MAKING-DECISION BASED ON MULTI-CRITERIA APPROACH FOR SUSTAINABILITY ASSESSMENT AS A MAIN ELEMENT OF ENERGY POLICY

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Content of the presentation

1. Research motivation
2. Research goal and scope
3. Sustainability assessment framework
4. Case study
5. Conclusions & further research

1

Research motivation

Sustainability within energy policy

Ecosystem & Regulations

Problems in decision making

Problems

- Sacrificing one aspect for the other
- Lack of long-term perspective

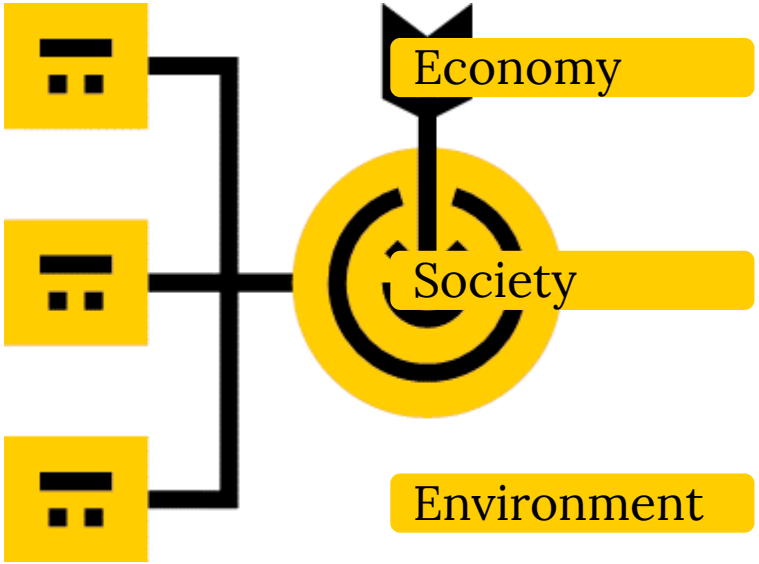
Answers

- Holistic approach
- Synergy between multiple dimensions

Sustainability

Sustainability assessment

- Sustainability as a SMART goal
- Mutlidimensional analysis



Specific

Measurable

Achievable

Relevant

Timely

Research motivation

- The importance of sustainability within energy policies is growing (European Environment Agency, 2018).
- Energy decisions are still lacking perspective of sustainability (Sathaye, Lucon et al., 2011).
- There is a need for tools for measuring sustainability due to the lack of standard methodology of such assessment (Todorov, Marinova, 2009; United Nations, 2014).

2 Research goals

Research goal and scope

Goal

- Providing a new approach to evaluation of energy technologies in terms of sustainability;
- Integrating three techniques for sustainability assessment.

Scope

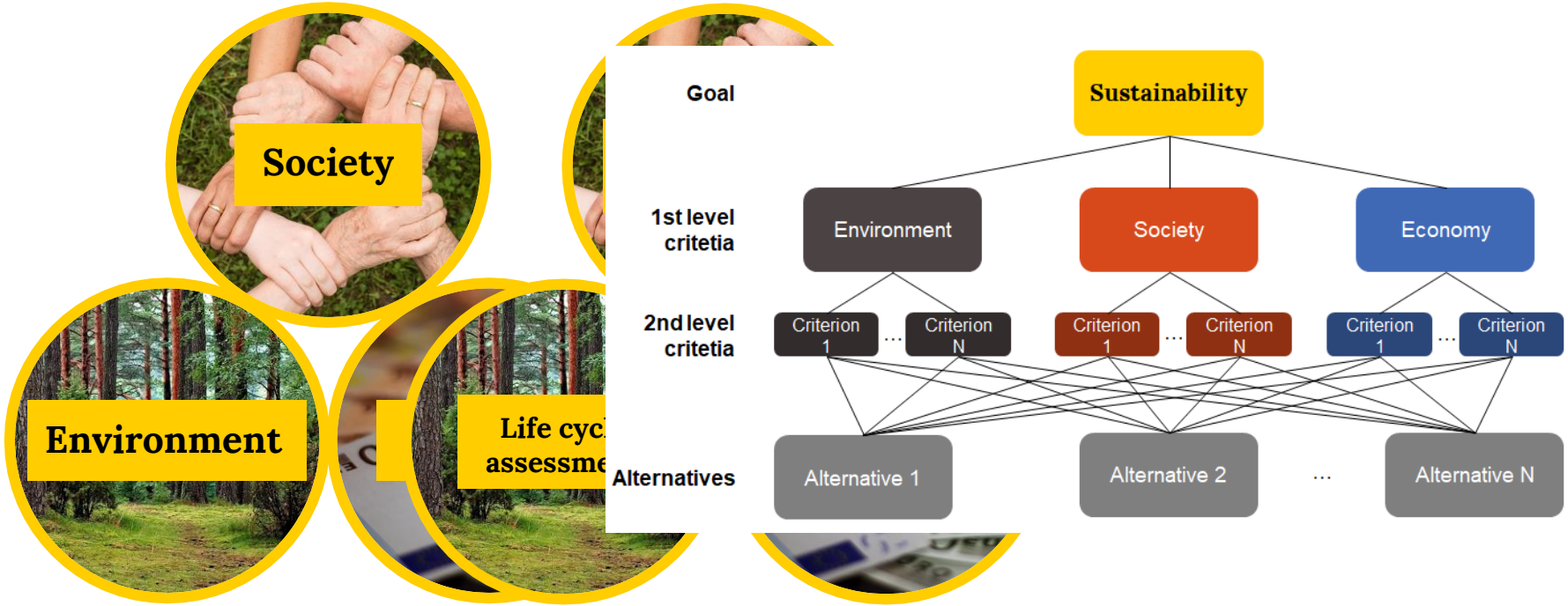
- Employing multi criteria decision making (MCDM) tool within the methodology – Analytical Hierarchy Process (AHP);
- Providing structured approach for the sustainability evaluation;
- Comparing three different scenarios according to the proposed methodology.

3

Proposed assessment framework

Methodology for measuring sustainability

Unique framework based on integration



Sustainal Life cycle sustainabi Multi criteria decision making (AHP)

Proposed methodology

1 Context of the assessment

Define the goal and the scope

Establish a team of decision-makers

Provide the information about the alternatives

Perform SWOT analysis

S	W
O	T

Analyse macro environment

P	E
S	T

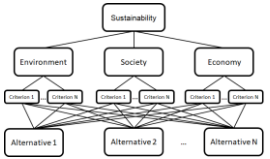
2 Inventory analysis

- Environmental LCA
- Social SLCA
- Economic LCC

Identify impact categories

Collect appropriate data

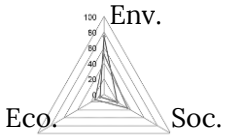
Carry on life cycle assessments



Define weights using AHP

3 Calculations and results presentation

Perform the calculation



Present the results

4 Results interpretation and discussion

Interpret and analyse the outcomes of the study, discuss the results

4 Case study

Selection of the most sustainable PV technology.

Context of the assessment

Selecting the most sustainable alternative

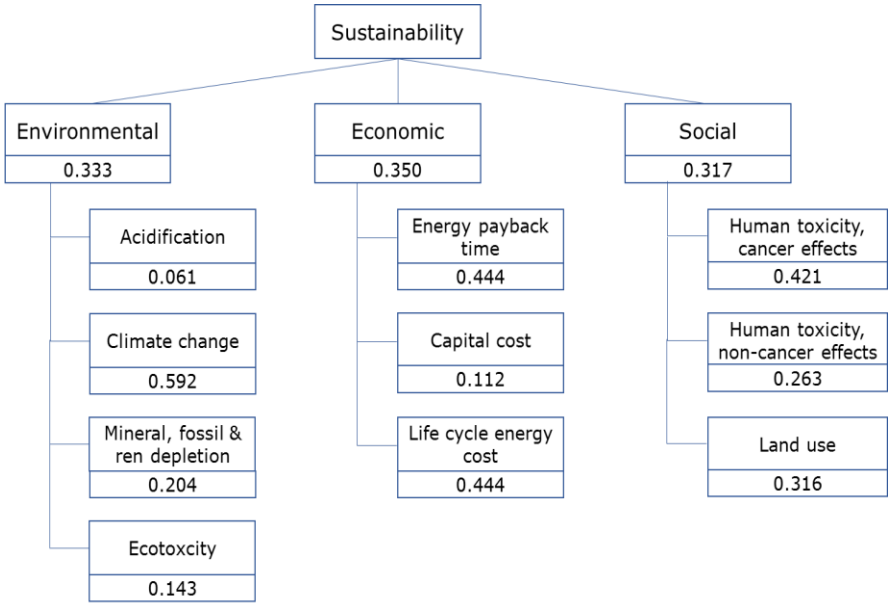
Monocrystalline Silicon
Mono-Si

Multicrystalline Silicon
Multi-Si

String Ribbon
Ribbon-Si

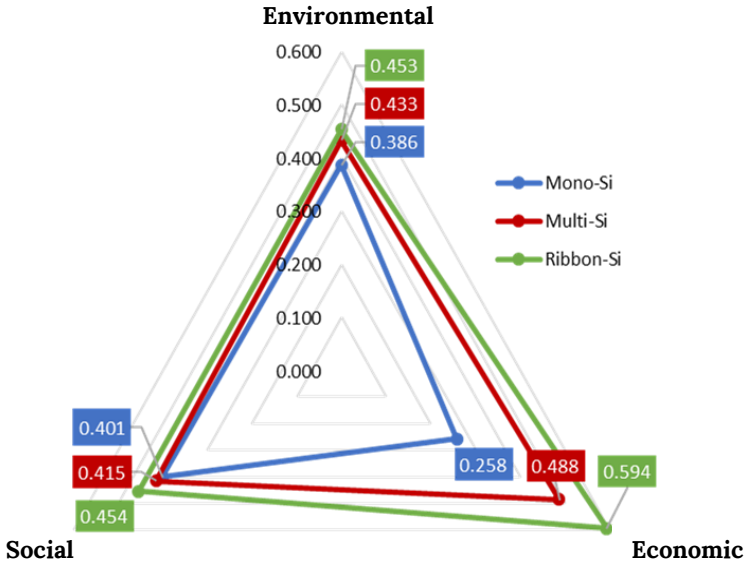
Inventory analysis

Stage of assessment	Resources
Criteria selection	The European Technology and Innovation Platform for Photovoltaics
Assessment input data	EcoInvent database
Assessment tool	WebService-Energy
Assessment method	Eco Indicator 99
Impact weights	Studies and interviews conducted among numerous scientists and experts

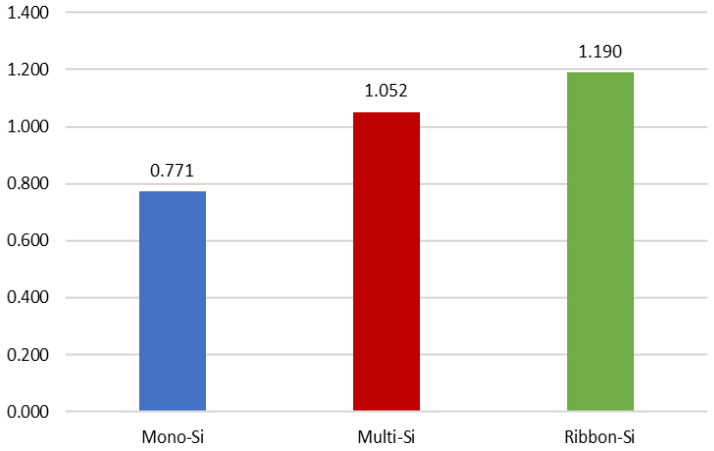


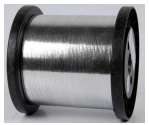
Results

The scores for the selected PV technologies concerning sustainability dimensions



Sustainability score for each of the selected PV technologies





5 Conclusions

Research findings

- Sustainability evaluations are highly dependent on the selected criteria
- The more criteria will be taken into account, the more authentic evaluation will be
- The biggest challenge is the data availability
- The process of sustainability assessment is time consuming and costly

Further research

- To recognize social criteria
- To collect data (sharing competetive information)
- To shorten the duration of assessment

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Thank you!

Any questions?

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