicle	2	20	
	Conventional (Oil)	95	50	
	Hybrid Bus (Oil)	5	40	
Rail (%)	Hybrid Bus (Biodiesel)	0	10	
	Conventional Passenger Train (Electric)	90	40	
Behaviour Change (%)	High Efficiency Train	10	60	
	Eco-Driving (Percent of drivers)	20	25	
Freight Vehicle by Fuel Type (%)	Conventional Vehicle (Oil)	80	50	
	Conventional Vehicle (Biodiesel)	20	30	
	Hybrid Vehicle (Oil)	0	20	
Rail (%)	Conventional Freight Train (Electric)	90	70	
	High Efficiency Freight Train (Electric)	10	30	
Waste Management				
Recycling Rate (%)		22	30	878 ktCO ₂ (1.8%)
Composting Rate (%)		8	15	
Diversion of Solid Waste from Landfill (%)		30	45	
Energy				
Power Generation (%)	Solar	3	10	17,525 ktCO ₂ (36.4%)
	Hydropower	5	10	
	Coal	59	42	
	Oil	5	3	
	Natural Gas	28	30	
	Biomass	0	5	

Sector/Aspects	Components	2020 (Mid-term) Targets	2030 Targets	Cumulative Reduction Induced in 2030
Low Carbon Green Building				
Commercial Buildings				
Air Conditioner (%)	High Efficiency Air Conditioner Conventional Air Conditioner	15 85	40 60	14,433 ktCO ₂ (29.9%)
Water Heating (%)	High Efficiency Oil Water Heater	5	5	
	Conventional Oil Water Heater	5	5	
	High Efficiency Electric Water Heater	5	20	
	Conventional Electric Water Heater	85	50	
	Solar Water Heater	0	20	
Kitchen (%)	High Efficiency Gas Cooking Stove	5	20	
	Conventional Gas Cooking Stove	0	0	
	High Efficiency Oil Cooking Stove	7	20	
	Conventional Electric Cooking Stove	83	30	
	IH Cooking Device	5	30	
Other Electrical Appliances (%)	High Efficiency Electric Appliances	20	40	
	Conventional Electric Appliances	80	60	
Building (%)	Solar Power Generation	10	40	
	Insulation of Commercial Building	15	30	
Behaviour Change (%)	Energy Saving Action (percent of commercial buildings)	10	20	
Residential Buildings				
Air Conditioner (%)	High Efficiency Air Conditioner Conventional Air Conditioner	20 80	60 40	2,153 ktCO ₂ (4.5%)
Water Heating (%)	High Efficiency Oil Water Heater	10	5	
	Conventional Oil Water Heater	40	5	
	High Efficiency Electric Water Heater	15	70	
	Conventional Electric Water Heater	35	20	
Kitchen (%)	High Efficiency Gas Cooking Stove	5	10	
	Conventional Gas Cooking Stove	20	0	
	High Efficiency Oil Cooking Stove	4	20	
	Conventional Electric Cooking Stove	70	40	
	IH Cooking Device	1	30	
Home Electrical Appliances (%)	High Efficiency Home Electric Appliances	40	60	
	Conventional Home Electric Appliances	60	40	
Building (%)	Solar Power Generation (percent of residential buildings)	15	60	
Behaviour Change (%)	Energy Saving Action	10	20	
Industry				
Equipment (%)	Energy Efficiency Improvement	5	10	75 ktCO ₂ (0.2%)
Carbon Sink				
Green Spaces (hectares)		2,808.6	5,164.7	452 ktCO ₂ (0.9%)
Number of Street Trees (mill.)		1.52	2.49	
TOTAL POTENTIAL REDUCTION			48,206 ktCO₂	



Photo credit: UTM LCARC

KUALA LUMPUR

70 BY 30

In transforming Kuala Lumpur towards achieving 70 by 30: A Greener and Better City by 2030, a clear sustainable and climate-responsive growth vision is crucial to frame and direct KLCH's commitment to becoming a leading city in combating climate change while simultaneously improving the city's economic, social and environmental performances. As Kuala Lumpur is envisioned to become a World Class Sustainable City by 2030, it needs to play a major global and sub-global role in tackling climate change and protecting the environment while benefiting all its residents, workers, visitors and investors socially and economically.

70 by 30 expresses Kuala Lumpur's aspiration to reduce the city's carbon emission intensity of GDP by up to 70% by 2030, which crucially supports Malaysia's renewed national carbon emission intensity reduction target of 45% by 2030. This calls for the adoption and implementation of ambitious yet achievable LCS measures and programs that have been formulated based on a holistic, Science-to-Action (S2A) and people-centric approach. The implementation of 245 LCS Programs, framed under 82 Measures, 37 Sub-actions and 10 LCS Actions, sets Kuala Lumpur on the path towards more ambitious carbon neutrality goals beyond 2030.

INTRODUCTION TO KL LCS

As Malaysia's vibrant capital city and commercial heart, and as a leading economic and cultural growth centre in Asia, Kuala Lumpur plays a pivotal role in the country's transformation towards becoming a socially progressive high income nation by 2020 and beyond.

In a climate changed world, it is essential that Kuala Lumpur realises its growth vision and at the same time contributes to meeting Malaysia's global commitment to reducing carbon emissions. The concept of LCS is therefore fundamental to guiding Kuala Lumpur's development up to 2030. The KL LCSBP 2030 will provide an effective policy platform for consolidating and coordinating in an integrated manner various related but largely unconnected sustainability and climate change mitigation policies that have been separately put in place over the years in Kuala Lumpur.

In doing so, the KL LCSBP 2030 lays down a strategic direction and clear policy framework that optimises Kuala Lumpur's limited resources towards more effective and impactful implementation of GHG reduction measures while enabling the city to continue its economic growth and social development visions.

POLICY CONTEXT OF KL LCSBP 2030

Towards decarbonising Kuala Lumpur's rapid economic growth and development, the city faces immense challenges in simultaneously meeting competing pro-growth and pro-environment goals, especially in the context of needing to advance institutionally less emphasised pro-environment goals within a traditionally deeply institutionalised pro-growth development policy framework. As such, it is critical that the formulation of the KL LCSBP 2030 carefully considers as much as possible all relevant global and national climate change mitigation and sustainable development policies as well as all existing national, regional and local development and environmental policies with a view to concretely linking the former with the latter policy sets.

The KL LCSBP 2030 therefore serves as a key policy instrument that translates and bridges between higher level sustainable, low carbon development policies (including the recent Sustainable Development Goals 2030, the Paris Agreement and the New Urban Agenda) and the city-level development policies (see Figure 1).

Crucially, towards operationalising the KL LCSBP 2030, it needs to be streamlined into Kuala Lumpur's existing spatial development planning framework, in particular into the city's statutory development plans (the Kuala Lumpur Structure Plan and the Kuala Lumpur City Plan) so as to take effect through the statutory planning control process to which all developments within the city are subject.

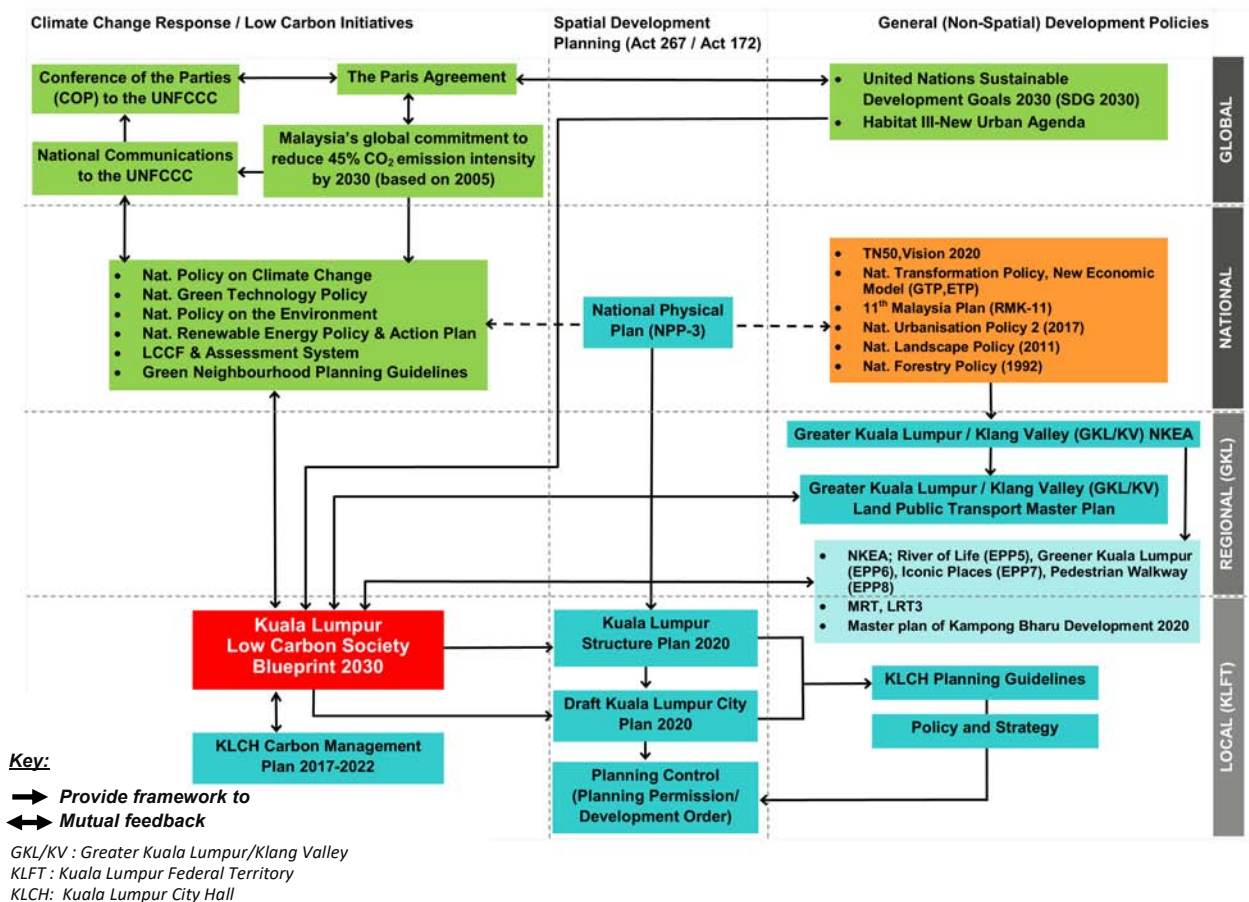


Figure 1: The policy context for the development of the KL LCSBP 2030

KL LCSBP 2030 PROCESS AND METHODOLOGY

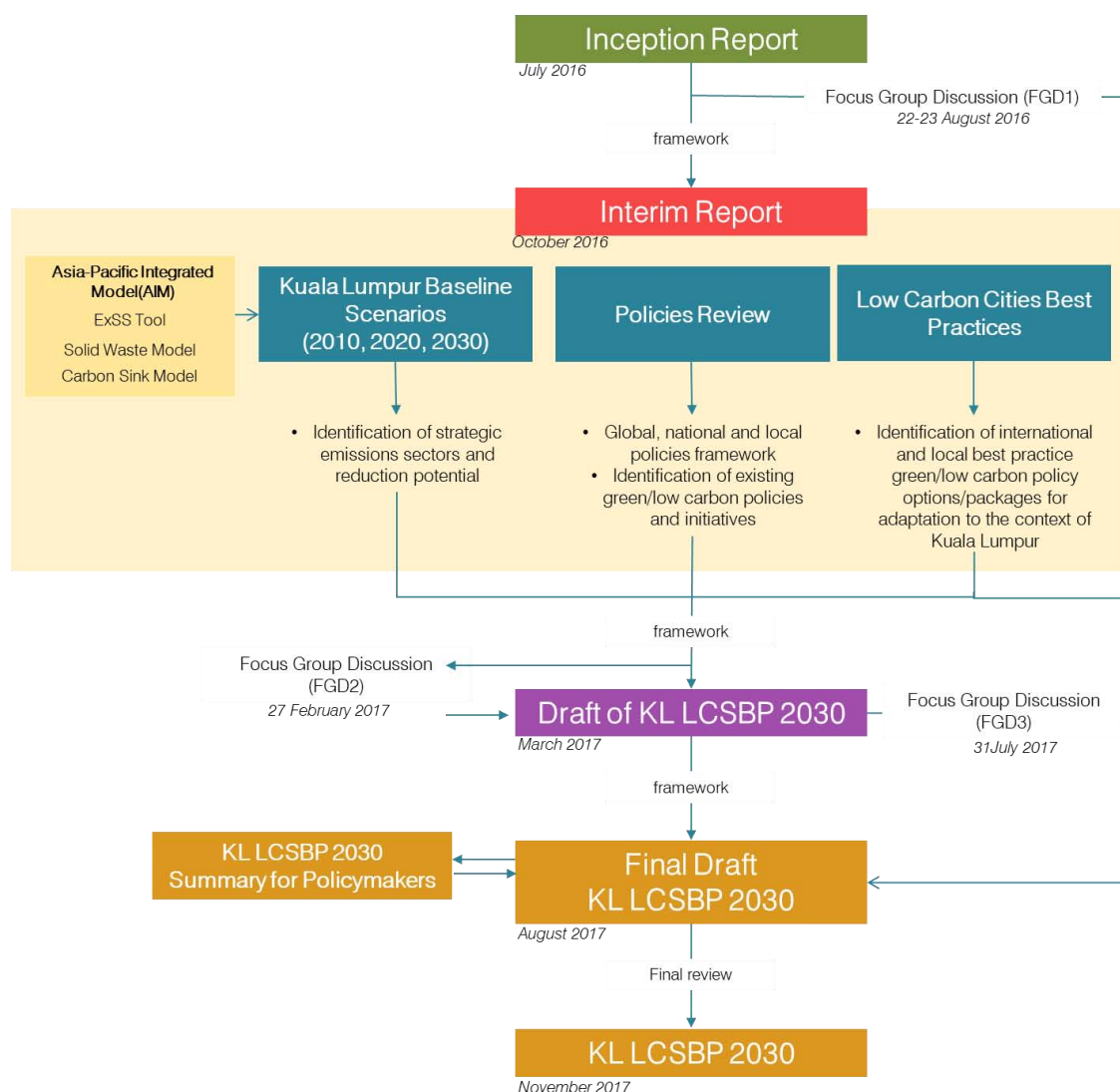


Figure 2: Project framework for KL LCSBP 2030

Formulation of the KL LCSBP 2030 began in July 2016 with a scoping exercise (Inception Report) that provided a framework for preparing the baseline study for Kuala Lumpur’s GHG emissions (Interim Report) (see Figure 2). The baseline study comprises four key components, namely 1) the setting of various baseline development scenarios for Kuala Lumpur (2010, 2020, 2030); 2) a careful review of all relevant global, national and local policies with respect to sustainable and low carbon development; 3) precedent and benchmarking studies on international and local best practices on sustainable and low carbon development; and 4) GHG modeling using the internationally recognised Asia-Pacific Integrated Model (AIM, see below and Figure 3 for details).

In tandem with the preparation of the baseline study, a multiple stakeholder engagement workshop (the first Focus Group Discussion, FGD1) was conducted in order to gain feedback and comments on modeling results and framework assumptions used in the baseline study. Findings from the FGD1 were then synthesised with that of the baseline study and results from FGD2, which provided a subsequent framework for preparing the Draft KL LCSBP 2030.

The Draft KL LCSBP 2030 was put to a final scrutiny by multiple stakeholders in FGD3, from which refinements were made to the program structures and emissions results, to produce the KL LCSBP 2030 and its Summary for Policymakers (SPM).

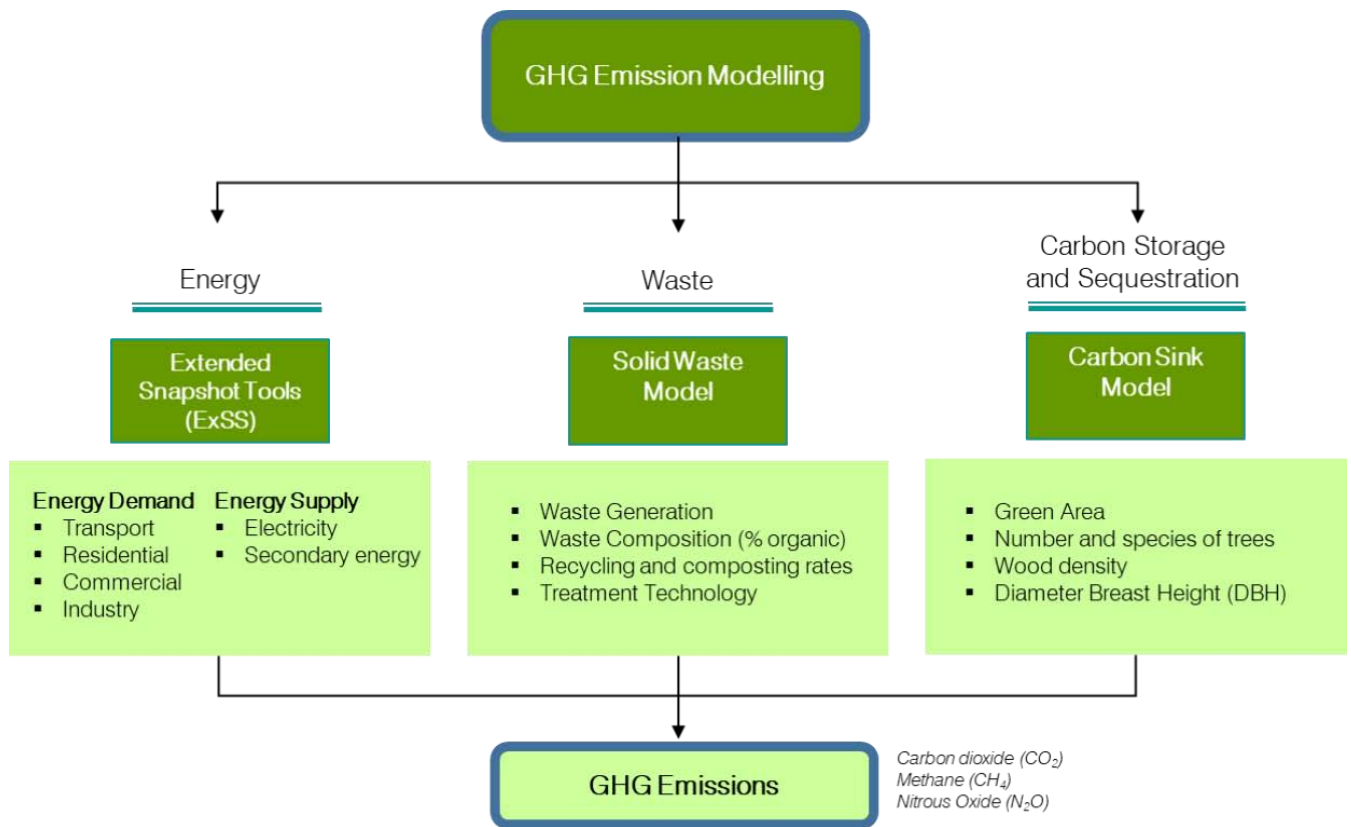


Figure 3: GHG Emission Modelling

The Asia-Pacific Integrated Model (AIM) quantifies GHG emissions for Kuala Lumpur for Business as Usual (BaU) and Counter Measure (CM) scenarios for 2020 and 2030. Three main models have been used including AIM's Extended Snapshot Tool (ExSS), Solid Waste Model (SWM) and Carbon Sink Model (refer Figure 3).

These models present the carbon emissions and reduction potentials of various low carbon countermeasures for Kuala Lumpur, which lead to the setting of priority sectors for effective emission reduction.

OBJECTIVES

The Kuala Lumpur Low Carbon Society Blueprint 2030 (KL LCSBP 2030) is a written document that presents comprehensive climate change mitigation policies and detailed strategies to guide the development of Kuala Lumpur towards becoming A World Class Sustainable City: A Greener Better Kuala Lumpur by 2030.

The blueprint incorporates various existing low carbon related plans and projects in Kuala Lumpur along with the Kuala Lumpur Structure Plan 2020 and Draft Kuala Lumpur City Plan 2020 in transforming Kuala Lumpur into a low carbon city. The blueprint discusses and provides more technical details of carbon mitigation options (with specific measures and programs) for implementation in Kuala Lumpur's development.

The blueprint aligns with the city's vision and aims to reduce the city's carbon emission intensity by 70% by 2030 while contributing to the economic growth targets. After an assessment of the current situation and future goals, the report lays down the following objectives:

- 1 To review **existing policies and development plans** of Kuala Lumpur;
- 2 To benchmark Kuala Lumpur with **selected global cities** in terms of **low carbon best practices**;
- 3 To develop baseline and future scenarios and **quantify carbon emissions** and **enhance co-benefits** of improved livability and green growth for Kuala Lumpur;
- 4 To develop a **roadmap** and identify the **relevant implementation agencies**.

ROAD TO ACHIEVING

70 BY 30 GOAL LOW CARBON KUALA LUMPUR GOALS AND INITIATIVES

KL LCSBP 2030 provides a strong foundation for promotion of economic growth, decoupling GHG emissions from growth and achieving various co-benefits, including the enhancement of quality of life in an equitable manner and protection of the environment. The LCS vision of Kuala Lumpur World Class Sustainable City 2030 is buttressed by three major thrusts: 1) prosperous, robust and globally competitive economy; 2) healthy, creative knowledgeable and inclusive community; and 3) ecologically friendly, liveable and resilient built environment. These thrusts are well aligned with the triple bottom line of sustainable development, the 17 Sustainable Development Goals (SDGs) 2030, the tree transformative commitments of the New Urban Agenda

as well as the Draft Kuala Lumpur City Plan 2020 (refer Figure 4). Kuala Lumpur World Class Sustainable City 2030 entails the creation of A Greener Better Kuala Lumpur that embraces a GHG emission intensity reduction target of up to 70% by 2030. To that end, 10 actions have been formulated which are organised under the three Thrusts that encompass Economy, Social and Environment. Actions under “Economy” include green growth (GG); energy efficient spatial structure (SS); green mobility (GM) and sustainable energy system (SE). Under “Social” is the action on community engagement and green lifestyle (CE) while under “Environment” are the actions of low carbon green building (GB); green and blue (BG); sustainable waste management (WM) and sustainable water management (WW). The last action—green urban governance (UG)—acts as the Kuala Lumpur low carbon society enabler.

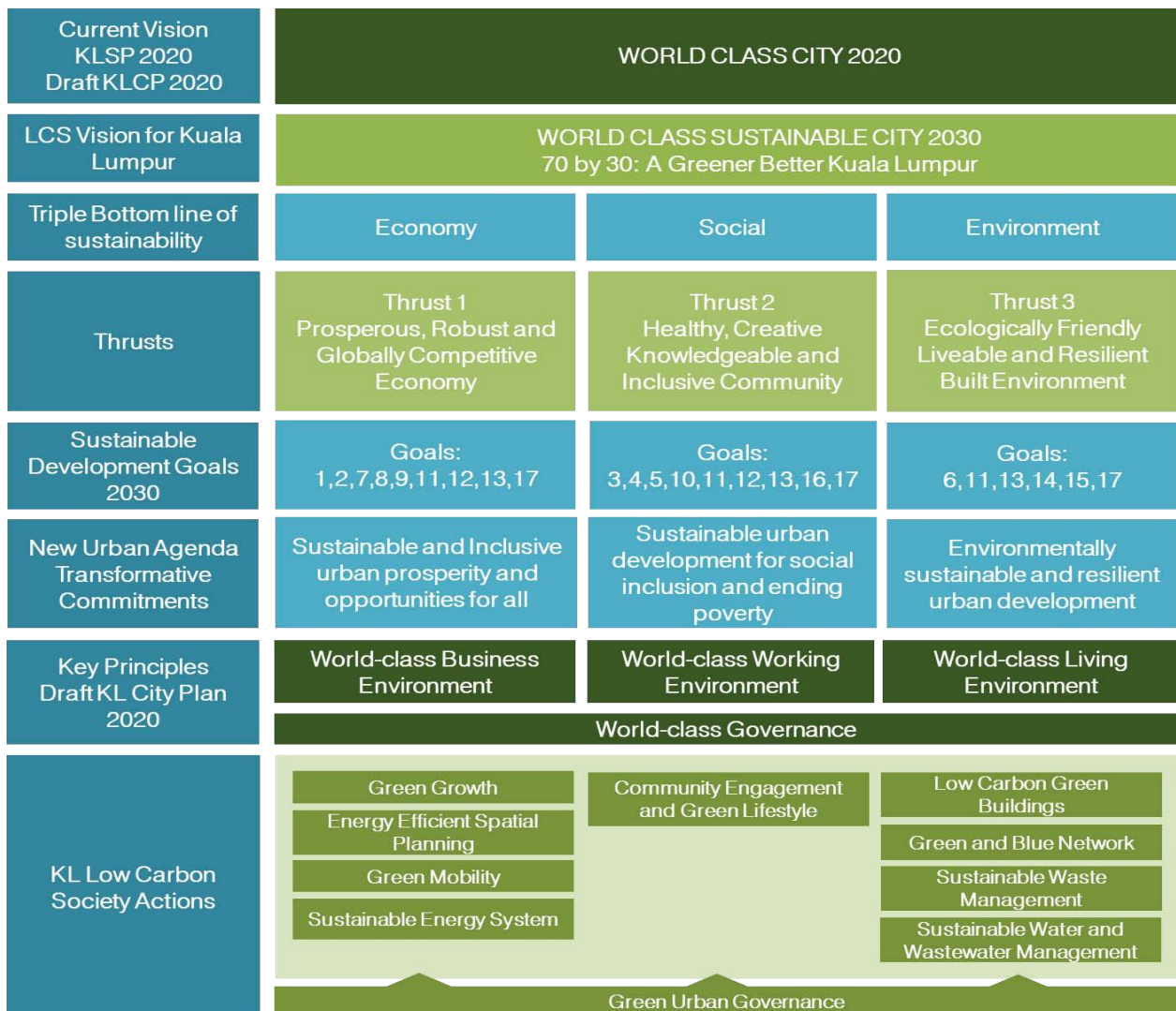


Figure 4: The framework of Kuala Lumpur Low Carbon Society Blueprint 2030

To provide a clear and effective framework for future implementation, monitoring and reporting of the KL LCSBP 2030, the 'work breakdown structure' (WBS) approach has been adopted. Through the WBS approach, key low carbon society actions are divided into sub-actions, which are further divided into measures and detailed implementation programs as described in Figure 5.

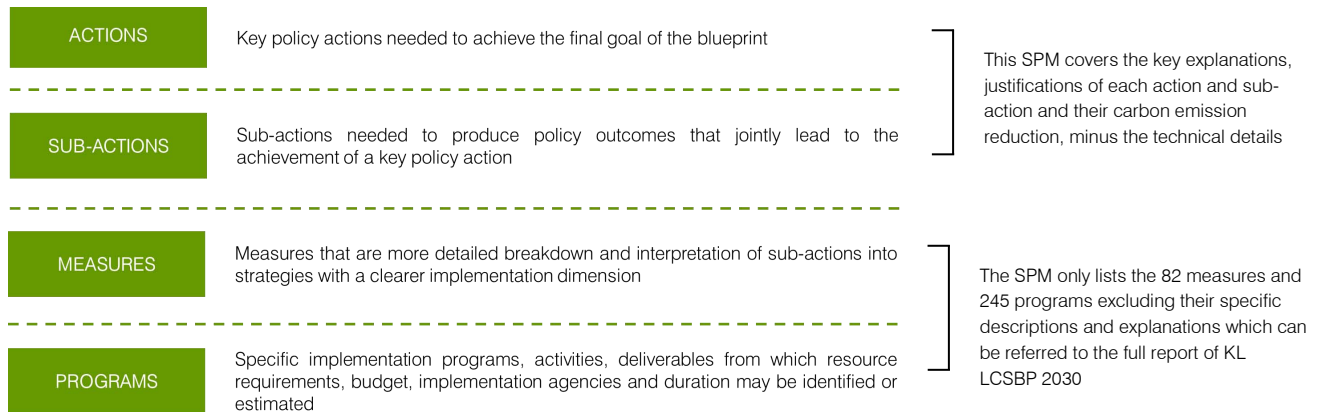


Figure 5: Work breakdown structure for Kuala Lumpur’s Low Carbon Society Blueprint 2030



KUALA LUMPUR

EMISSION PROFILE

GHG emission intensity of GDP

Figure 6 shows the GHG emission intensity of GDP of Kuala Lumpur. Based on Table 1, Kuala Lumpur's GHG emission intensity in 2010 is estimated at 0.30 ktCO₂eq/Mill.RM. In the 2030 CM scenario, the value decreases to 0.09 ktCO₂eq/Mill.RM, which is equivalent to a 70% reduction. This is higher than the national GHG emission intensity reduction target of 45% by 2030. As such, proper implementation of the KL LCSBP 2030 is essential to enable Kuala Lumpur to significantly contribute to Malaysia's global commitment to mitigating climate change while maintaining strong economic growth.

Table 1: GHG emission intensity by GDP

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



Figure 6: GHG emission intensity by GDP

EMISSION REDUCTION CONTRIBUTION BY ACTION

Towards providing further guidance to policymakers in prioritising and strategising implementation of the KL LCSBP 2030, the potential contribution of each of the 10 LCS Actions that have been identified has been estimated (see Figure 7 and Table 2). With respect to LCS programs that come under direct and indirect purviews of KLCH, investments in Low Carbon Green Building, Community Engagement and Green Lifestyle, Green Mobility, Energy Efficient Spatial Structure and Green Growth are highly recommended as these jointly potentially contribute to over 64% of the targeted emission reduction in 2030.

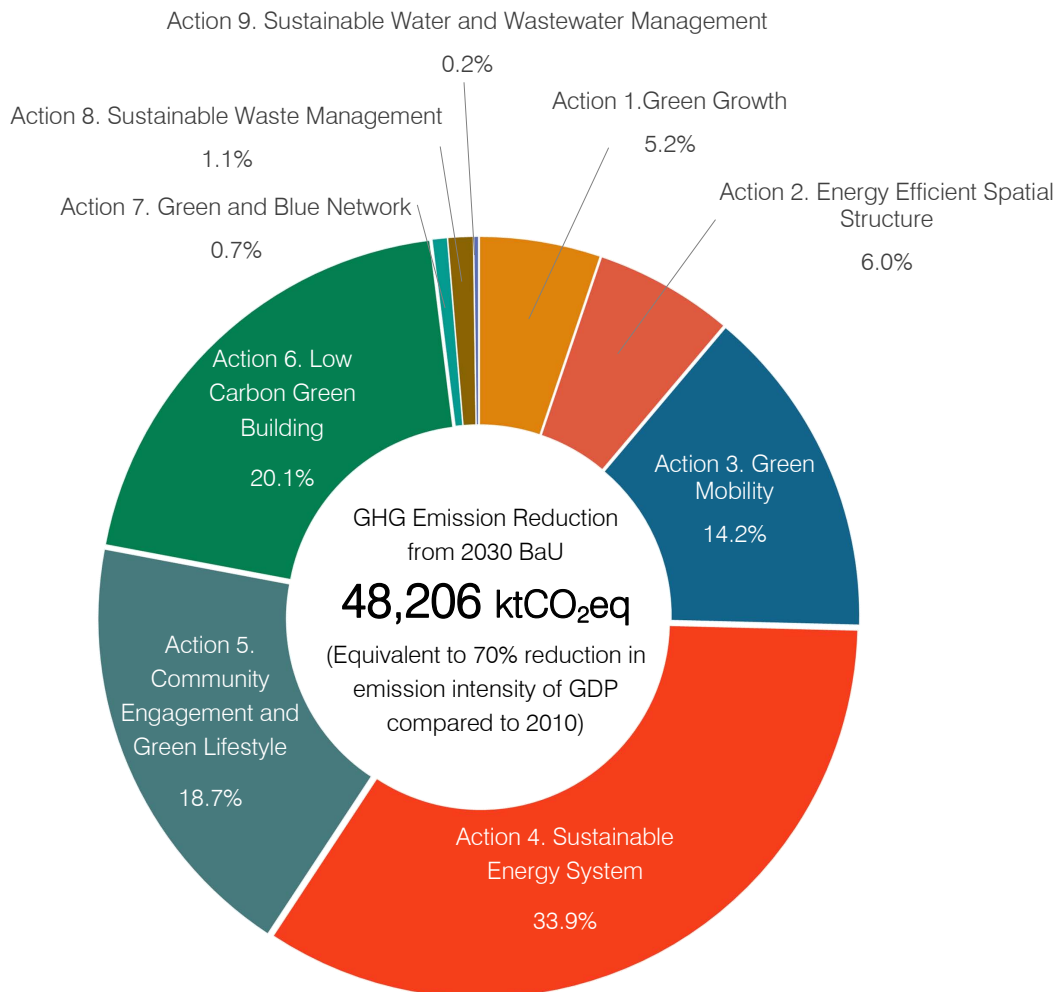


Figure 7: The carbon emission reduction contribution for the 10 actions

Table 2: Carbon emission reduction contribution and share of 10 LCS Actions

Thrusts	Actions	Reduction (ktCO ₂ eq)	Share by Actions (%)*	Share by Thrusts (%)
Economy	Action 1 Green Growth (GG)	2,502	5.2	59
	Action 2 Energy Efficient Spatial Structure (SS)	2,872	6.0	
	Action 3 Green Mobility (GM)	6,868	14.2	
	Action 4 Sustainable Energy System (SE)	16,327	33.9	
Social	Action 5 Community Engagement and Green Lifestyle (CE)	9,015	18.7	19
Environment	Action 6 Low Carbon Green Building (GB)	9,673	20.1	22
	Action 7 Green and Blue Network (BG)	316	0.7	
	Action 8 Sustainable Waste Management (WM)	527	1.1	
	Action 9 Sustainable Water and Wastewater Management (WW)	105	0.2	
Enabler	Action 10 Green Urban Governance (UG)	-	-	0
Total		48,206	100	100

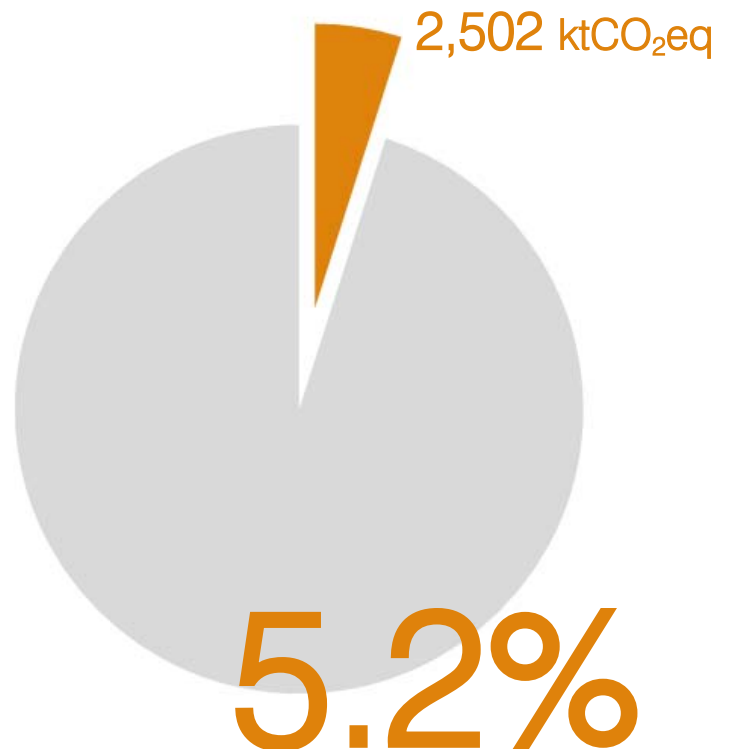
*Numbers may not add up precisely to 100% due to rounding

GREEN GROWTH



In the face of pressing economic and environmental challenges, national and international efforts to promote green growth as a new source of economic growth have been intensified in recent years. The current economic system is not only unsustainable and inefficient in its resource use, but is inequitable in its distribution of costs and benefits. A business that does not invest in low carbon measures will be at risk of being locked out of low-carbon growth markets demand and may experience a reduced market share in the traditional economy in the future. Align with Kuala Lumpur vision of becoming “a sustainable city” and achieving 70% GHG reduction by 2030, the progression towards low carbon society must ensure that carbon reduction targets are met without compromising the economic growth of the city.

Sectoral contribution to CO₂ emission reduction



1.1 Kuala Lumpur As A Green Business Hub

It is important for KLCH to develop Kuala Lumpur into a business hub that provides business owners and investors clear guide to its strategic directions, priority sectors, policy framework, incentives and procedures on investing in Kuala Lumpur.

Measure 1.1.1 Promote New Green Sectors and Services

Programs:

GG 1 Establish Kuala Lumpur as a major global venue for annual exhibitions, conferences and/or workshops on green businesses and investments

GG 2 Promote and attract R&D activities in strategic green sectors that are suited to Kuala Lumpur's economic and business ecosystems

GG 3 Establish a Green Enterprise Zone in each of Kuala Lumpur's six strategic zones to accommodate new green businesses and investments



Measure 1.1.2 Incentives and Fiscal Measures to Attract Green Businesses

Programs:

GG 4 KLCH to work with relevant ministries/agencies to create viable taxation systems and incentive mechanisms to attract strategic green sectors and Foreign Direct Investment (FDI) in green business

GG 5 KLCH to collaborate with relevant agencies and liaise with major financial institutions to expand on environmental investment opportunities and create attractive loan options for green investments

GG 6 Put in place procedures that expedite approval processes for green business and investments in Kuala Lumpur



1.2 Greening Existing Business

Measures such as reducing energy and resource intensity of existing businesses and green incentives and taxation for greening business are identified in order for greening every business in Kuala Lumpur to take place.

Measure 1.2.1 Reduce Energy and Resource Intensity of Existing Businesses

Programs:

GG 7 Progressive requirement for greener operation & eco-efficient policies in business administration, supply chain, and operations

GG 8 Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing businesses

GG 9 KLCH to lead the way in preparing institutional/ establishment level 5-year carbon management plan to reduce institutional/ establishment operational carbon emissions

GG 10 Create "KL Green Business Champions" by engaging KL's dominant building uses and/or biggest energy users (e.g. major offices, hotels, shopping malls, hospitals, educational institutions and restaurants) in greening their administration, supply chain and operation



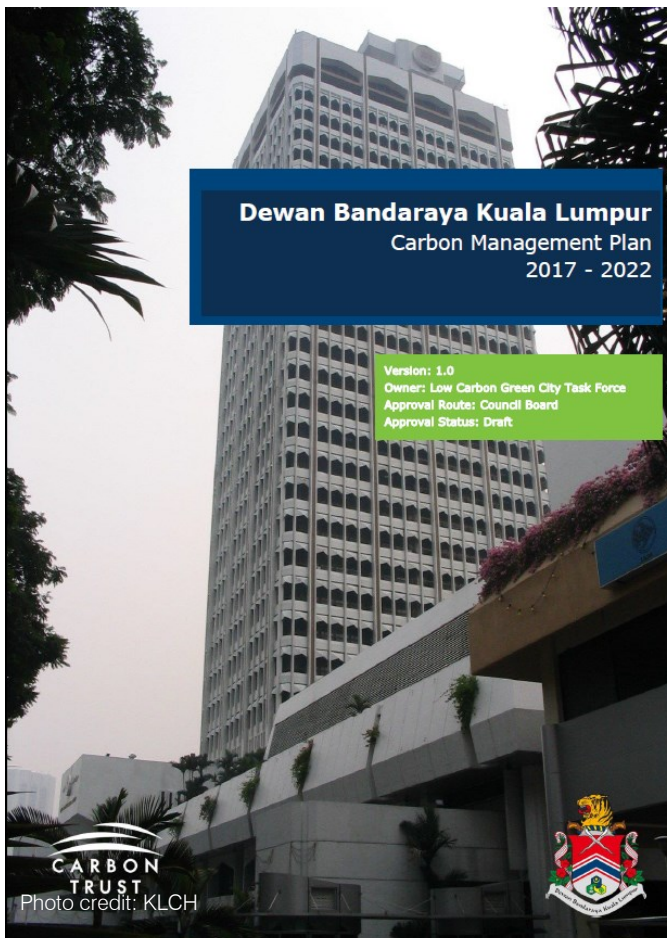
Measure 1.2.2 Green Incentives and Taxation for Greening Business

Programs:

GG 11 Introduce green incentives that cover and support existing businesses' green initiatives in investment and/or innovation in reducing energy and resource intensity of their administration, supply chain and operations

GG 12 Provide green incentives for business to set up an environmental & energy performance unit that generates green employment

GG 13 Introduce prestigious annual green awards that recognise and/or reward existing businesses that achieve significant results in resource and energy efficiency improvement in their overall operations



1.3 Establish Green Economy Ecosystem

Green economy focusing on the consumers as one of the players in the ecosystem. It is important to strengthen institutional support for green growth, create and expand green markets and capacity building in Kuala Lumpur.

Measure 1.3.1. Strengthen Institutional Support for Green Growth

Programs:

GG 14 Establish a Green Economy Unit in KLCH to promote, coordinate, advise, enable and facilitate the setting up of green businesses and markets in Kuala Lumpur

GG 15 KLCH through the Green Economy Unit to facilitate businesses and public sector organisations in solicitation of advice from relevant agencies (e.g. GreenTech Malaysia, MESTECC) on energy efficiency and renewable energy

GG 16 Develop a Green Growth Action Plan for Kuala Lumpur that clearly outlines KLCH's green growth policy direction and strategies, and provides clear policy guidance to green businesses and investors



Photo credit: UTM LCARC

Measure 1.3.2 Create and Expand Green Markets

Programs:

GG 17 All government entities within KLCH area to implement the Government Green Procurement (GGP) practice

GG 18 Set up and maintain a "Kuala Lumpur Green Portal" that provides real-time information on Kuala Lumpur's LCS progress, green technologies, green jobs, green education and links to key government green portals

GG 19 Widespread adoption of green certification (e.g. MyHIJAU Mark) for all range of green products and services within Kuala Lumpur to provide consumers with an authoritative and reliable guide to the emerging green market

GG 20 Encourage business establishments in Kuala Lumpur to tap into the MyHIJAU platform to expand connections to other green businesses and wider consumers

1.4 Capacity Building

Kuala Lumpur needs diverse range of workers with broad skill sets as well as workers that can cope with shifting demands in skills set. The adoption of green growth in Kuala Lumpur will create new jobs and redefine existing occupations. These changes involve the process such as reskilling, cross-skilling, and upskilling of new work practices.

Measure 1.4.1 Human Capital Enhancement

Programs:

GG 21 Work with the academia, industry and relevant government agencies to establish Kuala Lumpur as the regional hub for accredited professional short courses on green growth and green businesses

GG 22 Develop systematic up-skills programs for progressive upgrading/retraining of existing pool of professional and semi-professional workers in various green sectors

GG 23 Fiscal incentives for business establishment that offer continuous professional education for current employees in the green sector

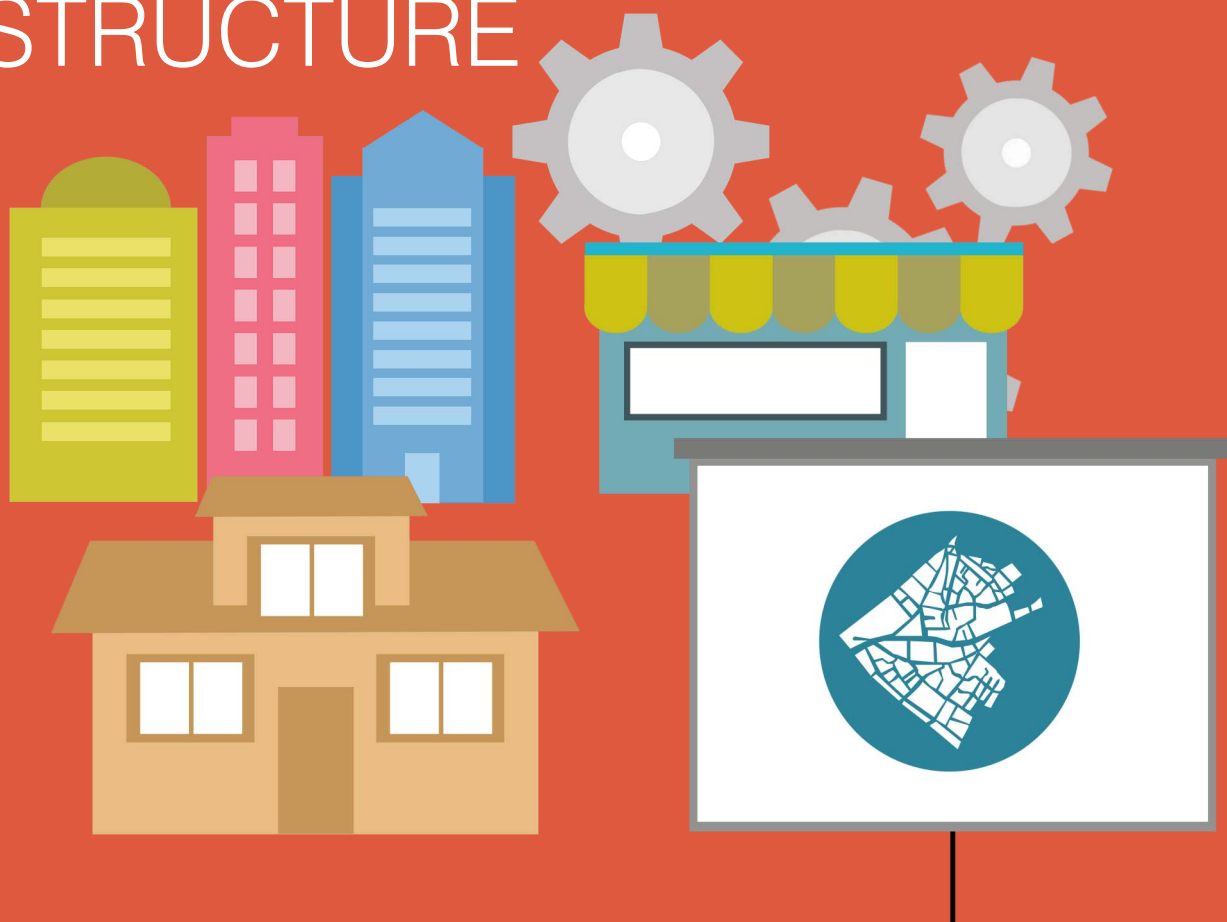
Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 1.1.1 Promote New Green Sectors and Services						
GG 1 Establish Kuala Lumpur as a major global venue for annual exhibitions, conferences and/or workshops on green businesses and investments				Corporate Planning Dept.	KW (Corporate Communication), MIDA, MESTECC, MOTAC, MOHR	GreenTech Malaysia
GG 2 Promote and attract R&D activities in strategic green sectors that are suited to Kuala Lumpur's economic and business ecosystems				Corporate Planning Dept.	KLCH (Administration Dept.), KW (Corporate Communication, and Policy Planning Dept.), MIDA	MIDA, GreenTech Malaysia
GG 3 Establish a Green Enterprise Zone in each of Kuala Lumpur's six strategic zones to accommodate new green businesses and investments				City Planning Dept.	KLCH (Economic Planning & Development Dept.), KW (Corporate Communication), MIDA, MOHR	Business assoc.
Measure 1.1.2 Incentives and Fiscal Measures to Attract Green Businesses						
GG 4 KLCH to work with relevant ministries/agencies to create viable taxation systems and incentive mechanisms to attract strategic green sectors and Foreign Direct Investment (FDI) in green business				Corporate Planning Dept.	KW (Policy Planning Division), GreenTech Malaysia, InvestKL, KLN, SSM	MIDA, SSM
GG 5 KLCH to collaborate with relevant agencies and liaise with major financial institutions to expand on environmental investment opportunities and create attractive loan options for green investments				Corporate Planning Dept.	KW (Finance, and Policy Planning Dept.), MIDA, MESTECC, SSM, SME Corporation	Business assoc., SME assoc.
GG 6 Put in place procedures that expedite approval processes for green business and investments in Kuala Lumpur				Economic Planning & Development Dept.	GreenTech Malaysia, SSM, InvestKL, PEMANDU, MIDA, SME Corporation, MITI, MIGHT	KLCH (Economic Planning & Development Dept.)
Measure 1.2.1 Reduce Energy and Resource Intensity of Existing Businesses						
GG 7 Progressive requirement for greener operation & eco-efficient policies in business administration, supply chain, and operations				City Planning Dept.	KW (Policy Planning Dept.), SSM, GreenTech Malaysia, MIDA	SSM, Business assoc.
GG 8 Promotion of environmental analytical & advisory services towards improving resource & energy efficiency in existing businesses				Licensing & Petty Traders Development Dept.	KW (Corporate Communication), SSM, GreenTech Malaysia, MAESCOs, MIDA	Business assoc.
GG 9 KLCH to lead the way in preparing institutional/establishment level 5-year carbon management plan to reduce institutional/establishment operational carbon emissions				Administration Dept.	KLCH (Administration Dept. (<i>Jawatankuasa Tenaga</i>))	KLCH (Administration Dept.)
GG 10 Create "KL Green Business Champions" by engaging KL's dominant building uses and/or biggest energy users (e.g. major offices, hotels, shopping malls, hospitals, educational institutions and restaurants) in greening their administration, supply chain and operations				Licensing & Petty Traders Development Dept.	SSM, MIDA, GreenTech Malaysia	Business assoc., Building owners
Measure 1.2.2 Green Incentives and Taxation for Greening Business						
GG 11 Introduce green incentives that cover and support existing businesses' green initiatives in investment and/or innovation in reducing energy and resource intensity of their administration, supply chain and operations				Property Management & Valuation Dept.	KW (Corporate Communication), SSM, MIDA, GreenTech Malaysia, MOF	Business assoc.

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 1.2.2 Green Incentives and Taxation for Greening Business						
GG 12 Provide green incentives for business to set up an environmental & energy performance unit that generates green employment		High		Administration Dept.	KW (Finance, Corporate Communication, and Socio Economic), SSM, MIDA, GreenTech Malaysia, MOF	Business assoc.
GG 13 Introduce prestigious annual green awards that recognise and/or reward existing businesses that achieve significant results in resource and energy efficiency improvement in their overall operations		High		Licensing & Petty Traders Development Dept.	KW (Corporate Communication), SSM, MIDA, GreenTech Malaysia	Business assoc.
Measure 1.3.1. Strengthen Institutional Support for Green Growth						
GG 14 Establish a Green Economy Unit in KLCH to promote, coordinate, advise, enable and facilitate the setting up of green businesses and markets in Kuala Lumpur		High		Administration Dept.	KLCH (Human Resource Dept.), MIDA, GreenTech Malaysia, SSM	KLCH (Administration Dept.)
GG 15 KLCH through the Green Economy Unit to facilitate businesses in solicitation of advice from relevant agencies (e.g. GreenTech Malaysia, MESTECC) on energy efficiency and renewable energy	High			Administration Dept.	KLCH (Human Resource Dept.), GreenTech Malaysia, MESTECC, SEDTA, MAESCOs	Business assoc.
GG 16 Develop a Green Growth Action Plan for Kuala Lumpur that clearly outlines KLCH's green growth policy direction and strategies, and provides clear policy guidance to green businesses and investors	High			Administration Dept.	KW (Policy Planning, and Corporate Communication), GreenTech Malaysia, MIDA, SSM	KLCH (City Planning Dept.), Business assoc.
Measure 1.3.2 Create and Expand Green Markets						
GG 17 All government entities within the KLCH area to implement the Government Green Procurement (GGP) practice	High			Administration Dept.	GreenTech Malaysia	Business assoc.
GG 18 Set up and maintain a "Kuala Lumpur Green Portal" that provides real-time information on Kuala Lumpur's LCS progress, green technologies, green jobs, green education and links to key government green portals (e.g. MyHIJAU)		High		Information Management Dept.	GreenTech Malaysia, MIDA	KLCH (Information Management Dept.)
GG 19 Widespread adoption of green certification (e.g. MyHIJAU Mark) for all range of green products and services within Kuala Lumpur to provide consumers with an authoritative and reliable guide to the emerging green market	High			Administration Dept.	GreenTech Malaysia	KLCH (Administration Dept.), GreenTech Malaysia
GG 20 Encourage business establishments in Kuala Lumpur to tap into the MyHIJAU platform to expand connections to other green businesses and wider consumers	High			Administration Dept.	GreenTech Malaysia, KW (Corporate Communication)	Business assoc.
Measure 1.4.1 Human Capital Enhancement						
GG 21 Work with the academia, industry and relevant government agencies to establish Kuala Lumpur as the regional hub for accredited professional short courses on green growth and green businesses	High			Human Resource Management Dept. (IDB)	KPM, KW, SSM, MIDA, GreenTech Malaysia	KLCH (Human Resource Management Dept. (IDB)), Business assoc.
GG 22 Develop systematic up-skills programs for progressive upgrading/retraining of existing pool of professional and semi-professional workers in various green sectors	High			Human Resource Management Dept. (IDB)	KPM, SSM, GreenTech Malaysia	KLCH (Human Resource Management Dept. (IDB)), Business assoc.
GG 23 Fiscal incentives for business establishments that offer continuous professional education for current employees in the green sector	High			Human Resource Management Dept. (IDB)	KLCH (Licensing and Petty Traders Development Dept.), KW (Finance), SSM, GreenTech Malaysia	KLCH (Licensing and Petty Traders Development Dept.), Business assoc.

Importance Level

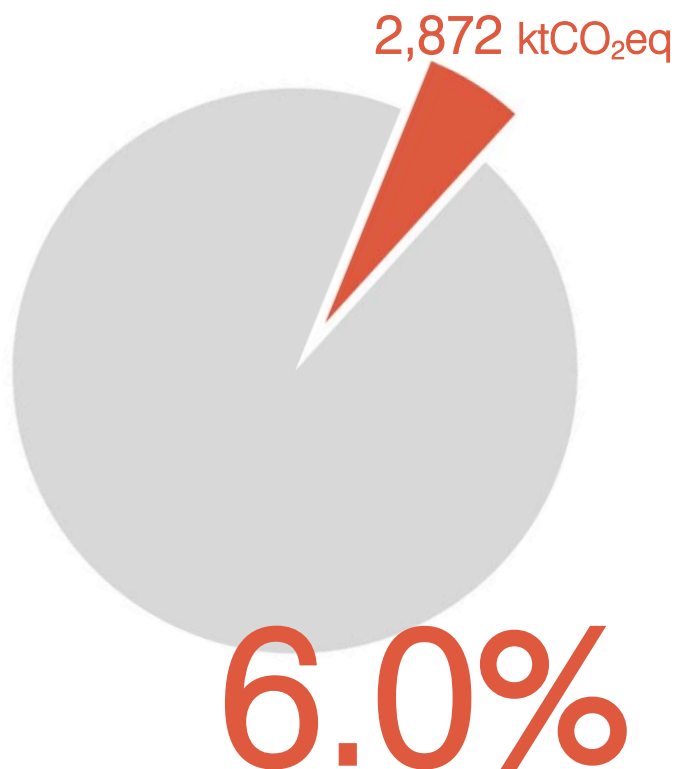
High  Medium  Low 

ENERGY EFFICIENT SPATIAL STRUCTURE



Kuala Lumpur’s population is expected to increase to 2.49 million by 2030. With the growing population, along with the scarcity and increasing demand for urban spaces in Kuala Lumpur, the spatial structure of this metropolis needs to be efficiently developed to reduce its energy consumption and CO₂ emission. This can be achieved by promoting polycentric spatial structure, materialising Transit Oriented Development (TOD) as well as encouraging walking and cycling as a mode of travel within suitable distance. Kuala Lumpur needs a more human-oriented urban design, which offers its residents a healthy and safe living environment, higher quality of life whilst reducing travel and energy demand as well as cost of living. This requires continuous collaboration between city planners, key economic actors and residents of Kuala Lumpur.

Sectoral contribution to CO₂ emission reduction



2.1 Compact Urban Form

Rapid development and economic growth coupled to limited land and strong demand for housing and urban space points to the importance of having a more compact urban form, which promotes higher density development with mixing of various activities as well as pedestrian and cyclist-friendly environments with better accessibility to services and facilities within closer proximity.

Measure 2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur

Programs:

- SS 1** Gradual densification in polycentric nodes connected by public transportation
- SS 2** Focus on high density mixed use development to minimise the need to travel
- SS 3** Plan to achieve a compact, contiguous pattern of growth – looking “inward and upward”

Measure 2.1.2 Promote Transit Supportive Land Use Planning

Programs:

- SS 4** Promote higher intensity urban development around transit stations
- SS 5** Rationalise key locations for TOD in relation to existing and proposed MRT and LRT networks
- SS 6** Station Area Planning (SAP)
- SS 7** Concentrate provision of new affordable homes around transit stations



2.2 Walkable and Cyclist-Friendly Urban Districts

Creating a human-oriented environmentally friendly urban design, which is a key aspect of a low carbon society, will eventually contributing to the CO₂ emission reduction. Like other cities such as Copenhagen, Amsterdam and especially Singapore, Kuala Lumpur can potentially solve its traffic problem by providing extensive and comprehensive pedestrian walkways and cycling lanes.

Measure 2.2.1 Enhance Interconnected Pedestrian Network

Programs:

- SS 8** Design permeable street layouts
- SS 9** Identify and connect discontinuities within existing pedestrian network and sub-urban areas
- SS 10** Create continuous active street frontages
- SS 11** Safe walking routes to schools and public institutions



Measure 2.2.2 Providing Comfortable and Safe Walkways

Programs:

- SS 12** Street planting for shades
- SS 13** Improve street furniture
- SS 14** Extend existing covered walkways to include all main pedestrian routes
- SS 15** Enforce universal design concept

Measure 2.2.3 Build Quality Public Spaces and Pedestrian Environments that Support Walking

Programs:

- SS 16** Identify potential urban spaces as public realms
- SS 17** Improve and redesign existing pocket parks
- SS 18** Conduct pedestrian Level of Service (LOS) analysis on high pedestrian traffic areas

Measure 2.2.4 Providing Safe and Comfortable Cycling Network

Programs:

- SS 19** Engaging local cycling clubs in planning Kuala Lumpur cycling routes
- SS 20** Dedicated cycle lanes on major routes in Kuala Lumpur
- SS 21** Bike Expressway (Bike E-Way) from suburbs area to city centre and along major rivers and railway lines



Photo credit: UTM LCARC

Measure 2.2.5 Crime Prevention Through Environmental Design (CPTED)

Programs:

- SS 22** Install CCTVs
- SS 23** Set up security beats at appropriate locations
- SS 24** Increase natural surveillance through proper building orientation and landscape design
- SS 25** Eliminate blind spots in urban environments
- SS 26** Enhance street lighting along pathway and other pedestrian used areas



Photo credit: Oxford Street by James Reid, 2014

2.3 Designing Civilised and Livable Streets

The liveability of streets decline as the traffic volumes and speeds increase. Streets with moderate to low traffic volume and speed are more satisfying to residents. In line with Kuala Lumpur policy documents in ensuring the safety of all road users, "traffic calming" should be introduced. Traffic calming can potentially control the volume and speed of traffic for example via road humps and 30km/h traffic sign which have been used in roads in Amsterdam and Barcelona.

Measure 2.3.1 Street Environment Enhancement

Programs:

- SS 27** Create 'home zones' in residential areas
- SS 28** Community landscaping program

Measure 2.3.2 Reducing Vehicular Traffic Speed for Enhanced Pedestrian Safety

Programs:

- SS 29** Carriageway narrowing, chicanes, pavement widening and kerb extension at junctions
- SS 30** Install humped pedestrian crossings and raised junction plateau

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur						
SS 1 Gradual densification in polycentric nodes connected by public transportation	████████████████████			City Planning Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), Neighbouring local authorities, MOT	Developers
SS 2 Focus on high density mixed use development to minimise the need to travel	████████████████████			City Planning Dept.	MOT, KPKT	Developers
SS 3 Plan to achieve a compact, contiguous pattern of growth – looking “inward and upward”	████████████████████			City Planning Dept.	KPKT, PLANMalaysia	Developers
Measure 2.1.2 Promote Transit Supportive Land Use Planning						
SS 4 Promote higher intensity urban development along transit stations	████████████████████			City Planning Dept.	PRASARANA, MOT, KPKT	Developers
SS 5 Rationalise key locations for TOD in relation to existing and proposed MRT and LRT networks	████████████████████			City Planning Dept.	MOT, KPKT, KW	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 6 Station Area Planning (SAP)	████████████████████			Infrastructure Planning Dept.	KLCH (City Planning Dept.), MOT, KPKT, KW	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 7 Concentrate provision of new affordable homes around transit stations	████████████████████			City Planning Dept.	KLCH (Housing Management & Community Development Dept.)	KLCH (Economic Planning & Development Dept.), KW, Developers
Measure 2.2.1 Enhance Interconnected Pedestrian Network						
SS 8 Design permeable street layouts	████████████████████			Infrastructure Planning Dept.	KLCH (City Planning, Building Control Dept., Project Implementation & Building Maintenance Dept., Civil Engineering & Urban Transportation Dept., Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 9 Identify and connect discontinuities within existing pedestrian network and sub-urban areas	████████████████████			Infrastructure Planning Dept.	KLCH (City Planning Dept., Civil Engineering & Urban Transportation Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 10 Create continuous active street frontages	████████████████████			Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Licensing & Petty Traders Development Dept.), KW, KPKT	Property/business owners
SS 11 Safe walking routes to schools and public institutions	████████████████████			Infrastructure Planning Dept.	KW, KPKT, JPWPKL, JKR	KLCH (Civil Engineering & Urban Transportation Dept.), Developers, Communities, Schools

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
2.2.2 Providing Comfortable and Safe Walkways						
SS 12 Street planting for shades				Landscape & Recreational Development Dept.	KLCH (Infrastructure Planning Dept., Civil Engineering & Urban Transportation Dept., City Planning Dept.) KW, KPKT	KLCH (Landscape & Recreational Development Dept.) and Developers
SS 13 Improve street furniture				Civil Engineering & Urban Transportation Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Infrastructure Planning Dept.), KW, KPKT	KLCH (Project Implementation & Building Maintenance Dept., Civil Engineering & Urban Transportation Dept.), Developers
SS 14 Extend existing covered walkways to include all main pedestrian routes				Infrastructure Planning Dept.	KLCH (Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 15 Enforce universal design concept				Infrastructure Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Landscape & Recreational Development Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
2.2.3 Build Quality Public Spaces and Pedestrian Environments that Support Walking						
SS 16 Identify potential urban spaces as public realms				City Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Landscape & Recreational Development Dept.), KW, KPKT	Developers
SS 17 Improve and redesign existing pocket parks				Landscape & Recreational Development Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Landscape & Recreational Development Dept.), Developers
SS 18 Conduct pedestrian Level of Service (LOS) analysis on high pedestrian traffic areas				Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), JKR, KW, KPKT, Prasarana	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
Measure 2.2.4 Providing Safe and Comfortable Cycling Network						
SS 19 Engaging local cycling clubs in planning Kuala Lumpur cycling routes				Infrastructure Planning Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Culture, Arts, Tourism & Sports Dept.), Prasarana, MOT, KW, KPKT, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.)
SS 20 Dedicated cycle lanes on major routes in Kuala Lumpur				Infrastructure Planning Dept.	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Culture, Arts, Tourism & Sports Dept.), Prasarana, MOT, KW, KPKT, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.), Developers

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 2.2.4 Providing Safe and Comfortable Cycling Network						
SS 21 Bike Expressway (Bike E-Way) from suburbs area to city centre and along major rivers and railway lines	██████████			Infrastructure Planning Dept.	MOT, KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
2.2.5 Crime Prevention Through Environmental Design (CPTED)						
SS 22 Install CCTVs	██████████			Civil Engineering & Urban Transportation Dept.	PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.), Community, Property owners
SS 23 Set up security beats at appropriate locations	██████████			Enforcement Dept.	PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.)
SS 24 Increase natural surveillance through proper building orientation and landscape design	██████████			Project Implementation & Building Maintenance Dept.	KW, KPKT, PLANMalaysia	KLCH (Landscape & Recreational Development Dept.), Resident assoc., Property owners, Community
SS 25 Eliminate blind spots in urban environments	██████████			Project Implementation & Building Maintenance Dept.	KLCH (Landscape & Recreational Development Dept.) PDRM, KW, KPKT, PLANMalaysia	KLCH (Civil Engineering & Urban Transportation Dept.), Property owners
SS 26 Enhance street lighting along pathway and other pedestrian used areas	██████████			Mechanical & Electrical Engineering Dept.	KW, KPKT	KLCH (City Planning Dept., Landscape & Recreational Development Dept., Civil Engineering & Urban Transportation Dept.), Property owners
2.3.1 Street Environment Enhancement						
SS 27 Create 'home zones' in residential areas	██████████			Civil Engineering & Urban Transportation Dept.	KLCH (Housing Management & Community Development Dept., Infrastructure Planning Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 28 Community landscaping program	██████████			Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), KW, KPKT	KLCH (Landscape & Recreational Development Dept.), Resident's assoc.
2.3.2 Reducing Vehicular Traffic Speed for Enhanced Pedestrian Safety						
SS 29 Carriageway narrowing, chicanes, pavement widening and kerb extension at junctions	██████████			Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers
SS 30 Install humped pedestrian crossings and raised junction plateau	██████████			Civil Engineering & Urban Transportation Dept.	KLCH (Project Implementation & Building Maintenance Dept.), KW, KPKT	KLCH (Civil Engineering & Urban Transportation Dept.), Developers

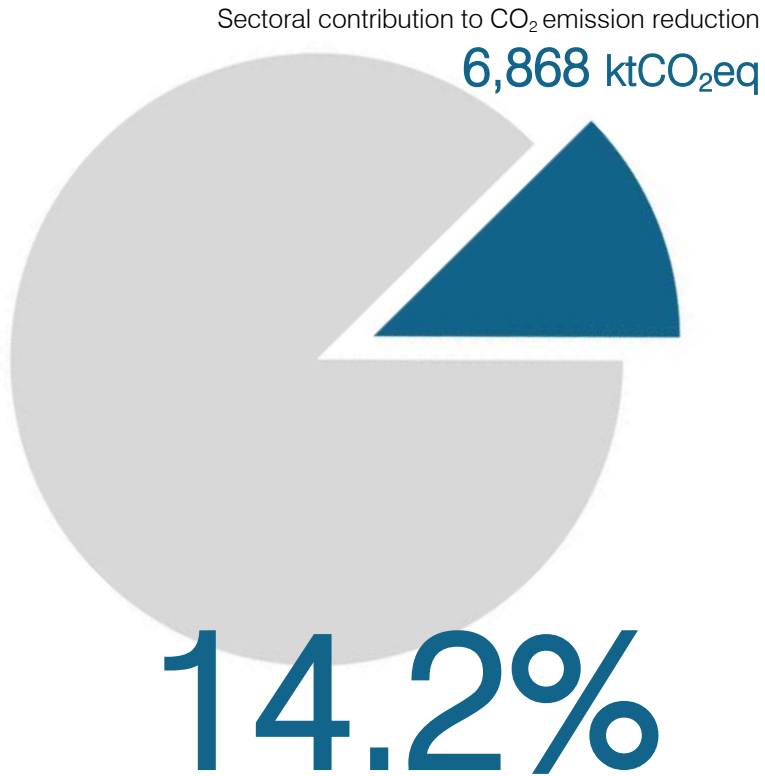
Importance Level

High ██████████ Medium ██████████ Low ██████████

GREEN MOBILITY



With the targeted strong growth in the economy and population in Kuala Lumpur, rapid growth in intra- and intercity passenger and freight transportation demand is inevitable. If left unchecked, growth in the transportation sector is expected to add to Kuala Lumpur carbon emission by 26,919 ktCO₂ and increased the transportation demand by 2030. In order to mitigate the carbon emission level of the projected increasing transportation demand, the development towards green mobility in Kuala Lumpur is essential. Its main purpose is to reduce Kuala Lumpur's carbon emission by inducing a voluntary modal shift from motorised vehicles to walking and cycling for short- to medium- distance trips, at the same time promoting public transport use. Undoubtedly, green mobility will create and promote a new culture of sustainable mobility in the Kuala Lumpur city.



3.1 Active Mobility

Active mobility is a form of transport of people and goods which use physical activity of the human being such as walking and cycling.

Measure 3.1.1 Promote Walking and Cycling on Short to Medium Trips

Programs:

- GM 1** Provision of bicycle facilities
- GM 2** Pedestrian and cycling priority at crossings
- GM 3** Cycle Safe and Right
- GM 4** Promote cycling as an attractive transport mode beyond recreational purposes
- GM 5** Establish bike rental program – KL Cycle Hire Scheme

Measure 3.1.2 Designate Pedestrian Zones in Key Activity Centres

Program:

- GM 6** Identify potential activity centres for implementation of pedestrian zones

3.2 Integrated Public Transportation

Integrated public transport system tends to meet the need of customers, which ultimately results in the increment of ridership.

Measure 3.2.1 Public Transport System Improvement (Bus and Rail)

Programs:

- GM 7** Route network expansion planning
- GM 8** Re-rationalisation of existing bus lane network
- GM 9** Strengthen enforcement against misuse of dedicated bus lanes
- GM 10** Work with relevant agencies to advocate for high capacity, fast, frequent and reliable rapid transit
- GM 11** Provide real time arrival information at all bus stops and rail stations
- GM 12** Reimaging public transport
- GM 13** Implement flat rate tickets and central area free shuttle services
- GM 14** Develop and promote web-based journey planner



Photo credit: www.data-display.com

Measure 3.2.2 Seamless Intermodal Transfer (Interchange Facilities)

Programs:

- GM 15** Integrated e-ticketing system (across all platforms)
- GM 16** Public transport interchange as destination and urban activity nodes
- GM 17** Upgrading bus and rail integrated terminal
- GM 18** Enhance 'Park and Ride' facilities in sub-urban transit nodes



Photo credit: UTM LCARC

3.3 Diffusion of Low Carbon Vehicles

It is imperative that the diffusion of low carbon vehicles in Kuala Lumpur to play its role as a potential to minimise the carbon impact of private vehicles for a low carbon future in Kuala Lumpur.

Measure 3.3.1 Promote the Use of Green Vehicles

Programs:

- GM 19** KLCH to use viable low carbon vehicles
- GM 20** Partnering with EV car sharing companies
- GM 21** Tax reduction for green vehicle purchase
- GM 22** Gradual phasing out for conventional diesel engine buses



3.4 Enhancing Traffic Flow Conditions and Performance

Enhancing traffic flow in Kuala Lumpur means delivering more reliable journey times and more free-flowing travel conditions than at present.

Measure 3.4.1 Transport Demand Management

Programs:

- GM 23** Enhance Intelligent Transportation System (ITS)
- GM 24** Chart out practical timeline for progressive implementation of congestion pricing scheme
- GM 25** Parking demand management
- GM 26** Intelligent traffic control and support eco driving
- GM 27** Enhance the use of effective Variable Message Signs (VMS)
- GM 28** Improve traffic signal performance
- GM 29** Tidal flow and contra-flow along primary radial routes



3.5 Green Freight Transportation

Government policies should focus on freight transport as much as it focuses on private vehicles and public transport.

Measure 3.5.1 Modal Shift to Greener Freight Transport Modes

Programs:

- GM 30** Promote hybrid freight transport through tax incentives in hybrid freight transport acquisition

Measure 3.5.2 Freight Demand Management (FDM)

Program:

- GM 31** Optimal scheduling of pick-up and delivery



Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.1.1 Promote Walking and Cycling on Short to Medium Trips						
GM 1 Provision of bicycle facilities	█			Infrastructure Planning Dept.	KLCH (City Planning Dept.), MOT, JKJR, Cycling organisations	KLCH (Civil Engineering & Urban Transportation Dept.), KL residents association, Neighbouring local authorities
GM 2 Pedestrian and cycling priority at crossings	█			Infrastructure Planning Dept.	KLCH (City Planning Dept.), JKR	KLCH (Civil Engineering & Urban Transportation Dept. Enforcement Dept.), PDRM
GM 3 Cycle safe and right		█		Infrastructure Planning Dept.	KLCH (Housing Management & Community Dev. Dept.), JPJ, MOT, MOE, Cycling organisations, JPWPKL, MIROS	KLCH (Infrastructure Planning Dept.)
GM 4 Promote cycling as an attractive transport mode beyond recreational purposes	█			Infrastructure Planning Dept.	KLCH (Housing Management & Community Dev. Dept.), JPJ, MOT, KPM, Cycling organisations, JPWKL, MIROS	KLCH (Infrastructure Planning Dept.)
GM 5 Establish bike rental program – KL Cycle Hire Scheme		█		Culture, Arts, Tourism & Sports Dept.	Prasarana, MOT, EC, MESTECC	KLCH (Civil Engineering & Urban Transportation Dept. Culture, Arts, Tourism & Sports Dept.), Cycling organisations, Residents assoc.
Measure 3.1.2 Designate Pedestrian Zones in Key Activity Centres						
GM 6 Identify potential activity centres for implementation of pedestrian zones	█			Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept. Maintenance Dept., Building Control Dept.), JKR, JKJR, MOT, DID, NAHRIM, REHDA	KLCH (Enforcement Dept. Civil Engineering & Urban Transportation Dept.)
Measure 3.2.1 Public Transport System Improvement (Bus and Rail)						
GM 7 Route network expansion planning		█		Infrastructure Planning Dept.	KLCH (City Planning Dept., Civil Engineering & Urban Transportation Dept.), MOT, MOF	KLCH (Civil Engineering & Urban Transportation Dept.), MOT, Prasarana, MRT Corp., MYHSR
GM 8 Re-rationalisation of existing bus lane network	█			Infrastructure Planning Dept.	MOT, MRT Corp., Prasarana	KLCH (Civil Engineering & Urban Transportation Dept.), Prasarana, MOT
GM 9 Strengthen enforcement against misuse of dedicated bus lanes	█			Enforcement Dept.	KLCH (Legal & Prosecution Dept.), MOT, PDRM, JPJ	KLCH (Enforcement Dept., Civil Engineering & Urban Transportation Dept., (ITIS))
GM 10 Work with related agencies to advocate for high capacity, fast, frequent and reliable rapid transit	█			Civil Engineering & Urban Transportation Dept.	MOT	Prasarana, MRT Corp., MYHSR
GM 11 Provide real time arrival information at all bus stops and rail stations	█			Civil Engineering & Urban Transportation Dept.	MOT, Prasarana, MRT Corp.	MOT, Prasarana

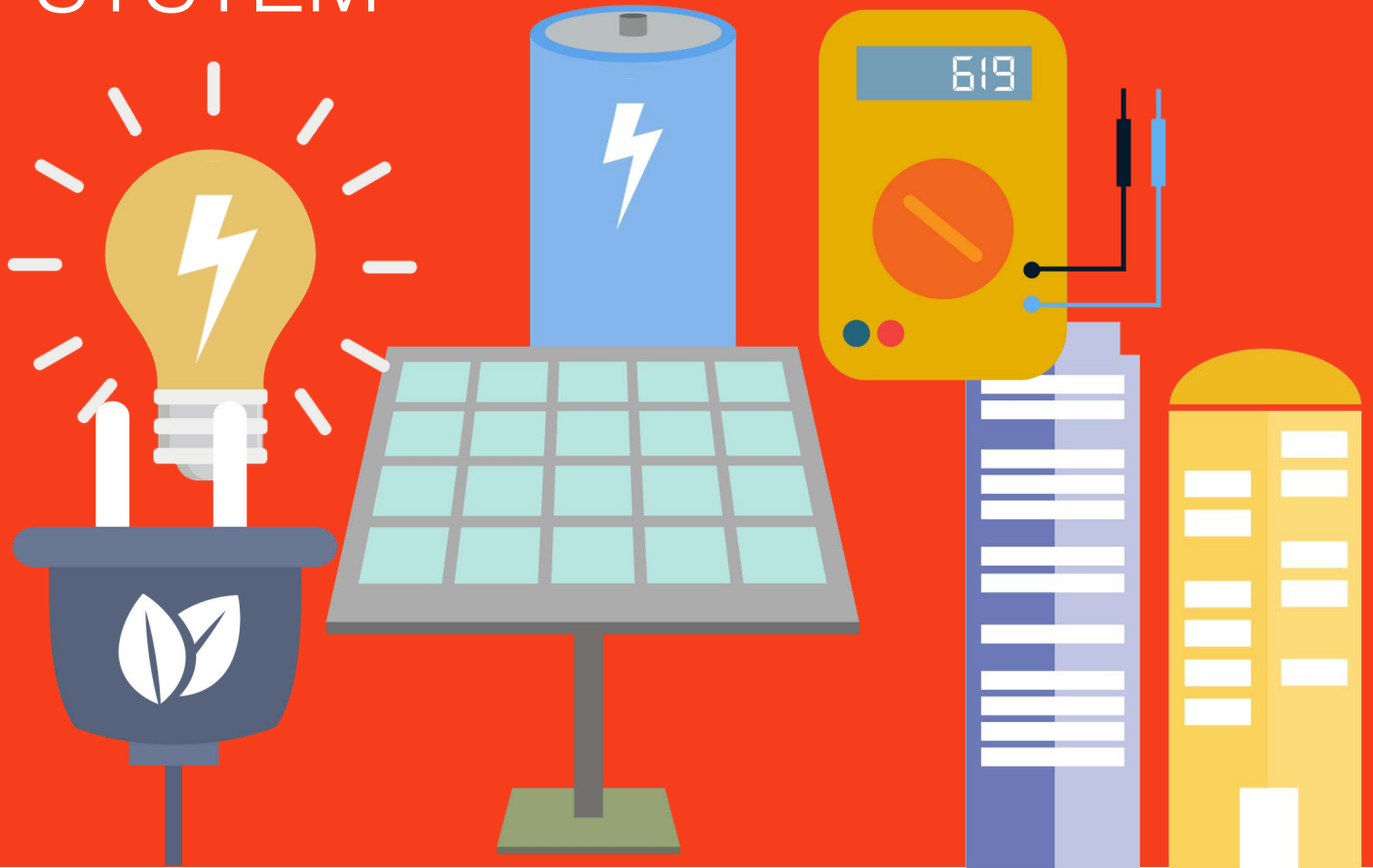
Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.2.1 Public Transport System Improvement (Bus and Rail)						
GM 12 Reimaging public transport	████████████████████			Civil Engineering & Urban Transportation Dept.	MOT, MOE, Malaysian Nature	Schools, HEIs
GM 13 Implement flat rate tickets and central area free shuttle services	████████████████████			Civil Engineering & Urban Transportation Dept.	EPU, MOT	Prasarana, MRT Corp.
GM 14 Develop and promote web-based journey planner			██████████	Civil Engineering & Urban Transportation Dept.	KLCH (Information Management Dept.), MOT	KLCH (Civil Engineering & Urban Transportation Dept., Information Management Dept.), MOT, Prasarana
Measure 3.2.2 Seamless Intermodal Transfer (Interchange Facilities)						
GM 15 Integrated e-ticketing system (across all platforms)	████████████████████			Civil Engineering & Urban Transportation Dept.	MOT	MOT, Prasarana, MRT Corp., MYHSR
GM 16 Public transport interchange as destination and urban activity nodes		██████████		Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., City Planning Dept.), MOT	MOT, Prasarana, MRT Corp., MYHSR, Developers
GM 17 Upgrading bus and rail integrated terminal	████████████████████			Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.) MOT, MOF	Prasarana, MRT Corp., MYHSR
GM 18 Enhance 'Park and Ride' facilities in sub-urban transit nodes	████████████████████			Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.), MOT	MOT, Prasarana, MRT Corp., MYHSR
Measure 3.3.1 Promote the Use of Green Vehicles						
GM 19 KLCH to use viable low carbon vehicles	████████████████████			Mechanical & Electrical Engineering Dept.	MESTECC, GreenTech Malaysia	COMOS, MAI
GM 20 Partnering with EV car sharing companies	████████████████████			Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Corporate Planning Dept.), MESTECC, GreenTech Malaysia, MOT	COMOS, MAI, Various EV car manufacturers
GM 21 Tax reduction for green vehicle purchase		██████████		Mechanical & Electrical Engineering Dept.	MOF, KASTAM, MOT, MITI, JPJ	MESTECC, GreenTech Malaysia, COMOS
GM 22 Gradual phasing out for conventional diesel engine buses	████████████████████			Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), MESTECC, GreenTech Malaysia, MOT	MOT, Prasarana
Measure 3.4.1 Transport Demand Management						
GM 23 Enhance Intelligent Transportation System (ITS)		██████████		Civil Engineering & Urban Transportation Dept.	KLCH (Information Technology Management Dept.), MOT, MESTECC	MOT, PRASARANA
GM 24 Chart out practical timeline for progressive implementation of congestion pricing scheme			██████████	Civil Engineering & Urban Transportation Dept.	KLCH (Legal & Prosecution Dept., Enforcement Dept.), MOT	MOT, JPJ
GM 25 Parking demand management	████████████████████			Civil Engineering & Urban Transportation Dept.	KLCH (Legal & Prosecution Dept., City Planning Dept.)	KLCH (Economic Planning & Development Dept.)

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 3.4.1 Transport Demand Management						
GM 26 Intelligent traffic control and support eco driving	High			Civil Engineering & Urban Transportation Dept.	KLCH (Information Management Dept.), MOT,	GreenTech Malaysia , Various car manufacturers
GM 27 Enhance the use of effective Variable Message Signs (VMS)	Medium			Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept.)	KLCH (Civil Engineering & Urban Transportation Dept.), LLM and JKR
GM 28 Improve traffic signal performance	High			Civil Engineering & Urban Transportation Dept.	MOT	KLCH (Civil Engineering & Urban Transportation Dept.), LLM and JKR
GM 29 Tidal flow and contra-flow along primary radial routes	Medium			Civil Engineering & Urban Transportation Dept.	KLCH (Enforcement Dept., Infrastructure Planning Dept.), JKR, MOT	KLCH (Enforcement Dept.), JPJ and PDRM
Measure 3.5.1 Modal Shift to Greener Freight Transport Modes						
GM 30 Promote hybrid freight transport through tax incentives in hybrid freight transport acquisition		Medium		Mechanical & Electrical Engineering Dept.	KASTAM, MITI, MESTECC, MOT	GreenTech Malaysia, Logistics operators
Measure 3.5.2 Freight Demand Management (FDM)						
GM 31 Optimal scheduling of pick-up and delivery	High			Civil Engineering & Urban Transportation Dept.	MOT	KLCH (Enforcement Dept.), JPJ, PDRM, Logistics operators

Importance Level

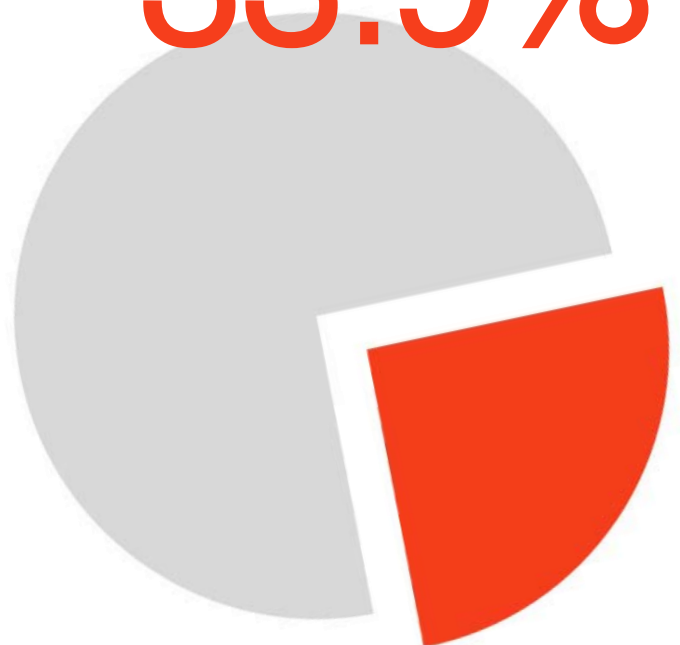
High  Medium  Low 

SUSTAINABLE ENERGY SYSTEM



Energy consumption of a modern society like Kuala Lumpur city is far less sustainable with high carbon emissions from the centralised power generation. As a countermeasure, the development of sustainable energy systems comprising efficient energy (in terms of operation and management) and renewable power generation are necessary. To accommodate a complex network of energy-demanding premises which are not initially designed with sustainable energy consumption criteria, there is still a long way to go for KLCH and relevant stakeholders to harmonise the existing situation with the sustainable energy consumption practices, besides stimulating renewable resources in the current power system.

33.9%



16,327 ktCO₂eq

Sectoral contribution to CO₂ emission reduction

4.1 Utilise Renewable Energy

Maximising the penetration of renewable and sustainable energy sources is an effective means of reducing the GHG emissions, via reduction of fossil fuel combustion for power generation.

Measure 4.1.1 Solar Energy System

Programs:

SE 1 To provide solar farms

SE 2 To promote PV and solar thermal system on buildings

SE 3 To promote PV system on public infrastructure

Measure 4.1.2 Waste-to-Energy

SE 4 Conversion of waste oil to biodiesel for KLCH transportation

SE 5 To recover energy from municipal solid waste using gasification

SE 6 Energy harvest from sewage treatment plant

SE 7 To convert food waste to energy

4.2 Enhance Efficient Energy System

The prediction from the Intergovernmental Panel on Climate Change (IPCC) reveals that a 75% reduction in energy consumption can be achieved by incorporating holistic and systematic energy efficiency strategies in buildings' design and operation, rather than improving individual component efficiency (M. Zaid et al., 2013).

Measure 4.2.1 Advanced Energy System

Programs:

SE 8 Implementation of district cooling system

Measure 4.2.2 Energy Storage System

Programs:

SE 9 To promote energy storage for efficient energy consumption

SE 10 Promote thermal energy storage for cooling

4.3 Implement Effective Energy Management System

As a countermeasure, an effective implementation of energy management system and some effective energy efficiency (EE) programs shall be scrutinised. Strengthening the funding and financial assistance are also vital for promoting a sustainable energy management system.

Measure 4.3.1 Energy Management System

Programs:

SE 11 To obtain certification in energy management system

SE 12 Implementation of online energy monitoring

4.4 Funding and Incentives to Encourage Energy Efficient and Renewable Energy Strategies

Sufficient funding and subsidies have to be provided for incentivising the energy efficiency strategies.

Measure 4.4.1 Funding and Incentives Support

Programs:

SE 13 To provide tax incentives for Waste-to-Energy (WtE) Initiatives

SE 14 Energy Performance Contracting to overcome financial barriers



Photo credit: Namita Shah

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partner	Implementer
Measure 4.1.1 Solar Energy System						
SE 1 To provide solar farms				Mechanical & Electrical Engineering Dept.	KLCH (Health & Environment Dept.), TNB, SEDA, MESTECC, GreenTech Malaysia, MIGHT, Alam Flora Sdn. Bhd.	Solar PV technology provider land owners, Alam Flora Sdn. Bhd.
SE 2 To promote PV and solar thermal system on buildings *Please cross reference with GB 18				Mechanical & Electrical Engineering Dept.	KLCH (City Planning Dept., Building Control Dept.), TNB, SEDA, MESTECC, GreenTech Malaysia, MIGHT	KLCH (Project Implementation & Building Maintenance Dept.), Building owners, Solar PV technology suppliers
SE 3 To promote PV system on public infrastructure				Mechanical & Electrical Engineering Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), SEDA, MIGHT, SIRIM, MESTECC, GreenTech Malaysia	KLCH (Project Implementation & Building Maintenance Dept.), Infrastructure owners, Solar PV technology supplier
Measure 4.1.2 Waste-to-Energy						
SE 4 Conversion of waste oil to biodiesel for KLCH transportation				Health & Environment Dept.	KLCH (City Planning (LA21KL)), MESTECC	KLCH (Mechanical & Electrical Engineering Dept.), Alam Flora Sdn. Bhd., Waste oil treatment company, Hotel and Restaurant operators, Resident's assoc.
SE 5 To recover energy from municipal solid waste using gasification				Mechanical & Electrical Engineering Dept.	KLCH (Health & Environment Dept.), SEDA, Alam Flora Sdn. Bhd	WtE technology provider
SE 6 Energy harvest from sewage treatment plant				Mechanical & Electrical Engineering Dept.	SEDA, IWK, SPAN	IWK
SE 7 To convert food waste to energy *As a pilot project				Health & Environment Dept.	KLCH (Mechanical & Electrical Engineering Dept.), Perbadanan Kampung Bharu, SEDA, MESTECC, SWCorp	Pasar Chow Kit, WtE technology providers
Measure 4.2.1 Advanced Energy System						
SE 8 Implementation of district cooling system				Mechanical & Electrical Engineering Dept.	KLCH (City Planning Dept., Building Control Dept.), GreenTech Malaysia	KLCH (Mechanical & Electrical Engineering Dept.), Building owners, utility (chilled water and electricity) companies
Measure 4.2.2 Energy Storage System						
SE 9 To promote energy storage for efficient energy consumption				Mechanical & Electrical Engineering Dept.	TNB, SEDA, GreenTech Malaysia	Energy storage suppliers, Solar PV distributors, Building owners
SE 10 Promote thermal energy storage for cooling				Mechanical & Electrical Engineering Dept.	TNB, SEDA, GreenTech Malaysia	Energy storage suppliers, Solar PV distributors, Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partner	Implementer
Measure 4.3.1 Energy Management System						
SE 11 To obtain certification in energy management system	High			Project Implementation & Building Maintenance Dept.	KLCH (Human Resource Management Dept., Administration Dept.), EC, SEDA, GreenTech Malaysia	Commercial building owners, ESCO (Advisor of energy management system)
SE 12 Implementation of online energy monitoring system			Low	Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA, EC, TNB	Building owners, Developers, Smart meter providers
Measure 4.4.1 Funding and Incentives Support						
SE 13 To provide tax incentives for Waste-to-Energy (WtE) initiatives		Medium		Property Management & Valuation Dept.	KLCH (City Planning Dept.), GreenTech Malaysia, MIDA	KLCH (Finance Dept.), LHDN, Building owners, Developers
SE 14 Energy Performance Contracting to overcome financial barriers	High			Economy Planning & Development Dept.	KLCH (Building Control Dept.), EC, GreenTech Malaysia, MIGHT, TNB	Building owners, Energy service companies, Technology suppliers

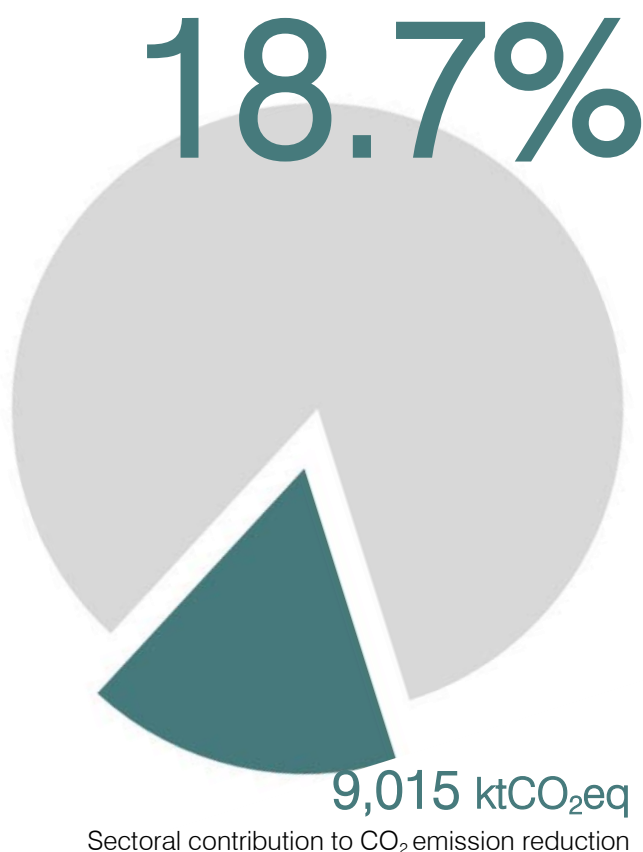
Importance Level

High  Medium  Low 

COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE



People are the core element in achieving sustainability. Establishing a low carbon society whereby residents are practising low carbon behaviour is an essential element in transforming Kuala Lumpur into a world recognised low carbon city. However, changing how people behave is a challenging task and is time consuming. In response to this challenge, empowering community to undertake low carbon initiatives and adopt a low carbon lifestyle via effective action plans is highly crucial to motivate and support the establishment of low carbon society in Kuala Lumpur.



5.1 Sustainable Consumption

Operation of electrical appliances to support modern lifestyle consume massive amount of electricity and considering that electricity is generated by power plant, mainly from natural gas and coal, it can lead to carbon emission.

Measure 5.1.1 Foster Sustainable Consumption Behaviour

Programs:

- CE 1 Survey sustainable consumption practice
- CE 2 Stimulate sustainable consumption practice
- CE 3 Strengthen sustainable consumption practice
- CE 4 Sustain sustainable consumption practice

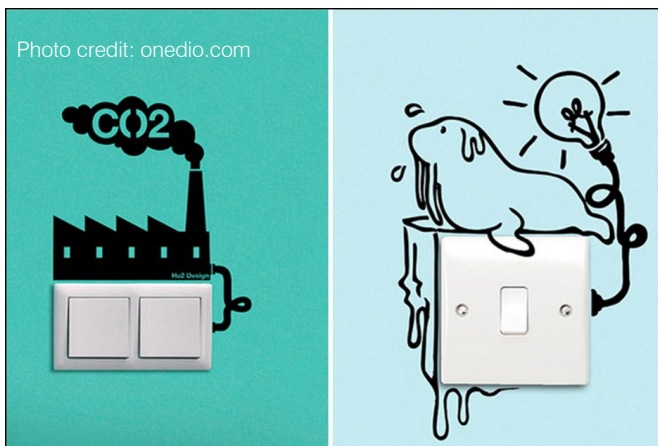


Photo credit: onedio.com

Measure 5.1.2 Promote Use of Technology that Contributes to Low Carbon Society

Programs:

- CE 5 Promote the adoption of Energy Star Rating /eco-labelling appliances
- CE 6 Promote the adoption of rainwater harvesting system
- CE 7 Promote the adoption of photovoltaic panel

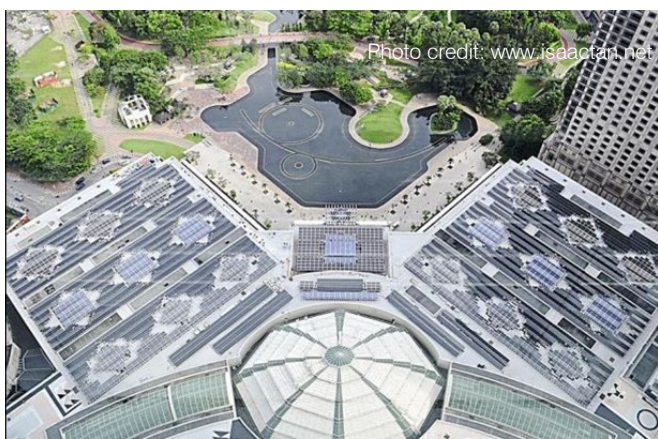


Photo credit: www.isaactan.net

5.2 Low Carbon Society

Awareness about low carbon is a must in converting a society into a low carbon society. Local citizen's awareness can be fostered via a series of public relation and marketing campaign and educational campaign.

Measure 5.2.1 Public Community Awareness

Programs:

- CE 8 Communicate LCS progress through mass media
- CE 9 Raise environmental awareness through community-based social marketing program



Photo credit: LAZ1, KLCH

Measure 5.2.2 Community Awareness through Education

Programs:

- CE 10 KLCH to collaborate with agencies and schools/pre schools on educating public
- CE 11 Virtual science centre for children and youth education
- CE 12 Develop new climate projects for children and youth
- CE 13 Climate Ambassador program
- CE 14 Green School Awards program
- CE 15 Introduce Eco-Life Challenge (ELC) in schools

5.3 Public Involvement

Alternatively, viewing the local community as partner by the local authority via fostering public involvement and engagement into low carbon initiative is an important strategy in promoting co-operation and collaboration between the authority and the local community as well as among the member of the community in moving towards a low-carbon society.



Measure 5.3.1 Community Engagement and Involvement

Programs:

- CE 16** Introduce Community Energy Saving program
- CE17** Promote community garden association and urban farming
- CE 18** Setting up database to record low carbon activities
- CE 19** Setting up Low Carbon Residential Association
- CE 20** Setting up community-based waste recycling centre
- CE 21** Introduce Waste to Wealth program
- CE 22** KLCH to collaborate with local communities in green space design

Measure 5.3.2 Increase Community Involvement in Community Safety and Security

Programs:

- CE 23** Set up community/police patrolling
- CE24** Set up Business Improvement District (BID)

Photo credit: KLCH



5.4 Green Lifestyle

Lifestyle is closely related to the formulation of a sustainable low carbon city.

Measure 5.4.1 Green Lifestyle and Smart Working Style

Programs:

- CE 25** Promote 'Work-from-Home' and the adoption of flexi working hours initiative
- CE 26** Reinforce 24 degree Celsius campaign
- CE 27** Promote *Cool Biz* campaign
- CE 28** Introduce turn-off Idling engine campaign
- CE 29** Promote "Stop Open Burning" campaign
- CE 30** Promote Eco-driving campaign

COMMUNITY ENGAGEMENT AND GREEN LIFESTYLE

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 5.1.1 Foster Sustainable Consumption Behaviour						
CE 1 Survey sustainable consumption practice	████████████████████			Health & Environment Dept.	KLCH (Information Management Dept.), JPWPKL, HEIs	KLCH (Housing Management & Community Development Dept.), Local research and higher learning institutions, NGOs, Resident's assoc.
CE 2 Stimulate sustainable consumption practice	████████████████████			Health & Environment Dept.	KLCH (Housing Management & Community Development Dept.)	NGOs, Resident's assoc.
CE 3 Strengthen sustainable consumption practice	████████████████████			Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Corporate Planning Dept., City Planning Dept. (LA21KL), Civil Engineering & Urban Transport Dept. (ITIS)).	NGOs, Resident's assoc.
CE 4 Sustain Sustainable consumption practice	████████████████████			Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., City Planning Dept. (LA21KL), Information Management Dept.)	NGOs, Resident's assoc.
Measure 5.1.2 Promote Use of Technology that Contributes to Low Carbon Society						
CE 5 Promote the adoption of Energy Star Rating / eco-labelling appliances	████████████████████			Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Housing Management & Community Development Dept.), EC, MESTECC	NGOs, Resident's assoc.
CE 6 Promote the adoption of rainwater harvesting system	████████████████████			Infrastructure Planning Dept.	KLCH (Health & Environment Dept., Project Implementation & Building Maintenance Dept. Building Control Dept.), DID, NAHRIM, REHDA	Developers, Building owners, Resident's assoc.
CE 7 Promote the adoption of solar photovoltaic panel (cross reference with energy SE2)	████████████████			Mechanical & Electrical Engineering Dept.	KLCH (Building Control Dept., Project Implementation & Building Maintenance Dept.), GreenTech Malaysia, SEDA	Building/Property owners, Resident's assoc.

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 5.2.1 Public Community Awareness						
CE 8 Communicate LCS progress through mass media	████████████████████			Corporate Planning Dept.	KLCH (Health & Environment Dept., Culture, Arts & Sport Dept., Information Management Dept.)	Mass Media
CE 9 Raise environmental awareness through community-based social marketing program	████████████████████			City Planning Dept. (LA21KL)	KLCH (Housing Management & Community Development Dept., Health & Environment Dept., Culture, Arts & Sport Dept.)	Resident's Assoc., NGOs
Measure 5.2.2 Community Awareness through Education						
CE 10 KLCH to collaborate with agencies and schools/pre schools on educating public	████████████████████			City Planning Dept. (LA21KL)	KLCH (Health & Environment Dept.), PPD, JPWPKL, JKM	NGOs, Schools
CE 11 Virtual science centre for children and youth education		██████████		Administrative Dept.	KLCH (Health & Environment Dept., Culture, Arts & Sport Dept.), Young Scientists Network-Academy Of Sciences Malaysia, PPD, JPWPKL, JKM, MOE, Malaysian Nature Society	Schools, HEIs
Measure 5.2.2 Education Community Awareness						
CE 12 Develop new climate projects for children and youth	████████████████████			Housing Management & Community Development Dept.	KLCH (City Planning Dept., Housing Management & Community Development Dept., Health & Environment Dept.), PPD, JPWPKL, PIBG, JKM, MOE	Schools, HEIs
CE 13 Climate Ambassador Program		██████████		Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL), Health & Environment Dept.), PPD, JPWPKL, PIBG	Schools, Resident's Assoc.
CE 14 Green School Awards program		██████████		Housing Management & Community Development Dept.	KLCH ((City Planning Dept. (LA21KL), Culture, Arts & Sport Dept.), PPD, JPWPKL, Social Welfare Dept., DOE, MOE, WWF, MESTECC	JPWPKL, Schools
CE 15 Introduce Eco-Life Challenge (ELC) in schools	████████████████████			Housing Management & Community Development Dept.	KLCH ((City Planning Dept. (LA21KL), Health & Environment Dept.), PPD, JPWPKL, DOE, MOE, MESTECC, WWF	JPWPKL, Schools
Measure 5.3.1 Community Engagement and Involvement						
CE 16 Introduce Community Energy Saving program	████████████████████			Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), TNB, GreenTech Malaysia	KLCH (Housing Management & Community Development Dept.), Resident's Assoc.
CE 17 Promote community garden association and urban farming	████████████████████			City Planning Dept. (LA21KL)	KLCH (Landscape & Recreation Development Dept., Housing Management & Community Development Dept.), MARDI, UPM	Resident's Assoc., NGOs, Schools

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
CE 18 Setting up database to record low carbon activities		■		City Planning Dept.	KLCH (Health & Environment Dept., Information Management Dept., Landscape & Recreation Development Dept.)	Resident's Assoc., NGOs
CE 19 Setting up Low Carbon Residential Association		■		Housing Management & Community Development Dept.	KLCH (City Planning Dept. (LA21KL)), KW	Resident's assoc.
CE 20 Setting up community-based waste recycling centre		■		Health & Environment Dept.	KLCH (Housing Management & Community Development Dept., Mechanical & Electrical Engineering Dept.), Alam Flora Sdn. Bhd., SWCorp	Resident's assoc.
CE 21 Introduce Waste to Wealth program	■	■	■	Health & Environment Dept.	KLCH (City Planning Dept., Project Implementation & Building Maintenance Dept., Housing Management & Community Development Dept.)	Resident's assoc., NGOs
CE 22 KLCH to collaborate with local communities in green space design	■			Landscape & Recreation Development Dept.	KLCH (City Planning Dept., Housing Management & Community Development Dept.), JLN	Resident's assoc., Business community, Property owners, NGOs
Measure 5.3.2 Increase Community Involvement in Community Safety and Security						
CE 23 Set up community/police patrolling			■	City Planning Dept.	KLCH (Enforcement Dept.), PDRM	Resident's Assoc., Business community
CE 24 Set up Business Improvement District (BID)			■	City Planning Dept.	KLCH (Enforcement Dept., Licensing & Petty Traders Dept.), PDRM	Business community
Measure 5.4.1 Green Lifestyle and Smart Working Style						
CE 25 Promote "Work-from-Home" and the adoption of flexi working hours initiative	■	■	■	Administration Dept.	KLCH (Human Resource Management Dept.)	Private & public sectors
CE 26 Reinforce 24 degree Celsius campaign	■	■	■	Administration Dept.	KLCH (Project Implementation & Building Maintenance Dept.), JPKKB	Private & public sectors
CE 27 Promote <i>Cool Biz</i> campaign	■	■	■	Administration Dept.	KLCH (Human Resource Management Dept.), MESTECC	Private & public sectors
CE 28 Introduce turn-off Idling engine campaign	■	■	■	Health & Environment Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Enforcement Dept.), PDRM, MOT	KLCH (Health & Environment Dept.), Car park operators
CE 29 Promote "Stop Open Burning" campaign	■	■	■	Health & Environment Dept.	KLCH (Enforcement Dept.), DOE	Resident's assoc., NGOs
CE 30 Promote Eco-driving campaign	■	■	■	Civil Engineering & Urban Transportation Dept.	KLCH (Mechanical & Electrical Engineering Dept., Civil Engineering & Urban Transportation Dept), MOT, JPJ	MIROS & MKJR, Driving schools, MAI, NGOs, Car manufacturers

Importance Level

High ■ Medium ■ Low ■

ACTION 6

LOW CARBON GREEN BUILDING



Kuala Lumpur as the capital city of Malaysia has become one of the major commercial centres in Asia region, which comprises many headquarters of multinational corporations as well as mega shopping building complexes. With the total area of 242 km², about 28% of the city's land use are used for commercial and residential buildings. Buildings contributed to 49% from the total of Kuala Lumpur's GHG emission where 10,329 ktCO₂ generates from commercial buildings and 2,152 ktCO₂ from residential buildings, respectively. In fact, about 80% of the commercial and residential space supply in Kuala Lumpur city centre is from the existing buildings (Kuala Lumpur Structure Plan 2020). With the rapid growth of GDP in the city, the total GHG emission from the building sector will rise about three times by 2030. Therefore, countermeasures are urgently needed for both the new and existing buildings.

20.1%



9,673 ktCO₂eq
Sectoral contribution to CO₂ emission reduction

6.1 Implementation of Sustainable Design Strategies

By responding to the local climatic conditions, which include the sun, wind and rain, buildings can reduce their dependency on mechanical and electrical equipment that require energy to achieve indoor comfort.

Measure 6.1.1 Efficient Building Envelope Performance

Programs:

GB 1 Minimum building envelope requirements

GB 2 Reduction of heat gain from direct solar radiation

GB 3 Maximising daylighting zone

GB 4 Promoting the use of natural ventilation

GB 5 Retrofitting the existing building envelope



Measure 6.1.2 Mitigation of Urban Heat Island (UHI) Phenomenon

Programs:

GB 6 Using appropriate materials on building surfaces

GB 7 Increasing the requirement of building green covering

GB 8 Improving coverings of the existing buildings

Measure 6.1.3 Increasing Building Water Efficiency

Programs:

GB 9 Implementation of rainwater harvesting

GB 10 Reduction of potable water consumption

GB 11 Improving water efficiency of existing buildings



Measure 6.1.4 Sustainable Low Carbon Building Construction

Programs:

GB 12 Incentives for certified low carbon green building materials and products

GB 13 Reuse of building materials for redevelopment projects

6.2 Usage of Energy Efficient (EE) & Renewable Energy (RE) Building Technologies

Efforts are needed to reduce the usage of non-renewable energy sources towards achieving zero energy or carbon neutral building.

Measure 6.2.1 Energy Efficient Air Conditioning System

Programs:

GB 14 High efficiency air conditioner for new non-residential buildings

GB 15 Conversion to high efficiency air conditioner for existing buildings



Measure 6.2.2 Energy Efficient Lighting System

Programs:

- GB 16** Energy efficient lighting system for new buildings
- GB 17** Conversion to energy efficient lighting for existing buildings

Measure 6.2.3 Renewable Energy System

Programs:

- GB 18** Installation of renewable energy system in commercial buildings
- GB 19** Implementation of net metering for PV System

Photo credit: <http://www.kenan-flagler.unc.edu>



Measure 6.2.4 Other Energy Efficient Equipment and Systems

Program:

- GB 20** Incentives for energy efficient products and electrical appliances usage

6.3 Monitoring and Management of Green Buildings

Maintenance and monitoring of the performances of green buildings require additional measures and are essential to assure the sustainability of these buildings with low carbon emission.

Measure 6.3.1 Low Carbon Green Building Monitor

Programs:

- GB 21** Low carbon green building calculator
- GB 22** Low carbon building award (LCBA)

Measure 6.3.2 Low Carbon Green Building Plan

Programs:

- GB 23** Submission of low carbon building plan
- GB 24** Submission of sustainable building waste management plan
- GB 25** Submission of green building user manual



Measure 6.3.3 Sustainable Management and Building Audit

Programs:

- GB 26** Energy management system (EMS) requirement
- GB 27** Smart and centralised building data collection
- GB 28** Modernising facility management for existing buildings
- GB 29** Building energy audit and certificate

Photo credit: Metro Services



Measure 6.3.4 Global Warming Control

Program:

- GB 30** Banning of Global Warming Potential (GWP) substance

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.1.1 Efficient Building Envelope Performance						
GB 1 Minimum building envelope requirements				Building Control Dept.	KLCH (City Planning Dept., Project Implementation & Building Maintenance Dept.), MESTECC, SEDA, JKR, CIDB	Professional Architects, Developers, Building owners
GB 2 Reduction of heat gain from direct solar radiation				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept.), SEDA, JKR	Building owners, Professional Architects, Developers
GB 3 Maximising daylighting zone				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept.), SEDA, PAM	Building owners, Professional Architects, Developers
GB 4 Promoting the use of natural ventilation				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept.), SEDA, PAM	Building owners, Professional Architects, Developers
GB 5 Retrofitting the existing building envelope				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Property Management & Valuation Dept., Legal & Prosecution Dept.), SEDA, PAM	Building owners, Developers, Chamber of Commerce
Measure 6.1.2 Mitigation of Urban Heat Island (UHI) Phenomenon						
GB 6 Using appropriate materials on building surfaces				Project Implementation & Building Maintenance Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Building Control Dept., Quantity Surveying Dept., Landscape & Recreation Development Dept.), SEDA	Building owners, Professionals Architects, Developers
GB 7 Increasing the requirement of building green covering				City Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., Building Control Dept., Landscape & Recreation Development Dept.)	Building owners, Professionals Architects, Developers
GB 8 Improving coverings of the existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (Landscape & Recreational Development Dept., Building Control Dept., Property Management & Valuation Dept.), SEDA	Building owners, Professionals Architects, Developers
Measure 6.1.3 Increasing Building Water Efficiency						
GB 9 Implementation of rainwater harvesting				Infrastructure Planning Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept., Building Control Dept.), NAHRIM	Building owners, Professionals Architects, Developers
GB 10 Reduction of potable water consumption				Infrastructure Planning Dept.	KLCH (Building Control Dept.) SPAN, SYABAS	Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.1.3 Increasing Building Water Efficiency						
GB 11 Improving water efficiency of existing buildings				Infrastructure Planning Dept.	KLCH (Building Control Dept., Project Implementation & Building Maintenance Dept.), SPAN, SYABAS	Building owners, Professionals Architects, Developers
Measure 6.1.4 Sustainable Low Carbon Building Construction						
GB 12 Incentives for certified low carbon green building materials and products				Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept.) MIDA, CIDB, SIRIM Berhad, SEDA, MESTECC, GreenTech Malaysia	Building owners, Professionals Architects, Developers
GB 13 Reuse of building materials for redevelopment projects				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Property Management & Valuation Dept.) CIDB	Building owners, Professionals Architects, Developers
Measure 6.2.1 Energy Efficient Air Conditioning System						
GB 14 High efficiency air conditioner for new non-residential buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept.) MESTECC, MIDA	Professionals bodies, Building owners
GB 15 Conversion to high efficiency air conditioner for existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Building Control Dept., Housing Management & Community Development Dept.) MESTECC, MIDA, SEDA, EC	Professionals bodies, Building owners
Measure 6.2.2 Energy Efficient Lighting System						
GB 16 Energy efficient lighting system for new buildings				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Engineering Dept., City Planning Dept.) MIDA, MESTECC, CIDB, SIRIM Berhad	Professionals bodies, Building owners
GB 17 Conversion to energy efficient lighting for existing buildings				Project Implementation & Building Maintenance Dept.	KLCH (Housing Management & Community Development Dept., Building Control Dept.), EC	Professionals bodies, Building owners
Measure 6.2.3 Renewable Energy System						
GB 18 Installation of renewable energy system in commercial buildings				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept.) SEDA, MESTECC, TNB	Professionals bodies, Building owners
GB 19 Implementation of net metering for PV System				Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Licensing & Petty Traders Development Dept.), SEDA, MESTECC, TNB	Professionals bodies, Building owners
Measure 6.2.4 Other Energy Efficient Equipment and Systems						
GB 20 Incentives for energy efficient products and electrical appliances				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Engineering Dept.), Administration Department (<i>Bahagian Perolehan</i>), MESTECC (<i>Bdn penarafan hijau</i>), EC	Professionals bodies, Building owners
Measure 6.3.1 Low Carbon Green Building Monitor						
GB 21 Low carbon green building calculator				Project Implementation & Building Maintenance Dept.	KLCH (Property Management & Valuation Dept.) SEDA, JKR, INSPEN	Professionals bodies, Building owners
GB 22 Low carbon building award (LCBA)				Project Implementation & Building Maintenance Dept.	KLCH (Property Management & Valuation Dept.), MESTECC, Rating tool operators	Professionals bodies, Building owners

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 6.3.2 Low Carbon Green Building Plan						
GB 23 Submission of low carbon building plan		■		Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., Health & Environment Dept, Infrastructure Planning Dept.), Relevant sector regulator / Sector facilitator	Professionals bodies, Building owners
GB 24 Submission of sustainable building waste management plan	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., Health & Environment Dept.), KPKT (Jabatan Pengurusan Sisa Pepejal Negara) Relevant sector regulator / Sector facilitator	Professionals bodies, Building owners
GB 25 Submission of green building user manual	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Building Control Dept., City Planning Dept, Mechanical & Electrical Engineering Dept, Infrastructure Planning Dept, Civil Engineering & Urban Transportation Dept.), MESTECC, Professional bodies, REHDA, MIP	Professionals bodies, Building owners
Measure 6.3.3 Sustainable Management and Building Audit						
GB 26 Energy management system (EMS) requirement	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept. & City Planning Dept.), SEDA, MESTECC, JKR	Professionals bodies, Building owners
GB 27 Smart and centralised building data collection	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA, TNB	Professionals bodies, Building owners
GB 28 Modernising facility management for existing buildings	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA	Professionals bodies, Building owners
GB 29 Building energy audit and certificate	■	■		Project Implementation & Building Maintenance Dept.	KLCH (Information Management Dept.), SEDA	Professionals bodies, Building owners
Measure 6.3.4 Global Warming Control						
GB 30 Banning of Global Warming Potential (GWP) substance	■			Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept., Health & Environment Dept., Administration Dept.), MESTECC	Professionals, building owners

Importance Level

High ■ Medium ■ Low ■

GREEN AND BLUE NETWORK



Enhancing green and blue elements in Kuala Lumpur city provides higher carbon sink and better liveable environment to the city inhabitants. Rapid development resulted in the decrease of green and blue elements in Kuala Lumpur. Based on the projection, carbon sink capacity of green infrastructure in Kuala Lumpur may rise from 1,067.65 (year 2010) to 1,746.36 ktCO₂ in 2030. KL LCSBP 2030 aims to increase the green cover of Kuala Lumpur from 10% (2010) to 30% (2030). In achieving this aim, the city's green space indicator (GSI) is expected to be increased from 0.36 to 2.0 hectare per 1000 population; which is corresponding to the current GSI of Melbourne, New York, and Toronto.

0.7%

316 ktCO₂eq

Sectoral contribution to CO₂ emission reduction

7.1 Green Cover Protection

Preserving and conserving these green elements is very important to maintain their high carbon storage capability and to mitigate the urban heat island effect.

Measure 7.1.1 Enhance Forest Conservation

Programs:

- BG 1** Protect existing reserved forests
- BG 2** Law enforcement and governance

Measure 7.1.2 Improve Urban Parks Health

Programs:

- BG 3** Develop an integrated pest management plan
- BG 4** Inspect and retain topsoil quality of urban parks

7.2 Promote Tree Planting

In order to utilise the tree planting program in an effective manner, measures as below are formulated to meet the 2.5 million trees target by 2030.

Measure 7.2.1 Achieve Appropriate Canopy Cover

Programs:

- BG 5** Establish canopy cover target by locations
- BG 6** Identify new planting spaces
- BG 7** Introduce 'no net tree canopy cover loss' policy

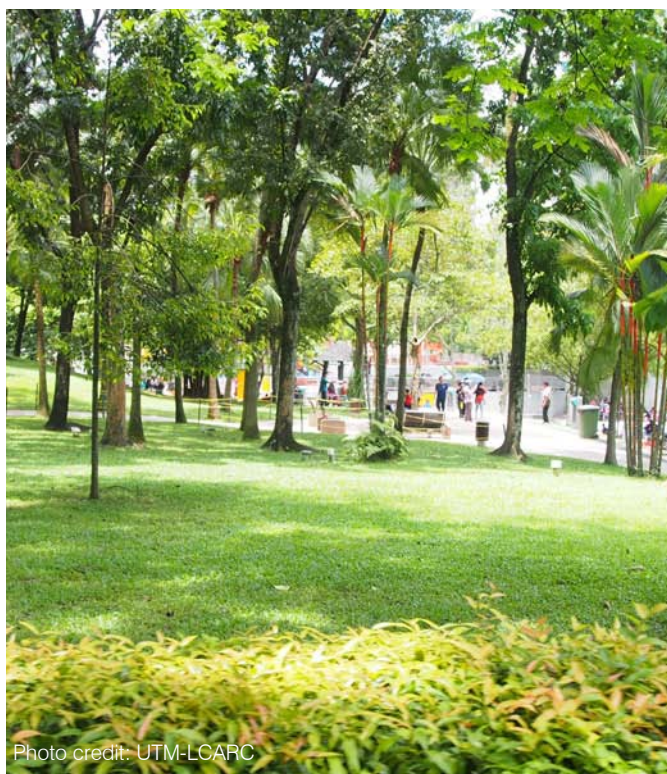


Photo credit: UTM-LCARC

Measure 7.2.2 Develop Tree Establishment Program

Programs:

- BG 8** Establish tree inventory
- BG 9** Prepare a 15-year tree planting plan
- BG 10** Organise 'One Resident, One Tree program'

Measure 7.2.3 Establish Diversity in Tree Population

Programs:

- BG 11** Develop standards for species at specific location
- BG 12** Develop a native tree seedlings project



Photo credit: UTM-LCARC

Measure 7.2.4 Preserve and Enhance Local Natural Biodiversity

Programs:

- BG 13** Manage green cover to enhance biodiversity
- BG 14** Reintroduce, where appropriate, 'lost' or rare native species in natural areas
- BG 15** Develop Kuala Lumpur green cover preservation master plan
- BG 16** Improving existing policies by laws
- BG 17** Revise the existing 'open space' policy

7.3 Improve Green Cover Maintenance

Tree maintenance improve the survival period of trees and other plants by pruning, watering, fertilization planning and keeping the surrounding environment clean.

Measure 7.3.1 Ensure Departments of KLCH Operate with Common Goals

Programs:

BG 18 Organise inter-departmental workshops on tree maintenance program

BG 19 Using tree for place making

Measure 7.3.2 Monitor Existing Canopy Cover

Programs:

BG 20 Carry out tree surveys for existing green areas

BG 21 Encourage reporting of illegal tree felling

Measure 7.3.3 Undertake Research to Improve Green Cover Performance and Encourage Adaptive Management

Programs:

BG 22 Form research partnerships with local institutions to study different aspects of green cover

7.4 Facilitate Local Community Engagement

The engagement of local community by facilitating events and workshops and by consultation and cooperation with stakeholders such as private landholders, developers, nurseries, and citizens at the neighbourhood can increase the awareness and acknowledge the importance of canopy cover.

Measure 7.4.1 Increase Public Awareness

Programs:

BG 23 Facilitate events and educational workshops

7.5 Promote More Water Bodies

Open water bodies are a great source of moisture for a relatively dry urban environment.

Measure 7.5.1 Preserve and Create Attractive Waterfronts

Programs:

BG 24 Monitor and improve water quality

BG 25 Increase new water elements

BG 26 Create linear urban parks along river and waterway reserves



Photo credit: UTM-LCARC



Photo credit: UTM-LCARC

Action 7 GREEN AND BLUE NETWORK

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.1.1 Enhance Forest Conservation						
BG 1 Protect existing reserved forest	██████████			Landscape & Recreation Development Dept.	KLCH (Property Management & Valuation Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), PTG WPKL	Federal Territory of Kuala Lumpur (Forestry Dept.)
BG 2 Law enforcement and governance	██████████			Landscape & Recreation Development Dept.	KLCH (Property Management & Valuation Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)	Federal Territory of Kuala Lumpur (Forestry Dept.)
Measure 7.1.2 Improve Urban Parks Health						
BG 3 Develop an integrated pest management plan	██████████			Landscape & Recreation Development Dept.	KLCH (Health & Environmental Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), FRIM	KLCH (Landscape & Recreation Development Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)
BG 4 Inspect and retain topsoil quality of urban parks	██████████			Landscape & Recreation Development Dept.	KLCH (Health & Environmental Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.), FRIM	KLCH (Landscape & Recreation Development Dept.), Federal Territory of Kuala Lumpur (Forestry Dept.)
Measure 7.2.1 Achieve Appropriate Canopy Cover						
BG 5 Establish canopy cover target by locations	██████████			Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 6 Identify new planting spaces	██████████			Landscape & Recreation Development Dept.	KLCH (Landscape & Recreation Development Dept.), HEIs	KLCH (City Planning Dept.), Building owners, Local communities
BG 7 Introduce 'no net tree canopy cover loss' policy	██████████			Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), Enforcement Dept., Legal & Prosecution Dept.), HEIs, FRIM	KLCH (Landscape & Recreation Development Dept.)
Measure 7.2.2 Develop Tree Establishment Program						
BG 8 Establish tree inventory	██████████			Landscape & Recreation Development Dept.	FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
BG 9 Prepare a 15-year tree planting plan	██████████			Landscape & Recreation Development Dept.	FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
BG 10 Organise 'One Resident, One Tree' program	██████████			Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (LA21KL), Corporate Planning Dept.), FRIM, JLN, HEIs	KLCH (Landscape & Recreation Development Dept.), NGOs, Local communities
Measure 7.2.3 Establish Diversity in Tree Population						
BG 11 Develop standards for species at specific location	██████████			Landscape & Recreation Development Dept.	FRIM, JLN., HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 12 Develop a native tree seedlings project	██████████			Landscape & Recreation Development Dept.	JPWPKL, FRIM, HEIs, JLN.	KLCH (Landscape & Recreation Development Dept.), NGOs, Local

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.2.4 Preserve and Enhance Local Natural Biodiversity						
BG 13 Manage green cover to enhance biodiversity				Landscape & Recreation Development Dept.	FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.)
BG 14 Reintroduce, where appropriate, 'lost' or rare native species in natural areas				Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (Landscape Valuation unit)), FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.), NGOs
BG 15 Develop Kuala Lumpur green cover preservation master plan				Landscape & Recreation Development Dept.	FRIM, Federal Territory of Kuala Lumpur (Forestry Dept.), JPWPKL, HEIs, JLN	KLCH (Landscape & Recreation Development Dept.)
BG 16 Improving existing policies by laws				Landscape & Recreation Development Dept.	KLCH (City Planning Dept. (Landscape Valuation unit))	KLCH (Enforcement Dept.)
BG 17 Revise the existing 'open space' policy				City Planning Dept.	KLCH (Landscape & Recreation Development Dept.), JLN	KLCH (City Planning Dept.)
Measure 7.3.1 Ensure Departments of KLCH Operate with Common Goals						
BG 18 Organise inter-departmental workshops on tree maintenance program				Landscape & Recreation Development Dept.	KLCH (City Planning Dept.), JLN, Arborists, HEIs, FRIM	KLCH (Landscape & Recreation Development Dept.)
BG 19 Using tree for place making				Landscape & Recreation Development Dept.	KLCH (City Planning Dept., Development Dept.), Arborist, HEIs, FRIM	KLCH (City Planning Dept., Landscape & Recreation Development Dept.)
Measure 7.3.2 Monitor Existing Canopy Cover						
BG 20 Carry out tree surveys for existing green areas				Landscape & Recreation Development Dept.	NGOs, Local Communities, HEIs	KLCH (Landscape & Recreation Development Dept.)
BG 21 Encourage reporting of illegal tree felling				Landscape & Recreation Development Dept.	KLCH (Enforcement Dept., Legal & Prosecution Dept., Information Management Dept., Corporate Planning Dept.), NGOs, Local Communities, HEIs	KLCH (Landscape & Recreation Development Dept.)
Measure 7.3.3 Undertake Research to Improve Green Cover Performance and Encourage Adaptive Management						
BG 22 Form research partnerships with local institutions to study different aspects of green cover				Landscape & Recreation Development Dept.	KLCH (Human Resources Management Dept.), FRIM, HEIs, Arborists	KLCH (Landscape & Recreation Development Dept.)
Measure 7.4.1 Increase Public Awareness						
BG 23 Facilitate events and educational workshops				Landscape & Recreation Development Dept.	KLCH (Human Resources Management Dept. (IDB), City Planning Dept. (LA21KL)), JLN, JPWPKL, FRIM, HEIs	KLCH (Landscape & Recreation Development Dept., City Planning Dept. (LA21KL)), Schools, Kindergarten, Local communities

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 7.5.1 Preserve and Create Attractive Waterfronts						
BG 24 Monitor and improve water quality	■			Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., Health & Environment Dept.), DID	KLCH (Civil Engineering & Urban Transportation Dept.), DOE
BG 25 Increase new water elements		■		Landscape & Recreation Development Dept.	KLCH (Infrastructure Planning Dept., Civil Engineering and Urban Transportation Dept.)	KLCH (Landscape & Recreation Development Dept.)
BG 26 Create linear urban parks along river and waterway reserves		■		Project Implementation & Building Maintenance Dept.	KLCH (City Planning Dept.)	KLCH (Landscape & Recreation Development Dept.)

Importance Level

High ■ Medium ■ Low ■

SUSTAINABLE WASTE MANAGEMENT



Rapid urbanisation is expected to change urban consumption patterns of Kuala Lumpur's residents. It is estimated that a total of 1,582 ktCO₂ GHG emission generated by waste coming from both landfill and waste transportation within Kuala Lumpur year 2030. Inadequate and inefficient waste collection, recycling or treatment, and uncontrolled disposal of waste in dump areas could cause severe effects such as health risks to human beings and pollution to the environment. With these severe environmental issues arising from managing solid waste, protective and preventive measures should be in place to minimise the adverse effects of these issues to Kuala Lumpur.

1.1%

527 ktCO₂eq

Sectoral contribution to CO₂ emission reduction

8.1 Sustainable Municipal Solid Waste (MSW) Management

Sustainable municipal solid waste (SMSW) management facilitates holistic approach in handling waste to reduce the environmental impact from the increased generation of waste and its disposal.

Measure 8.1.1 Nurturing Zero-Waste Culture

Programs:

WM 1 Encourage culture of sharing, borrowing, repairing and renting

WM 2 Promote the use of greener packaging, reusable bag

WM 3 KLCH to promote global “Love Food Hate Waste” initiative

WM 4 Encourage waste separation at source premises

WM 5 “Pay as You Throw” (PAYT) program

WM 6 Recycling of used cooking oil from residential premises

Measure 8.1.2 Promoting Education and Awareness on Waste Reduction

Programs:

WM 7 Involvement and promotion of green school initiative

WM 8 Organising reduction and awareness campaigns on enforcement of Act 672

Measure 8.1.3 Electronic Waste (E-waste) Reduction

Programs:

WM 9 Implementation of E-waste recycling program

Measure 8.1.4 Commercial Waste Reduction

Programs:

WM 10 Development and implementation of recycling commercial waste policies

WM 11 Food waste collection and treatment from commercial premises

Photo credit: feldavoice.com



8.2 Fostering Circular Economy (CE)

CE is known as an alternative to a traditional linear economy (make, use, dispose) in which resources are kept in use for as long as possible, extract the maximum value while in use, then recover and regenerate products and materials at the end of each service life.

Measure 8.2.1 Promoting Sustainable Consumption and Production (SCP)

Programs:

WM 12 Encouraging purchases of products made of recycled materials

WM 13 Development and implementation of Eco-Town

WM 14 Adoption of paperless meeting

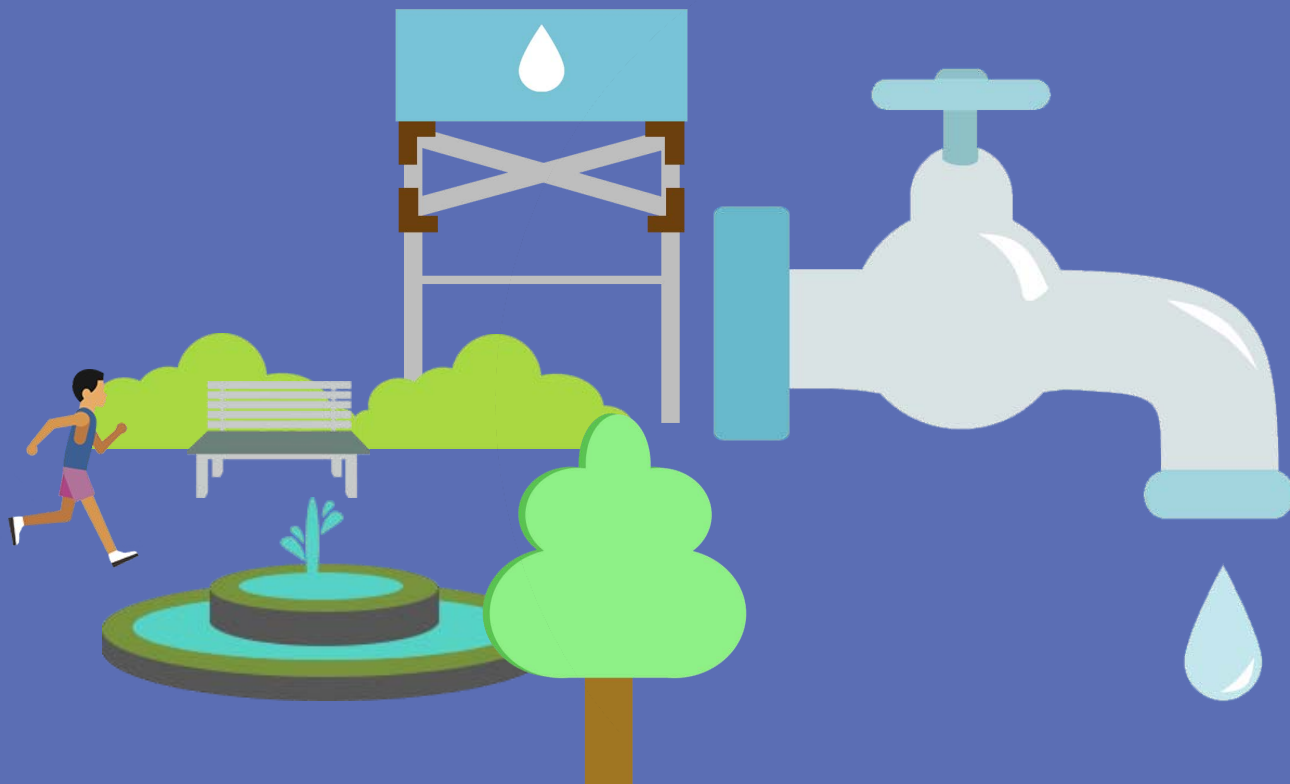
Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 8.1.1 Nurturing Zero-Waste Culture						
WM 1 Encourage culture of sharing, borrowing, repairing and renting				Housing Management & Community Development Dept.	KLCH (Housing Management & Community Development Dept., City Planning Dept. (LA21KL), Corporate Planning Dept.), SWCorp, JPSPN	Resident's assoc., NGOs
WM 2 Promote the use of greener packaging, reusable bag				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept.), JPSPN, SWCorp, KW, SIRIM Berhad	Biodegradable companies/manufacturers, Commercial premises, Resident's assoc.
WM 3 KLCH to promote global "Love Food Hate Waste" initiative				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), JPSPN, SWCorp., KW, KPDKK	Resident's assoc., Residential premises, Commercial premises, Food truck assoc., Schools, NGOs
WM 4 Encourage waste separation at source at premises				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept., Housing Management & Community Development Dept.), JPSPN, SWCorp, KW	Resident's assoc., Commercial premises, Property owners, Schools, NGOs, MAH, Alam Flora Sdn. Bhd.
WM 5 "Pay as You Throw" (PAYT) program				Health & Environment Dept.	KLCH (Licensing & Petty Traders Dept.), JPSPN, SWCorp., Alam Flora Sdn. Bhd., JPWPKL	Resident's assoc., Commercial premises owners
WM 6 Recycling of used-cooking oil from residential premises				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), JPSPN, SWCorp., DOE	Resident's assoc., Residential premises, Commercial premises, Licensed oil waste carrier companies
Measure 8.1.2 Promoting Education and Awareness on Waste Reduction						
WM 7 Involvement and promotion of green school initiative				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), MOE, JPSPN, SWCorp, DOE, JPWPKL, Alam Flora Sdn. Bhd.	Schools, HEIs, NGOs
WM 8 Organising reduction and awareness campaigns on enforcement of Act 672				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Housing Management & Community Development Dept.), JPSPN, KPKT, MOE, Alam Flora Sdn. Bhd., SWCorp	Schools, HEIs, NGOs, JPWPKL
Measure 8.1.3 Electronic Waste (E-waste) Reduction						
WM 9 Implementation of E-waste recycling program				Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL)), SWCorp, DOE	Resident's assoc., E-Waste collector companies, Commercial premises owners, Malaysian Shopping Malls assoc., MAH

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 8.1.4 Commercial Waste Reduction						
WM 10 Development and implementation of recycling commercial waste policies	██████████			Health & Environment Dept.	SWCorp, DOE, Resident's assoc., NGOs	Commercial premises owners, Malaysian Shopping Malls Assoc., MAH
WM 11 Food waste collection and treatment from commercial premises	██████████			Health & Environment Dept.	KLCH (City Planning Dept. (LA21KL), Licensing & Petty Traders Development Dept.), SWCorp, Alam Flora Sdn. Bhd.	Licensed contractors, Commercial premises owners, Malaysian Shopping Malls Assoc., MAH
Measure 8.2.1 Promoting Sustainable Consumption and Production (SCP)						
WM 12 Encouraging purchases of products made of recycled materials		██████████		Health & Environment Dept.	JPSPN, MESTECC, GreenTech Malaysia, SWCorp	Resident's assoc., Commercial premises, Property owners, MOE, NGOs, MAH
WM 13 Development and implementation of Eco-Town	██████████			Health & Environment Dept.	KLCH (City Planning Dept., Economic Planning Development Dept.), SWCorp, KPKT, KW	Developers, NGOs
WM 14 Adoption of paperless meeting	██████████			Administration Dept.	KLCH (Human Resource Management Dept., Information Management Dept.), SWCorp DOE, Alam Flora Sdn. Bhd., GreenTech Malaysia, HEIs, MOE	Private and government institutions, JPWPKL

Importance Level

High ██████████ Medium ██████████ Low ██████████

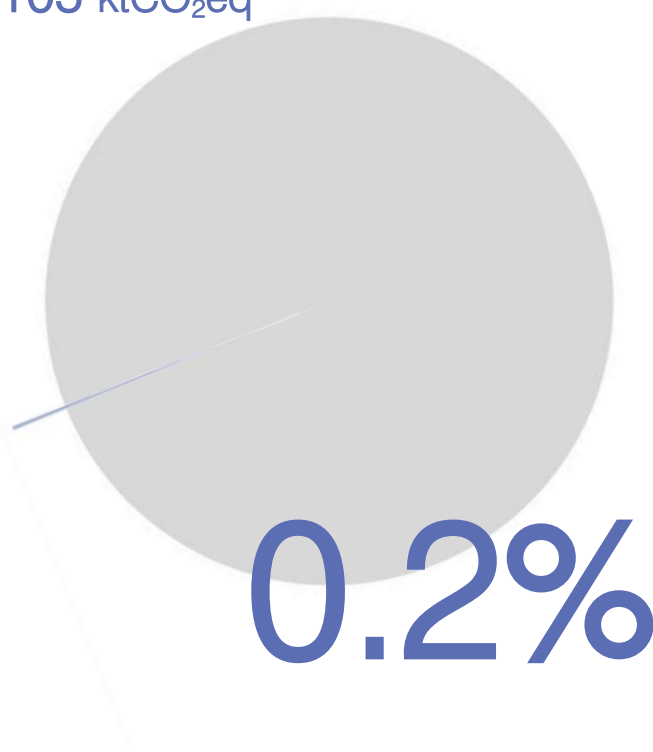
SUSTAINABLE WATER AND WASTEWATER MANAGEMENT



Kuala Lumpur is facing similar challenges when it comes to water resources and wastewater management. The city is vulnerable to prolonged periods of dryness, when reservoir levels drop to dangerously low levels. This precarious situation happens even though Kuala Lumpur usually receives at least 2,600 mm of rain annually. On the flip side, the urban drainage system in the City centre is overstrained during heavy downpours, leading to flash floods. As Kuala Lumpur is heavily reliant on surface water, it is also vulnerable to river pollution, where the bulk of raw water comes from. It is expected that the pollution nearby Sungai Langat, Sungai Semenyih and Sungai Selangor are recurring examples grey water recycling will be important option for sustainable water and wastewater management.

Sectoral contribution to CO₂ emission reduction

105 ktCO₂eq



9.1 Water Supply Management

There are three measures introduced that are suitable for KLCH which includes: minimising the use of drinking quality water for nonpotable functions, reduction of non revenue water (NRW) loss and smart water management.

Measure 9.1.1 Minimising the Use of Drinking Quality Water for Non-Potable Functions

Program:

WW 1 KLCH to work with relevant agencies to develop viable non potable water system distribution in Kuala Lumpur for new residential and commercial development

Measure 9.1.2 Reduction of Non Revenue Water (NRW) Loss

Programs:

WW 2 Collaborate with respective agencies for incorporating smart water technologies that allow water providers to minimise Non- Revenue Water (NRW)

WW 3 Encourage and promote community awareness practice towards reduction of NRW

Measure 9.1.3 Smart Water Management System

Program:

WW 4 Kuala Lumpur smart water management

9.2 Sustainable Wastewater Management

Management of wastewater in the urban context must be adapted according, not only to the size, but also to the economic development and governance capacity of the urban area.

Measure 9.2.1 Limit Wastewater Production

Programs:

WW 5 Work with relevant agencies to promote reduction at source

Measure 9.2.2 Maximizing the Value of Wastewater

Programs:

WW 6 Collaborate with relevant agencies to promote usage of recycled wastewater in Kuala Lumpur

WW 7 Collaborate with relevant agencies and academics institution to utilise bioenergy harvesting method for energy recovery

WW 8 Collaborate with respective agencies on composting sewage sludge from wastewater

WW 9 Promote use of phosphorous recovery from wastewater as new sustainable fertiliser alternative

WW 10 Collaborate with respective agencies to use and promote sludge as soil amendment

WW 11 Promote application of sewage sludge in urban landscaping and forest rehabilitation and regeneration

9.3 Stormwater Management

In moving towards sustainability, KLCH should take up the approach of control-at-source in managing stormwater in Kuala Lumpur. With this approach, quality and quantity of the runoff from developing an area can be maintained to be the same as predevelopment condition.

Measure 9.3.1 Incorporation of Low Impact Development (LID) In Stormwater Management

Programs:

WW 12 Adoption of Low Impact Development (LID) in Kuala Lumpur

WW 13 Promote the installation of run off storage

Measure 9.3.2 Elimination or Minimisation of Non-Point Source Pollutants

Programs:

WW 14 Establish partnership with agencies in educating and training public and industries

WW 15 Support implementation of Best Management Practices at construction site

WW 16 Promote incorporation of NPS pollution prevention strategies and policies into regional and official community plans

WW 17 Promote effluent management

SUSTAINABLE WATER AND WASTEWATER MANAGEMENT

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 9.1.1 Minimizing the Use of Drinking Quality Water for Non-Potable Functions						
WW 1 KLCH to work with relevant agencies to develop viable non potable water system distribution in Kuala Lumpur for new residential and commercial development				Economic Planning & Development Dept.	KLCH (Infrastructure Planning Dept., Health and Environment Dept., Community Development & Urban Wellbeing Dept.), KATS, SPAN, SYABAS, JPS	SPAN, Developers, SYABAS
Measure 9.1.2 Reduction of Non-Revenue Water (NRW) Loss						
WW 2 Collaborate with respective agencies for incorporating smart water technologies that allow water providers to minimise Non- Revenue Water (NRW)				Infrastructure Planning Dept.	KLCH (Community Development & Urban Wellbeing Dept., City Planning Dept., Infrastructure Planning Dept.), KATS, SPAN, SYABAS, JPS	Resident's assoc., SPAN, SYABAS
WW 3 Encourage and promote community awareness practice towards reduction of NRW				Corporate Planning Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), SPAN, SYABAS, HEIs, JPWPKL, KKMM (Information Dept.)	KLCH (Community Development & Urban Wellbeing Dept.), Resident's assoc., SPAN
Measure 9.1.3 Smart Water Management System						
WW 4 Kuala Lumpur smart water management				Economic Planning & Development Dept.	KLCH (Infrastructure Planning Dept., Community Development & Urban Wellbeing Dept.), MESTECC, KATS, SPAN	KLCH (Community Development & Urban Wellbeing Dept.), Developers, Resident's assoc.
Measure 9.2.1 Limit Wastewater Production						
WW 5 Work with relevant agencies to promote reduction at source				Project Implementation & Building Maintenance Dept.	KLCH (Infrastructure Planning Dept., Community Development & Urban Wellbeing Dept.), KATS, SPAN, DOE	DOE, IWK, Developers Resident's assoc.,
Measure 9.2.2 Maximizing the Value of Wastewater						
WW 6 Collaborate with relevant agencies to promote usage of recycled wastewater in Kuala Lumpur				Health & Environment Dept.	KLCH (Infrastructure Planning Dept., Health & Environment Dept.), SPAN, KATS, NGOs, IWK, KW, JPKKB	DOE, IWK, Resident's assoc.
WW 7 Collaborate with relevant agencies and academics institution to utilise bioenergy harvesting method for energy recovery				Health & Environment Dept.	KLCH (Infrastructure Planning Dept., Health & Environment Dept.), JPSPN, SPAN, Energy Commission (EC), HEIs, SEDA	DOE, IWK, Registered industrial and commercial companies

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 9.2.2 Maximizing the Value of Wastewater						
WW 8 Collaborate with respective agencies on composting sewage sludge from wastewater		High		Health & Environment Dept.	KLCH (Health & Environment Dept.), IWK, KATS, JPSPN, SPAN	KLCH (Civil Engineering & Urban Transportation Dept., Infrastructure Planning Dept.)
WW 9 Promote use of phosphorus recovery from wastewater as new sustainable fertiliser system alternative			Low	Landscape & Recreational Development Dept.	KLCH (Health & Environment Dept., Infrastructure Planning Dept.), DOE, IWK, KATS	IWK, Registered industrial and commercial companies in KL
WW 10 Collaborate with respective agencies to use and promote sludge as soil amendment		High		Landscape & Recreational Development Dept.	KLCH (Civil Engineering & Urban Transportation Dept., Health & Environment Dept.), SPAN, CREAM	KLCH (Health & Environment Dept.), IWK
WW 11 Promote application of sewage sludge in urban landscaping and forest rehabilitation and regeneration		High		Landscape & Recreational Development Dept.	KLCH (Health & Environment Dept., Infrastructure Planning Dept.), SPAN	KLCH (Health & Environment Dept.), IWK
Measure 9.3.1 Incorporation of Low Impact Development (LID) in Stormwater Management						
WW 12 Adoption of Low Impact Development (LID) in Kuala Lumpur		High		Civil Engineering & Urban Transportation Dept.	KLCH (Infrastructure Planning Dept., City Planning Dept.), PLANMalaysia	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept.), Developers
WW 13 Promote installation of run off storage		Low		Infrastructure Planning Dept.	KLCH (City Planning Dept., Building Control Dept., Project Implementation & Building Maintenance Dept.), DID, PLANMalaysia	KLCH (City Planning Dept., Infrastructure Planning Dept.), DID, Developers, Run off storage suppliers
Measure 9.3.2 Elimination or Minimisation of Non-Point Source Pollutants						
WW 14 Establish partnership with agencies in educating and training public and industries		High		Health & Environment Dept.	KLCH (Human Resource Management Dept.), Alam Flora Sdn. Bhd., DOE, DID, HEIs, JPWPKL, NGOs, SYABAS	DOE, Developers, Industry players, Schools, NGOs
WW 15 Support implementation of Best Management Practices at construction site		High		Building Control Dept.	KLCH (City Planning Dept., Infrastructure Planning Dept.), CIDB	PSP (Engineer & Architect), IEM, PAM
WW 16 Promote incorporation of NPS pollution prevention strategies and policies into regional and official community plans		High		Health and Environment Dept.	DOE, DID, MESTECC	KLCH (Infrastructure Planning Dept.)
WW 17 Promote effluent management		High		Health and Environment Dept.	KLCH (City Planning Dept.), DOE, NGOs	KLCH (Health & Environment Dept.)

Importance Level

High  Medium  Low 

GREEN URBAN GOVERNANCE



With the emergence of the concept of sustainable cities, there has been a growing interest in the role which cities could have in addressing global environmental issues and, in particular, climate change. The past decade has witnessed a new wave of municipal actions on climate change mitigation in which transnational municipal networks have grown and multiplied, while a more geographically diverse range of cities have become involved in addressing this issue. In an increasingly urbanising world with emissions producing activities concentrated in cities, the question of how municipal authorities and other actors might intervene in order to reduce their impact remains a significant one.

Green Urban Governance programs do not lead to direct carbon emissions reduction in Kuala Lumpur but they are fundamental to the effective implementation of vital CO₂ emissions reduction measures and programs of most other LCS actions

10.1 Enabling Development of Low Carbon Society (LCS)

Providing funding and training are key means through which municipal governments can enable action by private sector organisations or even by individuals. However, it is important for KLCH to provide enough financial resources through the ability to secure funding from external sources such as from ministry as MESTECC or agencies such as GreenTech Malaysia or MIDA.

Measure 10.1.1 Fund, Grant and Sourcing

Programs:

UG 1 Identifying existing pool of funds

UG 2 Setting up special unit for fund and grant sourcing for projects/programs that related to realisation of LCS

Measure 10.1.2 Incentives, Subsidies, Taxation Framework

Programs:

UG 3 Collaboration with relevant agencies to work out possible framework for incentives/ subsidies/taxation

UG 4 Rebates for developments that comply with low carbon policies

UG 5 Energy Efficiency and Renewable Energy Management Centre which provides partial monetary aid to domestic users for the installation of solar water heating systems



Measure 10.1.3 Staff Development

Programs:

UG 6 Awareness programs and continuous training conducted by KLCH on low carbon development

UG 7 Ensuring complementarity with other research based activities in Malaysia that are focused on the low carbon / green skills agenda

UG 8 Identifying funding package for pilot training, capacity building and skills development, which will support the stimulation and growth of low carbon built environment workforce in Kuala Lumpur



10.2 KLCH as Low Carbon Leader

Municipal initiatives in the self-governing mode have also involved the development of 'exemplar' or best practice buildings, to showcase the possibilities of new technologies and of energy efficiency standards.

Measure 10.2.1 Introduction of Best Practice for Institutional Behaviour Change Towards Low Carbon

Programs:

UG 9 KLCH Carbon Management Plan towards going Low Carbon

UG 10 Procurement of vehicles which runs on new and emerging sustainable technologies in council's fleet and assessing their performance

UG 11 Encouraging environmentally friendly behavior in the workplace

Measure 10.2.2 Demonstration Project on Low Emission Technologies

Programs:

UG 12 Replacement of bulbs and banning of incandescent lighting in the government building

UG 13 Trial of low emissions technologies on city hall's buildings

UG 14 Effective usage of air-conditioner

UG 15 Setting up a target of increasing energy efficiency within the municipality by 20% by 2030

UG 16 Building energy and monitoring reporting system (BEMRS)



10.3 Setting up Command and Control through Regulations

KLCH should ensure that it is vital to mandate local action for CO₂ mitigation and enabling planning authorities to take climate change into account in their decision-making.

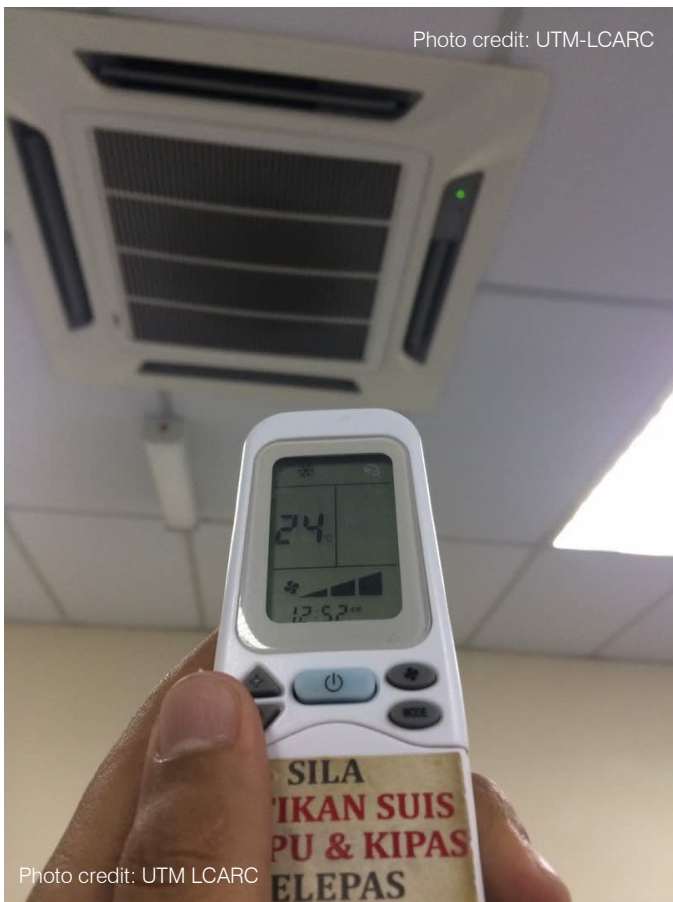
Measure 10.3.1 Development Planning for Low Carbon Kuala Lumpur

Programs:

UG 19 Institutionalisation of low carbon vision and carbon reduction targets in all statutory plans (KLSP 2020 and KLCP 2020)

UG 20 Design clear low carbon zoning and urban design codes that are geared towards Kuala Lumpur's energy efficient spatial structure

UG 21 Launching of a new social housing model that integrates green areas, public spaces and environmental design



Measure 10.2.3 Sustainable Operation and Energy Consumption

Programs:

UG 17 Work with partners in the city to build new neighbourhood-scale renewable energy system

UG 18 Energy consumption mapping for energy management



Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur

Programs:

UG 22 Mandatory requirement for new government buildings to adopt green performance framework and achieve the qualified level of recognition

UG 23 Enhance substantive (content) aspects of development order approval

UG 24 Online submission for applications with respect to development projects (e-Submission)

UG 25 Progressive retraining of planners, architects, engineers and other built environment professionals and semiprofessionals

UG 26 Setting up of a low carbon monitoring unit / task force in KLCH



10.4 Partnership through Multi Stakeholders Engagement

In addition to engaging a range of stakeholders and partners in addressing climate change locally, municipalities have, sometimes, also sought to involve communities in responding to the challenges of reducing GHG emissions.

10.4.1 Encouragement on Low Carbon Practices

Programs:

UG 27 To promote energy and water efficiency in public facilities

UG 28 To promote extensive use of online services to citizens



Measure 10.4.2 Low Carbon Projects with NGOs

Programs:

UG 29 Awards and recognition for any corporates or NGOs efforts towards low carbon

UG 30 Existing LA21KL unit to collaborate with community and NGOs on low carbon and environmental friendly campaigns



Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.1.1 Fund, Grant and Sourcing						
UG 1 Identifying existing pool of funds				Finance Dept., Administration Dept.	MESTECC, KLCH (Economic Planning & Development Dept., Quantity Surveying Dept.), KW	KLCH (Finance Dept., Economic Planning & Development Dept.)
UG 2 Setting up special unit for fund and grant sourcing for projects/programs that related to realisation of LCS				Finance Dept., Administration Dept.)	KLCH (Administration Dept. Quantity Surveying Dept., Finance Dept., Economic Planning & Development Dept., Human Resource Management Dept.), MESTECC, KW	KLCH (Human Resource Management Dept.)
Measure 10.1.2 Incentives, Subsidies and Taxation Framework						
UG 3 Collaboration with relevant agencies to work out possible framework for incentives/ subsidies/ taxation				Finance Dept., Administration Dept.)	KLCH (Building Control Dept. City Planning Dept., Legal and Prosecution Dept., Finance Dept.), MESTECC, SEDA, GreenTech Malaysia	KLCH (Economic Planning & Development Dept.)
UG 4 Rebates for developments that comply with low carbon policies				Building Control Dept.	KLCH (City Planning Dept., Economic Planning & Development Dept., Finance Dept.), MESTECC, SEDA, GreenTech Malaysia	Developers, Building owners
UG 5 Energy Efficiency and Renewable Energy Management Centre which provides partial monetary aid to domestic users for the installation of solar water heating systems				Economic Planning & Development Dept.	KLCH (Building Control Dept., Property Management & Valuation Dept. (<i>Commissioner of Building</i>)), KW, Residents, NGOs, MESTECC	KLCH (Housing Management & Community Development Dept.)
Measure 10.1.3 Staff Development						
UG 6 Awareness programs and continuous training conducted by KLCH on low carbon development				Human Resource Management Dept.	KLCH (City Planning Dept., Corporate Planning Dept., Administration Dept.), MESTECC, HEIs	KLCH (Administration Dept., Human Resource Management Dept.)
UG 7 Ensuring complementarity with other research based activities in Malaysia that are focused on the low carbon / green skills agenda.				Human Resource Management Dept.	HEIs, MESTECC, Professional Bodies, KW	KLCH (Human Resource Management Dept.)
UG 8 Identifying funding package for pilot training, capacity building and skills development, which will support the stimulation and growth of low carbon built environment workforce in Kuala Lumpur				Human Resource Management Dept.	HEIs, MESTECC, Professional Bodies, KW	KLCH (Finance Dept., Human Resource Management Dept.)
Measure 10.2.1 Introduction of Best Practice for Institutional Behavioural Change Towards Low Carbon						
UG 9 KLCH Carbon Management Plan towards going Low Carbon				Administration Dept.	KLCH*, SEDA	KLCH (Project Implementation & Building Maintenance Dept.)
UG 10 Procurement of vehicles which runs on new and emerging sustainable technologies in council's fleet and assessing their performance				Administration Dept.	KLCH (Quantity Surveying Dept. Administration Dept. (<i>Bahagian Perolehan</i>))	KLCH (Mechanical & Electrical Engineering Dept.), EV Providers
UG 11 Encouraging environmentally friendly behavior in the workplace				Administration Dept.	KLCH (All Dept.)	KLCH Staff

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.2.2 Demonstration Project on Low Emission Technologies						
UG 12 Replacement of bulbs and banning of incandescent lighting in the government building				Mechanical & Electrical Dept.	KLCH (Project Implementation & Building Maintenance Dept., Administration Dept. (<i>Bahagian Perolehan</i>))	KLCH (Mechanical & Electrical Dept.)
UG 13 Trial of low emissions technologies on city hall's buildings				Project Implementation & Building Maintenance Dept.	KLCH (Mechanical & Electrical Dept.), SEDA, GreenTech Malaysia	KLCH (Project Implementation & Building Maintenance Dept.)
UG 14 Effective usage of air-conditioner				Administration Dept.	KLCH (All Dept.)	KLCH (All Dept.)
UG 15 Setting up a target of increasing energy efficiency within the municipality by 20% by 2030				Administration Dept.	KLCH (Administration Dept.), Carbon Trust	KLCH (Project Implementation & Building Maintenance Dept.)*
UG 16 Building energy and monitoring reporting system (BEMRS)				Project Implementation & Building Maintenance Dept..	KLCH (Mechanical & Electrical Engineering Dept.), SEDA	KLCH (Project Implementation & Building Maintenance Dept.)
Measure 10.2.3 Sustainable Operation and Energy Consumption						
UG 17 Work with partners in the city to build new neighbourhood-scale renewable energy system				Mechanical & Electrical Engineering Dept.	KW, TNB, GreenTech Malaysia, SEDA, Resident's assoc.	KLCH (Economic Planning & Development Dept.), Developers, Land owners
UG 18 Energy consumption mapping for energy management				City Planning Dept.	KLCH (Information Management Dept.), TNB, Building owners, DOS	KLCH (City Planning Dept.)
Measure 10.3.1 Development Planning for Low Carbon Kuala Lumpur						
UG 19 Institutionalisation of low carbon vision and carbon reduction targets in all statutory plans (KLSP 2020 and KLCP 2020)				City Planning Dept.	KW, MESTECC, PLANMalaysia	KLCH (City Planning Dept.)
UG 20 Design clear low carbon zoning and urban design codes that are geared towards Kuala Lumpur's energy efficient spatial structure				City Planning Dept.	KLCH (Civil Engineering & Urban Transportation Dept.), KW, SEDA, MOT, PLANMalaysia	KLCH (City Planning Dept.)
UG 21 Launching of a new social housing model that integrates green areas, public spaces and environmental design				Economic Planning & Development Dept.	KLCH (City Planning Dept., Landscape & Recreation Development Dept., Building Control Dept.), KW, Prime Minister Dept.	Land owners, Developers
Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur						
UG 22 Mandatory requirement for new government buildings to adopt green performance framework and achieve the qualified level of recognition				Building Control Dept.	KLCH (Project Implementation & Building Maintenance Dept., City Planning Dept., Mechanical & Electrical Engineering Dept., Health & Environment Dept.), JKR, MESTECC, SPAN, TNB, Alam Flora Sdn.Bhd.	Government agencies (Building owners)

Programs	2015-2020	2021-2025	2026-2030	Responsible KLCH Department	Key Partners	Implementers
Measure 10.3.2 Planning Control Process, Procedures and Mechanism for Materialising LCS in Kuala Lumpur						
UG 23 Enhance substantive (content) aspects of development order approval				City Planning Dept.	KLCH Technical Departments & external technical agency**	KLCH (City Planning Dept., Building Control Dept.)
UG 24 Online submission for applications with respect to development projects (e-Submission)				City Planning Dept.	KLCH (All Dept.), Professional bodies, MESTECC, MAMPU, KW	KLCH (All Dept.)
UG 25 Progressive retraining of planners, architects, engineer and other built environment professionals and semiprofessionals				Human Resource Management Dept.	KW, MESTECC, HEIs, PLANMalaysia	MIP, PAM, Board of Engineers Malaysia (BEM) and other built environment professionals and semiprofessionals
UG 26 Setting up of a Low Carbon Monitoring unit / task force in KLCH				City Planning Dept.	KLCH (Human Resource Management Dept., Administration Dept.)	KLCH (City Planning Dept.)
Measure 10.4.1 Encouragement on Low Carbon Practices						
UG 27 To promote energy and water efficiency in public facilities				Corporate Planning Dept.	KLCH (Housing Management & Community Dept., Information Management Dept., Project Implementation & Building Maintenance Dept.), MESTECC, TNB, SYABAS, JKR	Public facilities owners, KL residents, NGOs
UG 28 To promote extensive use of online services to citizens				Corporate Planning Dept.	KLCH (Finance Dept., Information Management Dept., Enforcement Dept., Licensing & Petty Traders Development Dept., Housing Management & Community Development Dept., Legal & Prosecution Dept.)	KLCH (Finance Dept., Information Management Dept., Enforcement Dept., Housing Management & Community Development Dept., Legal & Prosecution Dept.), KL residents
Measure 10.4.2 Low Carbon Projects with NGOs						
UG 29 Awards and recognition for any corporates' or NGOs' efforts towards low carbon				Corporate Planning Dept.	KLCH (Housing Management & Community Development Dept., Corporate Planning Dept., Landscape & Recreation Development Dept., Infrastructure Planning Dept., Civil Engineering & Urban Transportation Dept., Mechanical & Electrical Engineering Dept., City Planning Dept. (LA21KL)), Professional Bodies, MESTECC, KPKT	NGOs, Resident's assoc., Business owners.
UG 30 Existing LA21KL unit to collaborate with community and NGOs on low carbon and environmentally friendly campaigns				City Planning Dept. (LA21KL)	KLCH (Housing Management & Community Development Dept., Landscape & Recreation Development Dept., Health & Environment Dept.), NGOs, Resident's assoc., HEIs, JPWPKL, Jabatan Pertanian, IWK, KW	NGOs, Resident's assoc.

Notes:

***Administration Department (Jawatankuasa Tenaga)**

City Planning Department (Jabatan Perancangan Bandaraya)
Civil Engineering and Urban Transportation Department (Jabatan Kejuruteraan Awam dan Pengangkutan Bandar)
Administration Department (Jabatan Pentadbiran)
Human Resource Management Department (Jabatan Pengurusan Sumber Manusia)
Licensing and Petty Traders Development Department (Jabatan Pelesenan dan Pengurusan Penjaja)
Culture, Arts, Tourism and Sports Department (Jabatan Kebudayaan, Kesenian dan Sukan)
Housing Management and Community Development Department (Jabatan Pengurusan Perumahan dan Pembangunan Komuniti)
Landscape and Recreation Development Department (Jabatan Pembangunan Landskap dan Rekreasi)
Mechanical and Electrical Engineering Department (Jabatan Kejuruteraan Mekanikal dan Elektrikal)
Health and Environment Department (Jabatan Kesihatan dan Alam Sekitar)
Enforcement Department (Jabatan Penguatkuasaan)
DBKL Training Institute (Institut Latihan DBKL)
Kuala Lumpur Library (Perpustakaan Kuala Lumpur)

**** Internal and External Technical Agencies OSC**

Internal Technical Agency
Technical Department

City Planning Department

Infrastructure Planning Department
Building Control Department
Health and Environment Department

Landscape and Recreation Development Department

External Technical Agency

Pejabat Tanah dan Galian Wilayah Persekutuan (PTGWP)
Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM)
Tenaga Nasional Berhad (TNB)
Syarikat Bekalan Air Selangor (SYABAS)
Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam (PPSP&PA)
Indah Water Konsortium (IWK)
Jabatan Mineral dan Geosains Malaysia (JMG)
Jabatan Bomba dan Penyelamat Malaysia (JBPM)
Jabatan Alam Sekitar (JAS)

Importance Level

High  Medium  Low 

HOW TO READ KL LCSBP 2030 ROADMAP

Methods of Program Evaluation through FGD

Kuala Lumpur Low Carbon Society Blueprint 2030 is formulated to help guide Kuala Lumpur towards becoming a world class sustainable city by 2020. This blueprint will provide Kuala Lumpur City Hall with a strategic direction and clear framework for coordinating related policies towards the reduction of 70% GHG emissions intensity for Kuala Lumpur by 2030 based on 2010 level with the implementation of 245 policy programs in a timely and proactive manner. Towards the implementation phase, several questions must be answered such as which programs should be implement first? How long is the implementation timeline? When is the target implementation year? Which potential implementation agencies should play important role in carrying out the programs? Thus, the roadmap section provides pathway to the stated questions by outlining programs proposed in the blueprint according to the given priority, timeline and related implementation agencies for 2015-2020, 2021-2025 and 2025-2030 periods. The roadmap is subject to review to accommodate possible institutional and organisational roles changes both external and internal to KLCH that may arise from time to time.

This section explains briefly the KL LCSBP 2030 method of program evaluation through focus group discussions (FGD). Three sessions of FGD had been conducted in August 2016, and February and July 2017 during the Interim Report, Draft Blueprint and Final Draft KL LCSBP 2030 stages. The purpose of FGD1 was to introduce the KL LCS 2030 and share the preliminary baseline results of Kuala Lumpur in 2010, building continuous engagement with stakeholders and understanding their feedback and views on overall direction, scope, and methodology of KL LCS 2030. Based on the outcome of FGD1, the Draft Kuala Lumpur Low Carbon Society Blueprint 2030 (Draft KL LCSBP 2030) was produced to outline the proposed LCS programs for implementation. The FGD2 was then held to present the proposed programs outlined and gain feedback from stakeholders with respect to the FGD1. The FGD2 also involved the presentation of draft proposal of sub-actions, measures, and LCS programs outlined in the Draft KL LCSBP 2030, based on three weighted three main criteria: i) Significance, ii) Suitability and iii) Feasibility. The definition for the three main criteria are as follows:

Significance - Measures the extent to which proposed LCS programs are in line with a stakeholder's institutional/corporate goal or policy direction.

Suitability - Appraises the appropriateness, acceptability and readiness of Kuala Lumpur's stakeholders on the proposed LCS programs with respect to Kuala Lumpur's local geographic setting and socio-cultural context.

Feasibility - Gauges the "implementability" of proposed LCS programs in terms of institutional and corporate financial capacity and human capital, as well as technological readiness and material resource availability in Kuala Lumpur.

Stakeholders were requested to assign a rating to each proposed LCS project based on three (3) levels which are Low (L), Medium (M) and High (H).

Programs	Significance			Suitability			Feasibility		
	Institutional Vision/Policy Direction			Long Geography setting/ socio-cultural context			Finance/Human Capital/ Local Technology/Material		
	L	M	H	L	M	H	L	M	H
CE6 Promote the adoption of rainwater harvesting system			●			●			●
CE7 Promote the adoption of photovoltaic panel					●	●			

The results were then analysed using the 'weighted scoring method' involving i) allocation of weights for each evaluation criterion, and ii) allocation of scores to each rating level to reflect each LCS program's performance in relation to each criterion. The result presented in a single weighted score for each criterion was then summed across for each proposed LCS program. The sum of the weighted score indicates the overall performance of a potential program, which combines all the three criteria of significance, suitability, and feasibility.

1) Criteria weightage

The three criteria were weighted to reflect the stakeholders' consensus on the relative importance of each criterion. Justification for the weights ascribed (Significance (40%), Suitability (20%), and Feasibility (40%)) was recorded to ensure the basis of the weights assigned is fully understood and accepted. Both the significance and feasibility criteria were equally given higher percentages as they were considered the most important compared to suitability. Ultimately, all the weights amounted to 100.

2) Score the levels to reflect how each program performs against each criterion and calculate the weighted scores

The next step was to score each level against each criterion on a suitable scale. A score value of 1,2, or 3 was assigned correspondingly to the rating level of Low (L), Medium (M) and High (H), and each LCS program was given a total score, by multiplying the score with the weightage that has been assigned to the criterion. The resulted weighted scores were then summed up to obtain an aggregate weighted score for each potential program (see table below):

Criteria	Significance (40%)			Suitability (20%)			Feasibility (40%)		
Level	Low	Medium	High	Low	Medium	High	Low	Medium	High
Score	1	2	3	1	2	3	1	2	3

Programs	Significance	Suitability	Feasibility	Weighted Score
	Institutional Vision/Policy Direction	Long Geography setting/socio-cultural context	Finance/Human Capital/Local Technology/Material	
CE6 Promote the adoption of rainwater harvesting system	2	3	3	83

3) Interpret the results

The weighted score results were then carefully translated into the importance level of Low, Medium and High with the target year in the implementation timeline (determined from the participants in FGD) to guide decision-makers. The three ranges of weighted scores were averaged for each different Action of the KL LCSBP 2030 accordingly and coloured based on the level of importance: light-gray (Low), medium-gray (Medium), and black (High) (see below).

Weighted scores	0-39	40-79	80-100
Colour			

The Draft KL LCSBP 2030 and Summary for Policymakers (SPM) were then presented in the FGD3 for further refinement of the LCS programs and roadmap (timeline and responsible actors). Based on the outcome of FGD3, the Final Draft KL LCSBP 2030 and SPM were then produced with better justified responsible actors, which have been divided to three key implementation actors namely: responsible KLCH department, partners, and implementers. The LCS program implementation timeline was also divided into three period of target years (2015-2020, 2021-2025, and 2026-2030 (see table below), while the operational definitions of actors are shown as follows:

PROGRAMS	2015-2020	2021-2025	2026-2030	Responsible KLCH Dept.	Partners	Implementers
2.1.1 Promote Polycentric, Compact Growth Pattern in Kuala Lumpur						
SS 1 Gradual densification in polycentric nodes connected by public transportation	■			City Planning Dept.	MPK, MPAJ, MOT	Developers

Responsible KLCH department

KLCH department with primary responsibility for initiating, coordinating, liaising with relevant external agencies, monitoring, and/or approving implementation of programs.

Partners

Technology providers, funding agencies or entities, and relevant government agencies with approving authority for and/or statutory duty of regulating, facilitating, and overseeing the implementation of programs.

Implementers

Agencies, entities and/or parties who implement, or are needed to implement, programs due to their statutory duty, ownership rights, institutional responsibility, and/or effective serving of collective interests.

ACRONYMS AND ABBREVIATIONS

AIM	Asia-Pacific Integrated Model	NPE	National Policy on the Environment
BaU	Business as Usual	NPP2	Second National Physical Plan
BEI	Building Energy Intensity/Index	NPS	Non-point Source
CO ₂	Carbon dioxide	NRW	Non-revenue Water
CM	Countermeasure	NREPAP	National Renewable Energy Policy and Action Plan
EE	Energy Efficiency	NUP	National Urbanisation Policy
EEI	Electrical, Electronic and Information Technologies	OECD	Organisation for Economic Cooperation and Development
EEl	Energy Efficiency Improvement	PV	Photovoltaic
EC	Energy Commission	R&D	Research and Development
EMS	Energy Management System	RE	Renewable energy
EPU	Economic Planning Unit	RMK 11	Eleventh Malaysia Plan
ERP	Electronic Road Pricing	RTTV	Roof Thermal Transfer Value
ExSS	Extended Snapshot Tools	SDG	Sustainable Development Goals
EV	Electric Vehicle	SME	Small and Medium Enterprise
FDI	Foreign Direct Investment	STP	Sewage Treatment Plant
FDM	Freight Demand Management	TDM	Transportation Demand Management
FGD	Focus Group Discussion	TOD	Transit Oriented Development
FITs	Feed-in tariffs	UHI	Urban Heat Island
GHG	Greenhouse gases	UNDP	United Nations Development Programme
GDP	Gross Domestic Products	UNEP	United Nations Environment Programme
GEZ	Green Enterprise Zone	UNFCCC	United Nations Framework Convention on Climate Change
GGP	Government Green Procurement	UNIDO	United Nations Industrial Development Organisation
GIS	Geographic Information System	UTM-LCARC	UTM-Low Carbon Asia Research Centre
GTFS	Green Technology Financing Scheme	VMS	Variable Message Signs
GTP	Government Transformation Programme	Unit	
ICT	Information Communication Technology	kg	Kilogram
IGEM	International GreenTech and Eco Products Exhibition and Conference Malaysia	g/km	Gram per kilometre
IGES	Institute for Global Environment Strategies	Mil.t/km	Million tonne per kilometre
IEA	International Energy Agency	mm	millimeter
IT	Information Technology	Mt	Million tonne
ITS	Intelligent Transport System	MWp	MegaWatt peak
ITT	Integrated Transportation Terminal	km	Kilometre
JASE	Japanese Business Alliance for Smart Energy WorldWide	km ²	Kilometre squared
KLCH	Kuala Lumpur City Hall	Km/h	Kilometre per hour
KLCP	Kuala Lumpur City Plan	ktoe	Kilotonne oil equivalent
KLSP	Kuala Lumpur Structure Plan	kWh	Kilowatt-hour
LCCF	Low Carbon City Framework	MJ	Mega joule
LCS	Low Carbon Society	Mil.RM	Million ringit
LED	Light-emitting diode	t/day	Tonne per day
LID	Low Impact Development	t/year	Tonne per year
LRT	Light Rail Transit	tCO ₂ eq	Tonne carbon dioxide equivalent
MAESCO	Malaysia Association of Energy Service Companies	ktCO ₂ eq	Kilotonne carbon dioxide equivalent
MRT	Mass Rapid Transit		
MSW	Municipal Solid Waste		
NC2	Second National Communication to the UNFCCC		
NGTP	National Green Technology Policy		
NIES	National Institute for Environmental Studies, Japan		
NPCC	National Policy on Climate Change		

REFERENCES

- Camilleri, M. A., 2017. Corporate Sustainability, Social Responsibility and Environment Management: An Introduction to Theory and Practice with Case Studies. Cham, Switzerland: Springer International Publishing AG.
- Chang, M. C., 24th April 2016. South Korea cuts food waste with 'pay as you trash'. Available at <http://www.straitstimes.com/asia/east-asia/south-korea-cuts-food-waste-with-pay-as-you-trash> <accessed on 12th December 2016>
- Dewan Bandaraya Kuala Lumpur (DBKL), 2012a, Projek Pengurusan Sisa. Available at http://www.dbkl.gov.my/la21kl/index.php?pg=bersih/kempen2012_info3 <accessed on 20th March 2017>
- Dewan Bandaraya Kuala Lumpur (DBKL), 2012b, Sisa Terurus Manfaat Bersama. Available at http://www.dbkl.gov.my/la21kl/index.php?pg=bersih/kempen2012_info6 <accessed on 20th March 2017>
- Dewan Bandaraya Kuala Lumpur (DBKL), 2010. Local Agenda 21 KL: Buletin Bil 01/2010. Available at http://www.dbkl.gov.my/la21kl/module/media/eberita/buletin/2010_1.pdf <accessed on 13th December 2016>
- Environmental Protection Agency (EPA), 2016. Waste-Resource Conservation-Conservation tool- Pay As You Throw. Available at <https://archive.epa.gov/wastes/conservation/tools/payt/web/html/index.html> <accessed on 24th March 2017>
- European Commission (EC), 2016. Waste streams: Sewage Sludge. Available at <http://ec.europa.eu/environment/waste/sludge/> <accessed on 24th March 2017>
- European Environment Agency (EPA), 2016. Circular Economy to have considerable benefits, but challenges remain. Available at <http://www.eea.europa.eu/highlights/circular-economy-to-have-considerable> <accessed on 23rd March 2017>
- Furlong H., 2016. Behaviour change campaign aims to reduce food waste, boost healthy eating in London. Behavior Change, 9th September 2016. Available at http://www.sustainablebrands.com/news_and_views/behavior_change/hannah_furlong/3m_behavior_change_campaign_aims_reduce_food_waste <accessed on 21st March 2017>
- Global Environment Centre Foundation, 2011. Waste Recycling Technologies and Recycling Promotion Initiatives in Eco-Towns in Japan. Available at http://nett21.gec.jp/Ecotowns/data/et_b-kawasaki.html <accessed on 23rd March 2017>
- Honda, S., 2014. Updates on E-waste Management in Japan. Ministry of the Environment Government of Japan (NIES). Available at https://www.epa.gov/sites/production/files/2014-08/documents/japan_country_presentation.pdf <accessed on 22nd March 2017>
- Independent, 15th March 2016. Morrisons, Sainsbury's, Tesco and Asda pledge to cut food waste 20 % by 2025. Available at <http://www.independent.co.uk/news/business/news/morrisons-sainsburys-tesco-asda-supermarkets-food-waste-pledge-a6931771.html> <accessed on 21st March 2017>
- Institute for Global Environmental Strategies (IGES), 2013. Best practices and recommendations for waste reduction: Towards sustainable consumption. Available at <http://www.foejapan.org/en/waste/policy/pdf/140227.pdf> <accessed on 22nd March 2017>
- Institute for Global Environment Strategies. (n.d.). Asia-Pacific Environmental Innovation Strategies (APEIS) Research on Innovative and Strategic Policy Options (RISPO) Good Practices Inventory: Kitakyushu Eco-Town Project. Available at <https://enviroscope.iges.or.jp/contents/APEIS/RISPO/inventory/db/pdf/0147.pdf> <accessed on 23rd March 2017>
- ISWM-TINOS, 2011. Development and implementation of a demonstration system on Integrated Solid Waste Management for Tinos in line with the Waste Framework Directive. LCA Studies for Composting and Anaerobic Digestion Units. Document ID: LIFE 10/ENV/GR/00610.
- Japan for Sustainability (JFS), 2017. Working to reduce plastic bag. Available at http://www.japanfs.org/en/news/archives/news_id027819.html <accessed on 22nd March 2017>
- Lacy, P. and Rutqvist, J., 2015. Waste to Wealth: Creating Advantage in a Circular Economy. Basingstoke, Hampshire: Palgrave MacMillan.
- Menon, P., 22th December 2016. Total ban in polystyrene in Selangor from Jan 1. The Stars Online. Available at <http://www.thestar.com.my/metro/community/2016/12/22/total-ban-on-polystyrene-in-sgor-from-jan-1-public-will-also-have-to-pay-20sen-a-plastic-bag-when-th/> <accessed on 23rd December 2016>
- Ministry for the Environment New Zealand (MfE NZ), 2000. Used oil recovery, reuse and disposal in New Zealand: Issues and Options. Available at www.mfe.govt.nz <accessed on 22nd March 2017>
- National Leagues of Cities (NLC), 2013. Pay-As-You-Throw Programs. Available at <http://www.sustainablecitiesinstitute.org/topics/materials-management/recycling/pay-as-you-throw-programs> <accessed on 22nd March 2017>
- Ofstad, S., Westly, L., Bratelli, T., and Miljøverndepartementet, N., 1994. Symposium: Sustainable Consumption: 19-20th January 1994: Oslo, Norway. Oslo, Norway: Ministry of Environment.
- Oltermann, P., 2014. Berlin 'borrowing shop' promotes the benefit of sharing. The Guardian 17th March 2014. Available at <https://www.theguardian.com/world/2014/mar/17/berlin-borrowing-shop-benefits-share-leila> <accessed on 17th March 2017>

PROJECT TEAM MEMBERS

Universiti Teknologi Malaysia (UTM)

Core Team Members

Ho Chin Siong
Chau Loon Wai
Mlysha Nurshyla Abdul Rahim
Mohamad Zulikhram Zulibrahim
Muhammad Akmal Hakim Hishammuddin
Nadzirah Jausus
Rohayu Abdullah
Nur Syazwani Saari

Kuala Lumpur City Hall

Mohd Najib Mohd
Sahrom Ujang
Nurazizi Mokhtar
Sulaiman Mohamed
Nik Mastura Diyana Nik Mohamad
Samsuddin Abd Kadir
Nor Hashida Harun
Bongsu Khairi Hashim
Nek Mah Basri

Subject Matter Experts

Mohd Hamdan Ahmad
Lim Yaik Wah
Muhammad Zaly Shah Muhammad Hussein
Lee Chew Tin
Zainura Zainon Noor
Haslenda Hashim
Fatin Aliah Phang
Kasturi Devi Kanniah
Siti Hajar Misnan
Lim Jeng Shun
Ho Wai Shin
Choong Weng Wai
Gobi Krishna Sinniah
Gabriel Ling Hoh Teck
Terrayline Kating-Jouman
Mohd Razman Salim
Christopher Heng Yii Sern
Cindy Lee Ik Sing
Lee Ming Kwee
Kang Chuen Siang
Liu Wen Hui
Chin Han Choong
Cassendra Bong Phun Chien

International Experts

Yuzuru Matsuoka
Junichi Fujino
Tomoki Ehara
Yuki Ochi

ACKNOWLEDGMENTS

The Kuala Lumpur City Hall (KLCH) would like to acknowledge and thank all the individuals, departments, agencies, ministries mentioned below for contributing their views and input for preparation of Kuala Lumpur Low Carbon Society Blueprint 2030.

Alam Flora Sdn. Bhd.
Association of Consulting Engineers Malaysia (ACEM)
Business Associations
CMS Sdn. Bhd.
Companies Commission of Malaysia (SSM)
Construction Industry Development Board (CIDB)
Construction Research Institute Malaysia (CREAM)
Cycling Kuala Lumpur
Department of Director General Lands and Mines (JKPTG)
Department of Environment (DOE)
Department of Irrigation and Drainage (DID)
Department of Social Welfare (JKM)
Department of Statistics Malaysia (DOSM)
District Education Office (PPD)
Economic Planning Unit (EPU)
Energy Commission (EC)
Federal Territories Director of Lands and Mines Office (JKPTGWPKL)
Forest Research Institute Malaysia (FRIM)
GreenTech Malaysia
Higher Education Institutions (HEIs)
IEN Consultants Sdn. Bhd.
Indah Water Konsortium (IWK)
Inland Revenue Board of Malaysia (LHDN)
Institute of Landscape Architects Malaysia (ILAM)
InvestKL
IZM Consult
Kampung Bharu Development Corporation (PKB)
Keretapi Tanah Melayu Berhad (KTMB)
Kuala Lumpur Centre for Sustainable Innovation (KLCSI)
Kuala Lumpur Federal Territory Education Department (JPWPKL)
Ministry of Transport (MOT)
Local Agenda 21 Kuala Lumpur (LA21KL)
Majlis Perbandaran Ampang Jaya (MPAJ)
Majlis Perbandaran Klang (MPK)
Majlis Perbandaran Sepang (MPS)
Majlis Perbandaran Subang Jaya (MPSJ)
Malaysia Association of Energy Service Company (MAESCO)
Malaysia Association of Hotels (MAH)
Malaysia Automotive Institute (MAI)
Malaysia External Trade Development Corporation (MATRADE)
Malaysia Green Building Confederation (MGBC)
Malaysia Industry-Government Group for High Technology (MIGHT)
Malaysia Shopping Malls Association (PPKM)
Malaysian Highway Authority (LLM)
Malaysian Hotel Association of Hotels (MAH)
Malaysian Institute of Architects (PAM)
Malaysian Institute of Planners (MIP)
Malaysian Institute of Road Safety Research (MIROS)
Malaysian Investment Development Authority (MIDA)
Malaysian Nature Society (MNS)
Ministry of Communications and Multimedia (KKMM)
Ministry of Domestic Trade, Co-operatives and Consumerism (KPDNKK)
Ministry of Education (MOE)
Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC)
Ministry of Territories (KW)
Ministry of Finance Malaysia (MOF)
Ministry of Foreign Affairs (KLN)
Ministry of Human Resource (MoHR)
Ministry of International Trade and Industry (MITI)
Ministry of Tourism and Culture (MOTAC)
Ministry of Transport (MOT)
Ministry of Urban Wellbeing, Housing and Local Government (KPKT)
Ministry of Water, Land and Natural Resources (KATS)
My High Speed Rail (MyHSR)
National Hydraulic Research Institute of Malaysia (NAHRIM)
National Landscape Department (JLN)
National Solid Waste Management Department (JPSPN)
National Water Services Commission (SPAN)
NGOs
Parent Teacher Association (PTA)
Perbadanan Pembangunan Kampong Bharu (PKB)
PLANMalaysia (Formerly known as JPBD Semenanjung Malaysia)
Property Developers
Real Estate and Housing Developers Association (REHDA)
Residents Associations
Road of Transport Department of Malaysia (JPJ)
Road Safety Department of Malaysia (JKJR)
Royal Malaysia Customs Department (KASTAM)
Royal Malaysia Police (PDRM)
SIRIM Berhad
SME Corporation Malaysia (SMESCorp)
Solid Waste Management and Public Cleansing Corporation (SWCorp)
Sustainable Energy Development Authority Malaysia (SEDA)
Syarikat Bekalan Air Selangor Sdn. Bhd. (SYABAS)
Syarikat Prasarana Negara Berhad (PRASARANA)
Tenaga Nasional Berhad (TNB)
The Institution of Engineers Malaysia (IEM)
Think City
Universiti Teknologi MARA (UiTM)
Universiti Malaya (UM)
Universiti Putra Malaysia (UPM)
Valuation and Property Management Services Department (INSPEN)
Water and Energy Consumer Association of Malaysia (WECAM)
World Wide Fund for Nature (WWF Malaysia)
Young Scientists Network Malaysia (YSN-ASM)

KUALA LUMPUR LOW CARBON SOCIETY BLUEPRINT 2030
Summary for Policymakers 4th Edition

Published by:
KUALA LUMPUR CITY HALL (KLCH)
City Planning Department
Level 9, Menara DBKL 1,
Jalan Raja Laut, 50350 Kuala Lumpur, Malaysia
Tel : 03-2617 9683/9692
Fax : 03-2691 0144

ISBN 978-967-16213-0-1



令和元年度 低炭素社会実現のための都市間連携事業委託業務（マレーシア国クアラルンプール市における建築物の省エネ普及に向けた低炭素制度基盤構築支援事業（クアラルンプール市-東京都）委託業務報告書

令和2年3月印刷

リサイクル適正の表示：印刷用の紙にリサイクルできます。
この印刷物は、グリーン購入法に基づく基本方針における「印刷」に係る判断の基準にしたがい、印刷用の紙へのリサイクルに適した材料 [Aランク] のみを用いて作製しています。