

# Policy Options for Harmonised RES Support in the EU

*-Multi-Criteria Analysis and Criteria  
Weighting*

Simone Steinhilber

Fraunhofer ISI

Contact:

Web: <http://www.isi.fraunhofer.de>

Email: [simone.steinhilber@isi.fraunhofer.de](mailto:simone.steinhilber@isi.fraunhofer.de)

# Overview

- What is multi-criteria decision analysis?
- Research question
- Criteria weighting exercise
- Preliminary results

# What is Multi-Criteria Analysis?

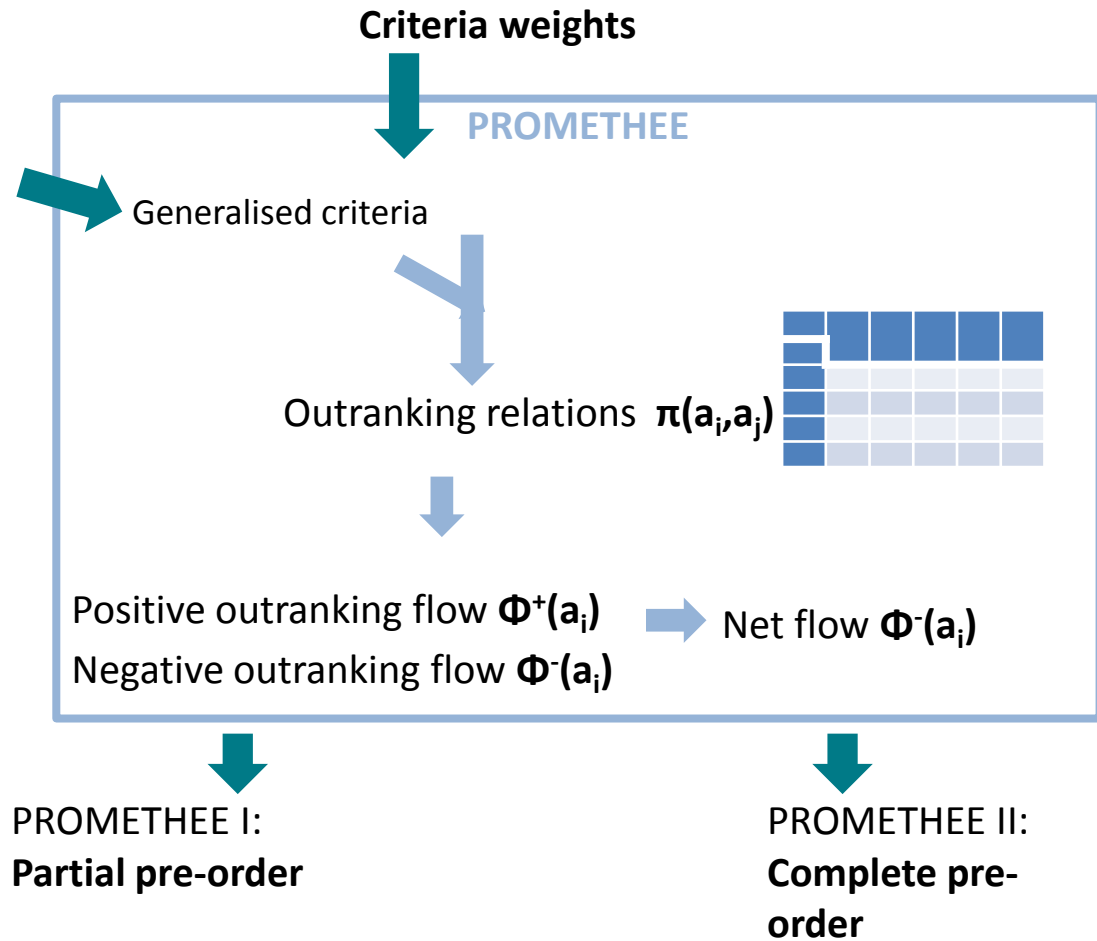
- Most human decision-making problems are of a multi-criterial nature
- But usually, no solution exists which optimises all the criteria at the same time
- The basic data of such a multi-criteria problem is summarised in the evaluation table:

Alternatives/Policy Pathways	$a_1$	$a_2$	$a_3$	$a_4$	$a_5$
Criteria					
Effectiveness : $f_1$	$f_1(a_1)$	$f_1(a_2)$	$f_1(a_3)$	$f_1(a_4)$	$f_1(a_5)$
Static efficiency: $f_2$	$f_2(a_1)$	$f_2(a_2)$	$f_2(a_3)$	$f_2(a_4)$	$f_2(a_5)$
Dynamic efficiency: $f_3$	$f_3(a_1)$	$f_3(a_2)$	$f_3(a_3)$	$f_3(a_4)$	$f_3(a_5)$
Env. and econ. effects: $f_4$	$f_4(a_1)$	$f_4(a_2)$	$f_4(a_3)$	$f_4(a_4)$	$f_4(a_5)$
Equity: $f_5$	$f_5(a_1)$	$f_5(a_2)$	$f_5(a_3)$	$f_5(a_4)$	$f_5(a_5)$
Soc.-pol. acceptability: $f_6$	$f_6(a_1)$	$f_6(a_2)$	$f_6(a_3)$	$f_6(a_4)$	$f_6(a_5)$
Legal feasibility: $f_7$	$f_7(a_1)$	$f_7(a_2)$	$f_7(a_3)$	$f_7(a_4)$	$f_7(a_5)$

- The analysis will produce a ranking of alternatives, depending on how highly each alternative scores in each criterion
- Obviously, the ranking also depends on the importance attached to each criterion by the decision maker

Policy pathways	$a_1$	$a_2$	$a_3$	$a_4$	$a_5$
Criteria					
$f_1$	$f_1(a_1)$	$f_1(a_2)$	$f_1(a_3)$	$f_1(a_4)$	$f_1(a_5)$
$f_2$	$f_2(a_1)$	$f_2(a_2)$	$f_2(a_3)$	$f_2(a_4)$	$f_2(a_5)$
$f_3$	$f_3(a_1)$	$f_3(a_2)$	$f_3(a_3)$	$f_3(a_4)$	$f_3(a_5)$
$f_4$	$f_4(a_1)$	$f_4(a_2)$	$f_4(a_3)$	$f_4(a_4)$	$f_4(a_5)$

Evaluation table



Source: own visualisation based on information from Brans et al.(1986) How to select and how to rank projects: The PROMETHEE method.

# Research Question

**Which alternatives (policy pathways) regarding the harmonisation of RES-E support schemes are acceptable for a broad range of political decision makers with differing preferences?**

We are not trying to find the one „correct“ solution

We do want to...

- objectify the policy discussion
- uncover the preferences of different stakeholder groups and make them more explicit
- identify the range of policy pathways which offer potential for compromise

# Criteria Weighting

Assumption:

- Different stakeholders will attach different weights to the criteria

Do the various stakeholder groups have typical “weighting profiles”?

How does this affect the preference ranking of policy pathways? And is there room for compromise for decision makers who allocate weights differently?

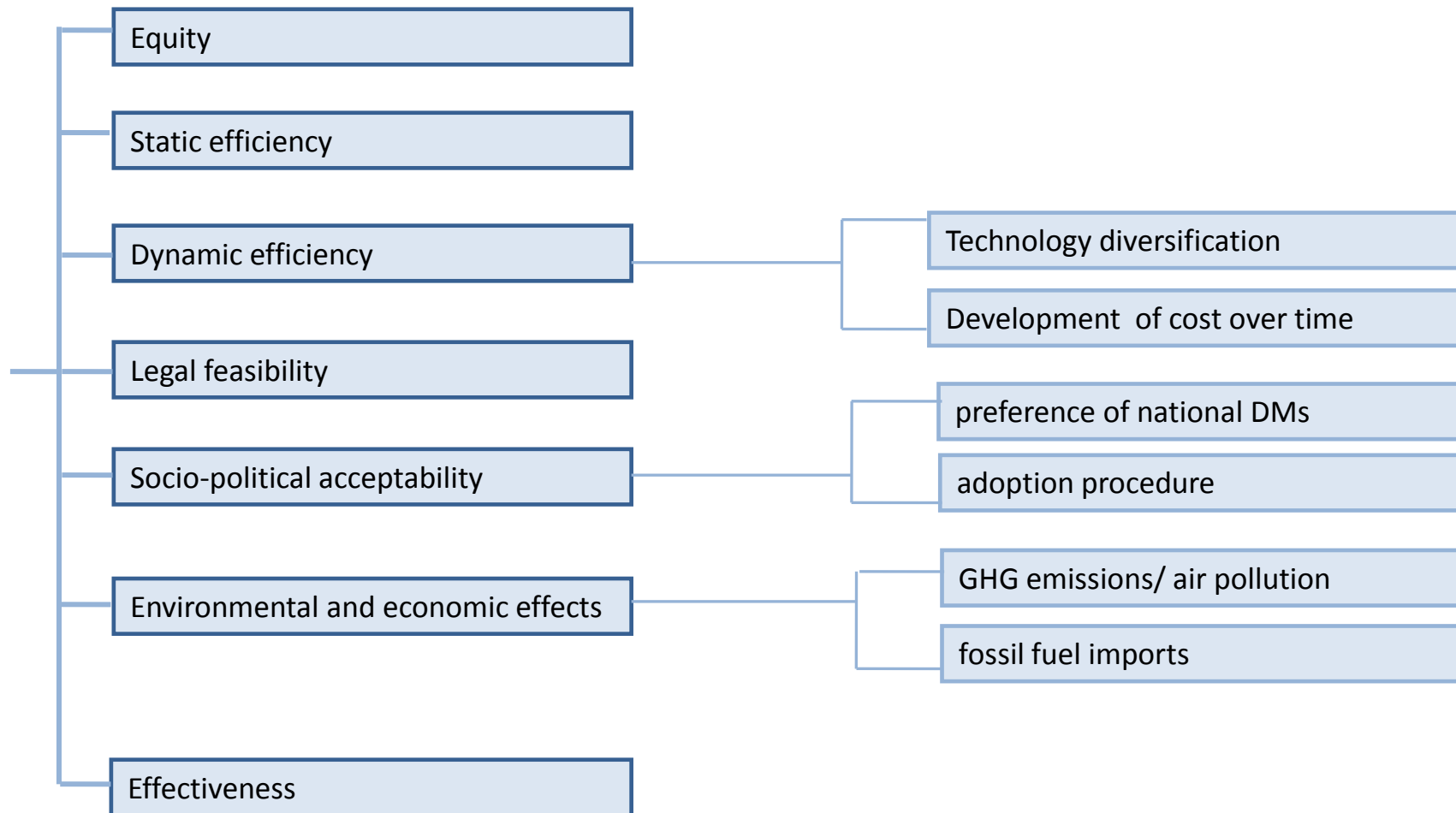
# Criteria Weighting

## Kindly fill in the criteria weighting questionnaire

- We want to collect criteria weightings from you to get an idea of the spread of opinions
- The collected data will substantiate our assumptions on decision maker “prototypes”
- As the questionnaire respondents do not constitute a representative sample, the responses will not be fed into the analysis directly. They will be combined with other methods (expert interviews, literature analysis) to deduct appropriate weighting vectors

All the information you provide will be treated confidentially by Fraunhofer ISI!  
Please fill in the reverse side of the questionnaire, as far as you feel comfortable.

# Assessment Criteria



# Equity

- Even if an instrument leads to net benefits for society as a whole, there will be winners and losers
- On Member State level: Does a given instrument lead to a concentration of the costs of RES-E promotion in a limited number of countries?
- Relevant data provided by Green-X modelling

**Indicator:**

Variation of policy cost per GDP (or GDP/capita) across EU-27 (Standard deviation)

# Static efficiency (cost-effectiveness)

- Achievement of a given short-run RES-E target at the lowest possible cost to society
- Equimarginality Principle: Cost-effectiveness is attained when an instrument encourages proportionally greater RES-E deployment by those firms and installations with lower RES-E deployment costs, and lower RES-E deployment by firms with higher deployment costs.
- Relevant data provided by Green-X modelling

**Indicator:**

Support cost [€/GWh]

+

System services cost (transmission and distribution cost, back-up cost) [€/GWh]

# Dynamic efficiency

- Ability of an instrument to generate a continuous incentive for technical improvements and costs reductions in renewable energy technologies
- Key in a problem with long-term horizons such as climate change
- Relevant data provided by Green-X modelling

**Indicator:**

Development of investment cost over time (technology-specific rate of change weighted by the technology portfolio in the end year or the average portfolio during the time interval)

Technology diversification (Herfindahl-Hirschman-Index as a measure of concentration)

# Legal feasibility

- two aspects: legislative competence; and compatibility with other EU primary and secondary law
  1. Does the EU have competence to legislate with regard to each specific pathway?
  2. all of the provisions of EU primary and secondary law which could be affected have to be listed and the compliance of each respective pathway has to be assessed. (Example: rules of the internal market, esp. on free movement of goods and competition)
- Data from legal analysis

**Indicator:**

EU competence to legislate: yes/no → only „yes“-pathways included in MCDA model

Compliance with EU primary and secondary law: Likert scale

# Socio-political acceptability

- related to the existence of real or perceived local drawbacks or benefits for specific Member States (MSs) or regions
- Related to support cost and to economic and environmental effects
- (perceived) social acceptability of RES-E policies at the MS level can be assumed to translate into a preference of national policy-makers for a specific pathway
- Data from surveys to decision makers and experts, and from legal analysis

**Indicator:**

Preference of national decision makers => survey

Adoption procedure => qualitative legal analysis; scale from „easy“ to „difficult/impossible“

# Environmental and economic effects

- Positive effects are possible for the country where the RES-E plants are located, or for the EU as a whole
- Here we focus on benefits for the EU as a whole
- Relevant data provided by Green-X modelling

**Indicator:**

GHG emissions and air pollution (deployed technologies \* emission factors)

Fossil fuel imports [ktoe] in 2030, or over time span 2020-2030

# Effectiveness

- Ability of a policy pathway to trigger deployment. Does this pathway enable EU Member States to achieve the RES(-E) target?
- Relevant data provided by Green-X modelling

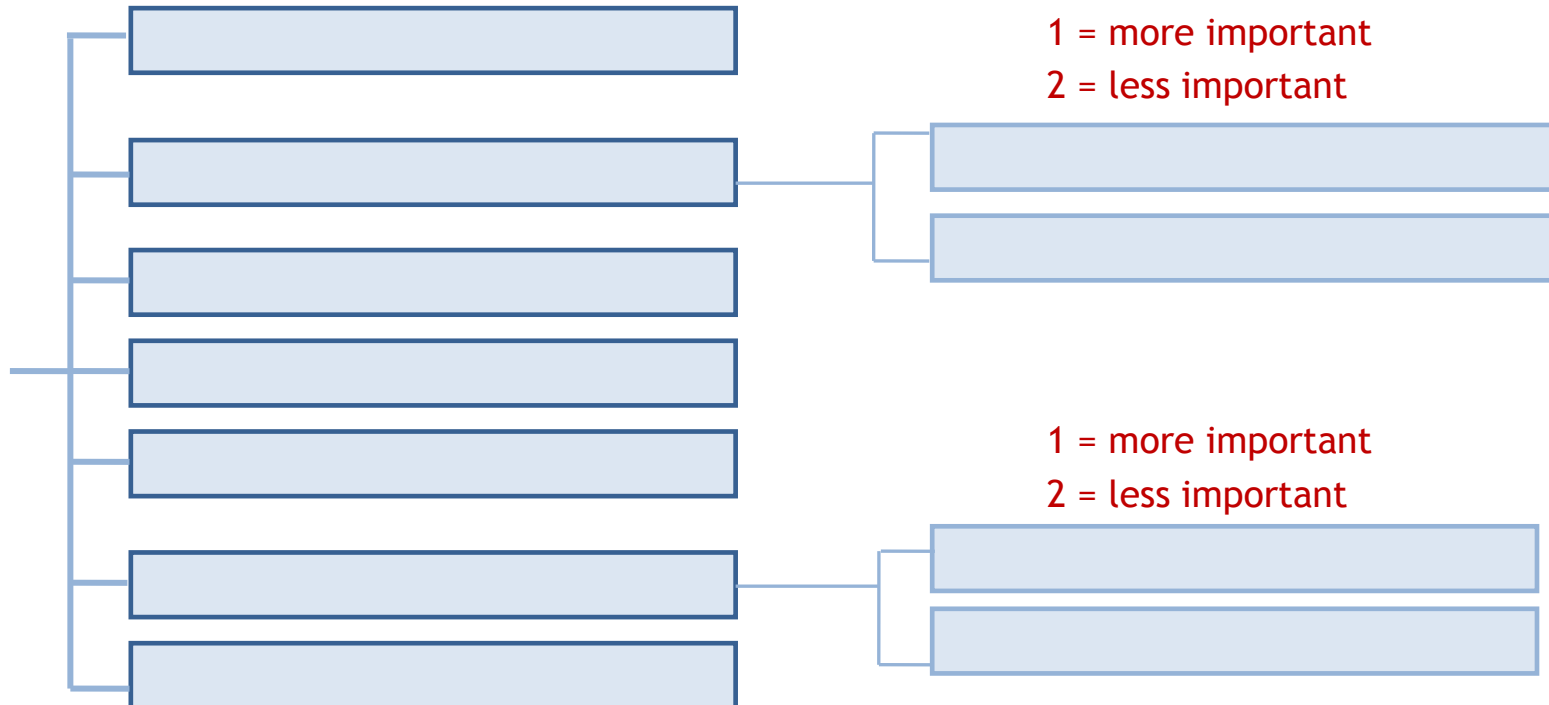
**Indicator:**

Degree of target achievement (% RES-E share)

# Questionnaire

- Please take a few minutes to rank the criteria

1 = most important  
7 = least important

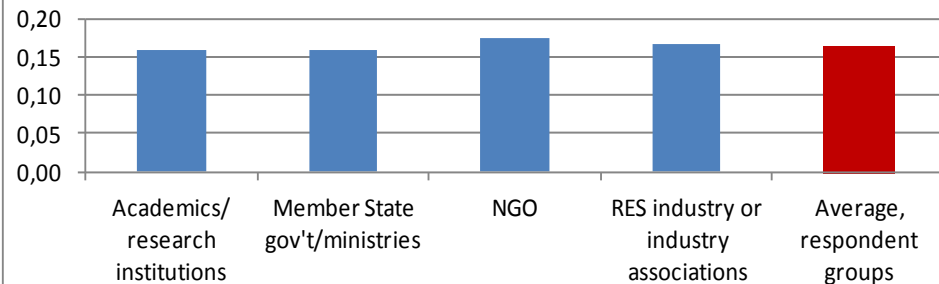


# Preliminary results

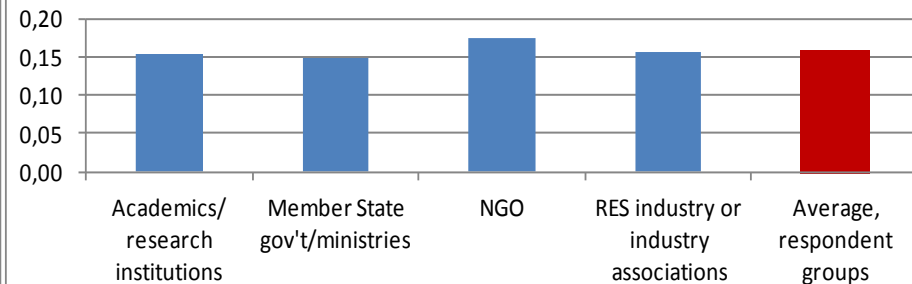
- 49 respondents so far, mostly from the following groups:
  - academics/research institutions
  - Member State governments/ministries
  - NGOs
  - RES industry or industry associations

# Preliminary results

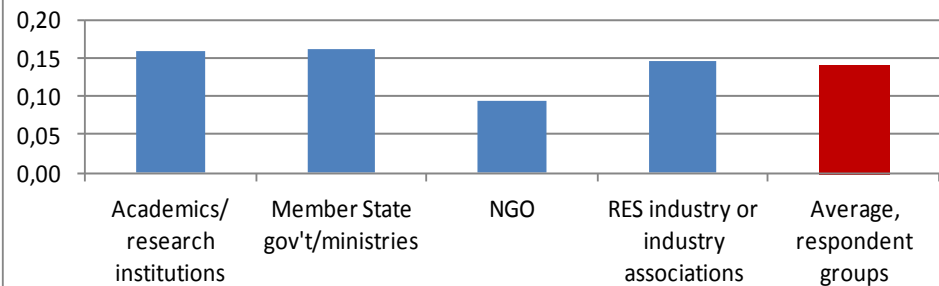
## Effectiveness



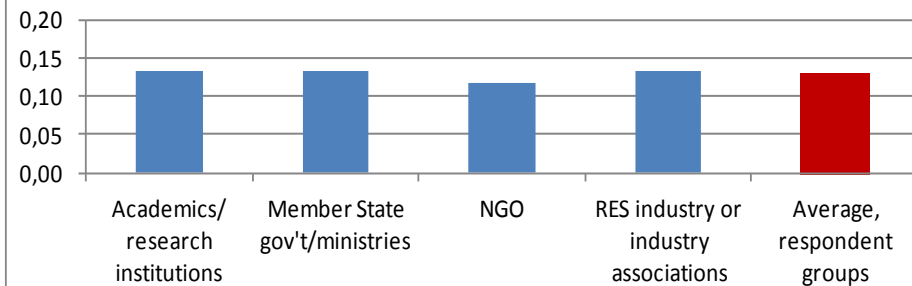
## Dynamic Efficiency



## Static Efficiency

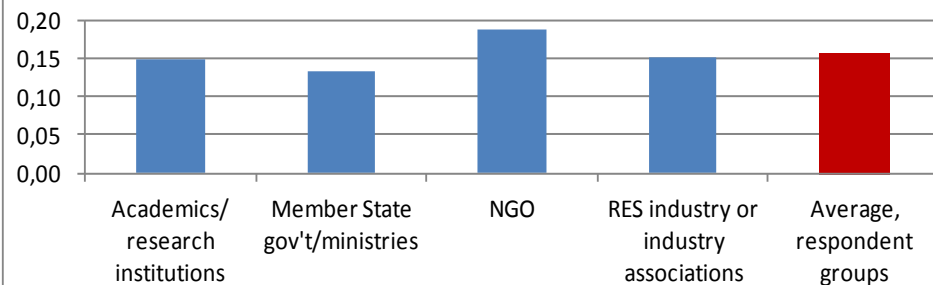


## Equity

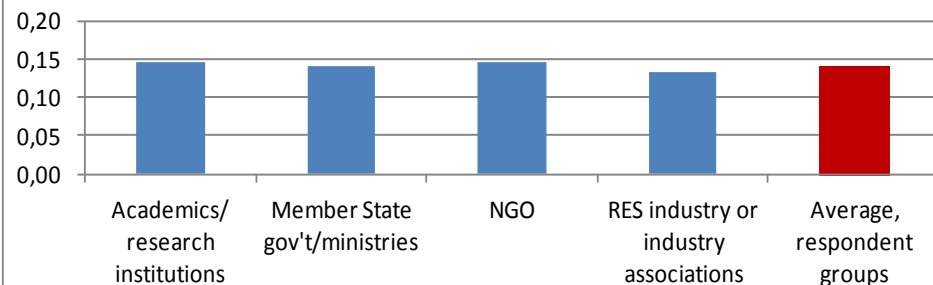


# Preliminary results

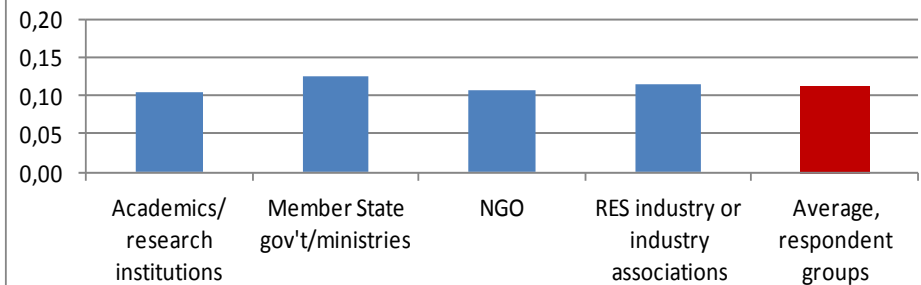
## Environmental and Economic Effects



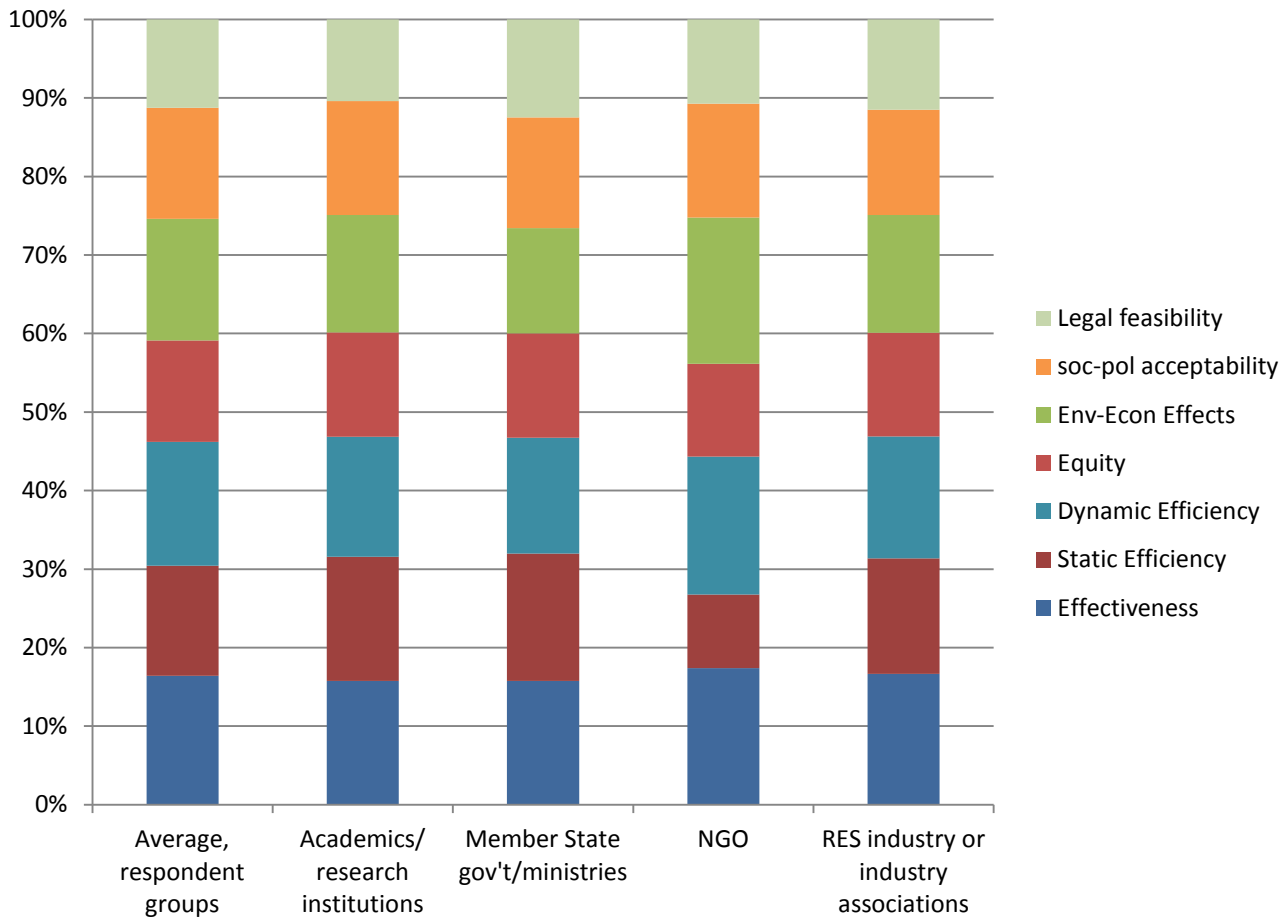
## Socio-political Acceptability



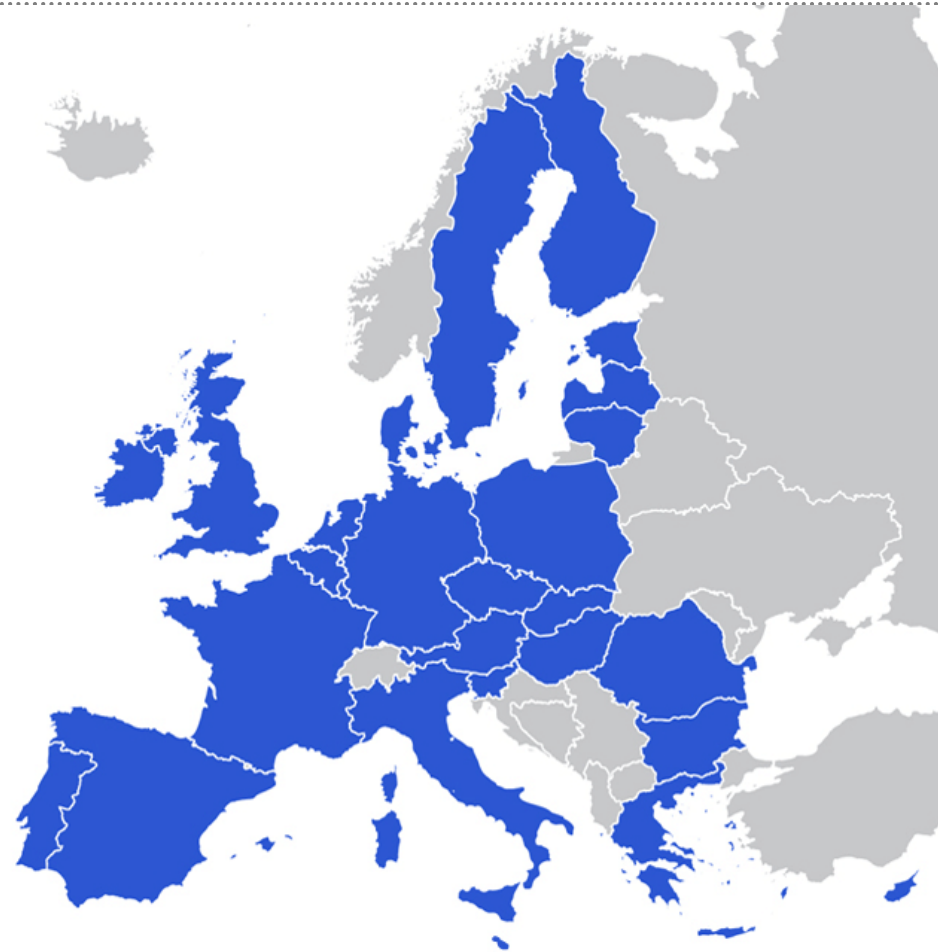
## Legal Feasibility



# Preliminary results



Thank you for your  
attention!



# ANNEX: Methodology

PROMETHEE was chosen because:

- We are dealing with a discrete solution space/ a finite number of possible alternatives
- The model can handle fuzzy, incomplete, or subjective information about alternatives
- Limited compensation between criteria: very weak performance in one criterion cannot be completely compensated by very good performance in another.
- Provides options for group decision making, with decision makers giving different weights to criteria.