11. SEA Methodologies

11.1 Methods and Applications in Hong Kong

Since policy-making processes may vary from case to case, it is commonly agreed that methods and techniques used in SEA should be highly flexible to coincide with each PPP.

SEA methodologies employed in Hong Kong and their applications on various PPPs are summarized in Table 5 below.

Table 5 SEA Methodologies and their Applications in Hong Kong

Methods	Remarks	Applications in Hong Kong
(I) Scenario Analysis		
a. Forecast	• Based on trends and mechanisms that can be seen in the past years. • More reliable for shorter-terms and well-defined areas. • Use of Scenario is good for comparative purposes and when there is a significant uncertainty about the future. • External Scenario – dependent on factors which cannot be controlled. • Policy Scenario – user can influence in a significant way.	• External Scenario have been used to estimate the future population, GDP, traffic etc. for land use and transport planning. • Computer modeling is commonly used to forecast environmental implications but before deciding whether to use it or designing the types of computer modeling, the following points should be noted: – The level of details required by the SEA should be carefully considered at an early stage as sophisticated models are usually time consuming and expensive but may not be meaningful for SEA in all cases. – Even though sophisticated models are available, special attention should be paid on whether credible information is available as input assumptions. – Margin of error of the model should be compared with that of the assumptions adopted. – Time available for conducting computer modeling should be assessed as even though very accurate results are produced, it would be useless if decisions have been made. • To deal with the uncertainty and to avoid unexpected environmental impacts, strategic environmental monitoring & audit should be developed as part of SEA to check the change of assumptions and follow up on the implementations of environmental mitigations that are necessary to avoid major problems. • Examples are SEA for TDSR, CTS-3, RDS-2, HK2030, etc.
b. Backcast	• Future goal is set. • Steps required to achieve this future goal.	• Used in HK2030 together with the Forecast approach. • In addition to the development pressure (such as population growth), the SEA also looked at the likely environmental targets in 30 years time and the possible trend or direction. • Measures required to achieve these future “targets” are also investigated and those related to land use planning are recommended to be incorporated in the strategic land use planning framework.

Methods	Remarks	Applications in Hong Kong
(II) Life Cycle Assessment	• Assess the environmental impacts and resources throughout a product's life from raw material acquisition through production use and disposal. • The Basis for the calculation is the functional unit to which all inputs and outputs are related (e.g. 1 MJ heat). • Such functional units could be compared among different alternatives. • The analysis is usually site and time independent. • Not all types of environmental effects are covered. • Effects associated with land use are traditionally difficult to assess.	• Relatively limited applications in Hong Kong. • Study on Potential Applications of Renewable Energy in Hong Kong (to be confirmed).
(III) Environmentally Extended Input/ Output Analysis (IOA)	• IOA is traditionally an analytical tool within economics and systems of national account. • IOA can be applied to include environmental impacts by adding emission coefficients to the monetary IOAs.	• In general, IOA has not been applied in SEA in Hong Kong. • However, a related approach is adopted in the SEA for the RDS-2 where the economic aspects of the environmental benefits and impacts of road vs. rail have been compared to present the whole picture of benefits and impacts borne by the community.
(IV) Risk Assessment		
a. of Chemicals	• For exposures of toxic chemicals.	• Only required if the proposals would lead to potential impacts related to the toxic chemicals. • For examples, toxic chemicals have been assessed in the site search for a Waste to Energy Incinerators. • Toxic Air Pollutants is also one of the indicators recommended in SUSDEV21 for sustainability assessment. • Environmental Baseline Surveys were conducted (as part of the Environmental Baseline Study for SUSDEV 21) to provide a comprehensive baseline of toxic air pollutants and toxic in marine sediments & biota for future SEA studies as appropriate.
b. of Accidents	• Analysis of accident consequences and their frequencies.	• Hazard assessment has been applied in SEA in Hong Kong if there are potential implications arising from the proposals, for example, TDSR, HK2030, where developments near the consultation zone of the Potentially Hazardous Installations have been considered (PHI).
(V) Impact Pathway Approach	• The analytical sequence "activities - emissions - dispersion – concentrations – impacts" are handled systematically. • Estimate how large a population is exposed to	• This approach is commonly applied in EIA in Hong Kong, and have been applied in a number of SEA, especially those with comprehensive studies, e.g. CTS-3 and Site Search for a New Power Station (by HEC). • Computer modeling (air quality and water quality), and wind tunnels are required to predict the concentrations of pollutants. For "points to note" in using computing

Methods	Remarks	Applications in Hong Kong
	different concentrations of pollutants. • Traditionally a site-specific and time-specific approach and is data demanding. • Mostly applicable to conventional pollutants.	modeling, please refer to "Applications in HK" column under Methodology (I) of the table. • The predicted concentrations are usually compared with the Air Quality Objectives and Water Quality Objectives to determine whether the impacts are acceptable.
(VI) Ecological Impact Assessment	• Usually site-specific. • In SEA, the areas affected will typically be larger and the detailed assessment methods may have to be adjusted to a coarser resolution.	• Ecological Impact Assessment has been commonly adopted in SEA in Hong Kong when there are potential ecological impacts arising from the proposal, e.g. TDSR, CTS-3, RDS-2 and HK2030. • In the SEA for RDS-2, potential cumulative ecological impacts arising from the proposed railway network were assessed based on indicative alignment. Encroachments into ecological sensitive areas were avoided.
(VII) Multiple Attribute Analysis (MAA)	• Aims to improve decision-making by making choices about conflicting or multiple objectives explicit and rational. • Display trade-off among criteria. • Use of weight and rating systems • Displayed in matrix display systems, diamond model, or value path. • Avoid a need for producing single summary values or indices that are supposed to capture different environmental dimensions. • Tend to have significant disagreements between methods as well as disagreement among individuals. • Purpose is not to come up with one answer but forces people to think about the problems at hand.	• MAA is a popular methodology for proponents and consultants in Hong Kong. However, there is a general tendency that instead of making the decision-making transparent and forces users to think, it often ends up with the opposite results where the reasons are buried and decisions are based on the final scores. • The final scores, derived by assigning and adding up scores, with or without weighting, based on different environmental aspects (e.g. noise, ecology, water and so forth) aims to provide a quantitative representation of the proposals' overall performance. This type of methodology must be used with caution as the approach is subjective and can be methodologically unsound. It can tend to hide the major issues which might not be reflected properly by final scores. However, this technique can, if used properly, provide a useful, quantitative, transparent and repeatable means to balance competing and disparate issues. As long as the shortfalls are recognized such methods can be useful, particularly in sensitivity analysis. • Moreover, qualitative information, such as rankings, have also been subject to various data manipulation as if they were quantitative information. This is methodologically flawed. • SEA in Hong Kong would try to make the environmental implications of a proposal and its alternatives explicit. • If MAA is used, it tends to use matrix display system as far as possible (e.g. SEA for the Landfill Extension Study) and avoid adding up scores assigned to environmental objectives with scores from the other objectives, a practice that would lead to over-relying on the final score, and lack of transparency for decision-making.
(VIII) Environmental Objectives	• Valuation results can be reported per target or objective. • The objectives can be used as a checklist when doing an inventory of potential impacts. • Indicators could be developed with the objectives in mind to facilitate comparisons. • Summarizing assessment	• Checklist, including environmental objectives, were developed to facilitate policy scans to check whether new policies under consideration has any potential environmental impacts (Appendix I of Joint PELBTC 10/98 (Figure 8 of this Manual refers) & WBTC 18/98). • Indicators recommended in SUSDEV21 for sustainability assessment are developed under a set of guiding principles, including one on environmental quality, and one on natural resources. • Please see above under MAA re aggregation. • Example : RDS2 -

Methods	Remarks	Applications in Hong Kong
	can also be made for the headline objectives in appropriate. • If Aggregation is required, has to be done through MAA mentioned above.	Two sets of objectives were developed – one for formulating railway network expansion options and the other one for comparing the options (the objectives are listed out at Appendix 2)
(IX) Economic Valuation	• To deal with social and private cost in the market as a result of certain activity (i.e. a negative environmental externality). • Different valuation approaches available, including hedonic pricing, willingness-to-pay, etc. • In the SEA context, might not have resource available to carry out the valuation studies. • Thus, probably have to work with the benefits transfer approach, i.e. utilizes results and data from existing studies and adjusts them to different situations.	• Data for detailed valuation studies is not available in Hong Kong. • Relevant studies in other parts of the world have been used with local emissions to demonstrate the likely consequence. • Pointed out the limitation of the current economic and financial assessment which did not take into consideration the environmental implications (both benefits and impacts) that are borne by the society. • Help to justify railway proposals that are marginally not viable in financial terms. • Example : RDS2 – In view that there is limited information and experience in monetarising environmental costs and benefits, and that monetarisation implicitly allows the environmental costs and benefits to be 'traded-off' by other economic factors, environmental costs and benefits were presented in the form of quantitative environmental information rather than monetarized terms. By producing two key issues papers - one on the economic appraisal of environmental costs and benefits of railways, and another on comparative assessments of road vs. rail, the whole picture of benefits and impacts borne by the community was well presented.
(X) Surveys	• This category refers to public opinion surveys, rather the traditional environmental surveys (such as field trips etc. to measure the ecological baseline). • In addition to public opinion survey, another set of methods emphasize small group elicitations and in-depth interviews.	• While public consultation are part of many SEA conducted in Hong Kong, public opinion surveys are in general not been used. • In the SEA for HK2030, it has arranged a view sharing workshops to listen to the major stakeholders and experts on any possible measures that could be incorporated in the strategic planning process to improve the environmental performance of the territorial land-use planning.
(XI) Valuation methods based on mass, energy and area	• As an alternative system to the economic valuation. • e.g. Material Flow Analysis, Material Intensity Per Unit Service, Ecological Footprint, etc. • Similar to the Life Cycle Assessment to certain extent	• In general have not been used in SEA. • However, Ecological Footprint has been considered as an valuation tools in the HK2030, and also as one of the sustainability indictors developed in SUSDEV21 to assess new proposals. • This tool was finally not adopted as a lot of assumptions need to used to convert all affected activities into "area", and it is more appropriate to serve as a tracking indicators to monitor the performance over time (with same set of assumptions), rather than as a tools to evaluate different proposals and alternatives.

11.2 Checklist of a Good SEA

No matter what SEA processes and methodologies are adopted, a good SEA should have the following characteristics:

Table 6 Checklist of a good SEA

Characteristics	Questions to be asked
Consideration of alternatives	Does SEA identify environmentally friendly alternatives ?
Pick up signals	Does SEA pick up key environmental threats and opportunities?
Focus	Does it focus on major issues?
Participation	Does it allow people to take part ?
Science-governance	Are the roles of experts and decision-makers clear and well understood?
Balancing interests & transparency	Is the decision-making transparent and balanced ?
Execution of agreed-on action	Are there commitments and mechanisms to follow through?