Methodology for the evaluation of transport policy instruments: TOPSIS approach

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Introduction (I)

Share of RES was 3.65% in 2019. +16.8% since 2014 (last 5 years) or +21.0% since 2012. Share of RES at least 14% until 2030 (directive 2018/2001/EC).

Fig.1. Energy use of transport sector in Latvia.
Introduction (II)

Greenhouse gas (GHG) emissions keeps rising in EU
Introduction (II)

Policy instruments need to be put in place to reduce future increases in energy consumption and GHG emissions. The possibilities are many and varied, how to achieve this, but how to choose the most promising direction?

The methodology described in the study envisages conducting a survey of industry experts, as well as processing the obtained data with the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method to determine the most promising policy instruments.
Methodology (I)

*Choice of policy instruments.*

This phase is based on existing legislation as well as positive examples from other countries. The described methodology offers an evaluation of 28 policy instruments.

- **Taxes** (reduction for alternative fuels/ increase for fossil fuels)
- Subsidies for *vehicles purchase*
- Establishment of alternative fuel cycling *infrastructure*.
- Increasing the *mandatory biofuel blend*.
- **Subsidization** of biofuel production / capital costs of biofuel plants
- **Free parking** for zero-emission and low-emission vehicles / Increasing parking fees for vehicles using conventional fuels
- Support of *public transport*
- etc.
Methodology (II)

Choice of evaluation criteria

Policy instruments are evaluated according to 4 criteria:

• **Required investments**, where 1 - the implementation of the measure does not require financial investment, and 10 - the implementation of the measure requires significant financial investments;

• **A monitoring mechanism**, where 1 - the implementation and monitoring of the measure is simple, and 10 - The implementation and monitoring of the measure is difficult;

• **RES promotion potential**, where 1 - the measure has minimal or no effect on the increase of the share of RES, and 10 - the measure significantly affects the increase of the share of RES;

• **Public support**, where 1 - the measure has no support or there is (is expected to have) minimal support in society, and 10 - the event has (is expected to have) high public support.
Methodology (III)

**Evaluation of alternative fuels**

- **Environmental aspect** *(how much the identified RES support will contribute to a negative impact on the environment?)*

- **Technological aspect** *(how developed is certain RES technology?)*

- **Social aspect** *(how much the support for the given technology will promote the creation of new jobs?)*
# Methodology (IV)

## Weighting

*The sum of the weights is equal to 1*

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Methodology (V)

**TOPSIS analysis**

1. Information on alternatives and criteria creating a matrix
2. Matrix normalization
3. Determination of criterion weights
4. Distance from the ideal option
5. Ideal and anti-ideal option
6. Weighted decision matrix
7. Prioritization
8. Sensitivity analysis

**Problem definition**

**Literature analysis**

**Data collection**

**Expert method**
Conclusion

Using the proposed methodology, several policy instruments can be evaluated, which aim to increase the share of RES, not only in terms of RES promotion potential, but also in terms of necessary investments, monitoring mechanism, and public support, considering expert evaluation.

The second part of the survey allows legislators and researchers to assess the most promising types of fuels which need more support.

The disadvantage of the method is its possible subjectivity. This can be avoided by interviewing only industry experts. It is also important to interview supporters of different types of alternative fuel vehicles (electricity, hydrogen biofuels, natural gas and biomethane) to get a broader view of the problem under study.
Thank you for your attention!