Other deliverable (PP)– D2.3

Correlation of I&M with the Criteria developed in WP1 (WP2)

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Glossary

Term	Description
Bioeconomy	Economy based on the production of renewable biomass resources such as plants, wood and waste, and their conversion into food, feed, biobased products and bioenergy
Bioeconomy gap	Difference between the current exploitation of biomass in a region and its potential exploitation
BISO	BioEconomy Observatory, that collects data and information on the bioeconomy in EU member states
Benchmark	Point of reference against which information of region x may be compared
BERST	BioEconomy Regional Strategy Toolkit
Case study region	Region in which a quantitative and qualitative study is made of the development of the bioeconomy strategy and the results of this strategy
Catalogue	A complete list of items in systematic order. In this project, two catalogues are compiled: a catalogue of instruments and measures, and a catalogue of best practices and case studies
C&I	Criteria and indicators
CoP	Community of practice
Community of Practice	A way of developing networks by bringing together participants that have a common interest to learn and share information about certain issues on regional development of biobased clusters
Criterion (single) /criteria (plural)	A principle or standard by which something may be judged or decided. (NB: there are many synonyms for criteria: point of reference, standard, norm, yardstick, benchmark, touchstone, test, formula, gauge, scale, barometer)
Driver	Factors that can force/change the (bio)economic system in a certain direction; via simple and complex mechanisms. There are 3 types of drivers (D1.4, SAT-BBE): 1. systems drivers: relate to human processes (population growth, consumer preferences) and biophysical processes (climate change) 2. policy drivers: relate to policy environment, and to instruments, measures and targets 3. constraints: relate to availability of resources/production factors (land, water, human capital/labour, waste
Good practice	Description of an applied successful strategy to exploit the bioeconomy in a region, that can serve as lesson for other regions
Indicator	Indicators are ways to measure Or: an indicator is something that helps you understand where you are, which way you are going and how far you are from where you want to be.

	An indicator is a device providing specific information on the state or condition of something/of a parameter.
I&M	Instruments and measures (these can be seen as drivers)
Instruments	Policy instruments that use markets, price, and other economic variables to provide incentives for actors to exploit bioenergy resources
Measures	A range of tools to address bioenergy issues such as regulations, subsidies, taxes, emission/consumption quotas, etc.
BERST Metabase	Data (extended with information) on criteria and indicators in BERST project
Region	Smaller than a country; any geographically meaningful entity (not necessarily a political or administrative), as a combination of biological, social and geographic criteria; e.g. based on NUTS2/NUTS3 (Eurostat)
Regional profile	Standardized set of data on the socio-economic resources and performance of a region, with a specific focus on the bioeconomy potential. The subsectors of the bioeconomy are the base for developing the regional profiles in BERST. Read more
Smart specialisation	Framework combining industrial, educational and innovation policies (including their design, implementation, and evaluation) that promote new growth opportunities. To be built on a sound analysis of regional assets and technology. To be based on a strong partnership between businesses, public entities and knowledge institutions. Read more

1. Introduction

This report is submitted in compliance with deliverable D2.3 of Work Package 2 'Correlation of Instruments & Measures (I&M's) with the Criteria developed in WP1'.

The project call text expressed the need to '*compile a catalogue of instruments and measures that can be correlated against the criteria and will foster the development of regional bioeconomies*'. A variety of methods can be suggested to organise such a correlation. E.g. the Oxford Dictionary of English defines a correlation as:

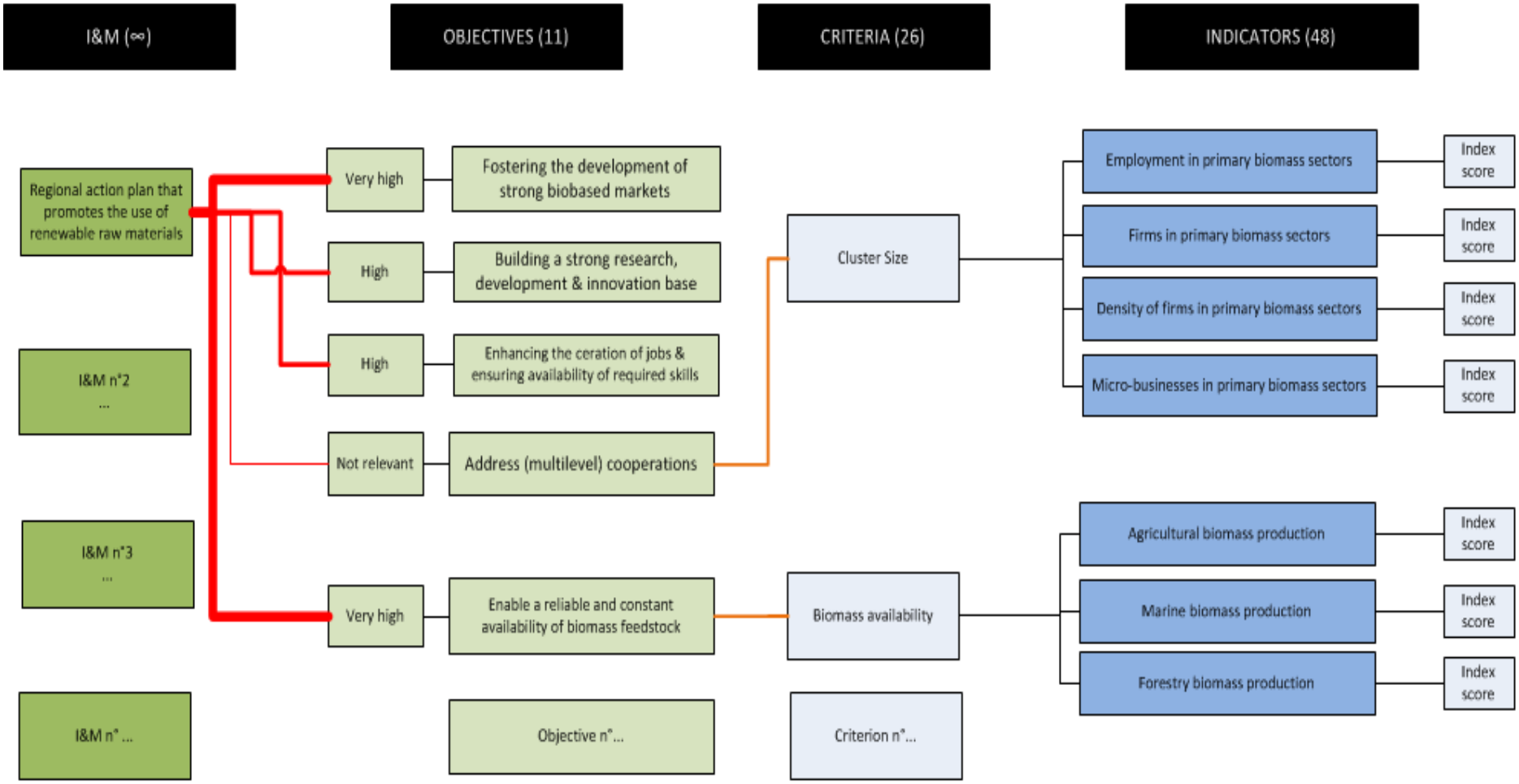
- a mutual relationship or connection between two or more things;
- the process of establishing a relationship or connection between two or more things;
- [Statistics] interdependence of variable quantities;
- [Statistics] a quantity measuring the extent of the interdependence of variable quantities.

Thus the term 'correlation' can be interpreted either as a direct and simple concept indicating the relationship or connection between two things or as a more complex statistical interdependency of variables.

The BERST regional project partners, representing seven EU regions, called for a final product (tool) that is easy to use by regional bioeconomy stakeholders; i.e. a tool that is KISS (Keep it Simple, Stupid, Keep it Short and Simple, Keep it Simple & Straightforward). In a response to this call the option was made to interpret the term 'correlation' in its simplest form reducing complexity for the end-user and increasing user-friendliness. Hence the ambition was to provide a simple and straightforward connection between I&M on the one hand and Criteria on the other.

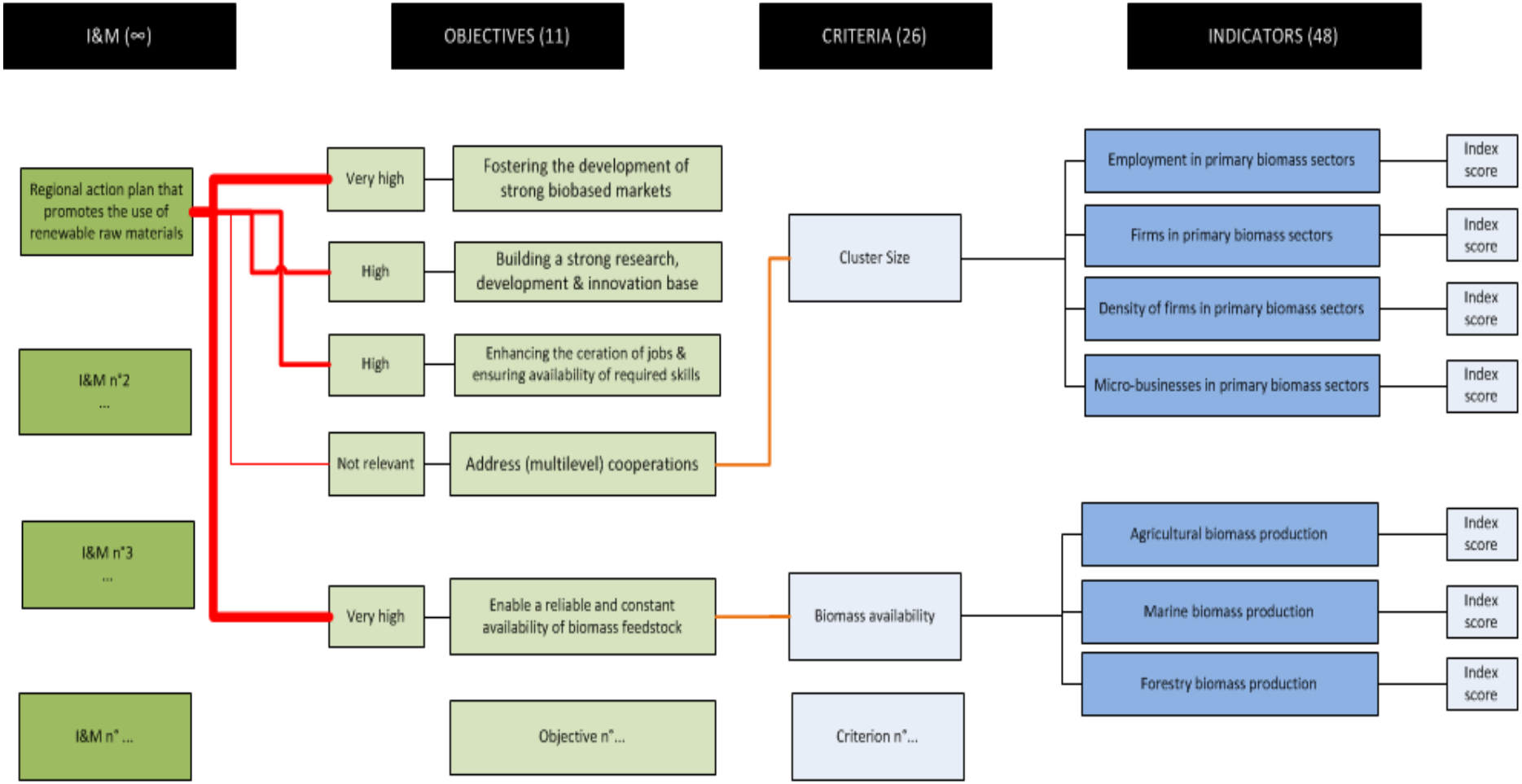
This Deliverable describes the suggested correlation methodology. A general overview of the correlation methodology is visually depicted in Figure 1.

General overview of the correlation methodology


I&M (∞)
OBJECTIVES (11)
CRITERIA (26)
INDICATORS (48)
Regional action plan that promotes the use of renewable raw materials
I&M n°2 ...
I&M n°3 ...
I&M n° ...
Very high
Fostering the development of strong biobased markets
High
Building a strong research, development & innovation base
High
Enhancing the ceration of jobs & ensuring availability of required skills
Not relevant
Address (multilevel) cooperations
Very high
Enable a reliable and constant availability of biomass feedstock
Objective n°...
Cluster Size
Biomass availability
Criterion n°...
Employment in primary biomass sectors
Firms in primary biomass sectors
Density of firms in primary biomass sectors
Micro-businesses in primary biomass sectors
Agricultural biomass production
Marine biomass production
Forestry biomass production
Index score
Index score
Index score
Index score
Index score
Index score
Index score

. The interrelations of the different building blocks in this overview will be gradually discussed throughout the report.

Figure 1. General overview of the correlation methodology



2. Instruments & Measures and their Objectives

2.1 Instruments & Measures

2.1.1 Definition

In an effort to define both terms separately the BERST-project defined them as follows[1].

- Instruments: policy instruments that use markets, price, and other economic variables to provide incentives for actors to exploit bioenergy resources
- Measures: a range of tools to address bioenergy issues such as regulations, subsidies, taxes, emission/consumption quotas, etc.

However a literature review learned that the terms 'Instrument' and 'Measure (I&M)' are often used as interchangeable terms depending on context and source. Difference in terms are mostly interpretational nuances. Therefor the added value of holding on to a clear separation between both terms was deemed low, as it could potentially be confusing or misleading for the end-users of the project's output (e.g. users looking for Instruments from their interpretative perception while others interpret these same Instruments to be Measures). Therefor the choice was made to consider 'Instruments & Measures' to be one conceptual term and define[2] it as:

A method or mechanism used by government/political parties, profit or non-profit organisations to achieve a desired effect through legal/regulatory, economic/financial or soft means.

- WHAT: a method or mechanism
- WHO: used by government/political parties, profit (business) or non-profit (NGO, individuals)
- WHY: to achieve a desired effect (i.e. boosting biobased economies)
- HOW: through legal/regulatory (binding), economic/financial or soft (non-binding) means.

From this definition it becomes clear that I&M's are to be broadly interpreted and are not restricted to their legislative or policy meaning (laws, regulation, subsidies,…) but stretch further taking into account soft or non-binding such as strategies, local industrial/scientific clustering, awareness campaigns,… Instruments and Measures can address e.g.:

- information and education (e.g. awareness campaigns, training, skill building,…)
- economic and financial instruments (e.g. support schemes, subsidies,…)
- research, development and deployment activities (e.g. research clusters, research agenda's,…)
- regulatory (binding) instruments (e.g. legislation, policy,…)
- voluntary (non-binding) initiatives (e.g. position papers, strategies,…)

2.1.1 Scope

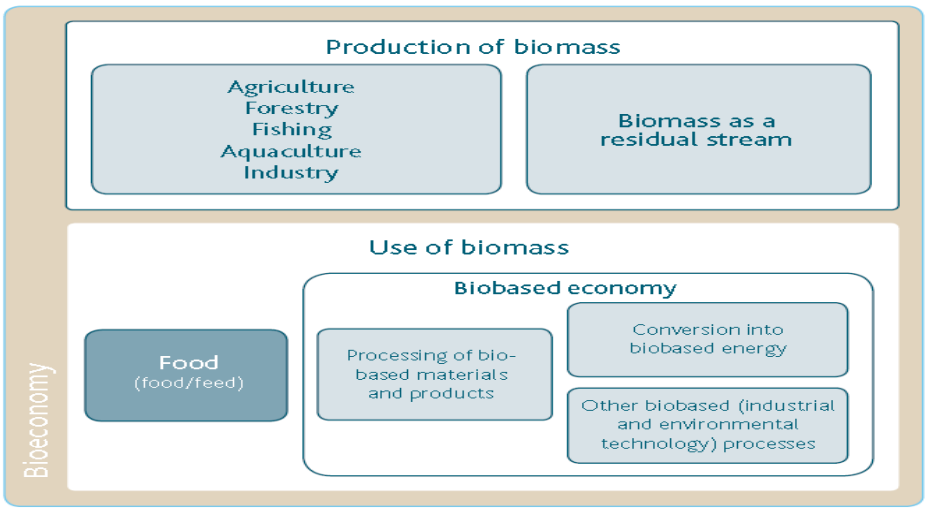
The catch line of the BERST project reads 'Building regional *BioEconomies*'. The scope of the project is reflected in its definition of the bioeconomy[3] i.e. it is *the economy based on the production of renewable biomass resources such as plants, wood and waste, and their conversion into food, feed, biobased products and bioenergy*. In a nutshell, the bioeconomy therefore includes all activities associated with the production of biomass and the various ways in which this biomass and its residual streams are subsequently processed and used.

The biobased economy is not explicitly defined in the European strategy, but following the logic of the abovementioned definition, it is that part of the bioeconomy in which biobased products and

[1] BERST discussion paper 1: Glossary of terms in BERST
[2] The definition is a merger of several sources; OECD, IEA, EIOS.
[3] BERST discussion paper 1: Glossary of terms in BERST.

materials are made and biomass is used in processes. As such the biobased economy is an integral part of the bioeconomy.

Figure 2. Bioeconomy and biobased economy[4]



2.1.1 Collected data

The type and detail collected in the on-line catalogue for I&M's is described in detail in deliverable D2.1 and the GUI[5] can be visited at https://berst.vito.be. In short, for each I&M a set of information themes is collected. This to the extent possible (not all data is available for each I&M) and according to the relevance of the information theme (not all information themes are relevant for each I&M). The table below provides an overview of the 20 information themes divided over 3 categories (key information, contact references and advanced information).

Table 1. I&M information categories and themes

Key Information	Contact References	Advanced Information
Short name (English)	Full name (English)	Feedstock type targeted[6]
Country/Region (up to NUTS3)[7]	Full name (native language)	Product type targeted[8]
Description[9]	Links[10]	Value Chain[11]
Goal/Aim[12]	Responsible authority	Enterprise Scale[13]
Type (and subtype)	Contact of responsible authority	Connection with National Policy[14]
Sector/Topic targeted[15]	Completed by[16]	Year started/ended
Status[17]		Budget[18]

[4] Bioeconomy in Flanders The vision and strategy of the Government of Flanders for a sustainable and competitive bioeconomy in 2030
[5] Graphical User Interface
[6] Provides information if I&M is dedicated to a specific feedstock type (agriculture, forestry, waste,…)
[7] Selects country/region for which the instrument or measure is applicable. You can detail up to the appropriate NUTS-level as required. (e.g., select 'Belgium', than select 'Flanders'). If an I&M is applicable to multiple regions e.g. for international or interregional cooperation this can be adopted as well (e.g. if applicable to the Netherlands and Germany, select 'Netherlands' than select 'Germany').
[8] Provides information if I&M is dedicated to a specific (end-)product (bioplastics, bioenergy, wood ,…)
[9] Provides a description of the I&M
[10] Provides hyperlinks to website information (e.g. legislation, general information, responsible ministries,…)
[11] Provides information if the I&M targets specific segment(s) of the value chain (e.g. primary production, transport/logistic, conversion,…)
[12] Describes primary goal (and secondary goal, if applicable) of the instrument or measure (e.g. increase bioenergy production, tax reduction on green jobs, position paper on sustainability, secure biomass supply,...)
[13] Provides information if the I&M targets a specific enterprise scale (large, SME).
[14] Provides information if a regional I&M is directly linked to (a result of) national policy.
[15] Selects the specific sector and/or topic that is targeted by the I&M. Multiple selections are possible to indicate combinations (e.g. selecting 'forestry' and ' employment' indicates an I&M focuses on job creation in the forestry sector; selecting only 'employment' indicates the I&M addresses the bioeconomy overall).
[16] Provides affiliation or email contact of the entity which submitted the information into the tool.

2.2 Objectives

Figure 2 shows that the bioeconomy covers a variety of activities. The concept of bioeconomy is complex. Therefore the way in which regional I&M's help building bioeconomies can differ greatly from one I&M to another, as they can concern different regions, can have different goals or can target different sectors or topics, different feedstock, different end-products,… As a result a variety of I&M's is adopted across EU regions.

Due to this variety it is a challenge to correlate all these individual I&M's to the defined Criteria in WP1[19][20] in a way that is simple, straightforward, user-friendly and at the same time still generates sensible outcomes.

To realise such an outcome the I&M's where approached from a "why-?" perspective. After all, there is a reason why I&M's are developed and implemented? An I&M is not at goal as such. It is a mean to realise a certain objective. In this contact an objective is defined as *a specific result or goal that a region aims to achieve in boosting its bioeconomy.*

The variety, and seemingly unlimited number, of I&M's that regions can deploy stands in contrast with the rather limited number of reasons (objectives) why these I&M's are deployed. Based on i) literature review, ii) input from BERST Community of Practice partners, iii) BERST regional partners and BERST scientific partners a list of objectives was inventoried and validated by the BERST project partners. The result is the following list of 11 Objectives.

1. Address the cooperations needed to start biobased businesses
2. Ensuring the availability of financial resources
3. Building a strong research, development and innovation base
4. Building competitive biobased industries
5. Creating a reliable and enabling policy setting
6. Creating an attractive environment including infrastructure
7. Enable a reliable and constant availability of biomass feedstock
8. Enhancing the creation of jobs and ensuring avail. of required skills
9. Fostering effective governance and involvement of the society
10. Fostering the development of strong biobased markets
11. Learning from the strategies/actions of other regions, clusters,...

2.3 Correlating Instruments and Measures with their Objectives

Depending on the type an I&M can be relevant or address several objectives. Next to that the degree of impact of an I&M on each objective to which it is relevant can vary. An example:

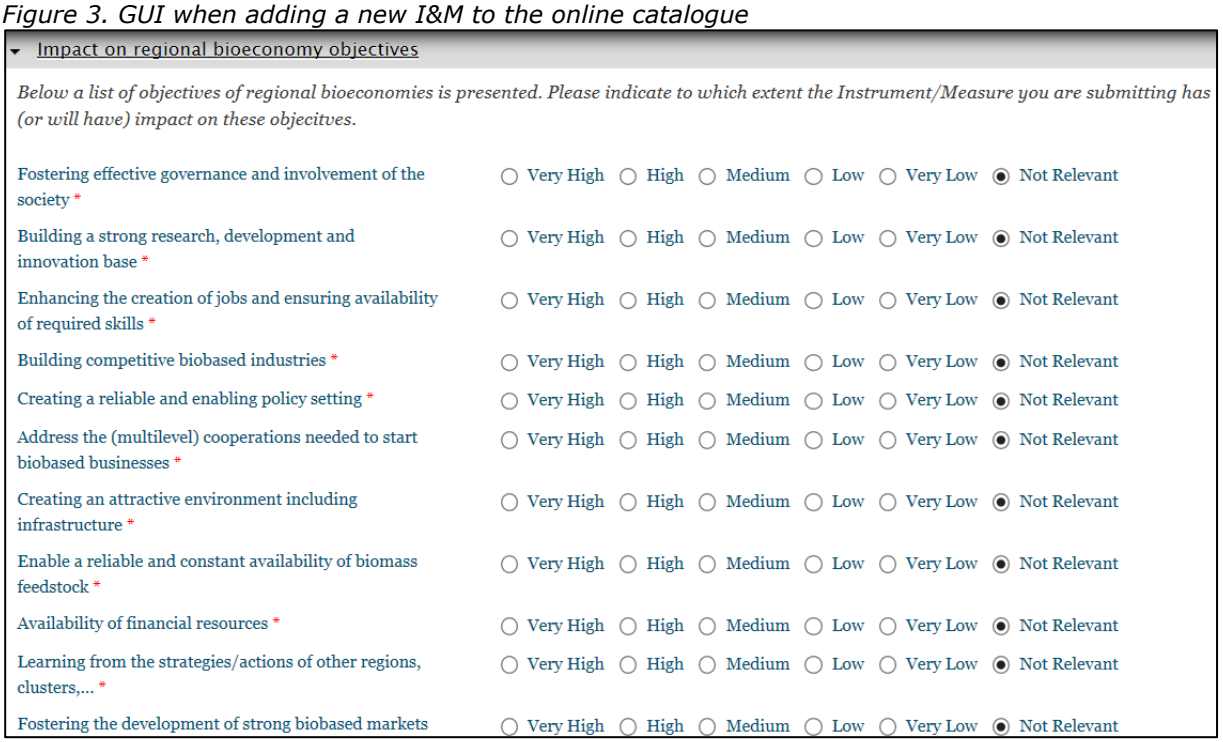
A 'regional policy strategy' is an I&M that clearly directly addresses the objective 'Creating a reliable and enabling policy setting' but next to that can also indirectly address 'Enhancing the creation of jobs' and 'Ensuring the availability of financial resources'.

Both the number of objectives addressed by an I&M as well as the impact of an I&M on each of these objectives are captured as follows. When adding a new I&M to the online catalogue the submitter can indicate which are the relevant objectives and to which extent (very high, high, medium, low, very low) these objectives are impacted by the I&M.

Figure 3 shows the GUI when adding a new I&M to the online catalogue. For new I&M's all objectives have a 'not relevant' value by default which can be adjusted by the submitter.

[17] Indicates whether a I&M is in force, in revision, superseded or ended
[18] Provides additional information if a specific budget is foreseen for the I&M.
[19] These criteria are defined in WP1 (see D1.1). The total number of unique Criteria is 10.
[20] BERST discussion paper 1: Glossary of terms in BERST defines Criteria as: A principle or standard by which something may be judged or decided.

Figure 3. GUI when adding a new I&M to the online catalogue



Impact on regional bioeconomy objectives

Below a list of objectives of regional bioeconomies is presented. Please indicate to which extent the Instrument/Measure you are submitting has (or will have) impact on these objecitves.

Fostering effective governance and involvement of the society *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Building a strong research, development and innovation base *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Enhancing the creation of jobs and ensuring availability of required skills *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Building competitive biobased industries *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Creating a reliable and enabling policy setting *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Address the (multilevel) cooperations needed to start biobased businesses *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Creating an attractive environment including infrastructure *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Enable a reliable and constant availability of biomass feedstock *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Availability of financial resources *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Learning from the strategies/actions of other regions, clusters,... *	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant
Fostering the development of strong biobased markets	○ Very High	○ High	○ Medium	○ Low	○ Very Low	◉ Not Relevant

After having submitted an I&M to the catalogue the GUI looks as follows e.g. **Error! Not a valid bookmark self-reference.** shows the impact profile for the I&M "regional action plan that promotes the use of renewable raw materials" (see also https://berst.vito.be/node/21 - Impact on regional bioeconomy objectives). Figure 3 shows the impact on some objectives is (very) high while this is (very) low or even not relevant for others. It is clear that this impact profile will differ depending on the type of I&M.

Figure 4. Screenshot from the GUI. Objectives of an I&M

Impact on regional bioeconomy objectives

Fostering effective governance and involvement of the society:	Very High
Building a strong research, development and innovation base:	High
Enhancing the creation of jobs and ensuring availability of required skills:	High
Building competitive biobased industries:	Low
Creating a reliable and enabling policy setting:	Very High
Address the (multilevel) cooperations needed to start biobased businesses:	Not Relevant
Creating an attractive environment including infrastructure:	Very High
Enable a reliable and constant availability of biomass feedstock:	Very High
Availability of financial resources:	Low
Learning from the strategies/actions of other regions, clusters,...:	Not Relevant
Fostering the development of strong biobased markets:	Very Low

Following the aforementioned procedure allows for all I&M's to be correlated with the 11 Objectives.

Main goal of this correlation effort is to synthesise simple and straightforward results out of a complex variety of I&M's making them more manageable in order to come to sensible outcomes.

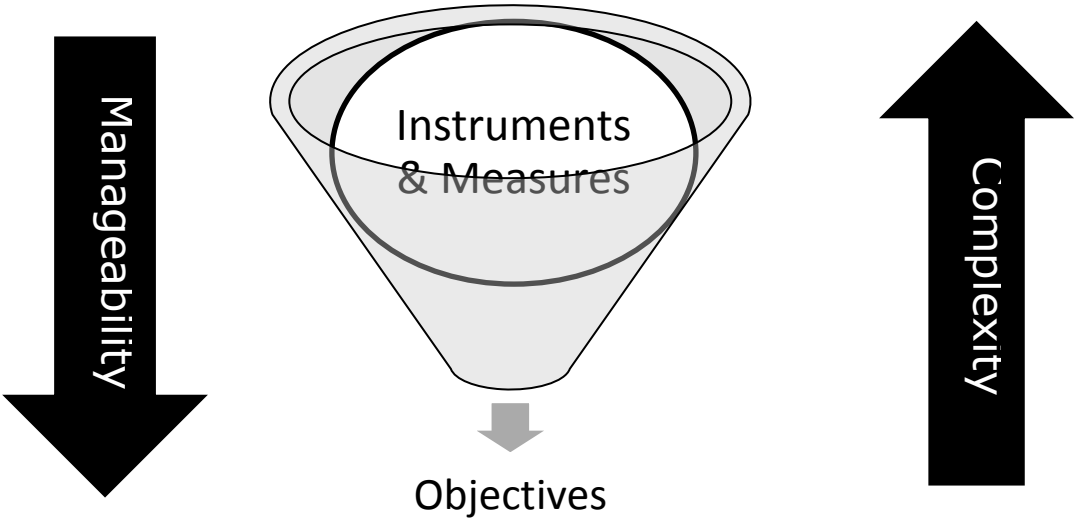
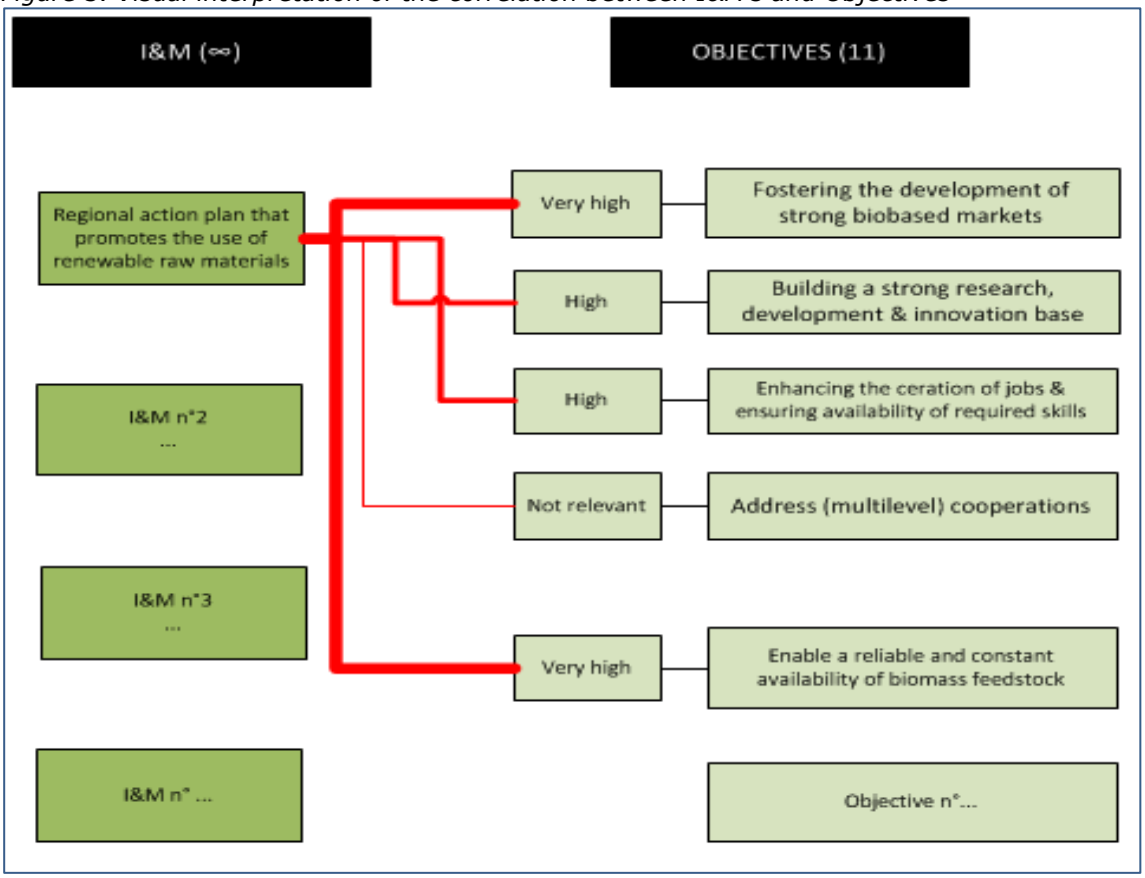


Figure 5 shows a visual interpretation of this correlation with the example of the I&M 'Regional action plan that promotes the use of renewable raw materials'. Black connector lines[21] indicate the correlation between the I&M and the 11 Objectives.

Figure 5. Visual interpretation of the correlation between I&M's and Objectives



[21] Line weight corresponds to level of correlation

3. Criteria and their Indicators

As a correlation between I&M's on the one hand and Criteria on the other needs to be established this section focuses on the Criteria and their in Indicators.

3.1 Criteria

Project Deliverable D1.1 'Criteria and Indicators describing the regional bioeconomy'[22] provides a set of Criteria which facilitate the development of regional bioeconomy. The list[23] consists of 27 unique Criteria (Table 2). For detailed information on this see D1.1.

Table 2. BERST list of unique criteria (based on D1.1)

Criteria	Criteria
Availability of funding	Infrastructure
Biomass availability	Intellectual property rights
Cluster governance	KET R&D focus
Cluster management	Land use
Cluster size	Presence of multinationals
Collaboration	Prominent universities or research institute
Commercialisation of innovative technologies	Proximity to financial institutions
Consumer preferences	Public support and acceptance
Diffusion of technology	Quality of workforce
Domestic production of biomass	Rate of SME formation
Economic history	Regulation
Entrepreneurial culture	Trade policy
Governance	Size of population
Household income	

3.2 Indicators

Based on the list of Criteria for describing a successful bioeconomy, the quantitative set of indicators for each Criterion were determined[24]. The set consists of 48 unique Indicators (Table 3).

[22] http://www.berst.eu/PublicationDetail.aspx?id=45
[23] See Annex 8.1
[24] http://www.berst.eu/PublicationDetail.aspx?id=45

Table 3. BERST list of unique indicators (based on D1.1)

Indicators	Indicators	Indicators
Agricultural biomass production	Employment in food & feed processing	Marine biomass production
Biotechnology patent applications per 1000 employees	Employment in primary biomass sectors	Micro businesses in biotechnology
Density of firms in biotechnology	Employment in pulp & paper	Micro businesses in chemicals, polymers & biorefinery
Density of firms in chemicals, polymers & biorefinery	Employment in textiles & clothing	Micro businesses in construction
Density of firms in construction	Extra-EU exports of chemicals & related products	Micro businesses in energy
Density of firms in energy	Firms in bioeconomy	Micro businesses in food & feed processing
Density of firms in food & feed processing	Firms in biotechnology	Micro businesses in primary biomass sectors
Density of firms in primary biomass sectors	Firms in chemicals, polymers & biorefinery	Micro businesses in pulp & paper
Density of firms in pulp & paper	Firms in construction	Micro businesses in textiles & clothing
Density of firms in textiles & clothing	Firms in energy	Proximity to a major financial centre
Employment in bioeconomy	Firms in food & feed processing	Quality of university
Employment in biotechnology	Firms in primary biomass sectors	R&D expenditure
Employment in chemicals, polymers & biorefinery	Firms in pulp & paper	SME birth rate
Employment in Chemicals, polymers & biorefinery and Energy	Firms in textiles & clothing	Transport of freight
Employment in construction	Forestry biomass production	Upper secondary or tertiary education
Employment in energy	Life expectancy at birth	Waste biomass production

3.3 Correlating criteria and Objectives

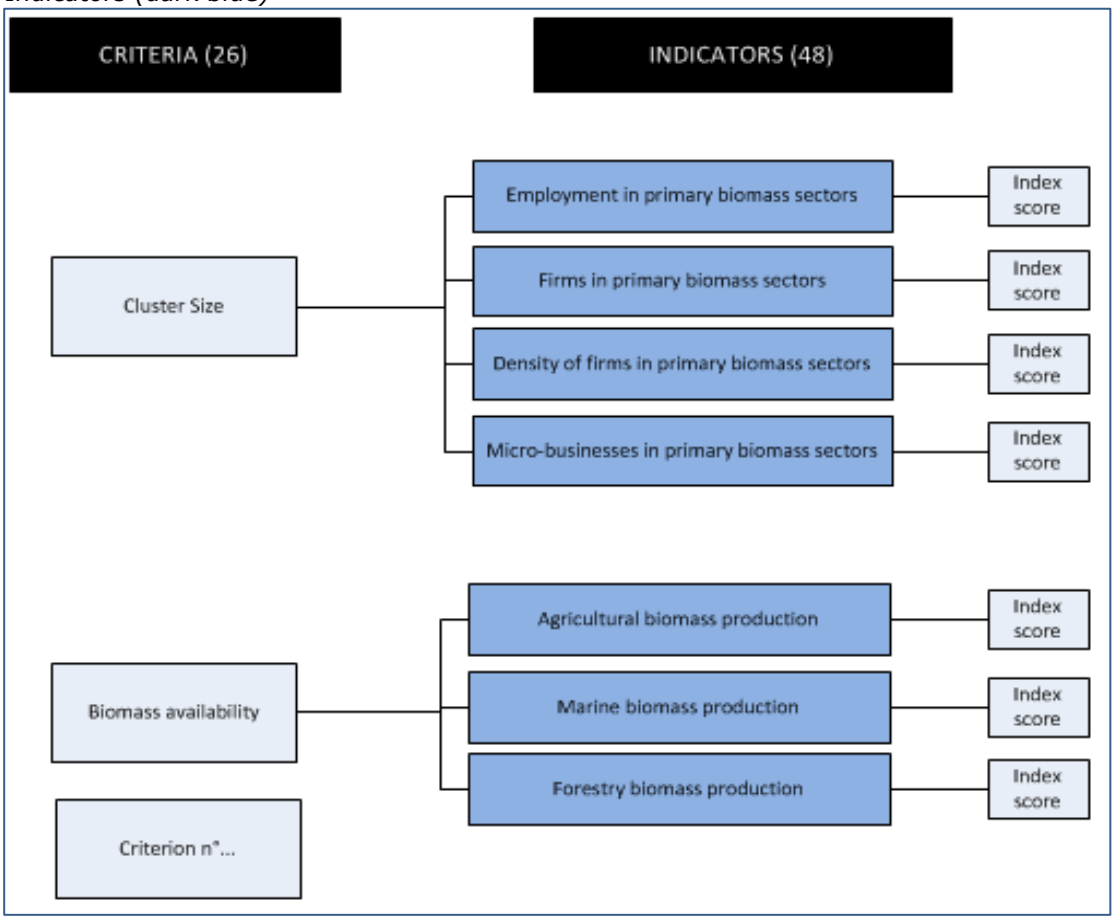
Each of the 10 Criteria (see 3.1) are quantitatively valued by one, or a set of, Indicators. An overview of the correlation between the 10 criteria and their respective indicators is provided in Annex 1. Table 4 shows e.g. the correlation between the criterion 'Biomass availability' and its 4 indicators.

Table 4. Correlation between a criterion and its indicators

Criterion	Indicators
Biomass availability	Agricultural biomass production
	Marine biomass production
	Forestry biomass production
	Waste biomass production

Figure 6 shows a visual interpretation of the connection between the Criteria 'cluster size' and 'biomass availability' with their respective indicators.

Figure 6. Visual interpretation of the correlation (black connectors) between Criteria (light blue) and Indicators (dark blue)



4. Bioeconomy subsectors and their descriptive criteria

4.1 Correlation: Criteria and their Objectives

The aforementioned sections established the correlation between:

a) I&M and their Objectives; and,
b) Criteria and their indicators.

In a next step the Criteria will be correlated with the Objectives. As a result the I&M's will be indirectly (using the Objectives as an intermediary) with the Criteria. To correlate between the Objectives and Criteria again a straightforward methodology was deployed.

The rationale behind the correlation is that in order to be effective the I&M's through their Objectives should (in)directly act the further deployment of one (or more) of the identified Criteria. After all the Criteria and their Indicator express (quantitatively) the current status and the future potential of bioeconomies across the EU regions.

Putting this rationale into practice for each of the 27 Criteria the corresponding relevant Objectives were identified. The number of corresponding Objectives was limited to the two most relevant; a primary and a secondary one. This in order to result in straightforward and sensible outcomes. Increasing the number of relevant Objectives would increase complexity and decrease focus and sensibility of the outcomes.

- E.g. for the Criterion 'Availability of funding' the Objectives 'Availability of financial resources' (primary) and 'creating a reliable and enabling policy setting' (secondary) were identified.
- E.g. for the Criterion 'Biomass availability' the Objective 'Enable a reliable and constant availability of biomass feedstock' was identified.

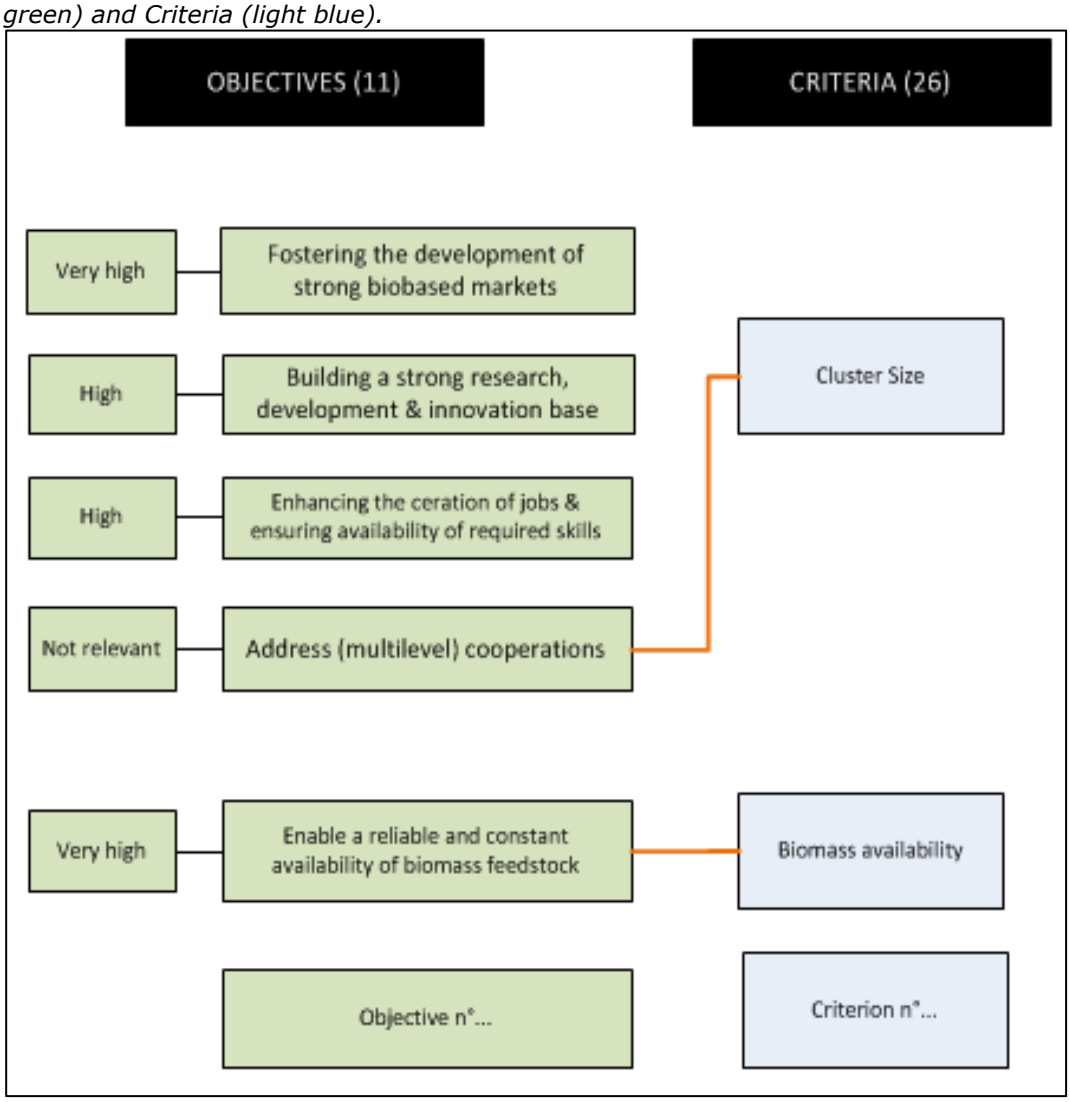
Table *5* shows the complete list of correlations between the 27 Criteria and their corresponding relevant Objectives.

Table 5. Correlation between Criteria and Objectives

Criteria	Objectives
N/A	Learning from the strategies actions of other regions, clusters,...
Availability of funding	Availability of financial resources Creating a reliable and enabling policy setting
Biomass availability	Enable a reliable and constant availability of biomass feedstock
Cluster governance	Address the (multilevel) cooperations needed to start biobased businesses
Cluster management	Address the (multilevel) cooperations needed to start biobased businesses
Cluster size	Address the (multilevel) cooperations needed to start biobased businesses
Collaboration	Address the (multilevel) cooperations needed to start biobased businesses
Commercialisation of innovative technologies	Fostering the development of strong biobased markets
Consumer preferences	Fostering the development of strong biobased markets Fostering effective governance and involvement of the society
Diffusion of technology	Building a strong research, development and innovation base
Domestic production of biomass	Enable a reliable and constant availability of biomass feedstock
Economic history	Building competitive biobased industries
Entrepreneurial culture	Building competitive biobased industries
Governance	Fostering effective governance and involvement of the society Creating a reliable and enabling policy setting
Household income	Fostering the development of strong biobased markets
Infrastructure	Creating an attractive environment including infrastructure Fostering the development of strong biobased markets
Intellectual property rights	Building competitive biobased industries Creating a reliable and enabling policy setting
KET R&D focus	Building a strong research, development and innovation base
Land use	Enable a reliable and constant availability of biomass feedstock Creating an attractive environment including infrastructure
Presence of multinationals	Building competitive biobased industries
Prominent universities or research institute	Building a strong research, development and innovation base Enhancing the creation of jobs and ensuring availability of required skills
Proximity to financial institutions	Availability of financial resources/ Address the (multilevel) cooperations needed to start biobased businesses
Public support and acceptance	Fostering effective governance and involvement of the society Creating a reliable and enabling policy setting
Quality of workforce	Enhancing the creation of jobs and ensuring availability of required skills
Rate of SME formation	Building competitive biobased industries
Regulation	Creating a reliable and enabling policy setting
Trade policy	Fostering the development of strong biobased markets Creating a reliable and enabling policy setting
Size of population	N/A

Figure 7 shows a visual interpretation of the connection (orange) between the Criteria 'cluster size' and 'biomass availability' (light blue) with their respective Objectives (light green).

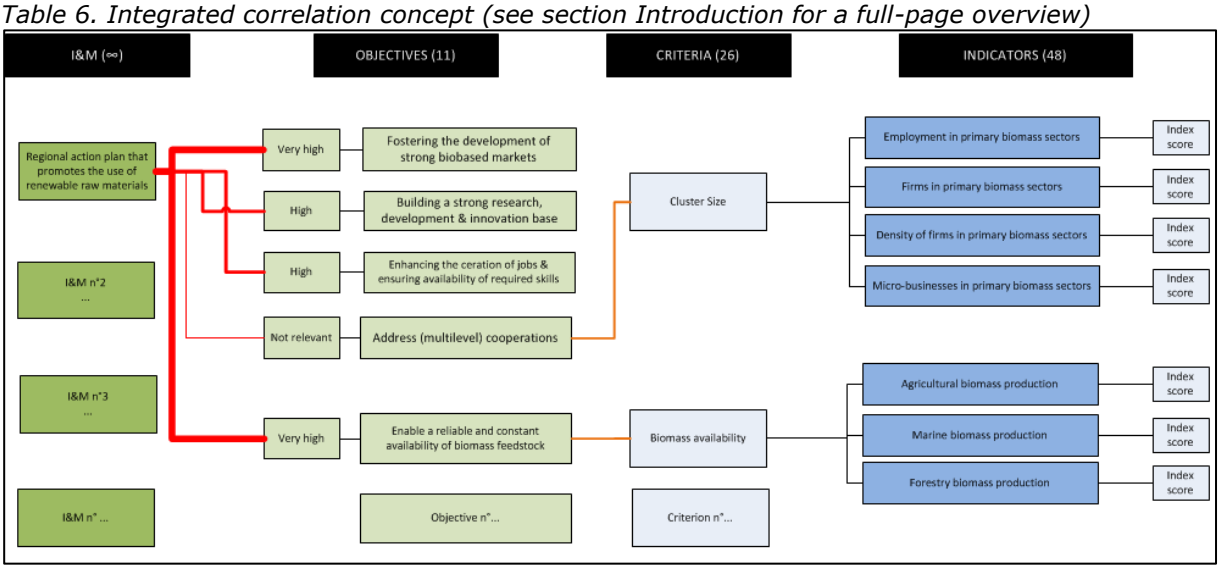
Figure 7. Visual interpretation of the correlation (orange connectors) between Objectives (light green) and Criteria (light blue).



4.2 Correlation: integrated concept

Combining the results from the previous sections results in an integrated methodology correlating I&M with their Criteria using Objectives as an intermediary.

Table 6. Integrated correlation concept (see section Introduction for a full-page overview)



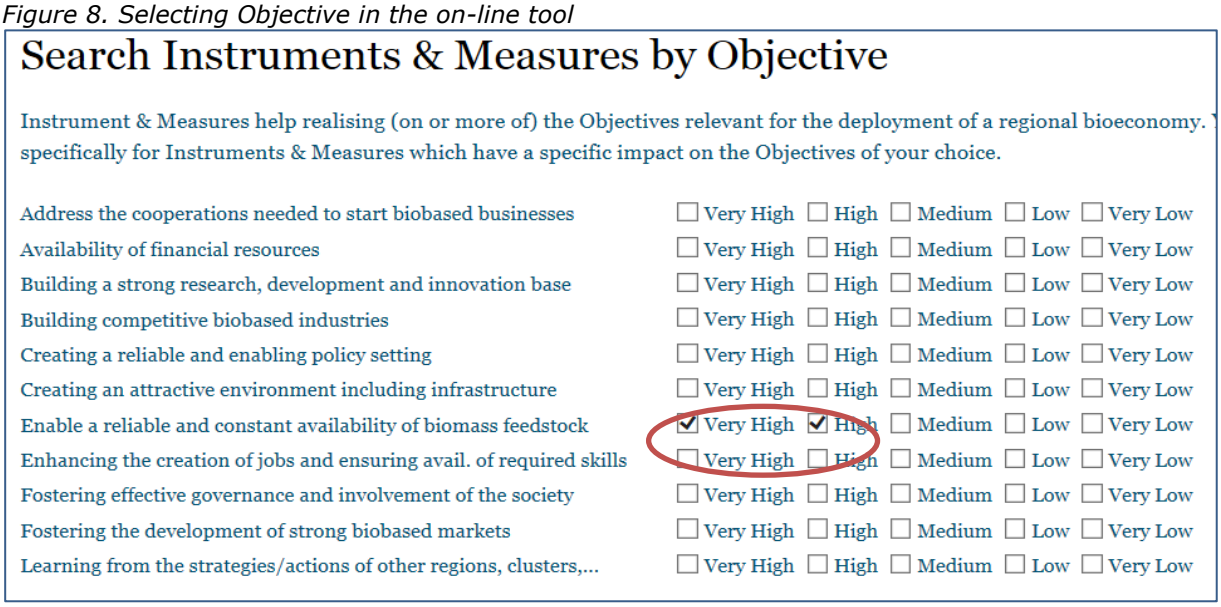
The resulting concept allows data exploration on several levels. E.g. For a given region the analysis of its Criteria resulted in the identification of a certain criterion having potential to be further developed (WP1). As a result this given region is interested in I&M's deployed in other regions acting on this specific criterion. In this event a selection can be made of the Objectives correlated with this criterion with a (very) high impact score. As a result the corresponding I&M will be returned. The results can be further filtered using the 20 information themes adopted in the catalogue (see section 2.1.1). For each I&M a detailed factsheet with all relevant information will be provided.

4.3 An example – searching by Objective

Assume the analysis of regions Criteria resulted in identification of the Criterion 'Biomass Availability' to have potential to be further developed.. For this Criterion the correlated Objective is 'Enable a reliable and constant availability of biomass feedstock'[25]. In the on-line tool (www.berst.vito.be/policies-by-impact) a selection is made to search for I&M's where the Objective 'Enable a reliable and constant availability of biomass feedstock' scores (very) high (Figure 8).

[25] See also Section 4.1.

Figure 8. Selecting Objective in the on-line tool



Search Instruments & Measures by Objective

Instrument & Measures help realising (on or more of) the Objectives relevant for the deployment of a regional bioeconomy. Y
specifically for Instruments & Measures which have a specific impact on the Objectives of your choice.

Address the cooperations needed to start biobased businesses	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Availability of financial resources	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Building a strong research, development and innovation base	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Building competitive biobased industries	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Creating a reliable and enabling policy setting	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Creating an attractive environment including infrastructure	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Enable a reliable and constant availability of biomass feedstock	☑ Very High	☑ High	☐ Medium	☐ Low	☐ Very Low
Enhancing the creation of jobs and ensuring avail. of required skills	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Fostering effective governance and involvement of the society	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Fostering the development of strong biobased markets	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low
Learning from the strategies/actions of other regions, clusters,...	☐ Very High	☐ High	☐ Medium	☐ Low	☐ Very Low

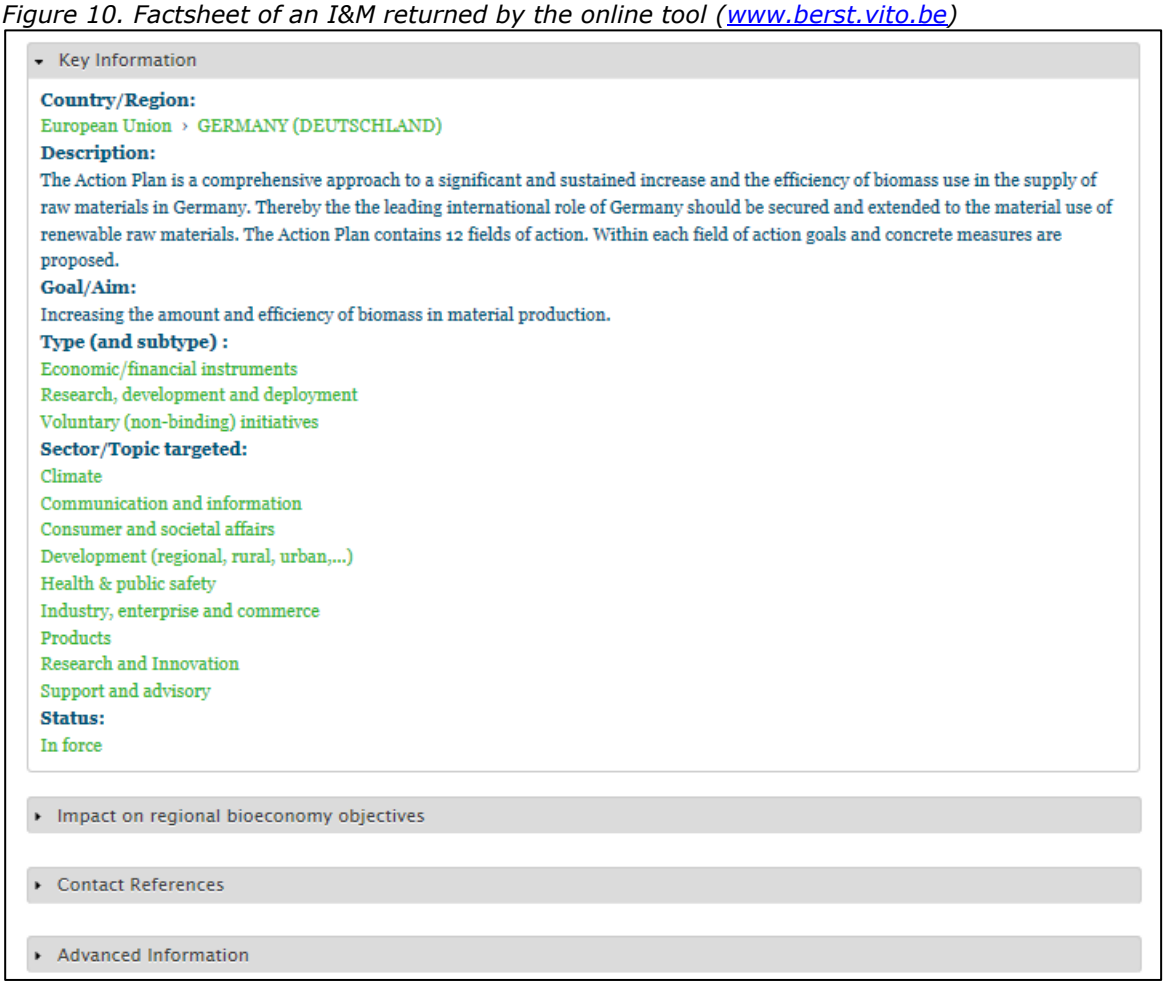
As a result the tool returns a list of the corresponding I&M's (Figure 9). For each I&M a short overview of title, country/region, type of I&M and the sector/topic targeted is provided.

Figure 9. Corresponding I&M's to Objective 'Enable a reliable and constant feedstock'

Title	Country/Region	Type (and subtype) of Instrument or Measure	Sector/Topic targeted
Action plan for the use of renewable raw materials.	GERMANY (DEUTSCHLAND)	Economic/financial instruments, Research, development and deployment, Voluntary (non-binding) initiatives	Climate, Communication and information, Consumer and societal affairs, Development (regional, rural, urban,...), Health & public safety, Industry, enterprise and commerce, Products, Research and Innovation, Support and advisory
National biomass action plan for Germany	GERMANY (DEUTSCHLAND)		Agriculture, Climate, Communication and information, Development (regional, rural, urban,...), Education, training and human rersource development, Energy, Environment (soil, water, air, nature, biodiversity,...), Forestry, Products, Research and Innovation, Support and advisory, Waste
Solid biofuels quality standards for heating applications	GREECE (ΕΛΛΑΔΑ)	Regulatory (binding) instruments	Energy

Starting from the provided list the user can go in to more detail for each individual I&M by clicking on it, on which a detail factsheet is provided. **Error! Reference source not found.** shows a summarised version of such a factsheet. See Annex 2 for a complete version of the factsheet.

Figure 10. Factsheet of an I&M returned by the online tool (www.berst.vito.be)



4.4 An example – searching by Information themes

Next to searching by Objectives, I&M can also be searched by using any of the information themes as selection filters.

Assume the user is only interested in i) Economic or Financial instruments, ii) that are applicable to the Energy sector iii) only in the Flemish region. Selecting the correct filter criteria in the on-line tool (https://berst.vito.be/policies)[26].

[26] Other examples are provided on the on-line tool at https://berst.vito.be/policies/examples

Figure 11. Criteria selection in the online tool (www.berst.vito.be)

As a result a list of I&M's will be returned matching the selected information themes (Figure 12). Again the corresponding factsheet can be consulted.

Figure 12. Corresponding I&M's to a set of information themes

Short name of Instrument or Measure	Country/Region	Type of Instrument & Measure	Sector/Topic targeted
Energy Decree - Green Power Certificates	VLAAMS GEWEST	Economic/financial instruments, Regulatory (binding) instruments	Energy

5. Discussion

To lift the correlation concept from a conceptual to a practical methodology it is key to have available data for the Indicators of the identified Criteria (see: Table 2). However data availability on regional level is limited. Figure 13 indicates for which Criteria data could be retrieved (bold)[27] and for which Criteria (plain text) data is missing.

It is clear that absence of regional data reduces correlation opportunities between Criteria and Objectives significantly. Active correlations are highlighted in grey.

[27] In D1.1 an example is provided for two EU regions

Figure 13. Indication of Criteria (bold) for which data is available on regional level (source: D1.1)

Criteria	Objectives
???	Learning from the strategies actions of other regions, clusters,...
Availability of funding	Availability of financial resources/ Creating a reliable and enabling policy setting
Biomass availability	Enable a reliable and constant availability of biomass feedstock
Cluster governance	Address the (multilevel) cooperations needed to start biobased businesses
Cluster management	Address the (multilevel) cooperations needed to start biobased businesses
Cluster size	Address the (multilevel) cooperations needed to start biobased businesses
Collaboration	Address the (multilevel) cooperations needed to start biobased businesses
Commercialisation of innovative technologies	Fostering the development of strong biobased markets
Consumer preferences	Fostering the development of strong biobased markets/Fostering effective governance and involvement of the society
Diffusion of technology	Building a strong research, development and innovation base
Domestic production of biomass	Enable a reliable and constant availability of biomass feedstock
Economic history	Building competitive biobased industries
Entrepreneurial culture	Building competitive biobased industries
Governance	Fostering effective governance and involvement of the society/ Creating a reliable and enabling policy setting
Household income	Fostering the development of strong biobased markets
Infrastructure	Creating an attractive environment including infrastructure/ Fostering the development of strong biobased markets
Intellectual property rights	Building competitive biobased industries / Creating a reliable and enabling policy setting
KET R&D focus	Building a strong research, development and innovation base
Land use	Enable a reliable and constant availability of biomass feedstock/ Creating an attractive environment including infrastructure
Presence of multinationals	Building competitive biobased industries
Prominent universities or research institute	Building a strong research, development and innovation base/ Enhancing the creation of jobs and ensuring availability of required skills
Proximity to financial institutions	Availability of financial resources/ Address the (multilevel) cooperations needed to start biobased businesses
Public support and acceptance	Fostering effective governance and involvement of the society /Creating a reliable and enabling policy setting
Quality of workforce	Enhancing the creation of jobs and ensuring availability of required skills
Rate of SME formation	Building competitive biobased industries/
Regulation	Creating a reliable and enabling policy setting
Trade policy	Fostering the development of strong biobased markets/ Creating a reliable and enabling policy setting
Size of population (demand)	N/A

6. Link with the Bioeconomy Observatory website

Contacts have been made with JRC representatives[28] to discuss potential integration of the on-line I&M catalogue www.berst.vito.be into the European Commission's Bioeconomy Observatory website (https://biobs.jrc.ec.europa.eu/). This process is currently ongoing.

[28] Damien Plan (JRC), Paola Reale (JRC)

Annex 1. Link between Bioeconomy Sector Groups and Criteria & Indicators

No	Bioeconomy Sector Groups	Important criteria	Indicator(s)
	All sectors	KET R&D focus	R&D employment
		Cluster size	Employment in Chemicals, polymers & biorefinery and Energy
			Employment in bioeconomy
			Firms in bioeconomy
		Infrastructure	Transport of freight
		Entrepreneurial culture	SME birth rate
		Prominent universities or research institute	Quality of university
1	Primary biomass sectors	Cluster size	Employment in primary biomass sectors
			Firms in primary biomass sectors
			Density of firms in primary biomass sectors
			Micro businesses in primary biomass sectors
		Biomass availability	Agricultural biomass production
			Marine biomass production
			Forestry biomass production
			Waste biomass production
2	Food & feed processing	Cluster size	Employment in food & feed processing
			Firms in food & feed processing
			Density of firms in food & feed processing
			Micro businesses in food & feed processing
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Biomass availability	Agricultural biomass production
			Marine biomass production
3	Construction	Cluster size	Employment in construction
			Firms in construction
			Density of firms in construction
			Micro businesses in construction
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Biomass availability	Agricultural biomass production
			Forestry biomass production
4	Chemicals, polymers and biorefinery	Cluster size	Employment in chemicals, polymers & biorefinery
			Firms in chemicals, polymers & biorefinery
			Density of firms in chemicals, polymers & biorefinery
			Micro businesses in chemicals, polymers & biorefinery
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Economic history	Extra-EU exports of chemicals & related products
		KET R&D focus	R&D expenditure
		Biomass availability	Agricultural biomass production
			Forestry biomass production
			Marine biomass production

No	Bioeconomy Sector Groups	Important criteria	Indicator(s)
5	Pulp & paper	Cluster size	Employment in pulp & paper
			Firms in pulp & paper
			Density of firms in pulp & paper
			Micro businesses in pulp & paper
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Biomass availability	Agricultural biomass production
			Forestry biomass production
6	Textiles & clothing	Cluster size	Employment in textiles & clothing
			Firms in textiles & clothing
			Density of firms in textiles & clothing
			Micro businesses in textiles & clothing
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Biomass availability	Agricultural biomass production
7	Energy	Cluster size	Employment in energy
			Firms in energy
			Density of firms in energy
			Micro businesses in energy
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		Biomass availability	Forestry biomass production
			Marine biomass production
			Waste biomass production
8	Biotechnology	Cluster size	Employment in biotechnology
			Firms in biotechnology
			Density of firms in biotechnology
			Micro businesses in biotechnology
		Availability of funding	Proximity to a major financial centre
		Quality of workforce	Upper secondary or tertiary education
		KET R&D focus	Biotechnology patent applications per 1000 employees
			R&D expenditure
		Size of population (demand)	Life expectancy at birth

Annex 2. Example of a complete I&M factsheet

Key Information

Country/Region:
European Union › GERMANY (DEUTSCHLAND)
Description:
The Action Plan is a comprehensive approach to a significant and sustained increase and the efficiency of biomass use in the supply of raw materials in Germany. Thereby the the leading international role of Germany should be secured and extended to the material use of renewable raw materials. The Action Plan contains 12 fields of action. Within each field of action goals and concrete measures are proposed.
Goal/Aim:
Increasing the amount and efficiency of biomass in material production.
Type (and subtype) :
Economic/financial instruments
Research, development and deployment
Voluntary (non-binding) initiatives
Sector/Topic targeted:
Climate
Communication and information
Consumer and societal affairs
Development (regional, rural, urban,...)
Health & public safety
Industry, enterprise and commerce
Products
Research and Innovation
Support and advisory
Status:
In force

Impact on regional bioeconomy objectives

Fostering effective governance and involvement of the society:	Very High
Building a strong research, development and innovation base:	High
Enhancing the creation of jobs and ensuring availability of required skills:	Medium
Building competitive biobased industries:	Very High
Creating a reliable and enabling policy setting:	Very High
Address the (multilevel) cooperations needed to start biobased businesses:	Low
Creating an attractive environment including infrastructure:	High
Enable a reliable and constant availability of biomass feedstock:	High
Availability of financial resources:	Low
Learning from the strategies/actions of other regions, clusters,...:	Low
Fostering the development of strong biobased markets:	Very High

Impact Comments:
This is only an action plan, therefore it is not legally binding. Of course it does provide the ground for legal initiatives.