Using the Regio1st Multi-Criteria Decision Analysis (MCDA) tool in practical feasibility assessment

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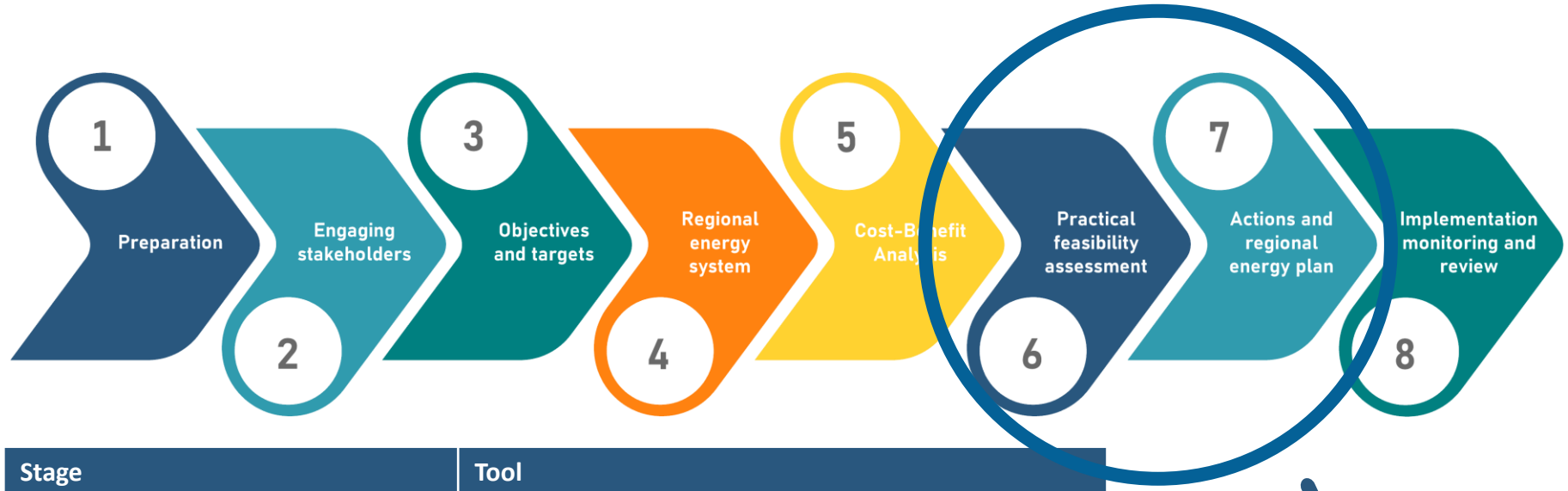
Introduction



Stage	Tool
1 Preparation	Roles and Responsibilities Matrix
2 Engaging stakeholders and building partnerships	Stakeholder Identification and Analysis Template
	Stakeholder Engagement Plan Guidance
3 Reviewing energy objectives and targets	National and Regional Targets Comparison Template
	Participatory Priorities Ranking (PPR) Tool
4 Exploring the current regional energy system	Energy Inventory Data Collection Template
5 Cost-benefit analysis	Technology Catalogue Tool
	Cost-Benefit Analysis Tool
6 Assessing the practical feasibility of least-cost energy solutions	Multi-Criteria Decision Analysis Tool (Stages 6 and 7)
7 Defining actions and developing the regional energy plan	Monitoring Template

The Regio1st Multi-Criteria Decision Analysis (MCDA) tool

Objective

enhance the decision-making process

of regional and local energy and climate planning by

- bringing together diverse perspectives
- ensuring that decisions are based on a broad set of criteria

Theoretical Background

Consider **multiple criteria** across four impact dimensions (Economy, Environment, Society, Practical feasibility)

Incorporates the previous stages' activities and the respective tools' results.

Flexible enough to incorporate both qualitative and quantitative aspects & assessments.

Open to assessments quantified by **participatory decision-making methods**

Methodology of the MCDA Tool

01 Alternatives

Select up to 4 alternatives to consider

02 Criteria

Select criteria- indicate their importance and type of impact

03 Practical feasibility

Assess the practical feasibility of each alternative per criterion

04 Quantification

Assess each alternative per criterion

05 MCD Analysis

Rank the importance of each decision-making category.

Calculations

RESULTS

Features

Excel-based format

Four (8) tabs

- Cover
- Instructions
- 1 – Alternatives
- 2 - Criteria
- 3 - Feasibility
- 4 - Quantification
- 5- MCDA
- Final Results

Scientific base

The algorithm used is based on the **TOPSIS method** (Technique for Order of Preference by Similarity to Ideal Solution)

- indicates the most favourable alternative against multiple criteria.
- complex decision-making problems in the energy sector.
- a systematic and quantitative approach to evaluate and rank alternative solutions.

Cover

Multi-Criteria Decision Analysis Tool (Regio1st MCDA tool)

REGIO1st Planning Framework
Stage 6 - Assessing the practical feasibility of least-cost energy solutions
Stage 7 - Defining actions and developing the regional energy plan
https://fedarene.org/project/regio1st/

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Instructions

REGIO1ST

Multi-Criteria Decision Analysis Tool (Regio1st MCDA tool)

User instructions

Guidance

Objective

The purpose of this tool is to enhance the decision-making process of regional and local energy and climate planning, by bringing together diverse perspectives and ensuring that decisions are based on a broad set of criteria/indicators. Given that involving all relevant parties, including public authorities, planners, stakeholders, and society, is vital for creating a meaningful plan, this tool incorporates features that facilitate collaborative decision-making.

Description

This tool (Multi-Criteria Decision Analysis Tool) is a structured tool designed to streamline the complex process of regional energy and climate planning. The tool empowers regions and their planners to make informed decisions by following a 5-step methodology. It provides a structured and efficient approach for regions and planners to extract, evaluate, and rank regional actions/investments, facilitating a data-driven, and impactful energy and climate planning process. This 5-step methodology enables the incorporation of views and priorities identified in the

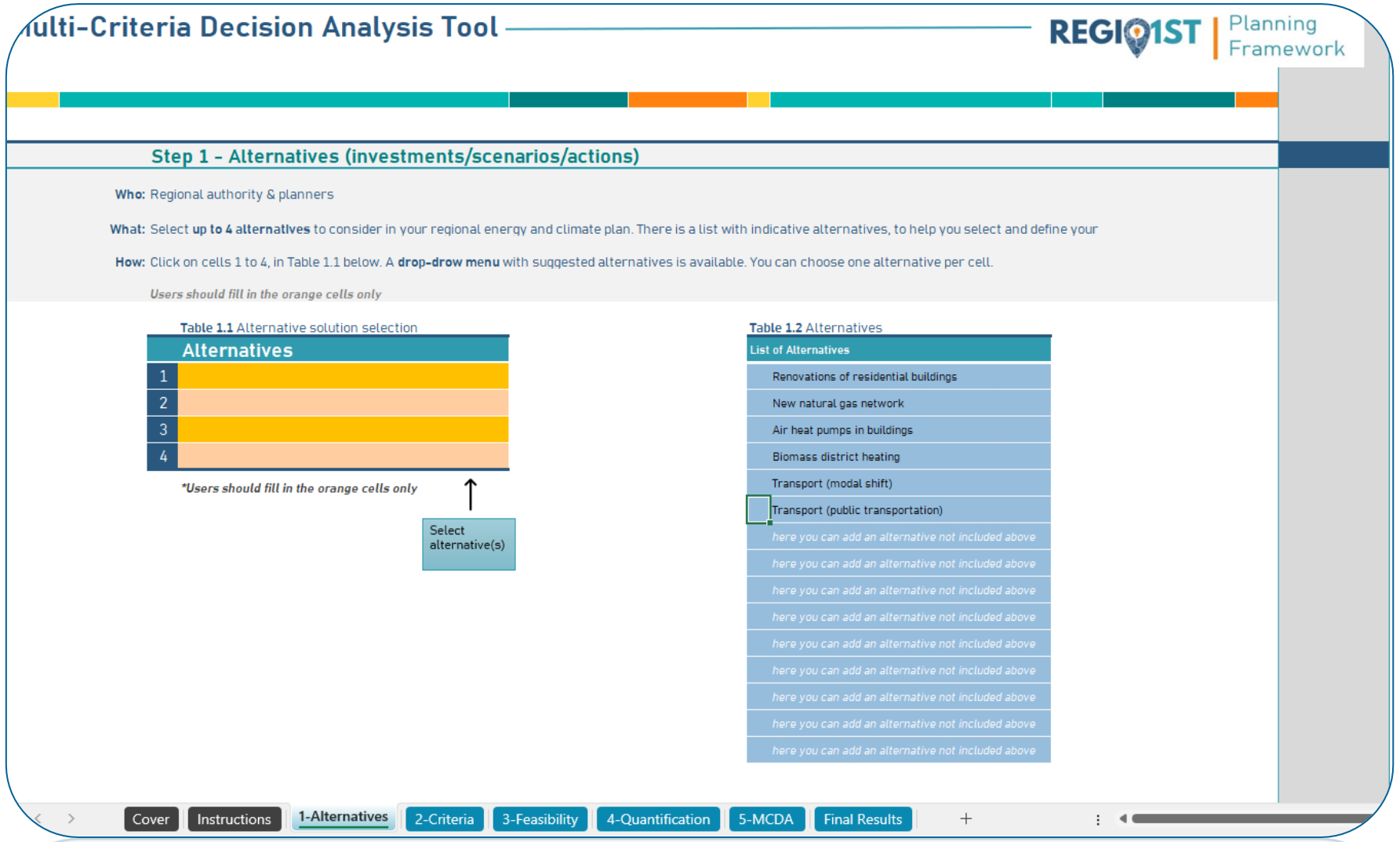
Methodology

In order to extract, evaluate and rank regional activities, regions and their planners need to:
1. Select up to 4 alternatives (investment options, scenarios of actions, stand-alone actions for energy and climate).
2. Define the criteria to evaluate the selected alternatives. along with their respective importance and type of impact. There are four categoris of criteria to consider: economic, environmental,
3. Evaluate the practical feasibility of the alternative energy solutions
4. Assess the alternatives using the remaining criteria
5. Select the importance of each criteria category
6. The final priorities ranking is presented, as calculated by the MCDA algorithm.

How do I use this tool?

(1) Step 1 - Alternatives (investments/scenarios/actions)	In this tab, the user selects up to 4 alternatives to consider in their regional energy and climate plan, using the drop-down menu.

Step 1 – Alternatives (investments/scenarios/actions)



Step 2 – Evaluation Criteria

here you can add a criterion not included above	
here you can add a criterion not included above	
here you can add a criterion not included above	

Practical feasibility

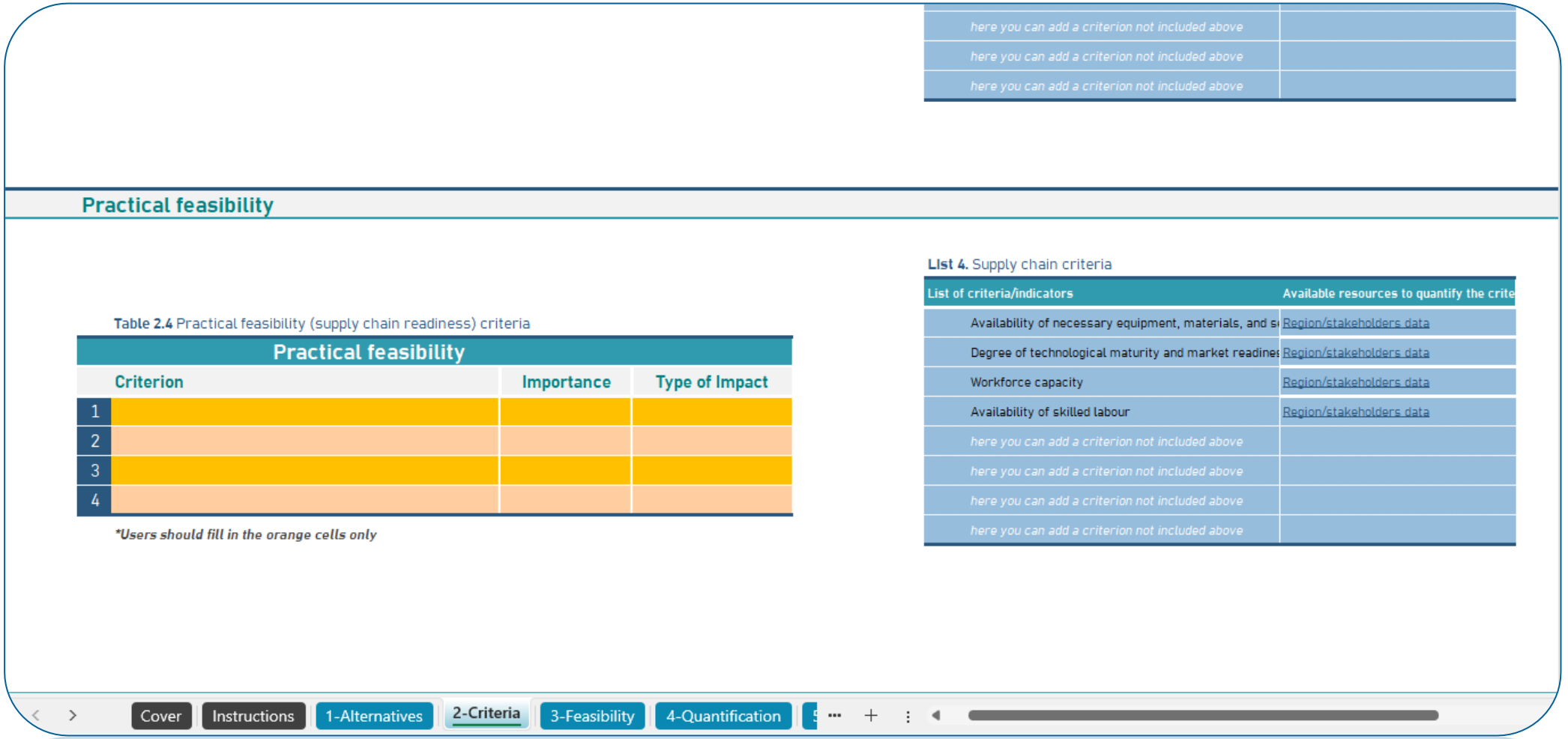
Table 2.4 Practical feasibility (supply chain readiness) criteria

Practical feasibility			
	Criterion	Importance	Type of Impact
1			
2			
3			
4			

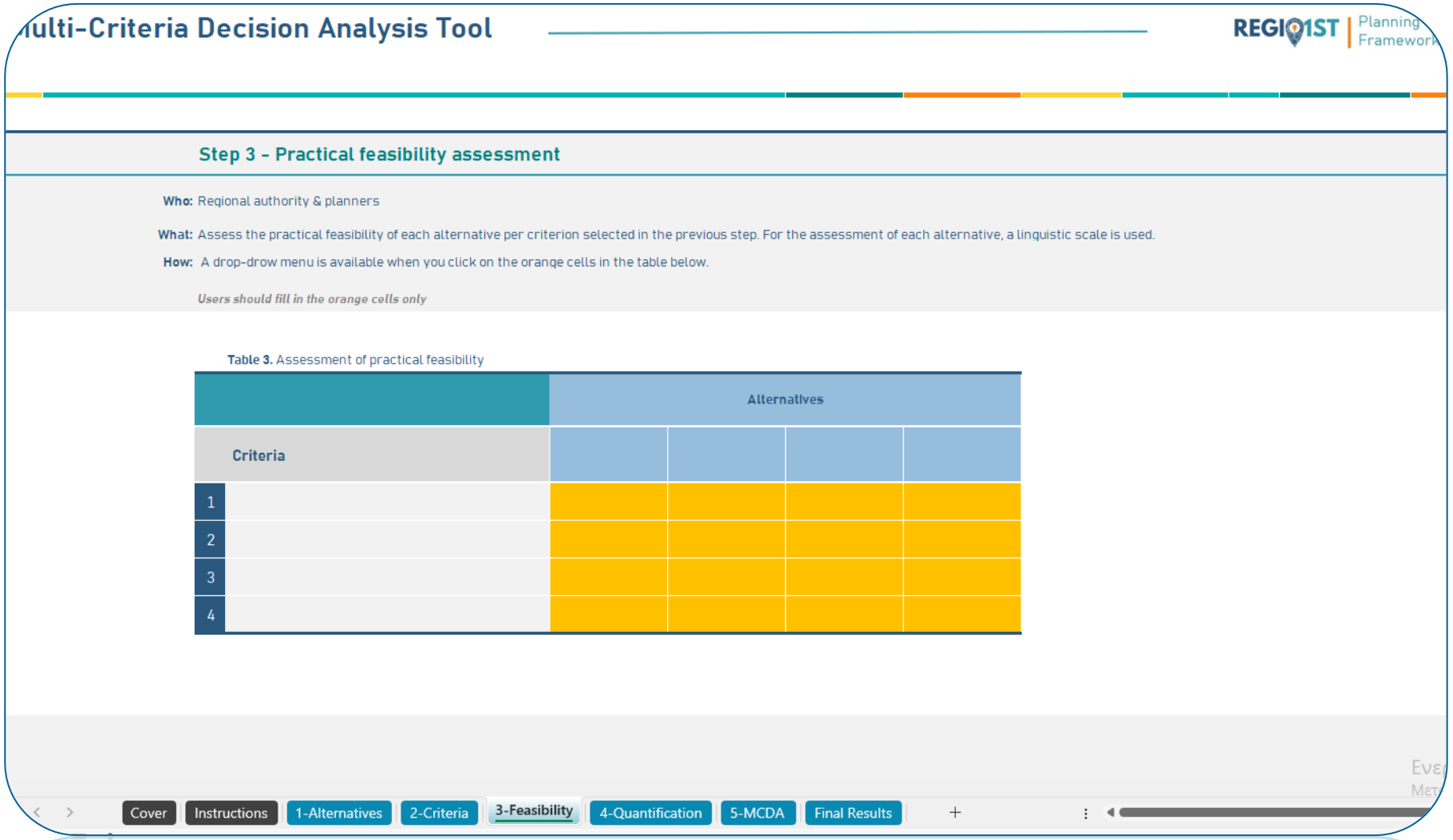
Users should fill in the orange cells only

List 4. Supply chain criteria

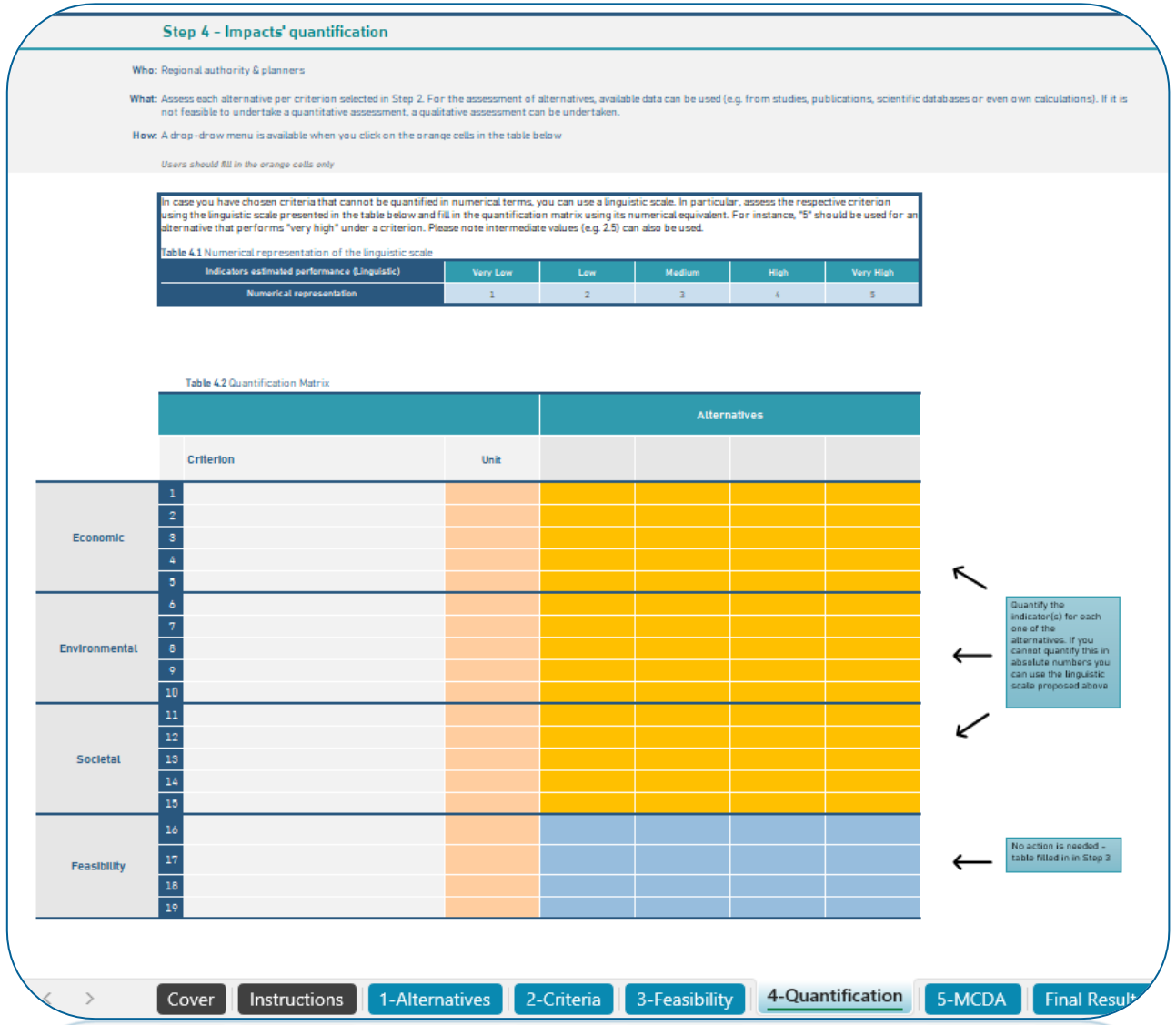
List of criteria/indicators	Available resources to quantify the crite
Availability of necessary equipment, materials, and s	Region/stakeholders data
Degree of technological maturity and market readines	Region/stakeholders data
Workforce capacity	Region/stakeholders data
Availability of skilled labour	Region/stakeholders data
here you can add a criterion not included above	
here you can add a criterion not included above	
here you can add a criterion not included above	
here you can add a criterion not included above	



Step 3 – Practical feasibility assessment



Step 4 – Impacts' quantification



Step 4 – Impacts' quantification

Who: Regional authority & planners

What: Assess each alternative per criterion selected in Step 2. For the assessment of alternatives, available data can be used (e.g. from studies, publications, scientific databases or even own calculations). If it is not feasible to undertake a quantitative assessment, a qualitative assessment can be undertaken.

How: A drop-drow menu is available when you click on the orange cells in the table below

Users should fill in the orange cells only

In case you have chosen criteria that cannot be quantified in numerical terms, you can use a linguistic scale. In particular, assess the respective criterion using the linguistic scale presented in the table below and fill in the quantification matrix using its numerical equivalent. For instance, "5" should be used for an alternative that performs "very high" under a criterion. Please note intermediate values (e.g. 2.5) can also be used.

Table 4.1 Numerical representation of the linguistic scale

Indicators estimated performance (Linguistic)	Very Low	Low	Medium	High	Very High
Numerical representation	1	2	3	4	5

Table 4.2 Quantification Matrix

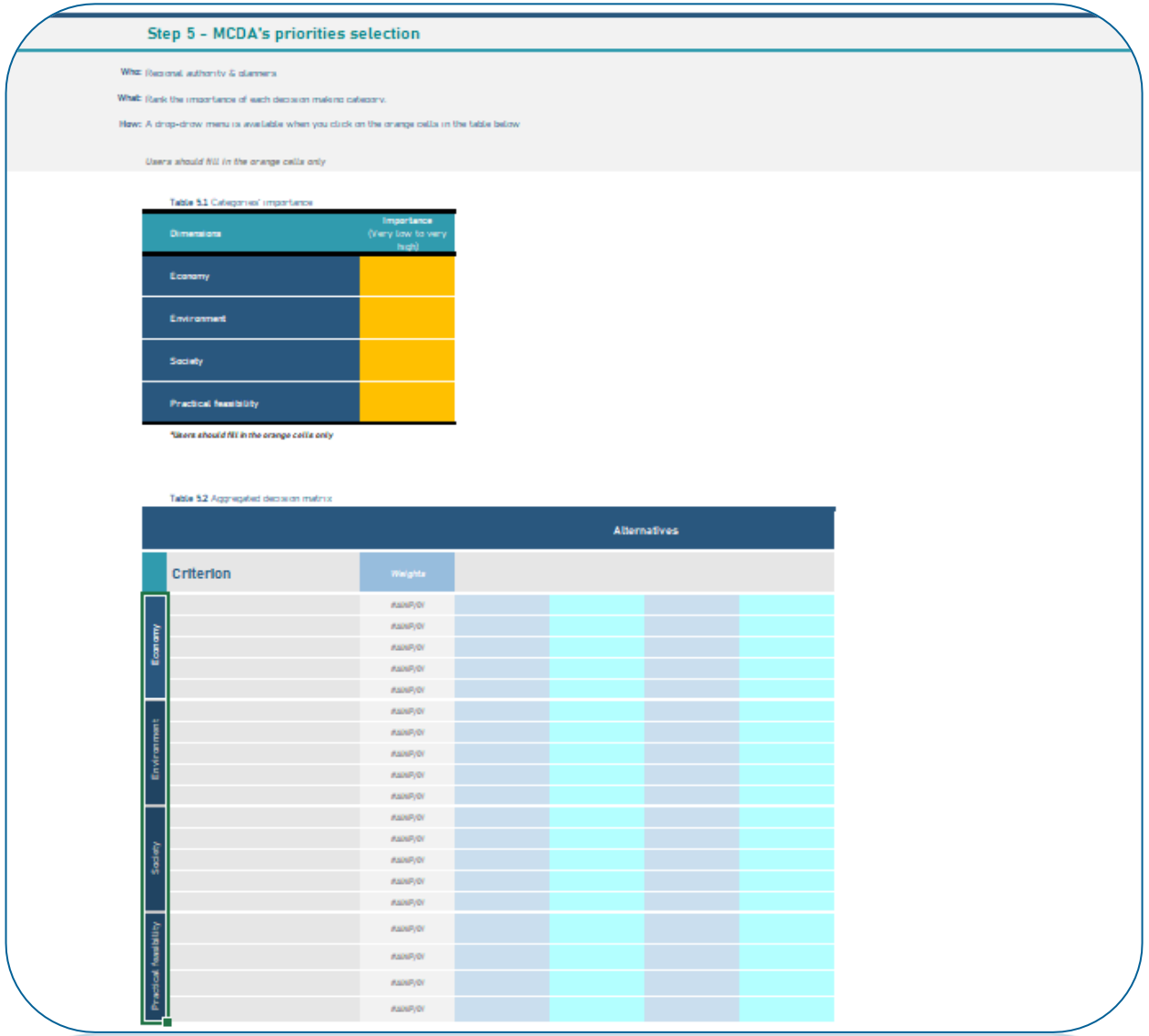
		Criterion	Unit	Alternatives			
Economic	1						
	2						
	3						
	4						
	5						
Environmental	6						
	7						
	8						
	9						
	10						
Societal	11						
	12						
	13						
	14						
	15						
Feasibility	16						
	17						
	18						
	19						

Quantify the indicator(s) for each one of the alternatives. If you cannot quantify this in absolute numbers you can use the linguistic scale proposed above

No action is needed - table filled in in Step 3

Cover | Instructions | 1-Alternatives | 2-Criteria | 3-Feasibility | 4-Quantification | 5-MCDA | Final Result

Step 5 – MCDA's priorities selection



Step 5 – MCDA's priorities selection

Who: Regional authority & planners

What: Rank the importance of each decision making category.

How: A drop-drow menu is available when you click on the orange cells in the table below

Users should fill in the orange cells only

Table 5.1 Categories' importance

Dimensions	Importance (Very low to very high)
Economy	
Environment	
Society	
Practical feasibility	

Users should fill in the orange cells only

Table 5.2 Aggregated decision matrix

			Alternatives			
	Criterion	Weights				
Economy		#####0!				
		#####0!				
		#####0!				
		#####0!				
		#####0!				
Environment		#####0!				
		#####0!				
		#####0!				
		#####0!				
		#####0!				
Society		#####0!				
		#####0!				
		#####0!				
		#####0!				
		#####0!				
Practical feasibility		#####0!				
		#####0!				
		#####0!				
		#####0!				

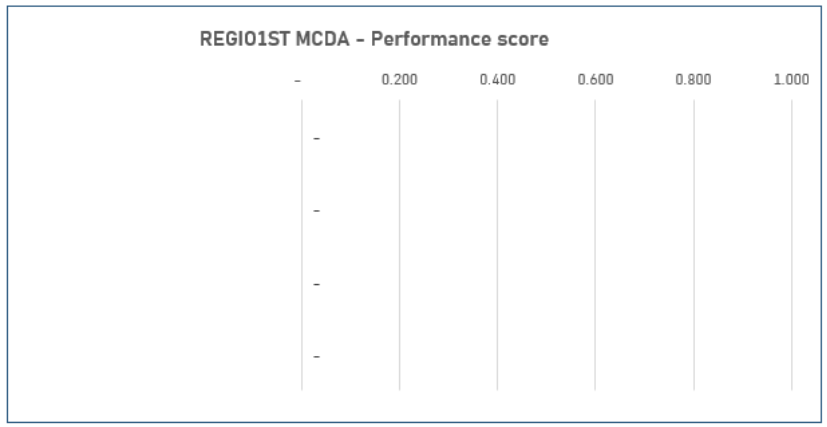
Final Ranking

Final Ranking

What: In this tab the alternatives' final ranking is presented

Table 6. Final Priorities' Ranking

Regional energy planning **Priorities**	**Performance score**	**Rank**	**Rank**



Cover | Instructions | 1-Alternatives | 2-Criteria | 3-Feasibility | 4-Quantification | 5-MCDA | Final Results

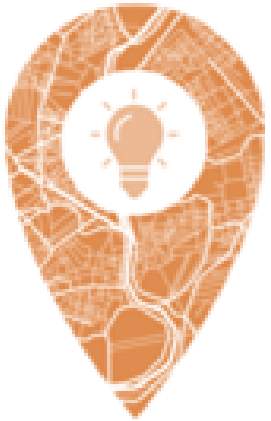
Demonstration

Final remarks

Final remarks

The Regio1st MCDA tool

- Does not function as a stand-alone tool only for conducting the practical feasibility assessment (Stage 6)
- Combines the input from Stage 6 and Stage 7. Results can be returned in Stage 7.
- Needs careful selection of criteria and appropriately weighting;
- Choose criteria that are relevant and independent
- Participatory assessment of the alternatives per qualitative criterion is desirable to ensure broad acceptance.



Next steps

- Practical implementation of tool in Regio1st pilot regions
- Evaluation in real assessment and decision-making conditions
- Feedback from testing the tool in real conditions will be key for improvements/adjustments

Thank you!

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Get Started | Regio1st-planning-framework (fedarene.org)

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