MCA application in the Mauritian Context – TNA, NAMA and other projects

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Overview

1. **MCA Steps – a recap**

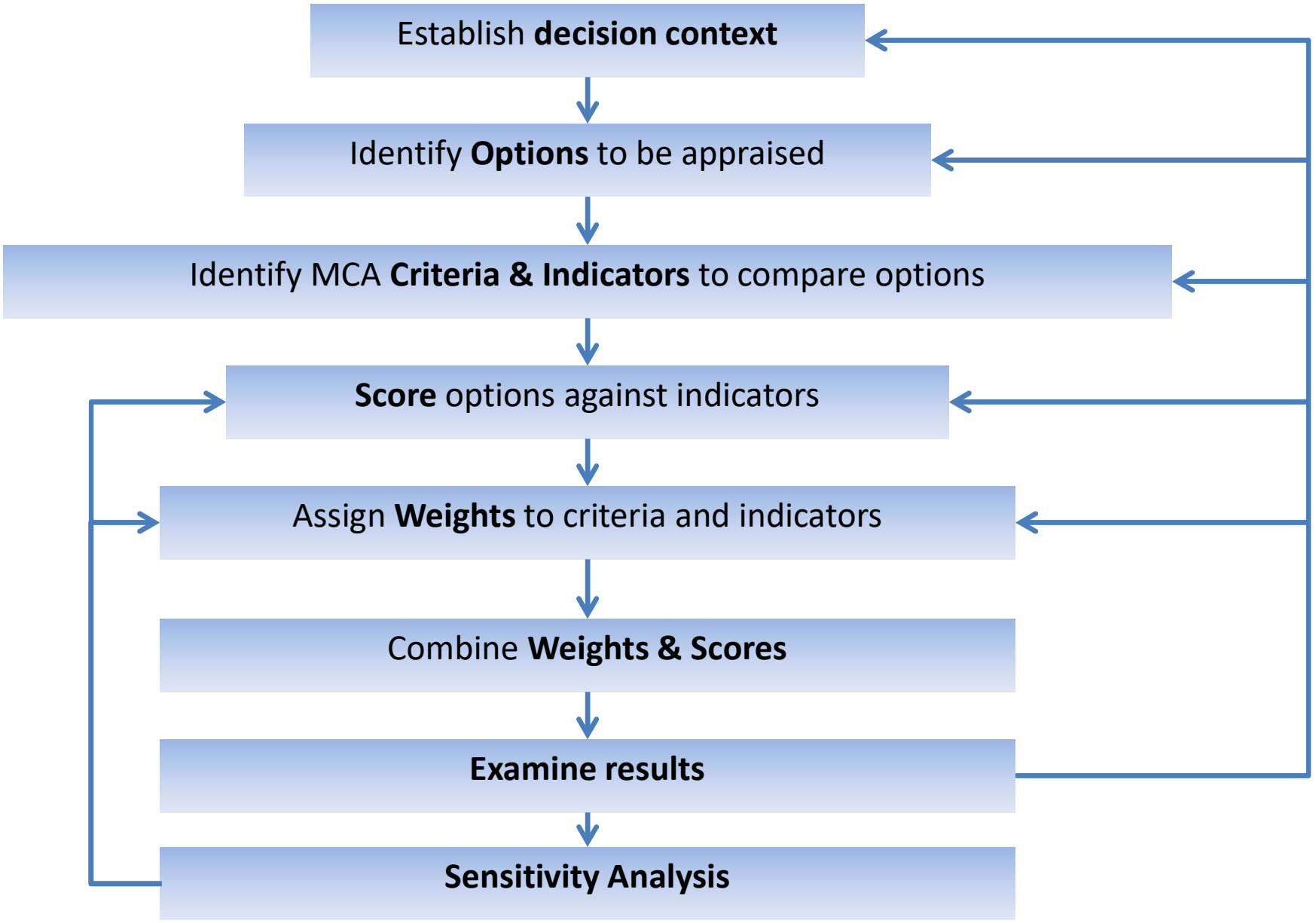
2. **The MCA4Climate Framework**

3. **Examples of application**
   - ***TNA***
   - ***TNC***
   - ***NAMA***
   - ***Renewable energy strategy***
   - ***Corporate Sustainability (materiality)***

Identification and Prioritization of mitigation options

(Multi-Criteria Analysis)

The MCA process



Step 1: Establish the decision context

- Developing low-carbon emissions pathways / scenarios for land transport in Mauritius

Step 2: Identify options to be appraised

- Based on a combination of literature review and expert judgement (members of the TWG)

MCA4Climate Framework (Criteria and Indicators)

Step 3: Identify criteria and indicators

Criteria	Indicators
Public financing needs	- Direct costs - Indirect costs
Implementation barriers	- Ease of implementation - Compliance with required timing of policy intervention
Climate-related	- GHG reduction (& black carbon emissions) - Enhance resilience to climate change
Economic	- Catalyzing private investments - Improvement of economic performance - Job creation - Contribute to fiscal sustainability
Environmental	- Protect environmental resources (quality & stock) - Protect biodiversity - Support ecosystem services
Social	- Poverty reduction - Reduce inequity - Improve health - Preserve cultural heritage
Political & institutional	- Contribute to political stability - Improve governance

Step 4: Scoring

Assess the expected impact of each mitigation action against the criteria/indicators selected in the previous step

- Objective indicators – done by ELIA
- Subjective indicators – done by TWG members

Step 5: Weighting

Assign weights for each of the criterion to reflect their relative importance to the decision

- Depends on expert knowledge

Step 6: Combining weights and scores

Combine weights and scores for each mitigation action to derive an overall value

- There is no normative model on how to carry MCA without critics
- **Linear additive model** (most widely used)

$$S_i = w_1 s_{i1} + w_2 s_{i2} + \ldots + w_n s_{in} = \sum_{j=1}^{n} w_j s_{ij}$$

Step 7: Examine results

This is the step through which feedback is introduced in the process flow. It can happen at multiple levels including adding new options and defining new criteria

Step 8: Sensitivity analysis

Do the preferences or weights affect the overall ordering of the mitigation actions?

- This is a very relevant step when stakeholders do not give same considerations to weights and/or when preferences differ widely
- Look at the advantages and disadvantages of mitigation actions
- Can be done conjunctly with step 7 until a final consensual outcome is obtained

Examples of Applications

TNA Mauritius – Mitigation (1/2)

Criteria	Indicators	Measurement scale	Weight	Sensitivity analysis	
Public Financing needs	Direct incremental cost, e.g. direct government budgeting	Rs/tCO2	0.15	0.2	0.15
Implementation Barriers	Ease of Implementation e.g. non-financial barriers	Likert scale: 0 (highest barrier) – 100 (lowest barrier)	0.15	0.1	0.1
Climate-related	GHG reduction	tCO2 (to 2025)	0.2	0.25	0.2
Economic	- Catalysing private investments	Likert scale: 0 (lowest) – 100 (highest)	0.15	0.05	0.05
	- Reduction in energy import bill	MRs (million Rs) (to 2025)	0.1	0.1	0.1
	- Replicability	Likert scale: 0 (lowest) – 100 (highest)	0.05	0.05	0.05
Social	- Impact on health	Likert scale: 0 (lowest) – 100 (highest)	0.05	0.05	0.05
	- Job creation	Quantity (to 2025)	0.10	0.15	0.15
Political and Institutional	Contribute to political stability	Likert scale: 0 (lowest) – 100 (highest)	0.05	0.05	0.15

TNA Mauritius – Mitigation (2/2)

		CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climate	Economic			Social		Political & Institutional		
TECHNOLOGY	Direct cost	Ease of implementation	GHG reduction (tCO2/kW)	catalysing private investment	Energy bill	replicability	Impact on health	Job creation	political stability	**TOTAL**	**RANK**
Solar PV (>1MW)	10.3	5.0	8.1	3.8	4.1	3.0	1.3	15.0	10.5	**61.00**	**2**
Wind (utility scale)	13.8	2.5	20.0	2.5	10.0	1.3	1.3	3.6	10.5	**65.44**	**1**
Small-scale hydro (>50kW)	13.8	4.0	0.6	1.5	0.3	3.5	1.3	0.0	9.0	**34.01**	**5**
EE HVAC (industrial)	0.0	6.0	0.3	3.5	0.2	4.0	2.5	0.5	7.5	**24.49**	**7**
EE Bldg Des (exterior insulation)	14.4	1.0	0.0	1.5	0.1	4.0	3.5	0.1	7.5	**32.06**	**6**
HE Compressors (industrial)	15.0	2.5	0.0	3.5	0.0	3.5	3.0	0.0	7.5	**35.03**	**4**
EE Boilers/Heat recovery	13.1	3.0	1.4	4.0	0.0	4.0	3.3	2.8	7.5	**39.10**	**3**
WEIGHTS	0.15	0.1	0.2	0.05	0.1	0.05	0.05	0.15	0.15	1	

Mauritius – Third National Communication (TNC)

Land Transport

	CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climate	Economic			Social			
TECHNOLOGY	Direct cost	Ease of implementation	GHG reduction	catalysing private investment	Energy bill	replicability	Impact on health	Job creation	TOTAL	RANK
Improved fuel efficiency	15.0	15.0	5.1	0.8	2.0	1.3	2.5	5.2	**46.74**	**2**
Improved vehicle inspection	15.0	12.0	25.0	3.8	10.0	0.8	3.0	10.0	**79.46**	**1**
Ethanol blend	14.6	3.8	5.7	4.5	2.5	0.5	2.0	5.4	**39.07**	**4**
Hybrid cars	7.1	12.0	2.9	9.8	1.3	3.8	2.5	5.2	**44.51**	**3**
Eletric cars	7.7	7.5	0.0	7.5	0.0	4.5	1.5	5.2	**33.90**	**5**
Express Rail	0.0	1.5	8.2	12.0	3.2	0.3	4.3	0.0	**29.43**	**6**
WEIGHTS	0.15	0.15	0.25	0.15	0.1	0.05	0.05	0.1	1	

Solid Waste

	CRITERIA AND INDICATORS									
	Public Financing	Implementation Barriers	Climate	Economic			Social			
TECHNOLOGY	Direct cost	Ease of implementation	GHG reduction (tCO2/kW)	catalysing private investment	Energy bill	replicability	Impact on health	Job creation	TOTAL	RANK
LFG capture	15.0	12.8	12.6	1.5	1.9	0.5	0.8	0.0	**45.06**	**3**
Recycling of paper and textile	12.5	9.8	0.0	6.0	0.0	1.0	2.0	4.0	**35.21**	**4**
WTE	0.0	3.8	25.0	10.5	10.0	0.3	0.5	10.0	**60.00**	**1**
Composting	13.8	7.5	12.4	8.3	0.0	1.0	1.0	3.3	**47.27**	**2**
WEIGHTS	0.15	0.15	0.25	0.15	0.1	0.05	0.05	0.1	1	

NAMA Project (e.g. Land Transport)

1. Starting framework is the MCA4Climate used in the TNC

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2. Review of criteria and indicators by Sectoral Working Group

3. Changes proposed (indicators): Incremental cost (objective); Impact of health (use noise pollution – subjective); avoided travel time (objective indicator under Social criterion)

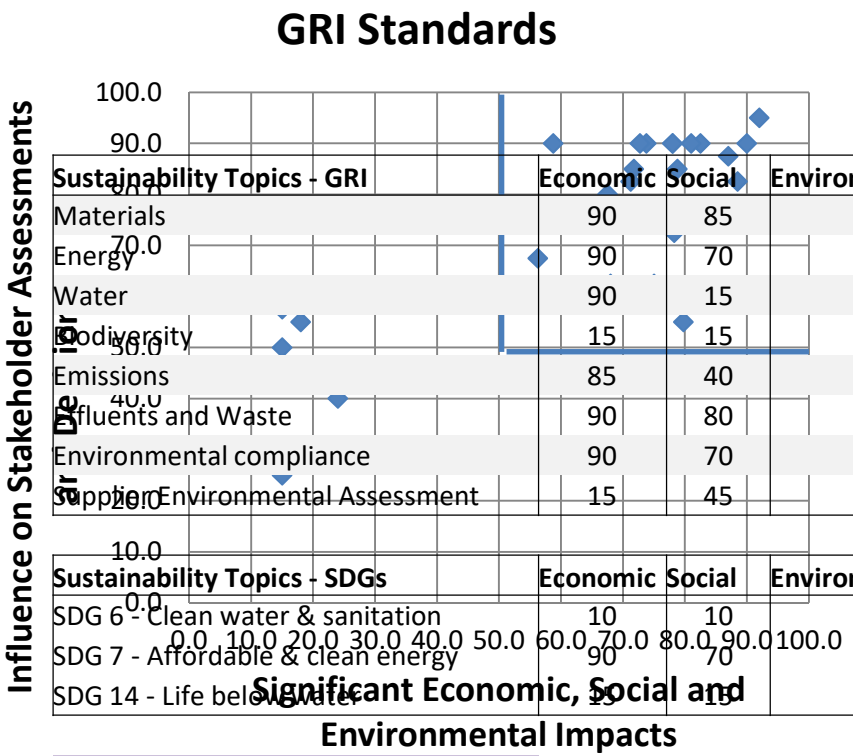
Renewable Energy Roadmap

Table1-3: MCA Scoring System for 2030 for RE 35% and RE 40%

Factor	Score	Weightage for 2030	Details of scoring system (as applicable)
Maturity of Technology	100	25	• High: 100 • Medium: 50 • Low: 0
LCOE	100	35	• 7.1 ¢$/kWh: 100 • 25.4 ¢$/kWh: 0 (prorated for LCOE costs in-between)
Environmental Impact	100	10	• Noise: -20 • Air: -20 • Water: -20 • Eyesore: -10 • Greenhouse Gas Emission: -20 • Impact on biodiversity: -10
Intermittency of Power Output	100	5	• No: 100 • Medium: 50 • Highly: 0
Land Use Impact	100	25	• Small: 100 • Medium: 50 • Extreme: 0

Republic of Mauritius. (2019). Renewable energy Roadmap 2030 for the electricity sector. Ministry of Energy and Public Utilities.

Corporate Sustainability – materiality analyses



Sustainability Topics - GRI	Economic	Social	Environmental	Option 1	Option 2	Option 3	Option 4
Materials	90	85	80	255.0	85.0	86.5	87.8
Energy	90	70	90	250.0	83.3	84.0	87.0
Water	90	15	15	120.0	40.0	52.5	67.5
Biodiversity	15	15	15	45.0	15.0	15.0	15.0
Emissions	85	40	85	210.0	70.0	71.5	78.3
Effluents and Waste	90	80	90	260.0	86.7	87.0	88.5
Environmental compliance	90	70	90	250.0	83.3	84.0	87.0
Supplier Environmental Assessment	15	45	45	105.0	35.0	30.0	24.0

Sustainability Topics - SDGs	Economic	Social	Environmental	Option 1	Option 2	Option 3	Option 4
SDG 6 - Clean water & sanitation	10	10	10	30.0	10.0	10.0	10.0
SDG 7 - Affordable & clean energy	90	70	90	250.0	83.3	84.0	87.0
SDG 14 - Life below water	15	15	15	45.0	15.0	15.0	15.0

NO WEIGHTS	Option 1

WEIGHTS				
Option 2	0.333333	0.3333	0.333333333	1
Option 3	0.5	0.3	0.2	1
Option 4	0.7	0.15	0.15	1

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