4th International Scientific Conference on "Energy and Climate Change",
13-14 October 2011, Athens, Greece

Selecting AMS as the appropriate multi-criteria evaluation method for climate change policy portfolios

Dr. Popi KONIDARI
Research Fellow of KEPA

Structure

- Introduction
- Comparison of multi-criteria evaluation methods
  - Objectives
  - Structural background
  - Methodology
  - Advantages and disadvantages for the user
  - Applications
- Conclusions

Introduction

- Problem
  - Development and implementation of policy instruments
    - Mitigation of greenhouse gas emissions
    - Adaption of human activities towards climate change effects
  - Evaluation of policy mixtures
- Need to understand
  - Aggregate performance of a policy instrument
  - Climate Policy interactions
- Outcome of efforts
  - Identification of optimum alternative

Multi-criteria Decision Analysis

- Used extensively for evaluations
- Exhibits large number of methods
- Adopted rule "Facilitation of the decision maker according to needs"

Framework of comparison

- Ninety papers exploited
- Seven MCDA methods evaluated qualitatively
  - **AHP** - Analytical Hierarchy Process
  - **F-AHP** - Fuzzy AHP
  - **MAUT** - Multi-Attribute Utility Theory
  - **SMART** - Simple Multi-Attribute Ranking Technique
  - **AMS** - Acronym for combination of AHP, MAUT and SMART
  - **ELECTRE** - Elimination Et Choix Traduisant le REalite
  - **PROMETHEE** - Preference Ranking Organization METHod of Enrichment Evaluation

Objectives

- Outcomes
- Set of criteria/sub-criteria
- Ability to incorporate model outcomes

Structural background

- Mathematical background
- Weight coefficients, parameters, thresholds, indexes

Methodology

- Understanding the problem
- Selecting criteria/sub-criteria and determining their weight coefficients
- Measurement scales and assessment of the performance
- Sensitivity analysis

Advantages-disadvantages for user

- Ease of use
- Low requirements on time and efforts
- Available software

Applications

	AHP	F-AHP	MAUT	SMART	AMS	ELECTRE	PROMHTHEE
Cases	5	2	0	0	4	4	4

RES Policy goals in Taiwan

Subsidy schemes for PV technology in Cyprus

Transport policy options

Options in energy, transportations, forestry in Peru

Low-carbon development scenarios in Bangkok (Thailand)

Renewable energy sources for Taiwan

Energy alternatives for Turkey

EU-ETS performance

Pairs of climate policy interactions under the Hellenic framework

Policy scenarios for RES penetration in Greece

GHG Emission Mitigation Policy instruments in Trinidad and Tobago

Adaptation actions in Canada

CO_2 reduction measures in transportations

Subsidy schemes for PV technology in Cyprus

Energy Efficiency initiatives

Subsidy schemes for PV technology in Cyprus

Options in energy, transportations, forestry in Peru

Scenarios for RES in Austria

Scenarios for power generation in Greece

Comparison

- Qualitative scale
  - High (+, 0, -)
  - Moderate (+, 0, -)
  - Low (+, 0, -)

Results of comparison (1/3)

	AHP	F-AHP	MAUT	SMART	AMS	ELECTRE	PROMETHEE
Objectives							
Outcomes	*H+*	*H+*	*H+*	*H+*	*H+*	*H-*	*H-*
Set of criteria/sub-criteria	*L-*	*L-*	*L-*	*L-*	*H+*	*L-*	*L-*
Ability to incorporate model outcomes	*H 0*	*H 0*	*H 0*	*L-*	*H 0*	*L-*	*L-*
Structural background							
Mathematical background	*H-*	*L-*	*H-*	*M+*	*H-*	*H+*	*M+*
Weight coefficients, parameters, thresholds, indexes	*H-*	*M-*	*M+*	*M+*	*H+*	*M+*	*M+*

Results of comparison (2/3)

	AHP	F-AHP	MAUT	SMART	AMS	ELECTRE	PROMETHEE
Methodology							
Understanding the problem	*H+*	*H+*	*M-*	*M+*	*H+*	*M-*	*M+*
Selecting criteria/sub-criteria and determining weight coefficients	*H+*	*H+*	*M-*	*M-*	*H+*	*M-*	*M-*
Measurement scales and assessment of performance	*H-*	*H-*	*H 0*	*M+*	*H+*	*M-*	*M+*
Sensitivity analysis	*H-*	*L+*	*H 0*	*M+*	*H+*	*M+*	*M+*

Results of comparison (3/3)

	AHP	F-AHP	MAUT	SMART	AMS	ELECTRE	PROMETHEE
Advantages – Disadvantages for the user							
Ease of use	*H-*	*M-*	*H+*	*H+*	*H+*	*M+*	*M-*
Low requirements on time and money	*M-*	*L-*	*H-*	*H-*	*H+*	*M-*	*M-*
Software	*H+*	*L+*	*H 0*	*M-*	*M-*	*H-*	*H-*
Applications	*H+*	*L+*	*L +*	*L -*	*M -*	*M -*	*M 0*

Conclusions

- Most appropriate MCDA method: AMS
  - Aggregate evaluation of performance of policy instruments
  - Evaluation of policy interactions
  - Complete criteria-tree
  - Incorporation of model outcomes
  - Easy to use

Thank you