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CONSIDERATION & VALUATION OF THE ENVIRONMENTAL COST & BENEFITS OF POLICY PROPOSALS FROM AN ECONOMIC PERSPECTIVE – FINAL REPORT (ENGLISH VERSION)

Report Prepared by :
Allied Environmental Consultants Ltd.

COMMERCIAL-IN-CONFIDENCE

Environmental Protection Department

The Government of the Hong Kong
Special Administrative Region

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EXECUTIVE SUMMARY

Allied Environmental Consultants Limited (AEC) has been appointed by the Environmental Protection Department of the Government of Hong Kong (the Employer) to conduct a study on the Consideration and Valuation of the Environmental Cost and Benefits of the Policy Proposal from an Economic Perspective. AEC is responsible and accountable for the content of the report.

The key objectives of this study are to:

a) Review the latest international practice on the valuation and consideration of the costs and benefits of the environmental impacts of policy decisions,

b) Study how various valuation approaches and tools can be used in the valuation and quantification of the costs and benefits of the environmental impacts of policy decisions,

c) Take reference of international practice and valuation/quantifications approaches and tools to advise on how the environmental costs and benefits of policy decisions can be valuated, quantified and taken into account in considering policy proposals for the case in Hong Kong,

d) Develop a set of generic tools (such as manual, procedural guidelines or valuation model) for valuating and quantifying the costs and benefits of environmental impacts arising from policy proposals so that they can be duly included in the financial/economic assessment of policy proposals in a comparable way,

e) Illustrate the international reference and generic tools using a recent policy of Hong Kong which has been made know to the public,

The review of the latest international practices in different countries and development co-operations on the valuation and consideration of the costs and benefits of environmental impacts of policy decisions were undertaken through literature review (e.g. papers, books and internet websites). Different countries have been chosen with reference to the development history of environmental policy, valuation approaches and tools. Countries and development organizations examined include United Kingdom (UK), Denmark, Finland, Germany, Norway, Austria, Netherlands, Portugal, Mainland China, Singapore, Japan, Thailand, Macau, Korea, Australia, New Zealand, United States of America (USA), Canada, World Bank, Asian Development Bank (ADB), United Nations Environmental Programme (UNEP), United Nations Development Programme (UNDP) and United Nations Economic Commission for Europe (UNECE).

The environmental protection framework including the implementation of Strategic Environmental Assessment (SEA) of the selected countries/development co-operations were reviewed. Most of the countries / development co-operations have their own environmental protection or scrutiny framework developed. SEA is not in practice in some countries. Environmental valuation on proposed policies and mitigation measures is not prevalently adopted in regulatory framework. Below is an overall conclusion:

- All European countries studied have its own environmental protection or scrutiny framework except Portugal which transposing the EU SEA Directive into its legislation is under preparation.

- Only few Asia-Pacific countries has adopted statutory environmental protection/scrutiny framework. China, Australia and New Zealand have adopted their own SEA-typed framework; where Korea has put emphasis on a scrutiny framework named Prior Environmental Review System (PERS) for plans or projects. Countries such as Singapore, Japan and Thailand noticed the need for SEA and have started studies on the issue.

- For the North America, United States of America (USA) has legally adopted its environmental protection framework; whereas Canada has undertaken an administrative requirement for provision of SEA.

- Few Development Corporations were investigated, they assist countries to introduce and apply SEA. Apart from it, World Bank and Asian Development Bank require the provision of SEA for several Banks' activities.

Final report has documented environmental protection/scrutiny framework summary of each country/development corporation. More detailed information was separately submitted to the EPD as stage 1 report.

Despite it is not a statutory requirement to include cost-benefit analysis (CBA) in SEA process, some countries/development corporations mentioned their work on economic valuation. Studies on various valuation tools were done. United Kingdom, World Bank and Asian Development Bank have publication like guidelines, training manual, handbooks etc. introducing valuation techniques and application of CBA in policy decision-making. Denmark has implemented CBA for chemical substances. The corresponding environmental department of Australia, New Zealand, and United States of America is working on integration of environment and economic considerations in policy decision-making. In Canada, economic valuation is practiced by the Economic and Regulatory Affairs (ERA) Directorate.

Though economic valuation was not found to be mandatory throughout the SEA process, many countries has shown their work on economic consideration in different examples. Some examples were explored for UK, Denmark, Finland, Germany, Norway, Austria, Australia, and New Zealand.

Summary tables were presented to illustrate the case study and explaining the approaches and tools. Tables in Appendix A listed out the examples; relevant policy, programme or plan, implementation framework, their valuation methods, concept, application, and the outcome. Tables in Appendix B listed out their approaches, concept, type of applicable policy, advantages, disadvantages and example of its application.

Different valuation tools were applied in the examples. The brief rationales of approaches were discussed. Production method and expenditure method are tools that estimate the environmental value by valuating the market price of environmental products or services. Market price method is easily understood since it depends on market data only. However, it is likely to ignore some elements in total economic value. Hedonic pricing method and travel cost method use surrogate or proxy market concept to estimates economic values for ecosystem or environmental services that directly affect market prices. It is also depends on market data, thus easily understood. On the other hands, there are number of restrictions the requirement of substantial data that

limit the application of it. Survey based methods such as contingent valuation and discrete choice modeling are tools that directly ask people for their willingness to pay, willingness to accept compensation or preference so to obtain the value of any ecosystem or environmental service. It is likely to cover all ranges of values in an analysis, but, at the same time it depends on respondents' attitude which may cause bias.

Some commonly adopted valuation approaches and tools introduced in the study were discussed on their possible implementation in the environmental valuation of proposed policies and mitigation measures in Hong Kong. Some strategic objectives and actions for the improvement of environmental quality in the 2006-07 Policy Address were used as an example to illustrate their application. The information required, application and the constraints were also presented in the report. Reference can be made to the flowchart of economic valuation procedures in the report and to the World Bank Economic Development Institution's publication "The Economic Appraisal of Environmental Projects and Polices – A Practical Guide" when economic consideration is going to be undertaken in policy decision-making process for the case of Hong Kong.

The application of environmental valuation shows the monetary value from an economic point of view. However not all environmental assets are quantifiable. The role of the environmental valuation is a tool to assist the decision of a policy proposal rather than a determining factor.

1 REVIEW OF INTERNATIONAL PRACTICE

The review of the latest international practices on the valuation and consideration of the costs and benefits of environmental impacts of policy decisions were undertaken and summarized below. Their valuation approach, concept, application framework and outcome are summarized in Tables 1.

1.1. European Countries

United Kingdom (UK)

The European Directive 2001/42/EC (SEA Directive) is transposed into four regulations for different regions of UK, England, Wales, Scotland and North Ireland. The Regulations set a statutory requirement of environmental assessment for plans and programmes.

These four regions, National Assembly for Wales, Scotland, Northern Ireland as well as England have similar regulatory requirements on environmental assessment of plans and programmes, they are the Environmental Assessment of Plans and Programmes Regulations, 2004[1]; the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004[2]; the Environmental Assessment Act (Scotland) 2005[3]; and; the Environmental Assessment of Plans and Programmes (North Ireland) Regulations 2004[4].

A generic practical guide [5] has been developed jointly by the Office of the Deputy Prime Minister, the Scottish Executive, the Welsh Assembly Government and the Department of the Environment in Northern Ireland. It is prepared on how to comply with the Directive and is in conjunction with the SEAD and the four Regulations mentioned above which transpose it into UK law. Other than generic SEA guidance, a Practical Guide ODPM 2005 is a sector specific SEA guidance on sectors.

SEA can be broken down into distinct stages or steps following the ODPM's guidelines for SEA. When a SEA is required, generally it is classified into 5 stages as Screening; Scoping; Assessing Environmental Effects; Public Consultation on Environmental Report and Plan or Programme; and; Monitoring and Remedial Actions.

Under the SEA Good Practice Guidelines, the agency has prepared a SEA Toolkit outlining tools/techniques which may be useful for plan makers when undertaking SEA. Cost benefit analysis (CBA) is one of the promoted techniques that could be used to compare technical, environmental and social impacts for SEA.[6]

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[1] http://www.opsi.gov.uk/si/si2004/20041633.htm
[2] http://www.opsi.gov.uk/legislation/wales/wsi2004/20041656e.htm
[3] http://www.opsi.gov.uk/legislation/scotland/acts2005/20050015.htm
[4] http://www.opsi.gov.uk/sr/sr2004/20040280.htm
[5] http://www.communities.gov.uk/pub/290/APracticalGuidetotheStrategicEnvironmentalAssessmentDirective_id1143290.pdf
[6] http://www.environment-agency.gov.uk/commondata/acrobat/sea_gpg_final_1137560.pdf

Apart from the SEA Toolkit, the guideline, Treasury (2003)[7], is the UK Green Book on Appraisal and Evaluation in Central Government from the Treasury Office. Guideline is reviewed with regard to the recommendations made on what to be included in a CBA.

Moreover, Defra's Project Appraisal Guidance 3 – Economic Appraisal, is one of a series on the appraisal of flood and coastal defence in England and Wales. [8]

CBA is primarily an evaluation tool not an impact identification tool, thus cannot operate in isolation. The current internal draft of the Agency's Basic Economic Appraisal Guidance provides practical assistance on how to conduct economic appraisal. It acknowledges that, in most cases, it will not be possible to express all the impacts of a proposal in monetary units and only a partial CBA can ever be taken. CBA is not likely a mandatory process in policy decision. Examples are summarized in Table 1.

[7] http://www.hm-treasury.gov.uk./media/785/27/Green_Book_03.pdf
[8] http://www.defra.gov.uk/environ/fcd/pubs/pagn/fcdpag3/

Denmark

At present, there are two statutory SEA tools in Denmark, SEA for policies and SEA for plans and programmes. The legal framework provision for SEA in Denmark was stipulated by Prime Minister's Office circular 1993 (amended 1995 & 1998, when requirement became legally binding). All government bills and proposals sent to Parliament of on which Parliament must be consulted require an assessment if they are expected to have significant environmental impacts.

In May 2004, the Act on Environmental Assessment of Plans and Programmes [9] was implemented to comply with the EU SEA Directive. It is a statutory requirement under the act to conduct environmental assessment of plans and programmes that may have significant impacts on environment so that to promote sustainable development.

The Ministry of the Environment issued Guidance on Procedures for Strategic Environmental Assessment of Bills and other Government Proposals (1993) and Strategic Environmental Assessment of Bills and other Government Proposals – Examples and Experience (1995) which describe a recommended procedure for the conduct of SEA and a checklist for screening process. An outlined procedure can be described as i) Screening; ii) Scoping; iii) Assessment; iv) Publication of statement in the observation on the bill.[10]

In Denmark the primary responsibility for the regulation of chemicals is under the Danish Environmental Protection Agency (EPA), which comes under the authority of the Danish Ministry of the Environment.[11] Among the relevant environmental acts, the Act on Chemical Substances and Products, clause 2(2) stated that the consideration of economic consequences in preventing damages to the environment is a statutory requirement under the Act. [12, 13]

During the study process, we explore example(s) of applying economic valuation into policy / mitigation measures proposals. However, according to the SEA material and other relevent information, it is not likely that economic consideration of policy decisions is a mandatory process under the country. Examples are summarized in Table 1.

[9] http://www.retsinfo.dk/_GETDOC_/ACCN/A20040031630-REGL (in Danish)
[10] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter3_Oct04.pdf, page 60
[11] http://www.mst.dk/homepage → Chemicals → other chemicals → Legislations → "What does the law say about chemicals substances and products?"
[12] http://www.mst.dk/homepage → Legislations → Acts → Chemicals → No. 21 of January 16, 1996
[13] http://www.mim.dk/eng/The+Ministry/

Finland

The Act and Decree on the Assessment of the Impacts of the Authorities' Plans, Programmes and Policies on the Environment (200/2005) [14] provides a statutory requirement to adopt SEA in Finland. The environmental impacts of plans, programmes and policies must be assessed if these may have significant environmental impacts.

New legislation came into force in Finland on 1 June 2005. The new legislation includes the same general obligations applied in the Decree on Environmental Impact Assessment Procedure (268/1999)[15] and in addition specifies the content requirements and assessment procedures that must be followed for certain types of plans and programmes.

The new legislation has been drafted in accordance with both the EU SEA Directive (2001/42/EC), which requires that environmental assessments should be carried out for certain types of strategic plans and programmes, and a related protocol of the United Nations' Economic Commission for Europe (UNECE) on strategic environmental assessments (SEA).

The Ministry of the Environment produces Guidelines for the environmental assessment of plans, programmes and policies in Finland for policy makers. [16] Tasks that should be included in an environmental assessment are as: i) planning the assessment approach, formulation of alternatives; ii) participatory planning and cooperation; iii) evaluation of impacts; iv) comparison of alternatives; v) assessment report; and vi) monitoring.

During the study process, we explore example(s) of applying economic valuation into policy / mitigation measures proposals. However, material about SEA does not suggest that economic consideration of policy decisions is a mandatory process under the country. Example is summarized in Table 1.

[14] http://www.ymparisto.fi/download.asp?contentid=44490&lan=en
[15] http://www.ymparisto.fi/download.asp?contentid=12806&lan=en
[16] http://www.ymparisto.fi/download.asp?contentid=19877&lan=en

Norway

Norway is one of the 38 signatories to the UNECE SEA Protocol. The Ministry of the Environment introduced regulation on Environmental Impact Assessment on amendments to the Planning and Building Act (environmental impact assessment) in April 2005. The regulation requires EIA for plans and projects. Nevertheless, regulation on environmental assessment of programmes or policies is not available.

The EIA for plans serves as a SEA-type valuation tools. It ensures that the environmental, natural resources and community are taken into account in the preparation of plans. The following plans shall always be dealt with in accordance with these Regulations [17] [18]:

- Country master plans and country sub-plans pursuant to the Planning and Building Act with guidelines for physical development;
- The land-use part of the municipal master plan and municipal sub-plans which specify area for physical development
- Zoning plans or building development plans pursuant to the Planning and Building Act for such projects as are listed in the Regulation. This covers building development plans only if no zoning plan has been prepared for the project.

During the study process, we explore example(s) of applying economic valuation into policy / mitigation measures proposals. However, information about SEA for plans does not suggest that economic consideration of policy decisions is a mandatory process under the country. Although economic valutaion is not likely to be used in SEA; the example suggests that economic valuation maybe incorporated in consultative document for natural resources conservation. Example is summarized in Table 1.

[17] http://odin.dep.no/filarkiv/273175/Regulations_on_Environmental_Impact_Assessment.pdf
[18] http://odin.dep.no/filarkiv/242484/Planning_and_Building_Act_April_2005.pdf, *Planning and Building Act, Chapter VII-A*

Germany

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety transposed the EU Directive 2000/42/EC, or named SEA Directive into German law with the amendment of the Environmental Impact Assessment Act (UVPG) in June 2005. The EU Directive was also implemented in the Federal Building Code and the Federal Spatial Planning Act in June 2004 by the Federal Ministry of Transport, Building and Housing.[19] [20]

To accommodate the EU Directive 2001/42/EC, the German federal law states a statutory requirement of environmental assessment for certain plans and programmes that may induce significant environmental impacts such as development plans, regional planning, building master plans, transport plans, etc.

SEA is also required for the certain plans or programmes if they set the framework for future development consent for projects listed in Annex I and II to Directive 85/337/EEC, named EU EIA Directive.

The general procedures of SEA in Germany are as follows:[21]

- screening;
- scoping;
- preparing the environmental report;
- consultations;
- revisions of the environmental report;
- decision making;
- information of the authorities involved and the public according to Article 9 of Directive 2001/42/EC;
- monitoring.

During the study process, we explore example(s) of applying economic valuation into policy / mitigation measures proposals. However, information of SEA does not show that economic consideration of policy decisions is a mandatory process under the country. Examples are summarized in Table 1.

[19] http://www.bmu.de/files/pdfs/allgemein/application/pdf/uvpg.pdf, EIA Act, Article 16, page 14
[20] http://bundesrecht.juris.de/bundesrecht/bbaug/index.html (in German)
[21] http://plannet.difu.de/2005/proceedings/2005_plannet-proceedings.pdf, Annex 4e

Austria

Up-to-date, SEA has been statutory required in only a few cases. It is developed at the federal and the nine provincial levels. The Austrian government has been transposing the EU SEA Directive into various legislations, including amending existing and enacting new one.

Acts that have transposed the EU SEA Directive at federal level include:

- Federal Act on Water Management (Federal Law Gazette I 82, 2003; Aug 29, 2003);
- Federal Act on Strategic Assessment into the Transport Sector;
- Federal Act on Environmental Noise;
- Federal Act on Air Quality.

Acts amended or enacted by the federal and provincial governments can be found in *SEA in spatial/land use planning in the 25 EU member states – a July 2006 update*[22].

Details information on legal documents can be found via www.anidea.at/aktu.html.

There was also guidance on how to conduct SEA within local land-use planning, published by certain provincial governments, including Lower Austria and Styria. The Leitfaden Lower Austria is provided in German.[23]

When studying the SEA process in Austria, no example is available and it does not mention that economic consideration of policy decisions is a mandatory process under the country.[24]

[22] http://www.laum.uni-hannover.de/uvp/aktuell/SEAinMS2006.pdf, page 5
[23] http://www.raumordnung-noe.at/uploads/sup_leitfaden.pdf (in German)
[24] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter3_Oct04.pdf, pages 53-55

Netherlands

Both Environmental Test and Strategic Environmental Impact Assessment (SEIA) are the valuation tools incorporated in Netherlands.

Environmental Test (E-test) is likely as an Environmental Protection Scrutiny process since it is an internal and informal process, regarded as an environmental assessment system for new legislation. It was introduced by the Cabinet in 1995 and addresses the environmental and sustainability impacts of a proposed law, draft regulation and potentially other policy in order to inform decision-making. It is an initiative by the Ministry of Housing, Spatial Planning and the Environment (VROM) and the Ministries of Economics Affairs and Justice.

SEIA or EIA for plans, a process similar to EIA except valuates impacts for plans and programmes, is legislative result of the European Directive 2001/42/EC (the SEA Directive), thus it is a statutory process. It is regulated in the Environmental Impact Assessment Decree 1994. It is an initiative by the Ministry of Housing, Spatial Planning and the Environment (VROM) and the Ministries of Economic Affairs and Justice. When the plan or programme is a statutory requirement or is mandatory under administrative law, an environmental report is required.

Process of E-test was revised and adopted in March 2003 as 2 phases:

- Quick scan; to investigate the need for draft legislation, including consideration of potential significant effects for the environment, compliance.
- Undertaking an appraisal; E-test and different appraisal are carried out, the National Institute for Health and Environment provides external expertise or support for the E-test. Appraisal should be prepared with information to be included in the explanatory memoradum and directed to the Ministry of Environment for comment.[25]

Generally the process of SEIA is similar to that of EIA except that SEIA requires provision of environmental report instead of environmental impact statement (EIS). The environmental report refers to a plan whose details may not been fully worked out. Therefore, it is less detailed than an environmental impact statement (EIS); the information in the environmental report may be used when making its EIS. [26]

However, there is no example or information suggesting that economic consideration of policy decisions is a mandatory process under the country.

[25] http://www.iaia.org/Non_Members/Conference/SEA%20Prague/SEA%20at%20the%20Policy%20Level.pdf, page 74

[26] http://international.vrom.nl/pagina.html?id=7378

Portugal

In Portugal, the legislation that would transpose the EU SEA Directive was still under preparation in mid-2006. As part of Portugal's moves to comply with the Directive, the guidance available in Portugal was on strategic impact assessment (SIA) of land-use/spatial plans (regional, inter-municipal, municipal, urban plans, coastal areas plans, natural protected areas plans and water reservoir plans) as defined in the Spatial Planning Act and regulations (Law n. 48/98 of 11th August, and Decree-Law n. 380/99, of 22 September 1999). It sets out a technical methodology for SIA to be used during the planning process as part of the conception, preparation, discussion, approval and implementation of spatial plans in Portugal. The guidance was issued in 2003 by the National Directorate General for Land-Use Planning and Urban Development of the Ministry of Environment.[27]

At this pre-transposition stage, there are few legal requirements bearing on SEA in Portugal. A general requirement for EIA of plans and programmes was included in the National Environmental Law (1987) but regulations to implement this provision were not issued. In addition, recent legislation on the development of mineral exploration plans contains a requirement for a SEA report to be included in the plan but so far there has been no legal definition of the process, methodology and content for SEA. As a member state of the European Union, Portugal is also bound by Council Regulation EEC 2081/93 regarding proposals for Regional Development Plans and Structural Funds programmes and now must implement the European SEA Directive 2001/42/EC.

At present, the SEA system is still not implemented in Portugal by legislation, but it is provided as an administrative process in some plans and programmes under the National Environmental Law (1987). Nevertheless, as a member stat of the European Union, the Portugal's government would transpose the EU SEA Directive into legislation in soon future. Moreover, no example or information about SEA suggests that economic valuation is a mandatory process in policy decision-making.

[27] *http://www.laum.uni-hannover.de/uvp/aktuell/SEAinMS2006.pdf, Page 7*

France

In France, Strategic Impact Assessment (SIA) and SEA for plans and programmes set out statutory requirement for assessment report if proposed plans, programmes or policies have significant environmental impacts.

Strategic Impact Assessment (SIA), a French SEA-equivalent tool which provides legal requirement at policy level for proposed laws and at regional levels for Master and Zoning plans. Since 1990s, it is introduced for major transportation projects; the requirement for EIA to assess not only the project but also the programme to which it is linked. A French SIA methodology was developed and applied to the National Road Master Plan; there are formal decision-making procedures for policies, plans and programmes in the transport sector.[28]

In June 2004, the EU SEA Directive was transposed into the French Environmental Law, named Ordonnace No 2004-89[29], which provides statutory requirement for SEA of plans and programmes. The text has two separate parts, general (Decree on 27 May 2004 which modified the Environment Code) and specific for spatial planning (Decree on 27 May 2004 which modified the Town and Country Planning Code), each parts describe the rule of assessment precisely. Two general guidelines are issued for spatial planning, other plans and programmes. Sectoral guidelines such as waste management and regional level for land use plans in several regions are available, while guideline for water management is under preparation. [30]

The Ministry of Environment proposed to adopt the approach used in the UK for environmental appraisals of development plans in order to provide coherence between decisions. This SEA procedure consists of four main steps:

- Environmental diagnosis, an environmental profile describing the state of the environment and listing political objectives at different scales;
- Compatibility analysis between the focus of the strategic action and the main reference objectives;
- Assessment of the importance of the potential impacts of the whole plan;
- Evaluation (ex post) of interactions between measures. [31]

However, no example is available and information about SEA does not suggest that economic consideration for policy decisions is a mandatory process under the country.

[28] http://www.transport-sea.net/docs, page 46
[29] http://www.ecologie.gouv.fr/article.php3?id_article=5737 (in France)
[30] http://www.laum.uni-hannover.de/uvp/aktuell/SEAinMS2006.pdf, page 9
[31] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter3_Oct04.pdf, page 70

1.2. Asia-Pacific

Mainland China

The EIA Law of the People's Republic of China has come into force since 1 September 2003, setting out the statutory requirements for EIA for plans and construction projects; and the legal liability in the EIA process.[32]

Under the Ordinance, environmental assessments have to be conducted for land-use planning, regional planning, and certain sectoral plans such as industry, agriculture, energy and transport during their planning stages. Those projects without environmental assessments could no longer obtain authorities approval. For projects with significant potential environmental impacts, public comments have to be consolidated with public hearings before submitting environmental assessment reports to the relevant authorities for approval.

Administrative regulations / guidance on Planning EIA includes the Measures for Approval of Specific Planning EIA Reports (專項規劃環境影響報告書審查法); the Technical Guideline for EIA of Development Area HJ/T131-2003 (開發區區域環境影響評價技術導則) and the Technical Guidelines for Plan EIA (on Trail) HJ/T130-2003(規劃環境影響評價技術導則 – 試行)[33], which have been promulgated by the SEPA in 2003.[34]

With the stipulation of the new EIA law, the procedural steps to undertake SEA-type assessment for all regional and sectoral plans and programmes is described below[35]:

- The plan and programme can be implemented only after the approval of the relevant assessment report.
- The department to draft the proposal of the plan/programme should also prepare the assessment report and submit to the supervised administration or local government for the approval.
- The proposal approval by the supervised administration or local government.
- The supervised administration or local government should put the conclusion and suggestion for the assessment report as an important reference for decision making.
- For those plans having great impact to environment, the department responsible for drafting the proposal should also track the practical impact during the execution of the plan.

China has a statutory requirement of EIA for plan. However, no example is available and under the EIA for plan information, it does not mention about the requirement of economic consideration in policy decision-making.

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[32] http://www.sepa.gov.cn/law/law/200210/t20021028_84000.htm
[33] http://www.sepa.gov.cn/image20010518/1481.pdf
[34] http://info.worldbank.org/etools/docs/library/211097/Shaanxicn1.pdf, page 43
[35] http://info.worldbank.org/etools/docs/library/211097/Shaanxicn1.pdf

Macau

The Environmental Council is the corresponding public juridical person under the supervision of the Secretary for Transport and Public Works. The major responsibilities of the Council include providing opinions towards environmental strategies; presenting to the Chief Executive legislative proposals on protection of the environment, nature and ecological balance; and administrative works relating to the enforced environmental laws.

According to the result of this study, no example is available and it is not likely that the Macau government adopt plan EIA/SEA into the region. Furthermore, economic consideration for policy decision-making is not available.[36]

[36] http://www.ambiente.gov.mo/english/02/

Japan

A national-level EIA system in Japan was given legal recognition in the Basic Environmental Law (1993). Article 19 of the Law stipulates that consideration must be given to environmental protection in the formulation and implementation of government policies that are expected to have an impact on the environment. So far, no formal provision has been made for a national system of SEA of policies, plans or programmes which are not subject to the EIA law of 1997.

However, at the time of the enactment of the EIA Law, the need for SEA was pointed out in the decision of the Diet. Following the decision, the Ministry of the Environment established an expert group named "Study Meeting for Strategic Environmental Assessment". The group published a report in 2000 introduce the principles and important factors relating to SEA and will continue its consideration of SEA.

The Environmental Basic Plan, agreed by the cabinet decision in 2000, addressed SEA, describing the need to consider the content and methods of environmental consideration in plans and policies, to study examples at national and local governments; and to consider the establishment of rules for SEA if necessary.[37] Details can be found at the link:

http://www.env.go.jp/en/policy/plan/basic/pt3c4.html#3-4-1

In addition, in 2003, the Ministry of Environment issued a preliminary guideline on SEA in the formulation of municipal waste management plans. The Ministry of Land, Infrastructure and Transport introduced guidelines for promoting public involvement in road, airport and harbour planning and for taking into consideration alternatives in an early stage of the planning process. [38]

It is shown that the Japanese government has put much emphasis on promoting SEA in the country. However, no example is available and information about SEA does not suggest that economic valuation is a mandatory process in policy decision-making.

[37] http://www.env.go.jp/en/policy/assess/pamph.pdf, page 17
[38] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter3_Oct04.pdf, Page 96

Singapore

The mission of the Ministry of the Environment and Water Resources (MEWR) is to deliver and sustain a clean and healthy environment and water resources for all in Singapore. Under MEWR, there is a Strategic Policy Division responsible for the formulation and implementation of strategic policies relating to clean air, clean land and public health for the protection and enhancement of Singapore's living environment, and the facilitation and management of the corporate planning process of the MEWR Family and the Singapore Green Plan (SGP) process.[39]

With reference to the MEWR as well as National Environmental Agency (NEA) and Public Utilities Board, there is no information indicating that environmental valuation will be undertaken during the consideration of a proposed policy and mitigation measures. The Singapore Green Plan 2012 (SGP2012) has been carried out and public consultations were undertaken in 2005. With reference to the SGP2012 3-yearly Review, there is no mention about the consideration of environmental valuation has been taken into account.[40]

According to the result of this study, Singapore government does not adopt SEA into the country. Furthermore, examples and information about economic consideration for policy decision-making is not available.

[39] http://app.mewr.gov.sg/about.asp?id=M2
[40] http://www.mewr.gov.sg/sgp2012/index_approach.htm

Thailand

At present, SEA system is not a statutory process in Thailand. The SEA development in Thai society is still in the initiating period. In June, 2005 the Office of National Environmental Board (ONEB) published Interim Guidance Notes on piloting for the country EA system, which covers SEA.[41]

Four main SEA approaches have been applied in the Thai society, they are:

- SEA - EIA School; an approach expanded from the EIA concept to level such as program or mega-project. The main process follows that of EIA, screening, scoping, impact analysis, reporting and monitoring. It is generally to address the development direction, program, or mega-project that is already decided or preliminary determined by the government of decision-makers.
- SEA – Area Base; an analysis on various aspects of an area to provide the scope and detail data for initiating or planning any development. It may be use for considering the overall development potential of the area and initiating development project, or for the more specific purpose, selecting the appropriate site for program or project development.
- SEA – Policy Options; it aims to support and influence the public decision-making process by providing information and analysis on the impacts of various policy options as well as the trade-off in each option. Policy alternatives and options are opened for comparison.
- SEA – Development Direction; it follows the concept and tool of Strategic Environmental Analysis (SEAN), which has been developed to integrate environmental issue into strategic planning. It is a systematic and comprehensive analysis of context, value, factors, problems, and opportunities to synthesize the best strategic direction and/or option.

According to the Office of Natural Resources and Environmental Policy and Planning (ONEP), mandatory provision for EIA was issued in 1975. However, there is no statutory SEA and information accessed does not suggest that environmental valuation is taken into account by law for policy decision making. No example is available.[42]

[41] http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/EIA&SEA-regional-review.pdf, Page 64
[42] http://www.onep.go.th/eng/

Korea

The Ministry of Environment Republic of Korea has put the EIA system into effect with the legislation of "Regulation on the Preparation of EIA" in February 1981. In January 1993, the Ministry introduced legislation of the Provision on the Environmental Validity Review of Administrative Plans and Projects, based on the Basic Environmental Policy Act, which is initiative the Prior Environmental Review System (PERS). The provision was revised in 1994 and 2000, based on the Basic Environmental Policy Act.[43]

The PERS aims to balance development and preservation by assessing possible environmental impacts of development plans or projects in the early stages of planning and review alternatives, as well as consider site suitability. Apart from the EIA system, the PERS is one of Korea's most important preventive policies.

In August 2000, the Basic Environmental Policy Act was amended, leading to adoption of the PERS. The enforcement ordinance was amended to considerably expand of scope of administrative plans and development plans subject to PERS. The revised PERS now specifies the documents required for preview, and timeframe and procedures for reaching agreement.[44]

Korea has implemented PERS for early stages of adminstrative or development planning.which is likely an environmental protection scrutiny tool. However, neither information about environemtnal protection scrutiny for programmes or policies nor SEA is available. Moreover, there is no example or evidence suggesting that economic consideration of policy decisions is a mandatory process under the country.[45]

[43] *http://eng.me.go.kr/docs/index.html*
[44] http://eng.me.go.kr/docs/common/common_view.html?idx=23&av_pg=1&mcode=10&classno=13
[45] *http://eng.me.go.kr/docs/index.html*

Australia

In Australia, Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)[46] established a Commonwealth process for environment assessment and approval of proposed actions that are likely to have a significant impact on matters of national environmental significance or on Commonwealth land.

The assessment is regarded as a SEA type process since it concerns impact on national level. Under the EPBC Act, assessment and approval are required for actions that are likely to have a significant impact on environmental or commonwealth issues. An action includes a project, development, undertaking, activity, or series of activities.[47]

If a proponent referred a proposed action to the Commonwealth Environment Minister and the Minister has decided that the proposed action requires approval, an environmental assessment must be carried out. Different assessment approaches will be appropriate in different circumstances. The Commonwealth Environment Minister will select one of the five options provided by Part 8 of the EPBC Act[48], namely assessment by i) Preliminary documentation; ii) Public environment report (PER); iii) Environmental impact statement (EIS); iv) Public inquiry; or v) Accredited assessment process.

The Minister is responsible to prepare written guidelines for the content of a draft public environmental report (PER) and draft environmental impact statement (EIS) report about the relevant impacts of the action, in which the valuation of environment may be required.

The Environmental Economics Unit (EEU), under the Policy Development Branch of the Policy Coordination and Environmental Protection Division, Department of the Environmental and Heritage, was established in 1992 to provide expert economic advice and analytical support to other areas of the Environment and Heritage portfolio, and to provide advice and briefing directly to the Minister and Executive on policy issues with an economic character. The EEU works to integrate environment and economic considerations in the decision-making process within the Department of Environment and Heritage.[49]

The case in Australia exhibits the importance of economic consideration in implementing policy decision. Economic valuation has been taken account into some policy proposals and relevant environmental mitigation measures. However, the economic assessments is not likely a mandatory process in all proposed actions unless it is required in the guidelines for Impact Statement/EIS prepared by the Minister. Examples are summarized in Table 1.

[46] http://www.frli.gov.au/ComLaw/Legislation/ActCompilation1.nsf/framelodgmentattachments/DDA601034B6B717ECA257000000A5351

[47] http://www.deh.gov.au/epbc/assessmentsapprovals/index.html

[48] http://www.deh.gov.au/epbc/publications/assessment.html#part8

[49] http://www.deh.gov.au/pcepd/economics/index.html

New Zealand

In New Zealand, the Resource Management Act 1991(RMA) set a statutory requirement of examining environmental effects. Under the RMA, any proposed plan, policy statement or a national policy statement related to managing natural resources requires to examine its environmental effects. Apart from RMA, when submitting policy proposals to Cabinet which result in Government bills or statutory regulations we must also provide a Regulatory Impact Statements (RIS)[50] which examines the potential impacts arising from government action.[51]

The RMA requires examination of alternatives, benefits and costs for a proposed plan, policy statement or a national policy statement. It also requires the preparation of national environmental standards and national and regional policy statements. The purpose of national policy statement is to state objectives and policies for matters of national significance that are relevant to achieving the purpose of this Act. The Minister has to consider any actual or potential effects of the proposed national policy statement.

National policy statements are tools under the RMA to help local government decide how competing national benefits and local costs should be balanced. The development of a national policy statement will usually comprise by four stages: scoping, drafting, consultation and implementation.

The Parliamentary Commissioner for the Environment (PCE) at present is looking to develop a Genuine Progress Indicator (GPI) for the state. The GPI is an indicator similar to the Gross Domestic Product (GDP) but it is more comprehensive as it measures social and environmental costs and benefits associated with economy growth. The PCE completed research on methods and data requirements for valuing environmental categories used in constructing a GPI. The study is under progress and tentatively will be completed in November 2006.[52]

The above study shows that PCE notice the importance of economic consideration in implementing policy valuation process. Example(s) of applying economic valuation into policy / mitigation measures proposals. However, information accessed does not show that economic consideration of policy decisions is a mandatory process under the country. Example is summarized in Table 1.

[50] http://www.mfe.govt.nz/laws/ris/

[51] Original text from: http://www.legislation.govt.nz/browse_vw.asp?content-set=pal_statutes&clientid=1067356527&viewtype=contents

[52] http://pce.govt.nz/projects/2004167.shtml

1.3. North America

United States of America (USA)

The National Environmental Policy Act (NEPA) provides statutory requirement to adopt SEA process in the US. It requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions through a systematic interdisciplinary approach. All federal agencies are to prepare detailed statements which commonly referred to as environmental impact statements (EISs).

The NEPA is generally through an analysis with three levels. The first level is Categorical Exclusion (CE) which is established by Federal agencies that has previously determined as having no significant environmental impact. The second level is Environmental Assessment (EA) which analyses and determines whether or not a federal undertaking would significantly cause impacts on the environment. EIS is the third category that federal agencies must prepare if any federal action significantly affecting the quality of the human environment.[53]

The Environmental Impact Statement (EIS) is a SEA-like report statutorily required to discuss the purpose of and need for action, alternatives, the affected environment, the environmental consequences of the proposed action, lists of preparers, agencies, organizations and persons to whom the statement is sent, an index and an appendix (if any). [54] A record of Decision (ROD) shall then be prepared to identify the final decision and alternatives considered and specified those that are environmental preferable.[55]

Various analyses categorised as economic in the regulatory development process are conducted by Innovative Strategies and Economics Group (ISEG) of the U.S. EPA and results of the analyses would be reported to regulatory decision-makers, to improve the benefit-cost analysis if applicable. *Economic impact analysis* involves estimating the reallocation of society's resources and the social costs associated with the proposed regulatory action. *Benefits analysis* involves analysing all the categories of benefits by identifying and quantifying/ monetizing the benefits. Generally, ISEG needs to assess a number of variables without and with the regulation from the time period of the analysis, including:[56] i) facility- and industry-level impacts; ii) market-level impacts; iii) company-level impacts; iv) community-level impacts; v) governmental impacts; and vi) social costs and benefits.

To conclude, there is no evidence to show that economic consideration is mandatory during policy decision-making. However, there is advisory guidance to estimate economic impacts of national regulations in various aspects of the country. There is also example to demonstrate the application of economic valuation in policy/ mitigation measures proposals.

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[53] http://www.epa.gov/compliance/nepa/index.html

[54] http://www.epa.gov/compliance/basics/nepa.html#eis

[55] http://www.nero.noaa.gov/whaletrp/archives/NEPAhand22.pdf#search=%22NEPA%20federal%20action%20site%3A.gov%22

[56] http://www.epa.gov/ttn/ecas/econdata/Rmanual2/5.0.html

To estimate the benefits of an environmental regulation, in particular, quantified benefits would be expressed in monetary terms after identifying the reductions in human health and environmental damages expected to result from the regulation. Health benefit is monetized in a number of cases of a particular morbidity effect - *Nonfatal Illness and Injury (Morbidity)*. There are four primary approaches which are cost-of-illness (COI) methods, expressed preference methods, averting action methods, and hedonic wage and property value methods.

Cost-of-illness (COI) Methods

It measures and is the sum of direct costs (value of goods and services used to diagnose and treat individuals suffering from the health effect) and indirect costs (foregone productivity measured by lost wages) resulting from a health effect.

Expressed Preference Methods

Contingent valuation (CV) and conjoint analysis, can be used to elicit an individual's willingness-to-pay (WTP) to avoid a given health effect.

Averting Action Methods

Defensive or averting action taken by individuals, when there is potential risk, provides information about the costs of the behaviours and the magnitude of cost savings due to the source control.

Hedonic Wage and Property Value Methods

It is to estimate housing prices over a range of properties with structural and community characteristics (including air quality) so as to infer a household's WTP for each of these characteristics.

Value of a Statistical Life (VSL) is used to estimate changes in fatality risk. It refers to the WTP for reductions in the risk of premature death aggregated over the population experiencing the risk reduction.[57] Example is summarized in Table 1.

[57] http://www.epa.gov/ttn/ecas/econdata/Rmanual2/7.2.html

Canada

Strategic Environmental Assessment (SEA) is set out in the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals* to demonstrate the process of reviewing these proposals to incorporate environmental considerations. It is proactive administrative tool to provide decision-makers and stakeholders with environmental information in a systematic and comprehensive way so that significant economic and social effects would be considered during the decision-making process. Ministers expect an SEA for a policy, plan or program proposal when the proposal is submitted to an individual minister or Cabinet for approval and the proposal is prone to significant environmental effects.

There are mainly four steps which begin with *Preliminary Scan*. It is to quickly identify potential significant (positive and negative) environmental effects. Then the result would be documented in SEA which should be started at early stage of the policy, plan or program development. The SEA should address the scope and nature of potential effects and the need for mitigation. In general, the SEA is only an administrative requirement when deriving policy, programs and plans. Economic consideration was not found to be statutory/ mandatory throughout the SEA process.[58] In fact, economic valuation is practiced by the Economic and Regulatory Affairs (ERA) Directorate.

The ERA is responsible for impact assessment of federal regulations and to value the environment so as to help economists perform cost/benefit and other impact analysis. The Regulatory and Economic Analysis Branch (REAB) is one of the four branches of the ERA that helps to research and assess models to provide strategic economic advice on federal regulatory policy. It usually involves as part of a formal Regulatory Impact Analysis Statement (RIAS). The Environmental Economics is another branch of the ERA that provides analytical support for clean air and climate hange initiatives by using the model called, Air Quality Valuation Model (AQVM). It models physical and monetary health and environmental benefits associated with projected changes. The value of environmental quality calculated by AQVM are based on the economic concept of "willingness to pay" and represent changes in welfare. [59]

The Environmental Valuation Reference Inventory (EVRI) is an online platform for subscribers to search and retrieve empirical studies on economic value of environmental benefits and human health effects, developed by the Environmental Economics Branch of the Environment Canada and other specialists. It is to help policy analysts using the benefits transfer approach which allows policy analysts to use previous studies as reference to estimate economic value of changes stemming from current programs or policies.[60]

It is a practice to valuate the environment in monetary terms during policy making, yet examples are not found during the study, and it is not a statutory in this country.

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[58] http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/JUD-4713514-N2T
[59] http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm
[60] http://www.evri.ca/english/default.htm

1.4. Development Corporations

World Bank

The Bank's application of SEA requires environmental assessment in all investment projects and provides for the use of sector or regional environmental assessment in specific contexts as well as sectoral adjustment loans.

More recently, the World Bank Environment Strategy, adopted in 2001, emphasizes the application of SEA into sectoral decision making and starts to promote the use of SEA as a tool for sustainable development. In August 2004, the Bank approved and updated policy on development policy lending, OP/BP 8.60. This new policy emphasizes upstream analytical work — such as SEA, Country Environmental Analysis (CEA), etc. — for analyzing the likely significant effects of an operation on the borrowing country's environment and natural resources, and for assessing the country's institutional capacity for handling these effects.

The Operation Policy on Environmental Assessment, OP 4.01 requires a mandated administrative tool, environmental assessment (EA) of projects proposed for Bank financing, to help ensure that they are environmentally sound and sustainable, and thus to improve decision making.[61] SEA is useful in few types of the Bank's activities such as Development policy lending (DPL); Investment lending; and Analytical and advisory activities (AAA).

There are wide ranges of approaches to SEA, generally categorized into two main types: "Impact-centered approach to SEA", which is similar to EIA methods, usually used to integrate environmental considerations in plans and programs; the other is "institutions-centered approach to SEA", which its methodological basis in policy and institutional analysis rather than EIA experience.[62]

An impact-centered SEA usually comprises the following stages of Screening; Scoping; Baseline preparation; Assessment; Reporting; Decision Making; and; Monitoring. An institutions-centered SEA mainly comprises the stages of Identification of effects and opportunities; Assessment of institutional capacity; and; Capacity building and governance strengthening.

The environmental valuation section presents papers on the issue and examples of the valuation of environmental degradation, health impacts, land, ecosystems and biodiversity, and cultural heritage.[63]

The organization published a training manual named "Estimating the Cost of Environmental Degradation" introducing the various valuation techniques and when a technique is useful for decision making.[64]

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61 http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:20885949~pagePK:148956~piPK:216618~theSitePK:244381,00.html

62 http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/p_ppah_basicEAP/$FILE/HandbookTheEnvironmentalAssessmentProcess.pdf, page 22-25

63 http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20998765~menuPK:2770701~pagePK:210058~piPK:210062~theSitePK:408050,00.html

The Bank's application of SEA is demonstrated. However, information accessed does not show that economic valuation is introduced into the decision process of a proposed Bank's policy.

[64] http://siteresources.worldbank.org/INTEEI/214574-1153316226850/20781069/EnvironmentalDegradationManual.pdf

Asian Development Bank (ADB)

The Environmental Policy was approved by the Board of Directors' in November 2002. The Policy highlights the need for more upstream environmental assessment (EA) at the level of country programming.

ADB has been assisting DMCs, including the People's Republic of China (PRC) and India, to (i) establish and strengthen the capacity of national environmental and sector development agencies; (ii) introduce environmental assessment regulations and guidelines to ensure integrated environmental and development planning and management; and (iii) implement policy, legislative, and institutional reforms.[65]

ADB requires EA as a compulsory tool of several operations; SEA is applied as EA of programme loans and sector loans. For program loans, SEA can be used to help prepare the matrix of environmental impacts of policy and institutional actions, mitigation measures, and the institutional basis for implementing mitigation measures and monitoring program. For sector loans, SEA can help with the cumulative impact assessment of all projects envisioned as a part of the loan.[66]

The Operation Manual (OM) Section F1/OP[67] complies with the policy element of the Environmental Policy on "Integrating Environmental Considerations in ADB Operations" documented application of the Policy. The ADB Environmental Assessment Guidelines is a series describing how to fulfill the requirements outlined in ADB's Environmental Policy and the Operations Manual on Environmental Considerations, OM Section F1/BP, in ADB Operations. Information on ADB's policies and procedures for conducting and reporting SEA and CEA are also provided.[68]

SEA processes have a general features as: i) Screening; ii) Scoping; iii) Identification, Prediction and Evaluation of Effects; iv) Integration; v) Mitigation; vi) Monitoring; vii) Independent Review; and viii) Influence on Decision.[69]

The Bank has published a handbook named "Economic Evaluation of Environmental Impacts: A Workbook". The book provides working tools to incorporate environmental costs and benefits within development projects.

ADB assists countries to introduce EA regulations and guidelines. Information accessed show that ADB is working on environmental valuation. However, no example is available.

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[65] http://www.adb.org/documents/policies/environment/default.asp?p=policies

[66] http://www.adb.org/documents/guidelines/environmental_assessment/Environmental_Assessment_Guidelines.pdf, page 100

[67] http://www.adb.org/Documents/Manuals/Operations/OMF01-25Sep06.pdf

[68] http://www.adb.org/documents/guidelines/environmental_assessment/default.asp

[69] http://www.adb.org/documents/guidelines/environmental_assessment/Environmental_Assessment_Guidelines.pdf, page 98-99

United Nations Environmental Programme (UNEP)

UNEP's Economics and Trade Branch (ETB) has been involved with EIA since the 1970s. To respond to the need for a more integrated approach to impact assessment, UNEP ETB has worked on Integrated Assessment of Trade-related Policies since the late 1990s.

More recently, except building EIA capacity activities, UNEP ETB has expanded its capacity building activities to include Strategic Environmental Assessment (SEA) and Integrated Assessment of Policies, Plans and Programmes in order to more fully promote sustainable development.

Integrated Assessment and Planning (IAP) is a SEA-like assessment with more comprehensive information on environment, economic and social issues. UNEP ETB's work on Integrated Assessment and Planning (IAP) contributes to achieving sustainable trade, sound environmental management and poverty reduction by improving the design of plans and programmes using an ex-ante approach - in recognition that early action allows policy makers to respond effectively to new challenges.

Integrated Assessment of Trade-related Policies is an approach developed by UNEP (2001) to help policy-makers and practitioners examine the economic, environmental and social effects of trade policy and trade liberalization. A manual for this approach is available at http://www.unep.ch/etb/publications/intAssessment/refmaniaFinal.pdf.

Another approach promoted by UNEP is Integrated Coastal Area and River Basin Management (ICARM). It develops steps which have much in common with the principles of SEA as well as good planning. A guidelines is available at http://www.ucc-water.org/Freshco/Docs/ICARM-Guidelines.pdf.[70]

UNEP ETB's objective is to build the capacities of governments and national institutions to apply IAP methodology throughout the various stages of plans and programmes to achieve sustainable development.

The publication EIA/SEA: Towards an Integrated Approach summarizes the latest developments of IAP. It also provides information and guidance on EIA and SEA good practice with particular application to developing countries in transition to market economics. [71]

UNEP is working on the SEA and IAP which both consider environmental impacts for policies, plans and programmes. However, no example is available and it does not mention whether UNEP is also working on application of economic valuation for policy decision-making.

[70] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter4_Oct04.pdf, page 130-133
[71] http://www.unep.ch/etb/publications/EnvImpAss/textONUBr.pdf

United Nations Development Programme (UNDP)

In early 1990s, the UNDP introduced a SEA-like tool named the Environmental Overview (EO), which no longer in use within the Programme, to support programming processes. The EO was applied to an aid programme at the draft formulation stage. At present, one of the Programme's works is to assist country partners in conducting SEA related projects and in applying SEA to improve the quality of the poverty reduction strategy process.[72]

Since EO is a flexible tool, many UNDP countries subsequently adopted its underlying principles in their prorammes. Most of the EO principles have been incorporated in the programming approach and guidance. However, UNDP has renewed its interest in SEA and is now piloting its application to poverty reduction strategies (PRS) for programming and building country capacity.[73]

Environmental mainstreaming is the integration of environmental considerations into UNDP's policies, programming and operations to ensure the coherence and sustainability of the Programme's mission and practices. Effective environmental mainstreaming involves an integration process to pursue environmental policy interests in coordination with other development policies and programmes. SEA is a kind of strategic approach to environmental mainstreaming of policies and programmes. The UNDP publication "UNDP Environmental Mainstreaming Strategy" can be obtained at http://www.undp.org/fssd/priorityareas/docs/envmainstrat.doc

Information about SEA in UNDP does not suggest that economic valuation is considered as a mandatory process for policy decision-making.

[72] http://europeandcis.undp.org/?menu=p_cms/show&content_id=470C58C8-F203-1EE9-B2AB2E5E93577293
[73] http://www.iied.org/Gov/spa/documents/SEAbook/Chapter4_Oct04.pdf, Pages 126 - 130

United Nations Economic Commission for Europe (UNECE)

Introduction

The Protocol on Strategic Environmental Assessment (SEA Protocol) (Kiev, 2003)[74] was adopted on 21 May 2003 supplementing to the Convention on Environmental Impact Assessment in a Transboundary Context. 38 States members of the UNECE as well as States having consultative status with the UNECE have signed this Protocol.

The Protocol requires, once in force, its Parties to evaluate the environmental consequences of their official plans and programmes. A SEA shall be carried out for plans and programmes which are prepared for agriculture, forestry, fisheries, energy, industry including mining, transport, regional development, waste management, water management, telecommunications, tourism, town and country planning or land use, etc. It also addresses policies and legislation, however, the application of SEA to these is not mandatory.

Besides evaluating the environmental effects, the Protocol emphasis on the consideration of human health effect, too.[75]

[74] http://unece.org/env/eia/documents/protocolenglish.pdf
[75] http://unece.org/env/eia/sea_protocol.htm

2. VALUATION METHODS

The following valuation approaches / methods are widely used in international practice in determining the environmental value:

2.1 Production Method

The productivity method, also referred to as the net factor income or derived value method, is used to estimate the economic value of ecosystem products or services that contribute to the production of commercially marketed goods. For example, how much of the added value generated by tourism is attributable to the existence of a particular ecosystem, as opposed to other inputs such as produced capital, material inputs, and labour. It is applied in cases where the products or services of an ecosystem are used, along with other inputs, to produce a marketed good.

The production method basically involves two procedures, i.e. physical effects and the monetary values of the physical impacts.

Step 1 – Estimation of physical impacts

This method requires an estimate of the environmental change in physical terms, using a method such as "environmental impact assessment". From these physical environmental impacts a dose-response relationship can be established. For instance, the effect of water pollution (dose) affects the fish catches (response).

The productivity approach is largely restricted to those responses which can be expressed in terms of changes in the quantity of a marketed good or service, and hence for which the impact can be evaluated using market prices. Sometimes if the actual market value concerned aspect (i.e. the response) does not exist, the price of similar or substitute good/service can be used.

Step 2 – Estimation of monetary values of physical impacts

The second stage is to assign monetary values to the physical response using actual market prices, or the prices of similar substitutes. If market prices are to be used to value outputs, assumptions have to be made about the underlying market structure and the responsiveness of output prices.

Apart from the dose response method to examine the changes in the dollar value of outputs resulting from a change in the quality of an environmental good, there is a human-capital method examines forgone earnings and cost of illness to value an environmental good, e.g. the impact on health of air pollution. [76, 77, 78]

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[76] Environmental Protection Agency, Queensland, Australia - Techniques for environmental economic valuation http://www.epa.qld.gov.au/publications/p00710aa.pdf/techniques_for_environmental_economic_valuation.pdf

[77] Ecosystem Valuation – Dollar based ecosystem valuation methods http://www.ecosystemvaluation.org/dollar_based.htm

[78] Valuing the Environment: A Sustainable Development Approach, prepared for External Programme of Imperial College at Wye, University of London by Juli Richardson and Robert Nurick, 2002.

Advantage of Production Method:

- Simple, generally most easily understood by decision-makers and stakeholders
- As the production and expenditure-based methods depend on existing market data, the data may be relatively easy to source
- If quantitative links can be established between potential changes to the environment and activities that already have a market value, there is a straightforward basis for generating dollar values

Disadvantage of Production Method:

- Difficulties in gaining sufficient information on ecological and/or health links to enable economic assessment
- Likely to ignore some elements of the total economic value, particularly passive values

2.2 Expenditure Method

The expenditure-based approaches include two distinct techniques of analysis. The first type of techniques involves actual expenditure made to alleviate an environmental problem. The second type of techniques involves potential expenditure. The expenditure-based approach includes the preventive expenditure method, mitigation cost method and the replacement cost method.

This method is relatively simple. The technique is based on the assumption that the victim of environmental damage will be prepared to incur preventive or mitigating expenditures until the costs of so doing are at least as great as the environmental damage costs. This behavior can be stated in the following way (Dixon *et al*, 1988, page 47)[7]:

$$N - N' = E$$

Where N = original level of perceived environmental damage

N' = mitigated level of perceived environmental damage

E = mitigation costs incurred in moving from N to N'

The damage cost avoided, replacement cost, and substitute cost methods are related methods that estimate values of ecosystem services based on either the costs of avoiding damages due to lost services, the cost of replacing ecosystem services, or the cost of providing substitute services. These methods do not provide strict measures of economic values, which are based on people's willingness to pay for a product or service. Instead, they assume that the costs of avoiding damages or replacing ecosystems or their services provide useful estimates of the value of these ecosystems

or services. This is based on the assumption that, if people incur costs to avoid damages caused by lost ecosystem services, or to replace the services of ecosystems, then those services must be worth at least what people paid to avoid the damage or replace the services. Thus, the methods are most appropriately applied in cases where damage avoidance or replacement expenditures have actually been, or will actually be, made. Examples of cases where these methods might be applied include:

- valuing improved water quality by measuring the cost of controlling effluent emissions;
- valuing erosion protection services of a forest or wetland by measuring the cost of removing eroded sediment from downstream areas;
- valuing the water purification services of a wetland by measuring the cost of filtering and chemically treating water;
- loss of habitat by establishing similar habitat elsewhere;
- valuing storm protection services of coastal wetlands by measuring the cost of building retaining walls; and
- valuing fish habitat and nursery services by measuring the cost of fish breeding and stocking programs. [79, 80]

Advantage of Expenditure Method:

- Simple, generally most easily understood by decision-makers and stakeholders
- As the production and expenditure-based methods depend on existing market data, the data may be relatively easy to source
- If quantitative links can be established between potential changes to the environment and activities that already have a market value, there is a straightforward basis for generating dollar values

Disadvantage of Expenditure Method:

- Difficulties in gaining sufficient information on ecological and/or health links to enable economic assessment
- Likely to ignore some elements of the total economic value, particularly passive values

2.3 Hedonic Pricing Method

The hedonic price method uses statistical analysis of market prices to infer a price for environmental quality. The hedonic pricing method estimates economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local

[79] Environmental Protection Agency, Queensland, Australia - Techniques for environmental economic valuation http://www.epa.qld.gov.au/publications/p00710aa.pdf/techniques_for_environmental_economic_valuation.pdf

[80] Ecosystem Valuation – Dollar based ecosystem valuation methods http://www.ecosystemvaluation.org/dollar_based.htm

environmental attributes. For example, a comparison would be made between housing prices in two streets, which were similar except for the level of air pollution. It can be used to estimate economic benefits or costs associated with:

- environmental quality, including air pollution, water pollution, or noise
- environmental amenities, such as aesthetic views or proximity to recreational sites.

There are three major steps in hedonic pricing [81]:

Step 1 – Defining the hedonic price function

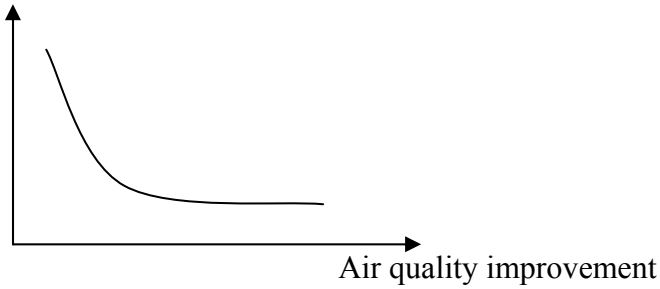
Different properties will have different characteristics that will affect their price. In some cases, the different characteristics will be related to each other.

Step 2 – Calculating the marginal (or additional willingness to pay for the environmental characteristic

People are often willing to pay a lot for initial improvements in air quality. However as quality improves, they are willing to pay less and less for each additional improvement.

Step 3 – Estimating the demand curve

Change in property values



Many empirical studies assume this to be the demand relationship, but strictly speaking this is only true under certain restrictive assumptions (e.g. the supply of housing is relatively fixed (inelastic) and the socio-economic characteristics of those affected by the air pollution are very similar). If air pollution affects a number of different groups in society then a separate marginal willingness to pay curve needs to be estimated for each group.

Advantage of Hedonic Pricing:

- Using market data as a proxy for the environmental goods and services being valued, and so may be better understood by stakeholders and decision makers

Disadvantage of Hedonic Pricing:

- To the extent that the goods are not perfect substitutes, adjustments must be made and the issue of market clearance must also be considered

[81] Valuing the Environment: A Sustainable Development Approach, prepared for External Programme of Imperial College at Wye, University of London by Juli Richardson and Robert Nurick, 2002.

- Not feasible to use surrogate market methods to estimate the value of a new good or service, or of a change in environmental quality outside of current experience
- There may never have been any significant variation in its quality, it is impossible to infer how people in the area would respond to a change in quality
- Estimates of value derived will thus depend upon a series of assumptions that remain largely untested

2.4 Travel Cost Method

The travel cost approach is a valuation method that uses a combination of surveys and surrogate markets to estimate the demand curve for an environmental resource. This method infers consumers' willingness to pay for environmental goods and series from the time and expense involved in traveling to them. It is used to estimate economic use values associated with ecosystems or sites that are used for recreation. The method can be used to estimate the economic benefits or costs resulting from:

• changes in access costs for a recreational site;
• elimination of an existing recreational site;
• addition of a new recreational site; and
• changes in environmental quality at a recreational site.

The travel cost methodology can be briefly outlined in three-step procedure [82]:

Step 1 – Assign travel zones

The area surrounding the recreational site is divided into travel zones to identify how far people are prepared to travel to the site, and whether the demand is largely local, regional, national or even international.

Step 2 – Survey of recreational use

Visitors to the site are then asked to participate in a survey to determine the information such as their zone of origin, visitor days per person over a specified time period, purpose of the trip, travel cost, on-site cost (e.g. park entrance fees) and socio-economic characteristics (e.g. income, age, preference for recreation).

Step 3 – Calculating visitation rates and travel costs

From the survey, information on the travel costs (in terms of time and money) of getting to the site from different travel zones is calculated. The time spent traveling to the site is converted to a monetary value using local wage rates (usually some proportion thereof).

Advantage of Travel Cost Method:

[82] Valuing the Environment: A Sustainable Development Approach, prepared for External Programme of Imperial College at Wye, University of London by Juli Richardson and Robert Nurick, 2002.

- Using market data as a proxy for the environmental goods and services being valued, and so may be better understood by stakeholders and decision makers

Disadvantage of Travel Cost Method:

- May have substantial data requirements
- Problems arise with multi-purpose trips
- Cannot predict changes in use value for changes in environmental quality without precedence

2.5 Contingent Valuation Method

The contingent valuation method (CVM) estimates economic values for all kinds of ecosystem and environmental services. It can be used to estimate both use and passive values, and it is the most widely used method for estimating passive values. The contingent valuation method involves directly asking people, in a survey, how much they would be willing to pay for changes in specific environmental services. In some cases, people are asked for the amount of compensation they would be willing to accept to give up specific environmental services. It is called "contingent" valuation, because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service.

The contingent valuation survey must be carefully designed to minimize the inherent biases in this approach. The method is based on setting up a contingent market to elicit valuations or bids which are close to those that would be revealed if an actual market did exist.

Methodology steps are as follows [83]:

Step 1 – Setting up the hypothetical market

To ensure the hypothetical market is as close to an actual market as possible, the information such as description of the environmental asset, institutional context in which the environmental asset is to be provided and method of financing, must be clearly provided to the questioner and the respondent.

Step 2 – Obtaining bids

Bids can be obtained through interview, telephone or mail surveys, or through hypothetical experiments (such as costless choice).

Step 3 – Analysis of willingness to pay responses

The survey procedure elicits a range of willingness to pay bids from the respondents which have to be analyzed. Simple, descriptive statistics can be prepared showing mean (average) and median (most popular) bids, as well as frequency distributions.

[83] Valuing the Environment: A Sustainable Development Approach, prepared for External Programme of Imperial College at Wye, University of London by Juli Richardson and Robert Nurick, 2002.

Advantage of Contingent Valuation Method:

- More likely than other methods to elicit the full range of values in the analysis
- Cost effective if designed to have wider use
- Completed surveys give full profile of target population
- Can estimate both use and non-use values

Disadvantage of Contingent Valuation Method:

- Difficulties interpreting hypothetical cases, especially if a complex situation is presented
- The potential for bias in has been widely reported.
- Relatively expensive, though the cost of surveys should be judged in the light of the total cost of the land use planning policy or at least individual development

2.6 Discrete Choice Modelling Method

This method estimates economic values for virtually any ecosystem or environmental service. The contingent choice method asks the respondent to state a preference between one group of environmental services or characteristics, at a given price or cost to the individual, and another group of environmental characteristics at a different price or cost.

Because it focuses on tradeoffs among scenarios with different characteristics, discrete choice is especially suited to policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services. For example, improved water quality in a lake will improve the quality of several services provided by the lake, such as drinking water supply, fishing, swimming, and biodiversity. In addition, while discrete choice can be used to estimate dollar values, the results may also be used to simply rank options, without focusing on dollar values.[84]

As both contingent choice and contingent valuation are hypothetical survey-based methods, their application is very similar. The main differences are in the design of the valuation question(s), and the data analysis[85]:

Step 1 – Define the valuation problem

This would include determining exactly what services are being valued, and who the relevant population is.

Step 2 – Make preliminary decision about the survey itself

[84] John Foster et al, Valuing Nature? Routledge, 1997.

[85] Valuing the Environment: A Sustainable Development Approach, prepared for External Programme of Imperial College at Wye, University of London by Juli Richardson and Robert Nurick, 2002.

It needs to decide the survey will be conducted by mail, phone or in person, how large the sample size will be, who will be surveyed, and other related questions. The answers will depend, among other things, on the importance of the valuation issue, the complexity of the question(s) being asked, and the size of the budget.

Step 3 – Actual survey design

This is the most important and difficult part of the process, and may take six months or more to complete. A series of focus group interviews will be required during the survey design process. The purpose is to obtain sufficient information to understand and answer in a way that makes sense and reveals their values for the services of the site. After a number of focus groups have been conducted, and the researchers have reached a point where they have an idea of how to provide background information, describe the hypothetical scenario, and ask the choice question, they will start pre-testing the survey

Step 4 – Actual survey implementation

The survey sample will be ideally a randomly selected sample of the relevant population, using standard statistical sampling methods. The survey can be conducted by mail and telephone call.

Step 5 – Analysis of results

The statistical analysis for contingent choice is often more complicated than that for contingent valuation, requiring the use of discrete choice analysis methods to infer willingness to pay from the tradeoffs made by respondents.

<u>Advantage of Discrete Choice Modelling Method:</u>

- Choice modelling has vastly improved the validity and reliability of the techniques
- Estimates Willingness To Pay (WTP) per attribute
- Does not directly ask WTP questions
- Suitable for valuing environmental changes irrespective of whether or not they have precedence

<u>Disadvantage of Discrete Choice Modelling Method:</u>

- Not yet as widely tested as Contingent Valuation
- Some techniques are not based on economic theory

3. ENVIRONMENTAL POLICY IN HONG KONG

Current practice of environmental protection scrutiny of policies in Hong Kong can be summarized as follows:

- Environmental Protection Scrutiny – Since the early 90s' Hong Kong has considered environmental implications arising from policy proposals in the decision-making process. All policy proposals submitted to the Executive Council need to contain an environmental implications section setting out the environmental impacts (positive or negative) arising form the proposed policy and suggesting environmental mitigation measures where necessary. For policies involving a designated project under the Environmental Impact Assessment Ordinance (EIAO), the environmental impact section needs to state briefly the major findings of the EIA study. The environmental implications section has to be cleared by the Director of Environmental Protection.
- Strategic Environmental Assessment – For territorial land use planning, Strategic Environmental Assessment (SEA), a systematic process for evaluating strategic environmental implications of proposed policies, plans and programmes (PPP), is required. The SEA would address cumulative environmental implications that cannot be fully addressed by individual project EIAs. Hong Kong has a statutory system to carry out SEA for certain landuse plans under the EIAO, as well as an administrative system for conducting SEA for other major proposals. Under Hong Kong's administrative system, proponents (usually government departments / bureaus) would volunteer an SEA for major proposals.

Central Policy Group of Hong Kong Government is undertaking a Commission on Strategic Development in which there is a Committee on Social Development and Quality of Life. The Committee advise the Chief Executive on various aspects including the environment to enhance the quality of life. However the valuation of environment is not included in the discussion.

Although the current practice does not include environmental valuation in proposed policy, environmental valuation is undertaken in noise barrier retrofitting projects in Hong Kong. The total construction cost of the proposed noise mitigation measures will be evaluated and the number of dwelling protected (i.e. the mitigated noise level complies with 70dB(A)) and dwelling benefited (i.e. the noise level reduces by 1dB(A) after the implementation of the noise mitigation measures) will be presented. The unit cost to protect or benefit a dwelling can be estimated. However this valuation exercise is for internal reference only and it is not a statutory process.

4. POSSIBLE ENVIRONMENTAL VALUATION APPROACH IN HONG KONG

Hong Kong is a densely populated city. Human activities and the environment are closely related and interacted. In determining the feasibility of a proposed policy and mitigation measures, the environmental impact usually compares against the existing statutory standards and guidelines. These environmental criteria mainly make reference to countries or cities of similar economic and social development background. Economic development is a leading component in the development of nowadays' Hong Kong. A better integration of economics into environmental decision making is necessary to a sustainable development.

In accordance with "The Economic Appraisal of Environmental Projects and Polices – A Practical Guide" prepared by Economic Dévelopment Institute of the World Bank, the choice of the environmental valuation method should be pragmatic and the following should be considered:

- deciding the type of environmental problem to be analysed;
- reviewing which technique is appropriate for that problem;
- considering what information is required about problem A if method B is to be used;
- assessing whether that information is readily available, and at what cost;
- in the light of the answer to previous question, reconsidering the choice of valuation method

The choice of valuation method will be different in different cases. It depends on the policy proposal and its supporting strategies, actions, plans and programmes.

4.1. Environmental Valuation Approach

In order to quantify the environmental cost of a proposed policy or mitigation measures, steps presented in Figure 1 are recommended. The flow chart also helps in determining the need of environmental valuation for a policy proposal or proposed mitigation measures. It is noted that the determination of valuation approach/tool is not only dependent on a single factor such as contributing benefit or loss to the environment, but also factors such as the type of policy proposal, the study aim to be obtained, complexity of the policy proposal/mitigation measures etc. affecting the selection process. Some simple and obvious cases can apply production/expenditure method as shown in the flowchart. Each case requires thoroughly consideration to select appropriate valuation approach/tool. Figures 2, 3 and 4 demonstrate the use of the flow chart using two selected examples.

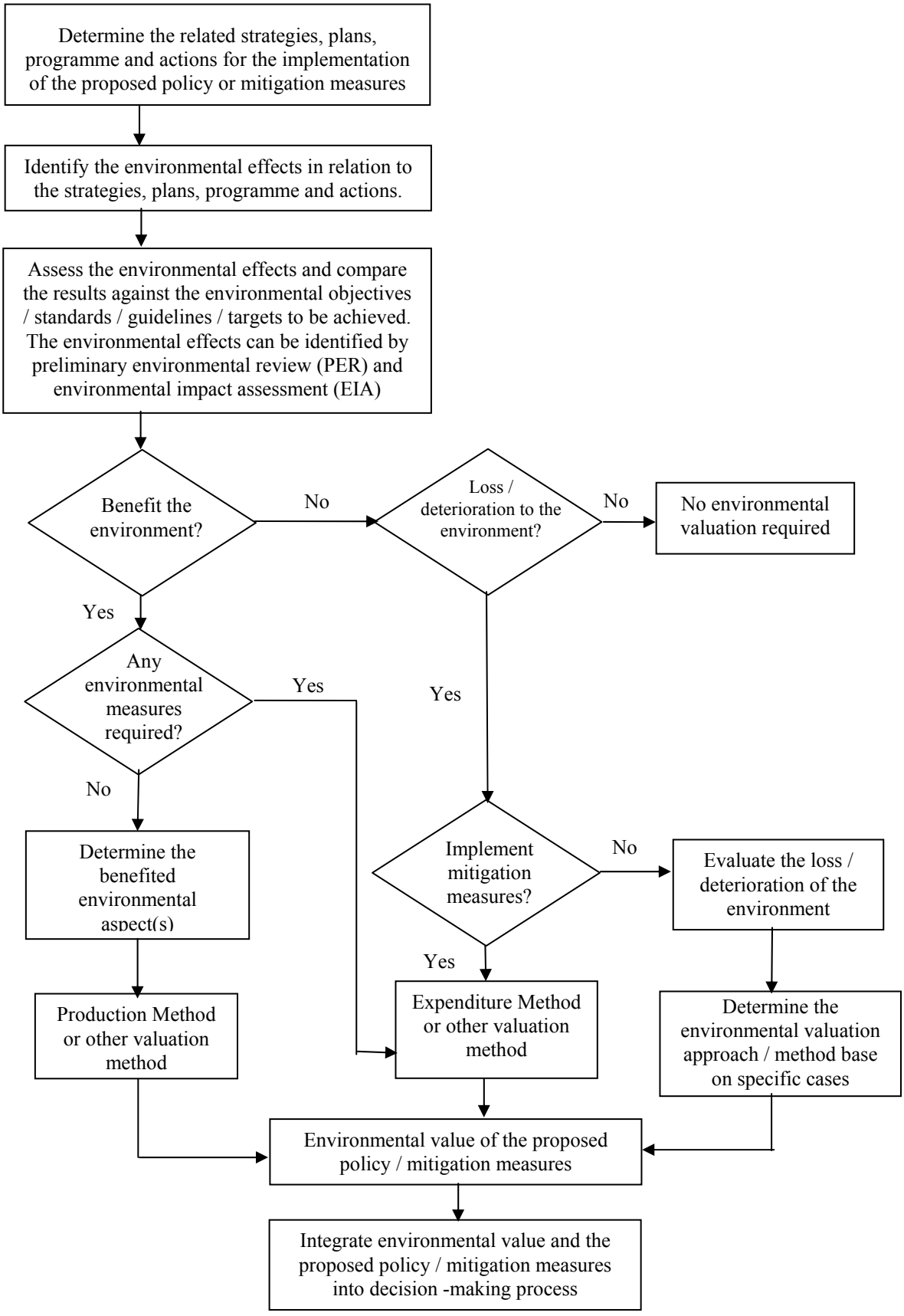


Figure 1 Recommended steps of environmental valuation of a policy proposal or proposed mitigation measures

4.2. Application of Valuation Methods

Policy Address

With reference to the 2006-07 Policy Address regarding the environmental quality, the strategic objectives and actions are related to the improvement of air quality and the waste management. Three of the strategic objectives and actions were selected to illustrate the application of valuation methods:

- *Environmental Protection Department to review of current Air Quality Objectives; set suitable targets and strategies in light of new air quality guidelines published by the World Health Organization*

  Valuation Method:

  - Production Method – Human Capital Method (determination steps are shown in Figure 2)
  - Expenditure Method – Mitigation Cost Method, Replacement Cost Method (determination steps are shown in Figure 3)

  Information Required:

  - Current air quality condition, Air Quality Objectives (AQOs), new air quality guidelines of World Health Organization and the proposed targets and strategies
  - The physical impacts, e.g. the illness related to air quality and environmental changes due to the implementation of targets and strategies
  - The decrease of capital value due to the illness of citizen e.g. lose of working power, taking sick leaves, reducing productivity, medical expenses and the cost to install and maintain the additional / replaced control measures, e.g. precipitator, desulphurization unit, etc. for reduction of air pollutants emission.

  Possible approach in the application of environmental valuation tools:

  Cost 1 – Cost 2 = Gain from the policy proposal (Gain)

  Where Cost 1 = the value of capital loss due to illness in relation to poor air quality (including lose of working power and medical expenses)

  Cost 2 = Air quality improvement measures (e.g. improve existing air pollution control measures)

  It is assumed that Cost 1 is not required when the air quality is improved to achieve the new AQOs.

  Constraints:

  - It may be difficult to identify whether the illness is purely due to the poor air quality.

- *Earmark $3.2 billion to help owners of 74 000 older diesel commercial vehicles convert to newer models meeting Euro IV emission standards*

  Replacing old diesel vehicles which are highly polluting has become a public concern. In this regard, the Address proposed to spend $3.2 billion to provide an incentive for the early replacement of 74 000 pre-Euro and Euro I diesel commercial vehicles with Euro IV vehicles. 18 months are allowed to pre-Euro vehicle owners and three years to Euro I vehicle owners to take up the offer. Emissions of nitrogen oxide and respirable suspended particulates in Hong Kong will be reduced by 10% and 18% respectively upon completion of the programme.

  Valuation Method:

  - Expenditure Method – Mitigation Cost Method, Replacement Cost Method (determination steps are shown in Figure 4)

  Information Required:

  - Current emission levels of the older diesel and the emission standards of Euro IV
  - Quantify the air quality improvement if older diesel commercial vehicles convert to newer models meeting Euro IV emission standards.
  - The effect to the efficiency of the commercial vehicles to comply with Euro IV emission standards, e.g. the loading capacity and traffic speed which may affect the number of trips on delivery of goods / services.
  - The cost of installation and maintenance of the mitigation measures / replaced measures.

  Possible approach in the application of environmental valuation tools:

  Cost = Cost of the mitigation measures required and the maintenance cost

  N = the percentage of reduction of air pollutant emission

  Efficiency = Cost ÷ N

  The efficiency can be provided to the policy decision making process. The higher is the cost, the higher monetary value is required to reduce the air pollutant emission.

  Constraints:

  - The driving practice of different drivers and uses may not be the same. The efficiency of the vehicles and the maintenance cost may vary.

- *30% reduction (up to $50,000) in first registration tax for low-emission, high fuel-efficient vehicles*

  Vehicle emissions account for some 25% of local air pollution. The government closely follows the latest Euro standards to ensure that new fuels and technology are adopted to reduce polluting vehicle emissions. A 30% reduction (up to $50,000) in first registration tax will be given to people purchasing vehicles with low emissions and high fuel efficiency.

  Valuation Method:

- Contingent Valuation Method

Information Required:

- Hypothetical scenario of the use of low-emission, high fuel-efficient vehicles including the cost, the variety and the availability of vehicles types on the market.
- Identify the potential benefited vehicles buyers and owners and determine the sample size
- Create questionnaires and determine the channel to contact them for the survey, e.g. by phone, mail and interview.
- Interviewers / surveyors to undertake the survey, and professional analyst for data analysis

Possible approach in the application of environmental valuation tools:

Cost = Total reduction of tax due to people purchasing vehicles with low emissions and high fuel efficiency

N = the percentage of reduction of air pollutant emission

Efficiency = Cost ÷ N

The efficiency can be provided to the policy decision making process. The higher is the cost, the higher monetary value is required to reduce the air pollutant emission.

Constraints:

- Time to prepare and complete the survey will be long and could be costly.
- People may have bias on certain vehicle types or due to the influence of their norms.

Hong Kong 2030: Planning Vision and Strategy – Strategic Environmental Assessment

The purpose of Hong Kong 2030 Planning Vision and Strategy is to gathering necessary information to review and generate scenarios relating to the future development of Hong Kong, and undertaken the testing of development options with a view to preparing HK2030 which will be:

"A long-term land use-transport-environmental planning strategy for guiding future developments and the provision of strategic infrastructure in Hong Kong and to help implement Government Policy targets in a spatial form." [86]

Environmental valuation however is not included in the SEA or the whole HK2030 planning study. As the environmental quality of Hong Kong also affects the tourism industry and the investment to Hong Kong, it is worthwhile to introduce the environmental valuation into the planning study. As such, the environmental value can be considered in economic assessment. There are many tasks in the study in which one of them is the review of sectoral planning issues in relation to the tourist facilities and

[86] http://www.hk2030.gov.hk/eng/inception/pdf/InceptionReport_1.pdf

land reserved for tourism projects. Below shows the use of valuation method of this task:

Valuation Method:

- Travel Cost Method

Information Required:

- Determine the required tourist facilities and land reserved for tourism projects in terms of:
  • changes in access costs for a recreational site;
  • elimination of an existing recreational site;
  • addition of a new recreational site; and
  • changes in environmental quality at a recreational site.
- Identify the potential environmental effects (e.g. ecological to the above changes, e.g. a new ecological park which enhances the ecological environment, the destruction of existing country park where is a scenic spot, and the expansion of the theme parks e.g. Ocean Park and DisneyLand.
- Identify the travel zones tourist coming from and their transportation method. A survey will be required to determine the information such as their zone of origin, visitor days per person over a specified time period, purpose of the trip, travel cost, on-site cost (e.g. park entrance fees) and socio-economic characteristics (e.g. income, age, preference for recreation)

Possible approach in the application of environmental valuation tools:

Cost = Total travel cost to visit the recreational site

As the travel cost of the visitors to the recreational site is in response to the visitors' willingness to pay to visit the site under different circumstances as set in the survey, the travel cost can be provided to the decision making process. The higher is the cost, the more important of the site is to the visitors.

Constraints:

- If the changes are not significant, the visitors may not be able to response the difference.
- A lot of data handling will be required from the survey.
- It will be difficult to determine the travel cost if the visitor is in multi-purpose trips.
- Cannot predict changes in use value for changes in environmental quality without precedence

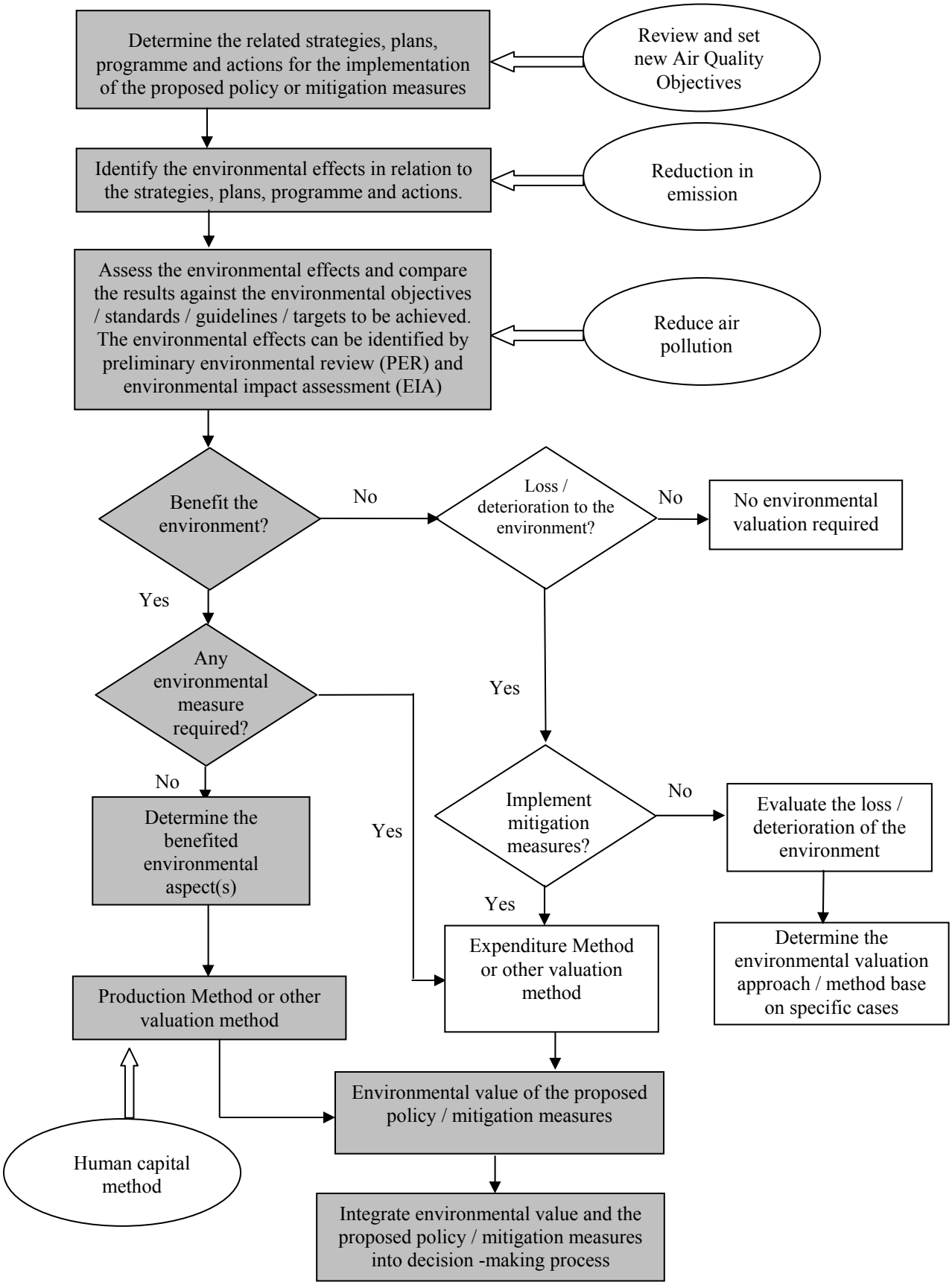


Figure 2 Steps of environmental valuation – Example 1 (Route 1)

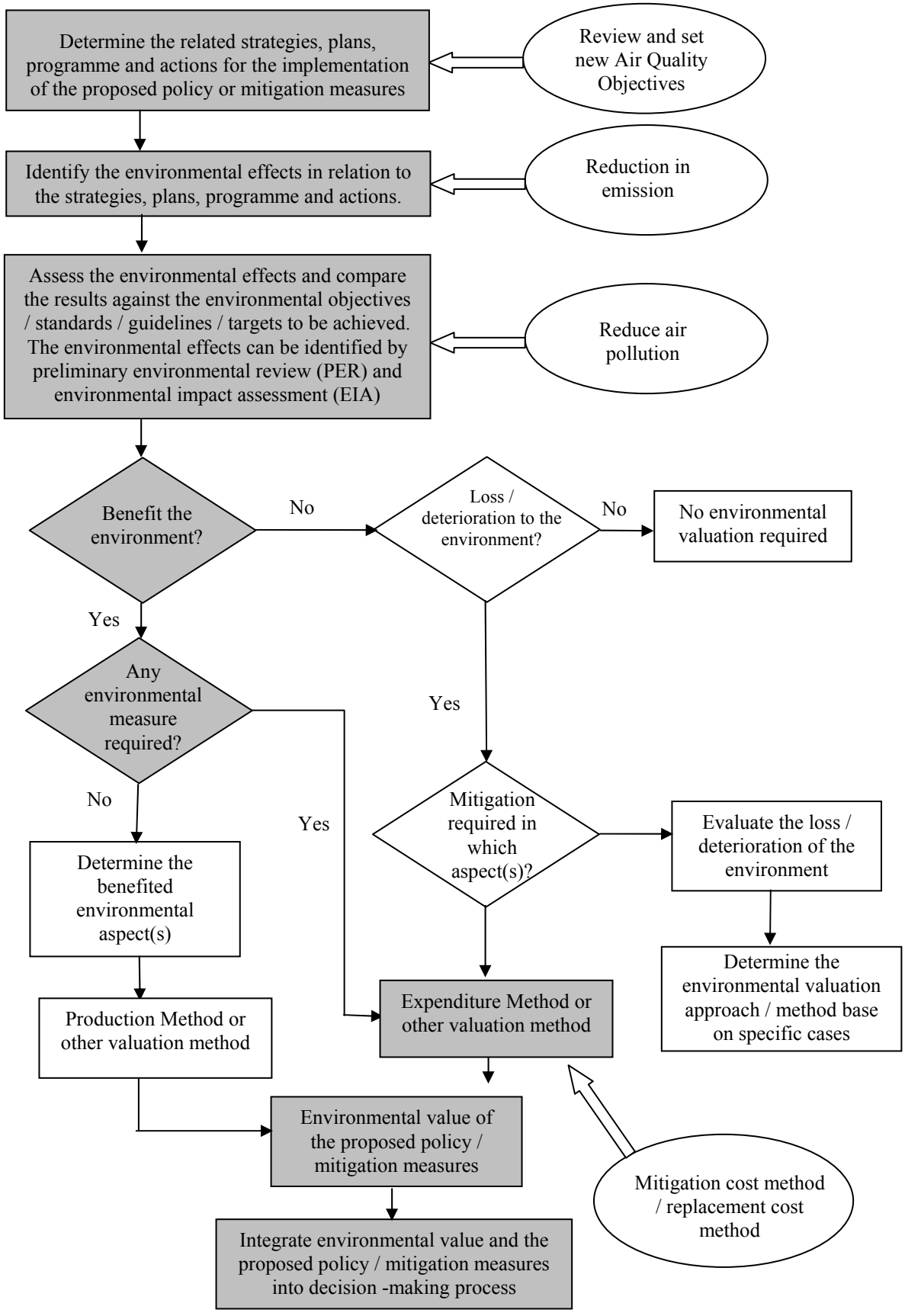


Figure 3 Steps of environmental valuation - Example 1 (Route 2)

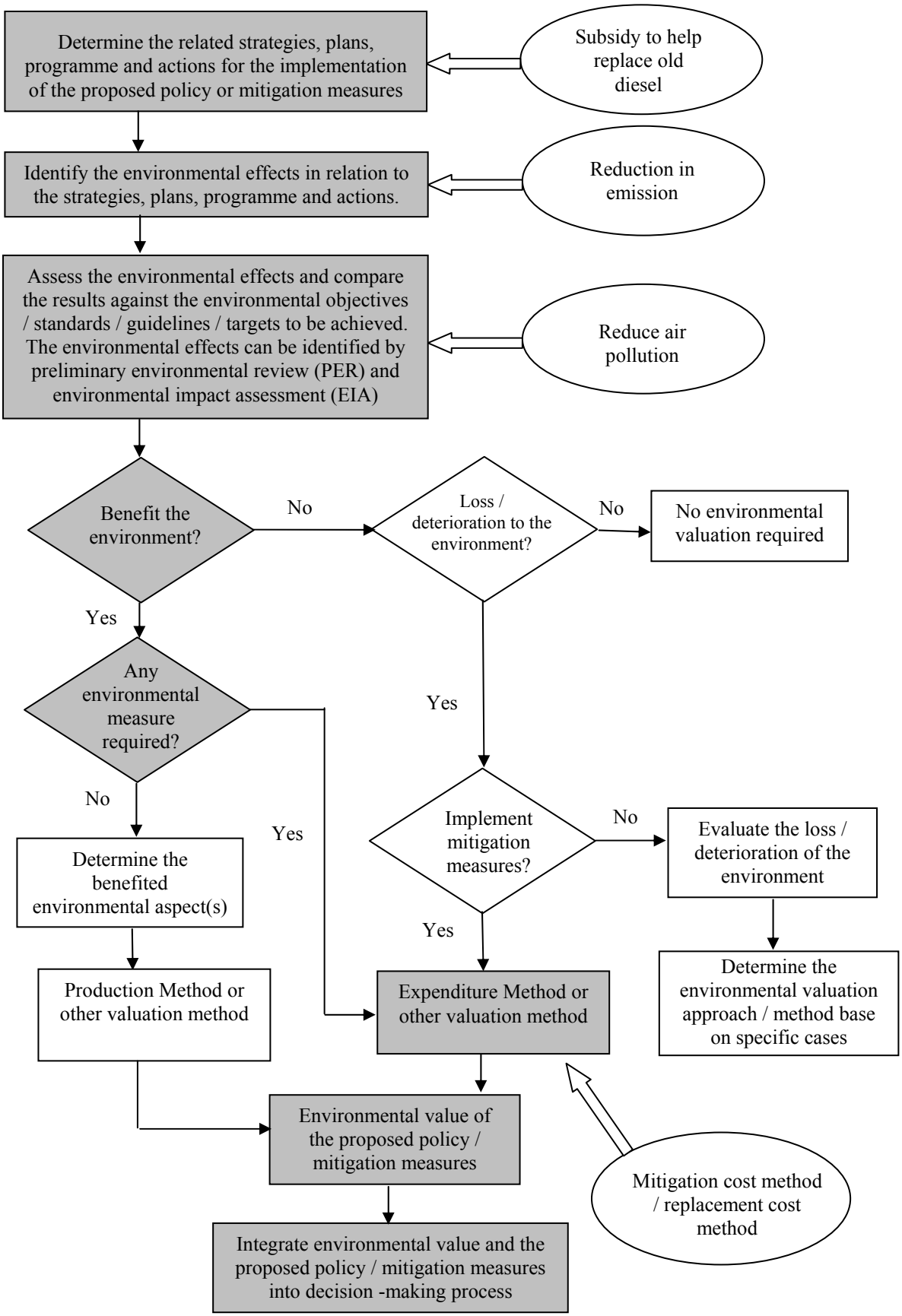


Figure 4 Steps of environmental valuation – Example 2

5. CONCLUSION

The evaluation tools/approaches applied in consideration of environmental costs and benefits of policy proposals and relevant environmental mitigation measures from an economic perspective in different countries and co-operations were reviewed. Examples were provided to illustrate these approaches and tools in considering a proposed policy. Their advantages and disadvantages were analyzed.

Some commonly adopted valuation approaches and tools introduced in the study were discussed on their possible implementation in the environmental valuation of proposed policies and mitigation measures in Hong Kong. Some strategic objectives and actions for the improvement of environmental quality in the 2006-07 Policy Address and HK2030: Planning Vision and Strategy were used as examples to illustrate their application. The information required and the constraints were also presented in this report.

The application of environmental valuation shows the monetary value from an economic point of view. However not all environmental assets are quantifiable. The role of the environmental valuation is a tool to assist the decision of a policy proposal rather than a determining factor. It is suggest that environmental valuation can be conducted for policy proposal to assist decision making. The flow chart in this report includes a screening process on the need of economic valuation and the possible valuation approach in decision making of policy proposals and proposed mitigation measures. Reference can be made to The World Bank Economic Development Institution's publication "The Economic Appraisal of Environmental Projects and Polices – A Practical Guide" for details on the valuation methods for the case of Hong Kong.

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Appendix A
Valuation Practice

TABLE 1 VALUATION PRACTICE IN AUSTRALIA

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Impact Statement for the National Environment Protection (Diesel Vehicle Emissions) Measure (NEPM) NEPMs are broad framework-setting statutory instruments defined in the NEPC Act. They outline agreed national objectives for protecting or managing particular aspects of the environment. The measure provides a framework for the management of emissions from the in-service diesel fleet. It is designed to facilitate compliance with in-service emissions standards developed in conjunction with the National Road Transport Commission.	*Implementation framework for the report* Statutory, an Impact Statement provided by the proponent, the National Environmental Protection Council (NEPC) *Implementation framework for economic valuation* Administrative	Preventive expenditure method	Examines expenditures made to prevent the effects of a fall in environmental quality.	Cases where damage avoidance or replacement expenditures have actually been, or will actually be, made.	*Outcome of policy proposal* Diesel NEPM was introduced by the NEPC. In-service Standards for diesel vehicles emissions was made by the National Road Transport Commission (NRTC). The measure provides guidelines for strategies to facilitate achievement of the standards such as developing: - inspection and maintenance programs; - fleet maintenance programs; - smoky vehicle programs; - retrofit programs; and - engine re-build programs. *Outcome of economic valuation* Estimated total repairing cost is about $66 million; Avoided Health Cost (benefit) to be $33 million, associated with high amenity benefit and private benefit. http://www.ephc.gov.au/pdf/diesel/diesel_is.pdf

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
The New South Wales Abalone Fishery – Environmental Impact Statement This is a document outlined the management goals, objectives, controls and other measures for achieving the objectives, performance measures and monitoring programs applying to the abalone fishery activity.	*Implementation framework for the report* Statutory, an EIS provided by the proponent, the NSW Department of Primary Industries *Implementation framework for economic valuation* Administrative	Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good.	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	*Outcome of policy proposal* Declaring that, the harvest operations of the New South Wales Abalone Fishery, as defined in the New South Wales *Abalone Share Management Plan 2000* in force under the New South Wales *Fisheries Management Act 1994*, as an approved Wildlife Trade Operation under section 303FN of the EPBC Act. *Outcome of economic valuation* Management charges per share are expected to increase from current (2003-04) $246 to $ 350 by 2008-09 http://www.deh.gov.au/coasts/fisheries/nsw/abalone/submission.html

TABLE 1B VALUATION PRACTICE IN UNITED KINGDOM

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
Economic Appraisal of Proposed Expenditure under the Rural Development Regulation Environmentally Sensitive Areas (ESAs) are designated in England, it is one of the policies under the Regulation and which is included in the Rural Development Plan, It encourage environmentally beneficial agricultural practices in areas of the countryside where the landscape, wildlife or historic interest is of national importance.	*Implementation framework of the report* Administrative, an Economic Appraisal provided by the Department for Environment Food and Rural Affairs (Defra) *Implementation framework of economic valuation* Administrative	Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good.	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	*Outcome of policy proposal* The economic and environmental assessments indicate that there is a case for continuing and increasing expenditure on these ESAs. *Outcome of economic valuation* The annual valuation of environmental benefits to the visitors and residents in the Somerset Levels ESA these benefits were valued at £10.8 million representing over 4 times the cost. Similar conclusions are found for valuations of South Downs ESA, Norfolk Broads ESA and ESAs in Scotland and Northern Ireland. http://statistics.defra.gov.uk/esg/consult/econappr.pdf
		Discrete choice modelling method	estimates economic values for virtually any ecosystem or environmental service	Policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services Appropriate method when a change affects only certain aspects of a resource / site	

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
Study into the Environmental Impacts of Increasing the Supply of Housing in UK The Deputy Prime Minister launched the Communities Plan set out plans to build a significant number of additional homes by 2016 and identifies four growth areas - Thames Gateway, London-Stansted-Cambridge-Peterborough corridor, Ashford and Milton Keynes-South Midlands. An economic valuation of environmental impacts is performed to calculate the value of non-market benefits from undeveloped urban fringe land.	*Implementation framework of the report* Administrative, a Study Report provided by the Department for Environment Food and Rural Affairs (Defra) *Implementation framework of economic valuation* Administrative	Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good.	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	*Outcome of policy proposal* Under the Baseline Scenario it is estimated that approximately 47,500 hectares of Greenfield and would be lost between 2001 and 2016. Scenario 1 entails a slightly lower loss of Greenfield and (approximately 42,400 ha). Scenarios 2 and 3 involve greater loss of greenfield land 52,000 ha and 77,500 ha respectively. *Outcome of economic valuation* The greatest burden of environmental impact falls on the South East, London and the South West regions, with estimated lost of Present Value of Non-Market Benefit (PVB) over the Baseline ranging from £3m to £7m. http://statistics.defra.gov.uk/esg/reports/housing/default.asp)
		Travel cost	Estimate economic use values associated with ecosystems or sites that are used for recreation.	Estimate the economic benefits or costs resulting from: Changes in access costs for a recreational site Elimination of an existing recreational site Addition of a new recreational site Changes in environmental quality at	

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
				a recreational site.	

TABLE 1C VALUATION PRACTICE IN DENMARK

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Valuation of Chemical related Health Impacts Estimate the unit costs of selected chemical related diseases. The estimates are expected to be used in connection with economic analyses in the area of chemicals. The diseases estimated include asthma, headache, contact allergy, lung cancer and skin cancer.	*Implementation framework of the report* Administrative, a Study Report provided by the Danish EPA *Implementation framework of economic valuation* Administrative	Human capital method	Examines forgone earnings and cost of illness to value an environmental good	Applicable to straightforward case where environmental quality directly affects the cost of producing a marketed good Most readily applicable to direct, market-based uses such as tourism, fishing, mining	*Outcome of policy proposal* -- *Outcome of economic valuation* The result is following range for the unit cost estimates: Asthma: DKK 900 - 2,600 Headache: DKK 200 - 6000 Contact allergy: DKK 79,000 - 690,000 Lung cancer: DKK 1.8 m. - 11.8 m. Skin cancer: DKK 28,000 - 519,000. http://www.mst.dk/udgiv/Publications/2004/87-7614-295-7/html/default_eng.htm
		Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good.	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
Economic Valuation of the Visual Externalities of Off-shore Wind Farms Under the Kyoto Protocol, Denmark has an obligation to reduce its CO2 emissions by 21 percent. Increasing wind power production capacity could potentially be an important component of the Danish reduction strategy (Ministry of Finance, 2003).	*Implementation framework of the report* Administrative, a Study Report, the study is part of the Danish monitoring programme for off-shore wind farms which is coordinated by the Danish Forest and Nature Agency, the Danish Energy Authority, etc. *Implementation framework of economic valuation* Administrative	Discrete choice modelling method	estimates economic values for virtually any ecosystem or environmental service	Policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services Appropriate method when a change affects only certain aspects of a resource / site	*Outcome of policy proposal* -- *Outcome of economic valuation* WTP for extending the distance from 8 to 12 km is 330 DKK/household/year; from 12 to 18 km is 700DKK/household/year; and from 18 to 50 km is 900DKK/household/year. http://www.hornsrev.dk/miljoeforhold/miljoerapporter/economic%20valuation%20of%20the%20visual%20externalities%20of%20off-shore%20wind%20farms.pdf

TABLE 1D VALUATION PRACTICE IN FINLAND

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Appraising the Socio-economic Impacts of Climate Change for Finland Investigate how climate change induced impacts on the physical environmental interact with the economy; and a preliminary indication of the order of magnitude of the costs and benefits of climate change for Finland	*Implementation framework of the report* Administrative, a Working Paper provided by the Finnish Environmental Institute *Implementation framework of economic valuation* Administrative	Dose-response method	Examine changes in the dollar value of outputs resulting from a change in the quality of an environmental good	Applicable to straightforward case where environmental quality directly affects the cost of producing a marketed good Most readily applicable to direct, market-based uses such as tourism, fishing, mining	*Outcome of policy proposal* Sectors in Finland that could gain from climate change are the forest sector and agriculture. Furthermore, the potential for the use of hydro electricity in existing facilities will grow to some extent. Commercial tourist and outdoor leisure services could also benefit. *Outcome of economic valuation* The order of magnitude of the aggregate effects, however incomplete these are at this stage, hovers in the area between 0 and a few hundreds million euro, or to put it differently the effects amount to less than a 0.1% change in GDP. http://www.ymparisto.fi/download.asp?contentid=45371&lan=EN

TABLE 1E VALUATION PRACTICE IN GERMANY

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Ecologically Optimized Extension of Renewable Energy Utilization in Germany In order to support the shaping of an ecologically optimized development path for renewable energy sources, the project aims to assess possibility today the long-term process of the extension of renewable energy sources and its impacts.	*Implementation framework of the report* Administrative, a Research Project Report provided by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) *Implementation framework of economic valuation* Administrative	Preventive expenditure method	Examines expenditures made to prevent the effects of a fall in environmental quality	Cases where damage avoidance or replacement expenditures have actually been, or will actually be, made	*Outcome of policy proposal* Future developments will bring further appreciable reductions in the environmental impacts caused by renewable energy systems. Sustainable energy supply is developed with a substantial increase in the conversion and utilization efficiency of all energy sources. Also, substantial efficiency improvements make it easier to move into renewables. It is found that combined heat and power (CHP) generation is an important mainstay of the extension of renewable energy systems. *Outcome of economic valuation* Today the CO_2 avoidance costs for electricity generation from:

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
					wind energy, geothermal energy, Solar thermal power plants and Biomass : 40 - 80 €/t CO_2 Photovoltaic systems : about 1000 €/t CO_2. Most technologies will in the long term reach negative CO_2 avoidance costs. http://www.bmu.de/files/pdfs/allgemein/application/pdf/nutzung_ee_eng.pdf
Technical Options for Abating Road Traffic Impacts – Comparative Study of Fuel Cell Vehicles and Vehicles with Internal Combustion Engines In principle, fuel cells are an interesting option for efficient cogeneration of electricity and heat. The UBA undertake a cost-benefit analysis of fuel cell technology of automotive applications to establish what advantages and drawbacks it offers compared with other propulsion systems on current evidence.	*Implementation framework of the report* Administrative, a Study Report provided by the Federal Environmental Agency (UBA) *Implementation framework of economic valuation* Administrative	Preventive expenditure method	Examines expenditures made to prevent the effects of a fall in environmental quality	Cases where damage avoidance or replacement expenditures have actually been, or will actually be, made	*Outcome of policy proposal* The Federal Environmental Agency analysis suggests that fuel cell vehicles are not a cost-effective option from the environmental viewpoint. Since CO_2 emissions from traffic must be reduced now to protect our climate, further development of today's conventional vehicles is likely to be the only source of emission reductions in the foreseeable future. *Outcome of economic valuation* The avoidance costs for FCVs range from DM 300 to 500 (153-256 euros) per tonne of CO_2. An efficient ULEV yields a gain of

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
					DM 110 (56 euros) for each tonne of CO_2 avoided. http://www.umweltdaten.de/publikationen/fpdf-l/1779.pdf

TABLE 1F VALUATION PRACTICE IN NEW ZEALAND

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Economic Impact Analysis of Mandatory Energy Performance Standards for Specific Product Classes The economic impacts of introducing the MEPS into product classes; domestic refrigeration appliances, motors, and packaged air conditioners; are investigated.	*Implementation framework of the report* Administrative, a Economic Impact Analysis Report provided by Ministry for the Environment *Implementation framework of economic valuation* Administrative	Dose-response method	Examine changes in the dollar value of outputs resulting from a change in the quality of an environmental good	Applicable to straightforward case where environmental quality directly affects the cost of producing a marketed good Most readily applicable to direct, market-based uses such as tourism, fishing, mining	*Outcome of policy proposal* It is likely that, for most of the product range, MEPS will have very little impact on the end-user. Coupled with the pending introduction of MEPS into Australia and strong links between the New Zealand and Australia markets, most of the market appears to have already anticipated the introduction of MEPS. *Outcome of economic valuation* Present value of the energy savings accruing to the end user as a result of bringing a 7.5 kW motor up to the MEPS standard would range around NZ$100 and over NZ$5000, depending on the use pattern. The comparisons of energy savings with the cost of the motor, around NZ$800. http://www.mfe.govt.nz/publications/energy/economic-impact-meps-feb01.pdf

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
Climate Change Case Study: Assessment of the Impacts of Sea Level Rise on Floodplain Management Planning for the Avon River Prediction of future sea-level will rise to 9.25 – 9.29 m and 9.42 – 9.6 m in 2050 and 2100 respectively. Study of coastal area is to investigate the damage will occur in economic aspect and the response options available to mitigate the damages.	*Implementation framework of the report* Administrative, a Impact Assessment Report provided by the NZ Climate Change Office, the Ministry for the Environment, as part of its portfolio of climate change work *Implementation framework of economic valuation* Administrative	Mitigation cost method	Uses estimates of the cost of repair or rehabilitation of environmental resources after environmental damage	Cases where damage avoidance or replacement expenditures have actually been, or will actually be, made	*Outcome of policy proposal* All minimum floor levels considered are unlikely results in net benefit relative to the 11.4m minimum floor level. The Bexley Special Management Area subdivision restrictions do not appear to bring a net economic benefit in preventing flood damages. The analysis suggests stopbank upgrade 25 years later shows a net benefit. Tidal barrages do not considered to be a feasible mitigation measure. *Outcome of economic valuation* For a 100 year storm event, the lost (in $ million) at present is $0.21. In 2050, the lose will rise to $2.48 million, and there is large increase in 2100 with the lost of $163.52 million. http://www.climatechange.govt.nz/resources/local-govt/avon-river-floodplain.pdf

TABLE 1G VALUATION PRACTICE IN NORWAY

POLICY PROPOSALS / THEIR MITIGATION MEASURES	IMPLEMENTATION FRAMEWORK	VALUATION APPROACH / TOOL	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	OUTCOME
Consultative Document on an Environment Fee for Visitors to Svalbard Proposing introduction by regulation of an environment fee for journeys to Svalbard's land areas. Visitors will contribute to the conservation of Svalbard's unique wilderness areas and cultural heritage by the fee. The proceeds from the environment fee will be paid in to the Svalbard Environmental Protection Fund. Money from the Fund can only be spent on measures in Svalbard the purpose of which is to protect the environment.	*Implementation framework of the report* Administrative, a Consultation Document provided by the Ministry or the Environment *Implementation framework of economic valuation* Administrative	Travel cost method	Estimate economic use values associated with ecosystems or sites that are used for recreation.	Estimate the economic benefits or costs resulting from: Changes in access costs for a recreational site Elimination of an existing recreational site Addition of a new recreational site Changes in environmental quality at a recreational site.	*Outcome of policy proposal* The Ministry proposes that the environment fee shall enter into force on 1 January 2007. An inquiry carried out in 1995 shows WTP in the region of NOK 250 as a contribution towards environmental protection in Svalbard. It is not likely that the environment fee will cause large adverse impact towards tourism of the region. *Outcome of economic valuation* For each ticket bought for a journey to Svalbard, the tour operator will be charged an environment fee of NOK 150. Base on the Governor information, a fee of NOK 150 would amount to revenues for the Environmental Protection Fund of in the region of NOK 8.2 million per year. http://odin.dep.no/md/norsk/dok/hoeringer/paa_hoering/022021-080011/ram006-bn.html#ram6

TABLE 1H VALUATION PRACTICE IN UNITED STATES OF AMERICA (USA)

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Rocky Intertidal Ecosystems in Orange County, California Users were surveyed to determine their willingness-to-pay to protect the area.	*Implementation framework of the report* Administrative, a Case Study provided by the NOAA Coastal Services Center *Implementation framework of economic valuation* Administrative	Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	*Outcome of policy proposal* -- *Outcome of economic valuation* It is estimated that visitors are willing to pay $6 more per visit per day to access the beach if the tide pools were protected. http://www.csc.noaa.gov/mpass/casestudies_southerncalifornia.html

TABLE 1I VALUATION PRACTICE IN CANADA

POLICY PROPOSALS / THEIR MITIGATION MEASURES	**IMPLEMENTATION FRAMEWORK**	**VALUATION APPROACH / TOOL**	**CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL**	**APPLICATION**	**OUTCOME**
Long Point Recreational users were surveyed to measure how much they are willing to pay over and above their current expenditures to receive the same benefits.	*Implementation framework of the report* Administrative, a Case Study *Implementation framework of economic valuation* Administrative	Contingent valuation	Uses survey methods to directly elicit a person's willingness to pay or to accept compensation for different qualities of an environmental good	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	*Outcome of policy proposal* -- *Outcome of economic valuation* It is estimated that recreational users were willing to spend $119,000 in total to receive wetland benefits that were estimated to have a contingent value of $213,000 per year.

Appendix B
Valuation Method

TABLE 2 VALUATION METHODS[1]

VALUATION APPROACHES / TOOLS	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	ADVANTAGES	DISADVANTAGES	EXAMPLE
MARKET PRICE METHOD					
Production Method					
Dose-response method	Examine changes in the dollar value of outputs resulting from a change in the quality of an environmental good	Applicable to straightforward case where environmental quality directly affects the cost of producing a marketed good Most readily applicable to direct, market-based uses such as tourism, fishing, mining	Simple, generally most easily understood by decision-makers and stakeholders As the production and expenditure-based methods depend on existing market data, the data may be relatively easy to source If quantitative links can be established between potential changes to the environment and activities that already have a market value, there is a straightforward basis for generating dollar values	Difficulties in gaining sufficient information on ecological and/or health links to enable economic assessment Likely to ignore some elements of the total economic value, particularly passive values	Loss of production from a fishery affected by water pollution. The impact on health of air pollution How much of the added value generated by tourism is attributable to the existence of a particular ecosystem, as opposed to other inputs such as produced capital, material inputs, and labour
Human capital method	Examines forgone earnings and cost of illness to value an environmental good				
Expenditure Method					
Preventive expenditure method	Examines expenditures made to prevent the effects	Cases where damage avoidance or replacement	Simple, generally most easily understood by	Difficulties in gaining sufficient information on	Valuing improved water quality by measuring the

VALUATION APPROACHES / TOOLS	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	ADVANTAGES	DISADVANTAGES	EXAMPLE
	of a fall in environmental quality	expenditures have actually been, or will actually be, made	decision-makers and stakeholders As the production and expenditure-based methods depend on existing market data, the data may be relatively easy to source If quantitative links can be established between potential changes to the environment and activities that already have a market value, there is a straightforward basis for generating dollar values	ecological and/or health links to enable economic assessment Likely to ignore some elements of the total economic value, particularly passive values	cost of controlling effluent emissions Valuing erosion protection services of a forest or wetland by measuring the cost of removing eroded sediment from downstream areas Valuing the water purification services of a wetland by measuring the cost of filtering and chemically treating water Loss of habitat by establishing similar habitat elsewhere
Mitigation cost method	Uses estimates of the cost of repair or rehabilitation of environmental resources after environmental damage				
Replacement cost method	Uses estimates of the cost of replacing the services of damaged productive assets e.g. engineering works to prevent soil erosion after land clearing				
SURROGATE OR PROXY MARKET METHOD					
Hedonic pricing method	Statistical analysis of market prices to infer a price for environmental quality Estimates economic values for ecosystem or environmental services that directly affect market prices	Variations in housing prices that reflect the value of local environmental attributes	Using market data as a proxy for the environmental goods and services being valued, and so may be better understood by stakeholders and decision makers	To the extent that the goods are not perfect substitutes, adjustments must be made and the issue of market clearance must also be considered Not feasible to use surrogate market methods to estimate	Comparison would be made between housing prices in two streets, which were similar except for the level of air pollution. It can be used to estimate economic benefits or costs associated with:

VALUATION APPROACHES / TOOLS	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	ADVANTAGES	DISADVANTAGES	EXAMPLE
				the value of a new good or service, or of a change in environmental quality outside of current experience There may never have been any significant variation in its quality, it is impossible to infer how people in the area would respond to a change in quality Estimates of value derived will thus depend upon a series of assumptions that remain largely untested	- environmental quality, including air pollution, water pollution, or noise - environmental amenities, such as aesthetic views or proximity to recreational sites
Travel cost method	Estimate economic use values associated with ecosystems or sites that are used for recreation.	Estimate the economic benefits or costs resulting from: - changes in access costs for a recreational site - elimination of an existing recreational site - addition of a new recreational site - changes in environmental	Using market data as a proxy for the environmental goods and services being valued, and so may be better understood by stakeholders and decision makers	May have substantial data requirements Problems arise with multi-purpose trips Cannot predict changes in use value for changes in environmental quality without precedence	

VALUATION APPROACHES / TOOLS	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	ADVANTAGES	DISADVANTAGES	EXAMPLE
		quality at a recreational site.			
SURVEY BASED METHOD					
Contingent valuation method	Estimate both use and passive values, and it is the most widely used method for estimating passive values by directly asking people, in a survey, how much they would be willing to pay for changes in specific environmental services	Contingent on a specific hypothetical scenario and description of the environmental service Potentially can be applied for all environmental resources and changes, though the application is limited by the complexity of the questionnaire Most suitable when all attributes of a natural resource are affected rather than individual attributes.	More likely than other methods to elicit the full range of values in the analysis Cost effective if designed to have wider use Completed surveys give full profile of target population Can estimate both use and non-use values	Difficulties interpreting hypothetical cases, especially if a complex situation is presented The potential for bias in has been widely reported. Relatively expensive, though the cost of surveys should be judged in the light of the total cost of the land use planning policy or at least individual development	
Discrete choice modelling method	Estimates economic values for virtually any ecosystem or environmental service	Policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services Appropriate method when	Choice modelling has vastly improved the validity and reliability of the techniques Estimates Willingness To Pay(WTP) per attribute Does not directly ask WTP	Not yet as widely tested as Contingent Valuation Some techniques are not based on economic theory	Improved water quality in a lake will improve the quality of several services provided by the lake, such as drinking water supply, fishing, swimming, and biodiversity

VALUATION APPROACHES / TOOLS	CONCEPT / BRIEF INTRODUCTION OF THE APPROACH / TOOL	APPLICATION	ADVANTAGES	DISADVANTAGES	EXAMPLE
		a change affects only certain aspects of a resource / site	questions Suitable for valuing environmental changes irrespective of whether or not they have precedence		

[1] Environmental Protection Agency, Queensland, Australia - Environmental Economic Valuation – an Introductory Guide for Policy-makers and Practitioners http://www.epa.qld.gov.au/publications/p00870aa.pdf/Environmental_economic_valuation_an_introductory_guide_for_policymakers_and_practitioners.pdf