



# SDG 7 Localisation Snapshot

## Penang, Malaysia

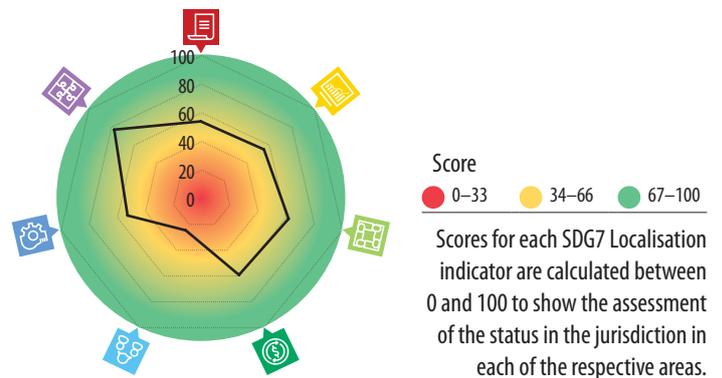
SDG7 Localisation Snapshot provides a brief overview of the key areas related to implementation of the Sustainable Goal 7 (SDG7) to 'Ensure access to affordable, reliable, sustainable and modern energy for all' at the local level based on the answers provided by the jurisdiction to the SDG7 Localisation questionnaire.

Questionnaire allowed to collect the assessments from the local officials regarding the situation on the implementation of SDG7 in their jurisdiction. SDG7 Localisation Snapshot is a part of the collaborative project of United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and United Nations Environment Programme (UNEP) to support city and sub-national governments in accelerating their efforts in the field of sustainable energy.

### General information

<b>Name of the jurisdiction</b>	PENANG
<b>Country of the jurisdiction</b>	Malaysia
<b>Population of the jurisdiction</b>	1.8 million people
<b>Area of the jurisdiction (in km<sup>2</sup>)</b>	1,031
<b>Predominant climate</b>	Warm Equatorial Climate

### SDG7 Localization score



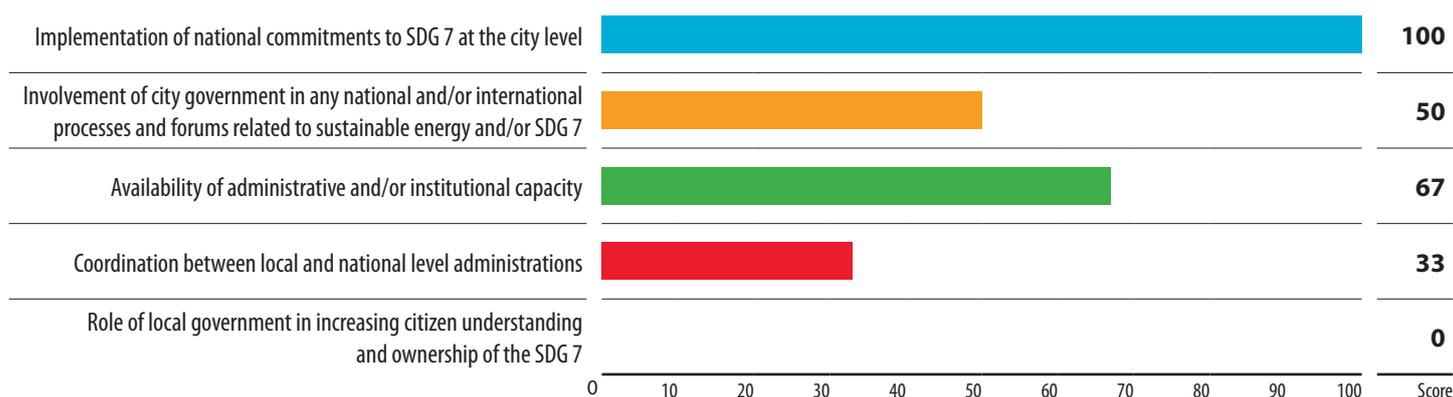
### Indicators score

<b>54</b> <b>Available policies and institutions for SDG localization</b> Availability of specific policies and institutions focused on supporting the SDG 7 implementation.	<b>56</b> <b>Energy data monitoring</b> Accessibility and penetration of energy monitoring and smart metering.	<b>62</b> <b>Cooperation with national and international stakeholders</b> Efficient communication and collaboration between local stakeholders and various stakeholder groups at the national and international levels.	<b>59</b> <b>Use of financial resources</b> Availability of various financial resources and instruments for supporting SDG 7 implementation actions.	<b>24</b> <b>Awareness raising and capacity- building</b> Availability of policies or actions to increase the understanding among citizens and build the capacity of professionals for SDG 7 implementation.	<b>52</b> <b>Implementation</b> Presence of policies and actions to implement SDG 7 targets.	<b>77</b> <b>Linkages to other SDGs</b> Availability of policies or actions with linkages between SDG 7 and other SDGs.
Sub-indicator score <b>64 Energy access</b> Policies or actions taken by cities on energy access.		Sub-indicator score <b>40 Renewable energy</b> Policies or actions taken by cities on renewable energy.		Sub-indicator score <b>53 Energy efficiency</b> Policies or actions taken by cities on energy efficiency.		
<b>83</b> <b>SDG3. Good health and well-being.</b> The presence of energy-related activities or measures that support the health sector.	<b>67</b> <b>SDG6. Clean water and sanitation.</b> The presence of energy-related activities or measures that support water and sanitation.	<b>67</b> <b>SDG11. Sustainable cities and communities.</b> The presence of energy-related activities or measures that support development of sustainable cities and communities.	<b>67</b> <b>SDG12. Responsible production and consumption.</b> The presence of energy-related activities or measures that support responsible production and consumption.	<b>100</b> <b>SDG13. Climate action.</b> The presence of energy-related activities or measures that support climate action.		

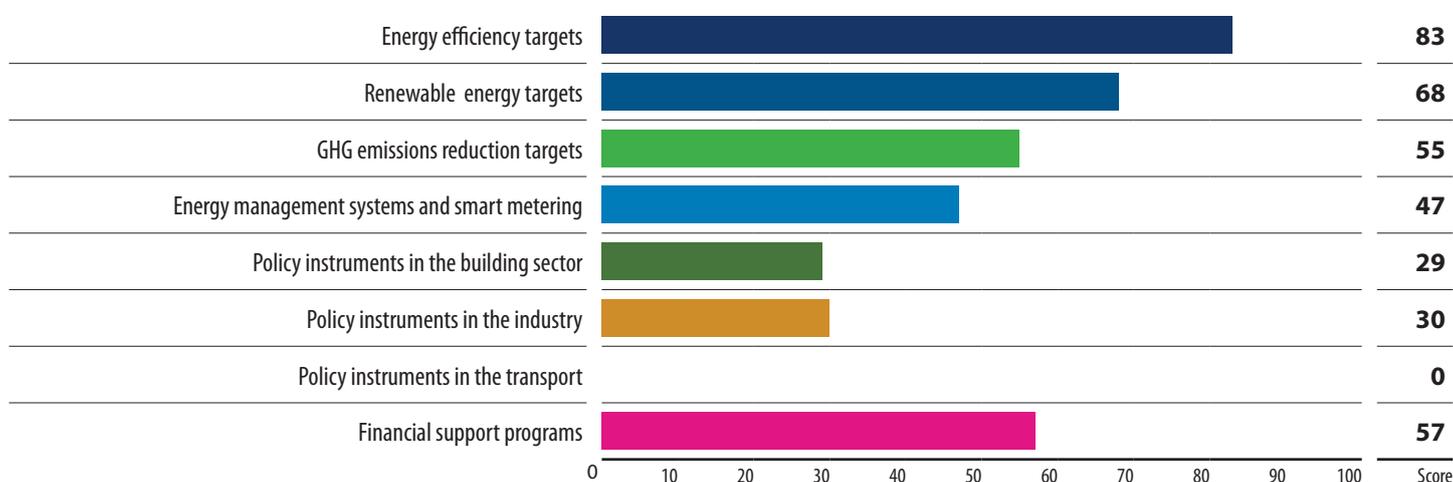
It is important to note that these indicators are qualitative and should not be used for assessing cities' achievement of quantitative targets under the SDG 7. The results for these qualitative indicators are based on cities' self-assessment of their current conditions, efforts, resources and capacity in relation to supporting SDG 7 localization process and can serve the role of the evidence base for constructing recommendations tailored to the local context, as well as the baseline results for tracking cities' progress of their SDG 7 localization efforts.

The results for each indicator are presented as a nominal score from 0 to 100 (where 100 is the maximum possible score, that can be achieved for each indicator or sub-indicator based on the aggregation of all answers of the questionnaire attributed to this particular indicator or sub-indicator).

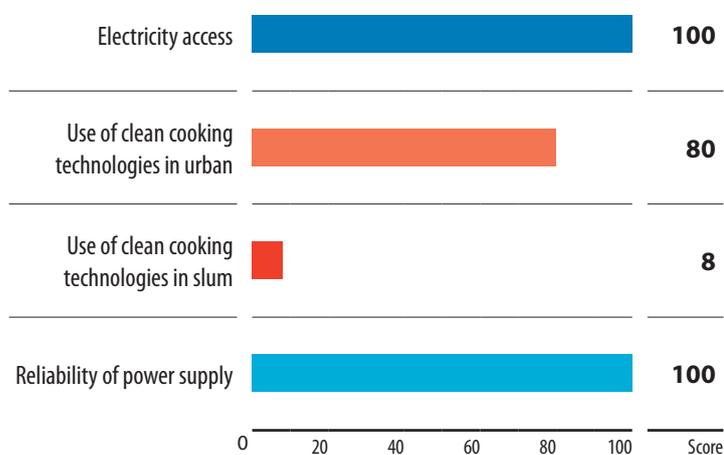
## SDG 7 commitments and institutional capacity of Penang



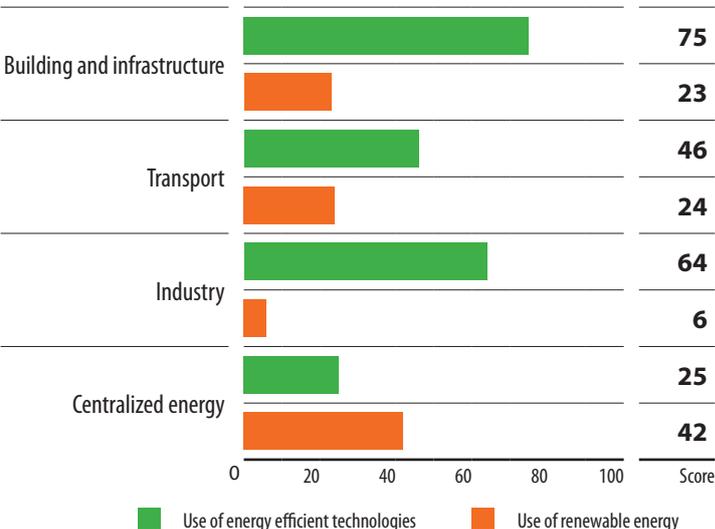
## Implementation of SDG 7 support targets and regulations in Penang



## Assessment of Energy Access in Penang



## Assessment of utilization of energy efficiency and renewable energy technologies in Penang



## Recommendations



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### Indicator. Available policies and institutions for SDG localization

The jurisdiction is implementing policies and projects that take into account existing national SDG 7-related commitments. Ensuring that local efforts on SDG 7 implementation are aligned with the national commitments and plans. Exploring the ways to apply Multi-Level Governance (MLG) approach to implementing SDG 7 is recommended in order to enhance the efficiency of coordination between national and local levels of governance.

The jurisdiction has already established the necessary institutional set-up and appointed dedicated staff to support SDG 7 implementation. However, the existing technical and/or administrative capacity to support sustainable energy projects is limited. It is important to evaluate whether staff qualifications and capabilities are adequate enough to carry out the work on SDG 7 implementation. It is recommended that consideration be given to allocating some resources towards capacity-building and professional training of appointed staff to ensure that they have sufficient knowledge of SDG 7-related issues and solutions.

Some sustainable energy policies for the building sector have been adopted at the national level. However, only a limited number of related initiatives have been implemented at the local level. It is recommended that work be undertaken on the implementation of nationally supported policy instruments at the local level. This implementation may start with selected national policy instruments, and/or cover specific sector or energy end-users in the jurisdiction. Monitoring and verification of the results, achieved after this 'pilot' implementation of selected policy instruments, are needed for possible fine-tuning and adaptation of the policies to the local conditions and requirements. It is also recommended working towards expanding and refining the policy framework in order to arrive at an effective mix of regulatory measures, incentives and information instruments.

Sustainable energy policy instruments in the transport sector are not implemented at the national and local levels. It is critically important to introduce a relevant policy framework, in order to provide the foundation for SDG 7 implementation and to stimulate sustainable energy behaviour in the transport sector. Such a framework should include a mix of regulatory measures, financial incentives for energy efficiency improvements and renewable energy utilization, and information instruments. Capacity-building training and educational courses on sustainable energy consumption, and generation for the transport sector should be organized for administrative and technical personnel in the jurisdiction. It is also recommended that the jurisdiction seek technical assistance from national and international experts to help local experts design the policy framework and capacity-building activities based on existing international best-practices and tailored to the local context.



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### Indicator. Energy data monitoring

The Jurisdiction has established data collection and monitoring systems in the following areas: energy efficiency, energy access, implementation of SDGs and specifically SDG 7, energy supply and demand. Nevertheless, some of the sustainable energy development targets still do not have reliable verification mechanisms, such as renewable energy. Establishment of a comprehensive data collection system for the local energy sector and areas related to other SDGs is a crucial foundation for the development and implementation of SDGs-related projects. Consulting existing guidelines on SDG indicators for further improvement of existing systems is recommended.

The jurisdiction has partially implemented an energy management system and smart metering, which covers some of the energy end-users: streetlights and architectural and buildings lights. It is recommended that the scope of the energy management system be extended to other energy consumers and focus be placed on the continuous analysis of data received from the established manual or automated energy metering system, in order to set performance targets for energy end-users. Additional capacity-building training is recommended for local specialists on practical guidance for use of the analytical possibilities of the energy management system as well as the preparation of action plans and accessing potential financial sources for implementation of identified actions. It is advised that a mechanism be initiated for tracking progress on specific key energy performance indicators and revising them regularly (e.g., every five years).



62

### Indicator. Cooperation with national and international stakeholders

Jurisdiction is a member of several multi-stakeholder city initiatives. Further collaboration with city initiatives, networks and associations is recommended in order to continue building local capacity, participate in peer-to-peer learning, unlocking finance and disseminating knowledge on best-practices and solutions in the field of sustainable energy and SDG 7 localization.

The jurisdiction has limited involvement in national and/or international processes and forums related to sustainable energy. Improved communication and cooperation with national and international stakeholders are required in order to promote knowledge sharing and peer-to-peer learning with other jurisdictions across the region. It is recommended that more opportunities for participation in such forums be identified, and that there be more proactive assigning of relevant technical staff to participate and share knowledge.

There are some limited coordination mechanisms between the jurisdiction and other levels of governance (e.g., the national Government) regarding sustainable energy issues and/or SDG 7 implementation. In order to make the coordination between the different levels of governance more effective it is recommended that the institutional set-up and budgetary framework be strengthened in collaboration with the national Government. The jurisdiction could initiate a dialogue with the national Government to demonstrate the importance of such coordination mechanisms, and to provide suggestions on how such collaboration could encourage the progress of SDG 7 implementation.



59

Indicator. **Use of financial resources**

Various financial programmes for supporting sustainable energy policies and projects have been adopted at the local level for different energy-consuming sectors. Nevertheless, it is recommended that additional financial incentives be provided to the following sectors for which national-level support is currently not available or in the development stage: energy access electrification and clean fuels use for commercial buildings, informal settlements, industry and streetlights consumers.

The jurisdiction has access to international financial support for the implementation of energy efficiency and renewable energy technology projects in the area of the water management system. Detailed performance monitoring and result verification is required to enable further dissemination of successful results from the implemented projects.



24

Indicator. **Awareness raising and capacity building**

The jurisdiction has been involved in some reporting activities for tracking the progress on SDG targets. In order to evaluate that progress and the contribution to the achievement of Sustainable Development Goals, including SDG 7, identify areas of life that require improvement, evaluate project opportunities, access sustainable energy financing and coordinate efforts with the national stakeholders, it is recommended that a sound SDG tracking and reporting process be established in the jurisdiction and that cooperation be improved with relevant national level stakeholders. Preparation of VLRs is one of the ways to analyse available data, and track and report on progress for SDGs at the local level.

Currently, efforts to increase citizens' understanding and ownership of the SDG 7 targets through awareness-raising campaigns are not included in the local Government's policy agenda. It is crucial to design and implement a series of information campaigns as well as awareness-raising materials to educate citizens on the importance of their actions in line with different SDGs. It is recommended that the local Government conduct outreach activities concerning its on-going and planned activities and how they align with SDGs as well as potential (or achieved) benefits from their successful implementation. This will help to gain additional support citizens and improve their self-motivation.



52

Indicator. **Implementation**

64

Sub-indicator. **Energy access**

Local government should make efforts to maintain high level of reliable electrification in the jurisdiction, as well as reaching remaining areas that might lack quality electricity supply. Proper monitoring and evaluation of the current power grid operation should be taking place regularly to identify potential efficiency gaps and possible ways for further improvements. Learning from international expertise and best-practices on sustainable electricity will help the local government identify further areas for sustainable energy actions.

A number of clean cooking technologies are used by households in the jurisdiction, such as: basic methods of burning fossil fuels (coal, oil products, wood, raw organic waste), electric cookers/pressure cookers, induction electric stoves, high efficient natural gas or LPG stoves, and solar thermal cooking. Further promotion and support for clean cooking technology dissemination (e.g., capacity-building training on assembly and maintenance of clean cooking equipment for local professionals and low-income communities) are required, in order to achieve replication of efforts and large-scale adoption.

Efficient and low-emissions cooking methods are not used, or have very limited use, in slums and informal settlements. Promotion of clean cooking technologies such as: basic methods of burning fossil fuels (coal, oil products, wood, raw organic waste), kerosene, ethanol/alcohol, improved wood cookstoves, induction electric stoves, high efficient natural gas or LPG stoves, low emission stoves (using fossil fuels or pellets/charcoal briquettes), solar thermal cooking, solar concentrators, and landfill or biomass methane gas cooking stove and the analysis of cooking technology patterns for different end-users are recommended, in order to identify the most suitable technological solutions and adoption strategies. It is possible to adapt available national and international experience in clean cooking promotion. Large-scale awareness-raising campaigns on clean cooking and its benefits (including improved health and quality of life) should target relevant implementing local agencies and the public. Capacity-building training on assembly and maintenance of clean cooking equipment should be developed and made available to local professionals and low-income communities.

The jurisdiction has a sustainable energy supply. Power outages are not common. It is important to maintain emergency backup energy generation facilities in operation mode in order to be prepared for immediate reaction to blackouts in the main energy source. Establishment of regular training is recommended for the responsible operation personnel as well as capacity building for responsible engineering staff, as it will facilitate implementation of the best available technologies and solutions for sustainable energy supply, such as integration of renewable energy sources.

40

Sub-indicator. **Renewable energy**

Renewable energy targets are being established at the local level. However, these targets lack support from the overarching renewable energy policy framework at the national level. It is recommended that a dialogue be initiated with the relevant national-level stakeholders to inform them about the local targets and the progress the jurisdiction is making towards reaching them as well as the importance for establishing such targets at the country level. It is recommended that a study be conducted of the jurisdiction's renewable energy potential to ensure that such targets are tailored to the local context and different energy consumers. The results of this study and the identified targets should be used as a basis for developing a renewable energy action plan for the jurisdiction. Establishment of a mechanism is advised for tracking progress according to specific key performance indicators and revising them regularly (e.g., every five years).

Targets for reducing GHG emissions/air pollution are being implemented at the local level. However, these targets lack support from the national policy framework at the national level for informing them about the local targets and the progress the jurisdiction is making towards achieving them as well as the importance of establishing such targets at the country level. It is recommended that a regular GHG inventory be conducted and that air pollution monitoring in the jurisdiction to collect the data necessary for updating local targets. It is advised that a mechanism be initiated for tracking progress on achieving these targets and revising them regularly (e.g., every five years).

Renewable and non-fossil fuel energy technologies are not used in the building sector and infrastructure, or their utilization is very limited. Deployment of renewable energy solutions should start with establishing ambitious, yet realistic targets based on estimation of the renewable energy potential for various sources available at the local level. In case of data unavailability geospatial data can be collected and analysed by GIS experts. Implementation strategy for identified renewable energy sources could be developed in cooperation with experienced local or international professionals. The analysis of relevant financing schemes for renewable energy deployment can help to identify potential sources of investment and project implementation.

Renewable and non-fossil fuel energy technologies are not used or have a limited level of implementation in the transport sector of the jurisdiction. Local government should a strategy for promoting renewable energy utilization in the transport sector and analyze potential financing mechanism in cooperation with relevant local and national experts. Feasibly studies for utilization of various RE technologies in different types of transport should be prepared taking into account existing international best-practices to identify the most appropriate solutions and implementation steps. Capacity building and trainings should be conducted for relevant administrative and technical personal to improve their skills on project development, installation and maintenance of renewable energy technologies.

53

Sub-indicator. **Energy efficiency**

Targets for improved energy efficiency or the reduction of energy intensity are being applied at the local level, although they may only cover a limited number of energy-consuming sectors. However, these targets lack support from the overarching energy efficiency policy framework at the national level. It is recommended that a dialogue be initiated with the relevant national-level stakeholders in order to inform them about the local targets and the progress that the jurisdiction is making towards achieving them as well as the importance for establishing such targets at the country level. It is recommended that a study be conducted of the jurisdiction's energy sector and the opportunities for energy efficiency improvement, with objective of ensuring that such targets are tailored to the local context and different energy consumers. The results of the study and the identified targets should be used as a basis for developing the energy efficiency action plan for the jurisdiction. It is advised that a mechanism be established for tracking progress on reaching these targets according to specific key performance indicators and for revising them regularly (e.g., every five years).

Fossil fuels are available and widely used in the building sector and infrastructure. Respective energy-consuming equipment and technologies are typically highly efficient. It is recommended making sure (e.g., through regular inspections and energy audits) that these technologies comply with the minimum energy performance standards and targets, and that they are well-maintained and regularly upgraded to ensure highest levels of energy performance. Incentive programmes could be provided to encourage manufacturers and developers to exceed these targets and integrate opportunities for higher utilization of renewable energy. Development and implementation of the low-emissions strategy is recommended at the local level, with support from relevant national regulations and financial institutions.

Use of energy-efficient technologies for electricity consumption in the building sector and infrastructure is currently at the moderated level. Enhancing dissemination of energy-efficient technologies is recommended, preferably supported by relevant financial incentives to encourage consumers' choices in favour of more energy-efficient appliances and equipment. Engagement of the private sector and international financial institutions is highly recommended through documentation and dissemination of the impacts and lessons learnt, continuous capacity-building as well as collaboration with international organizations and think tanks.

Fossil fuels are widely used in the transport sector of the jurisdiction, and in most cases it works with moderate levels of efficiency and emissions. It is recommended that a low-emissions transportation strategy be developed, with the focus on strengthening relevant administrative and financial frameworks. To support this process, it is recommended that research be conducted on the implementation of relevant projects and best-practices at the national and international levels as well as improvement of the dialogue with responsible national agencies and international organizations. Public awareness-raising campaigns and promotion of "green" transport may further encourage citizens' behavioral change towards the choices in favour of more sustainable transportation practices.

The jurisdiction has limited or pilot level electrical vehicle deployment. A further increase in the number of electrical vehicles should be accompanied by the development of supporting infrastructure. This includes charging stations and batteries as well as the overall decarbonization of the electricity supply in the jurisdiction through wider utilization of local renewable energy sources. Financial incentives – such as lower vehicle taxes, lower electricity tariffs for charging, free parking etc., for private electric vehicles – will stimulate consumers' choices in favour of this type of transport, especially once the supporting infrastructure becomes widely available.



77

Indicator. **Indicator 7. Linkages to other SDGs**

83

Sub-indicator. **SDG3. Good health and well-being**

Most of the existing health-related facilities have adequate space cooling and can, to a large extent, satisfy the health needs of the local population. Improvement and analysis of energy data monitoring is recommended for the health-care facilities in the jurisdiction. It is also recommended that dedicated energy performance indicators (focused on space cooling efficiency) be included in the energy management system or relevant existing energy monitoring protocol, if any. It is recommended that consideration be given to implementing passive cooling strategies (especially for new buildings) through building design, insulation, shading, white roofs, windows with low-e coating and natural ventilation, where applicable, to reduce the cooling load, and that energy efficiency improvement be made in active cooling systems (i.e., air-conditioning, refrigeration, ventilation, etc.), including integration of renewable energy solutions.

The jurisdiction has sufficient mobile vaccine/blood refrigeration facilities to satisfy the current needs of the local population. Such facilities are crucial to people's well-being and to ensuring adequate responses to a health crisis (such as the one caused by COVID-19 pandemic). It is recommended that a local sustainable health-care strategy be introduced (or the existing one updated) in consultation with the national level stakeholders and in cooperation with international organizations. This will enable an analysis to be made of present and future local health-care needs for related sustainable supply chains and their readiness for an emergency response. Further expansion of such facilities and equipment will increase energy use and the need for a reliable electricity supply. Therefore, it is recommended that the existing energy-efficient solutions available for health cold chain and 'green' vaccines supply be reviewed (e.g., energy-efficient cooling and refrigeration technologies with better insulation, off-grid direct current-based refrigerators, solar cooling or solar direct drive vaccine refrigerators).

The jurisdiction has well-established sustainable water treatment activities, with almost all wastewater generated in the jurisdiction undergoing good-quality treatment. Continuous and adequate maintenance and upgrading of existing wastewater treatment facilities, including integration of energy-efficient and renewable energy technologies, are required.

Water management and sanitation equipment in the wastewater facilities of the jurisdiction is relatively energy efficient. Continuous monitoring of the performance of working equipment is recommended in order to be able to take corrective actions when a decrease is detected in performance. Prioritizing proper maintenance of the wastewater equipment and, where necessary, upgrading it is recommended, starting from identification of existing best practices, and with integration of energy-efficient and renewable energy solutions.

Integrated Water Resource Management (IWRM) is not a common practice, but there are some related pilot projects being implemented in the jurisdiction. It is important to support further development and implementation of IWRM across different water end-users. Additional capacity-building training is required for the administrative and technical personnel concerned, in order to effectively identify and implement IWRM that is suitable for the local situation.

Exploring the opportunities for further integration of energy-efficient and renewable energy technologies into the existing IWRM is recommended (e.g., smart process control systems, automated demand-side water supply regulation, solar energy for water supply and treatment etc.). This should be supported by building relevant technical capacity.

A relatively small portion of the local population (less than 5%) lives in informal settlements or inadequate housing. People who live in these areas typically do not have access to sustainable energy services. Deployment of energy-efficient and renewable energy technologies is challenging, due to the lack of basic infrastructure. Integration of upgrading strategies for such informal settlements into local housing policies is recommended. Also recommended is the development of policies on energy access (electrification and clean cooking) and last-mile electrification of these areas in combination with support programmes for slum dwellers to use more energy-efficient and renewable energy technologies, such as solar LED lighting, solar mini-grids and efficient cooking stoves. Awareness-raising about benefits of sustainable energy technologies and their proper maintenance are important to ensuring effective adoption and long-term use.

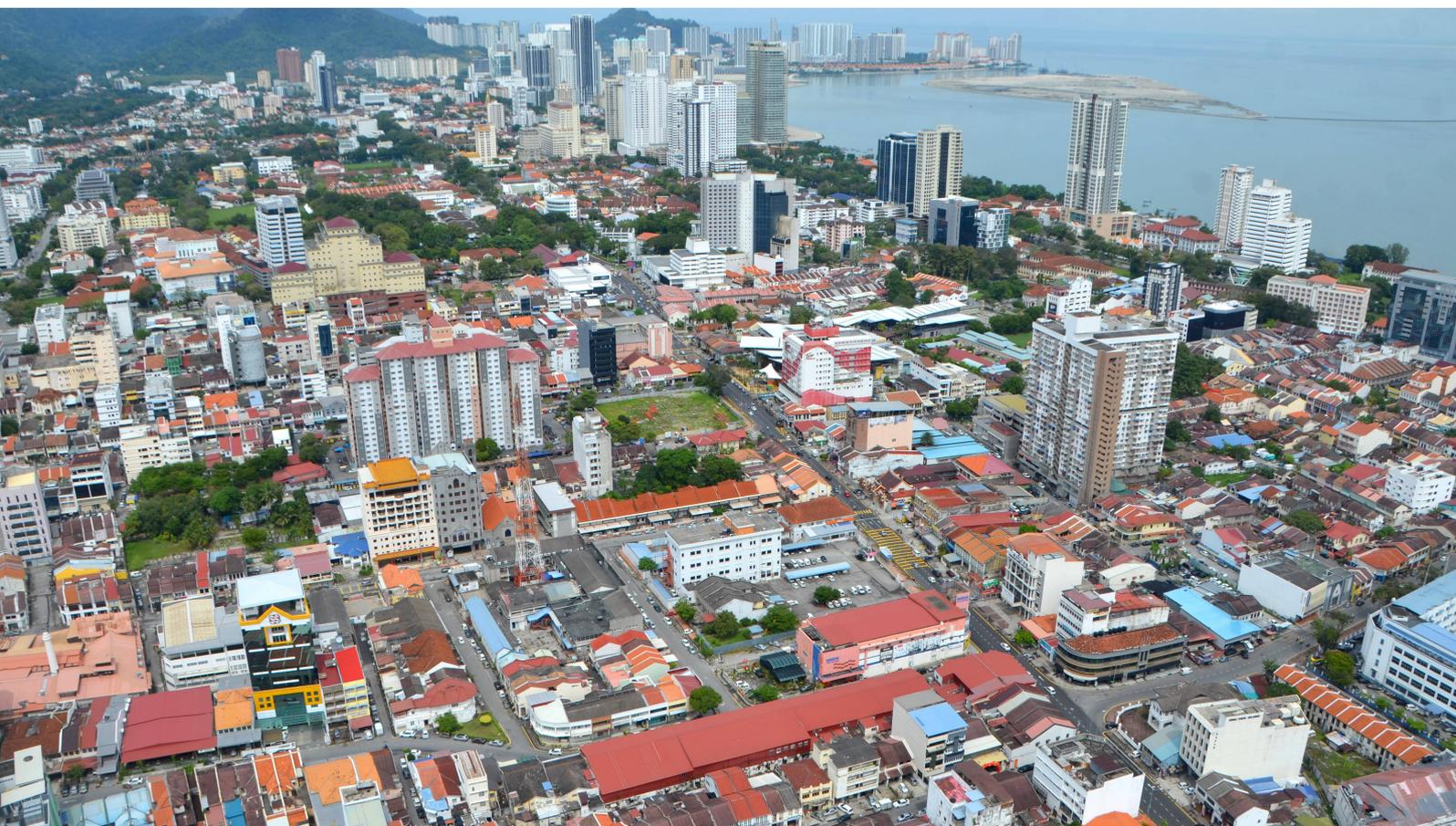
Less than 25% of the city population has access to public or shared transportation. Improving the local public transportation network is recommended. Wide availability of public and shared transport significantly reduces energy consumption in the transport sector and the related GHG emissions, while making urban mobility more sustainable and affordable for people. An analysis of national and international best-practices in the transport sector as well as improvements in cooperation between relevant national and international stakeholders are needed in order to identify suitable innovative solutions and investment opportunities for pilot projects.

Pedestrian lanes are common in multiple places in the jurisdiction and most of them are convenient for walking, although some lanes require improvement. Improvement of the situation is recommended by expanding existing territorial planning solutions or by introducing additional ones (e.g., dedicated lanes for pedestrians and cyclists, restricted pedestrian area, etc.) aimed at developing effective walkable neighbourhoods, as well as ensuring proper maintenance of existing pedestrian areas. Such measures can significantly reduce transportation energy use as well as improve air quality and people's well-being.

The level of air pollution in the jurisdiction is considered moderate (between 51 and 100 ppm). Continuation is recommended of the implementation of a low-emissions development strategy, which should include the improvement of energy efficiency and increased utilization of renewable energy sources in the main air-polluting sectors.

The jurisdiction is taking steps towards sustainable waste management process implementation with some of the landfills already implementing pilot waste treatment and recycling practices. Conducting a detailed benchmarking analysis of the operational efficiency on the implemented waste recycling facilities is recommended, together with the preparation of a strategy for replication of successful sustainable solutions in other facilities in the jurisdictions. A feasibility study to explore the potential for waste-to-energy projects in the jurisdiction, its cost-effectiveness and ways to gain financing can help to enhance waste treatment as well as offer a local source of sustainable energy. Conducting capacity-building training for local professionals, focused on existing best practices for sustainable solid waste treatment systems, and consideration of possible financing mechanisms is also recommended. Cooperation with relevant national level and international stakeholders is required at this stage in preparing guidelines for large-scale development and implementation of green urban solid waste treatment projects.

Disaster reduction strategies are being implemented at the local level in line with relevant national strategies. Reviewing these strategies is recommended in order to learn whether the synergies between disaster reduction and sustainable energy solutions are being considered. Examples of such synergies may include, but are not limited to materials and technologies that enhance a building's energy efficiency as well as make the building more durable and resilient to threats posed by natural disasters. A sustainable energy supply, co-generation systems, distributed generation and micro-grids can support the recovery process from natural disasters etc. Where such synergies are not considered in the existing disaster reduction strategies, it is recommended that relevant adjustments be made based on existing international good practices. Implementation of a public awareness programme on these synergies is recommended in order to influence the adoption and implementation of energy-efficient and resilient designs.



#### About the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)

ESCAP serves as the United Nations' regional hub promoting cooperation among countries to achieve inclusive and sustainable development. The largest regional intergovernmental platform with 53 Member States and 9 Associate Members, ESCAP has emerged as a strong regional think-tank offering countries sound analytical products that shed insight into the evolving economic, social and environmental dynamics of the region. The Commission's strategic focus is to deliver on the 2030 Agenda for Sustainable Development, which it does by reinforcing and deepening regional cooperation and integration to advance connectivity, financial cooperation and market integration. ESCAP's research and analysis coupled with its policy advisory services, capacity building and technical assistance to governments aims to support countries' sustainable and inclusive development ambitions.



#### About the UN Environment Programme (UNEP)

UNEP is the leading global voice on the environment. It provides leadership and encourages partnership in caring for the environment by inspiring, informing and enabling nations and peoples to improve their quality of life without compromising that of future generations. This work is supported by the UNEP-led Integrated Urban Systems Partnership – a public-private initiative launched by UNEP and partners in 2019 that supports an integrated approach to infrastructure development in cities to achieve more sustainable and liveable cities that are more energy and resource efficient.

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